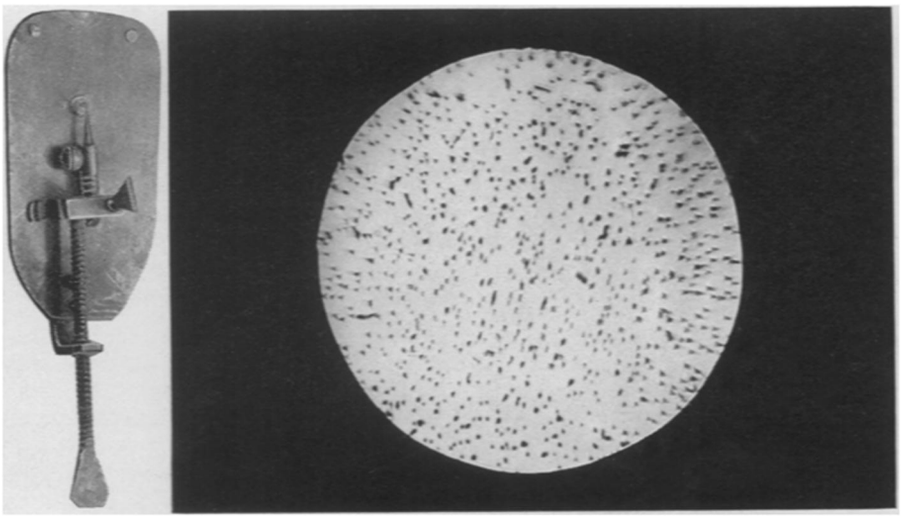

IT WORKS AGAIN

The paddle-shaped object at the left is a microscope made by the Dutch pioneer Antony van Leeuwenhoek and now kept at the University of Utrecht. The lens, of pin-head size, was mounted in a little opening in the middle of the flat oblong piece of metal. It is still good enough so that it was used by Dr. P. H. van Cittert of the University of Utrecht to make the photomicrograph of the germs that cause common boils shown on the right.

MICROSCOPY

First High-Power Microscopes Still in Good Working Order

Lenses Made 250 Years Ago by Antony van Leeuwenhoek Can Even Now Serve to Make Clear Photomicrographs

LENSES made as an amateur's hobby 250 years ago for the world's first high-power microscope, and better than most lenses made until a hundred years ago, are still good enough today to make clear-cut photographs of bacteria and other one-celled plants and animals.

These bits of carefully-shaped glass, themselves almost microscopic in size, were prepared and used by Antony van Leeuwenhoek, pioneer Dutch microscopist, away back in the latter part of the 17th century.

One of Leeuwenhoek's home-made instruments, now in the University of Utrecht in the Netherlands, has been used in making a number of good quality photographs.

Some of these are reproduced in a book which contains photographic copies of Leeuwenhoek's own reports and a translation of this important document out of 17th-century Dutch into modern English, by Dr. Barnett Cohen of the Johns Hopkins University.

Antony van Leeuwenhoek, amateur genius of 250 years ago, was a public official in the city of Delft. Just what his job was, nobody knows now—or cares very much. He probably did his work well enough to earn his pay and no complaints from his hardheaded Dutch superior officers.

Of importance, however, is the fact that he had enough leisure time to follow an interesting hobby—the grinding and polishing of very tiny but very powerful lenses, through which he peered at drops of rainwater, grains of dust, a louse's eye, and anything else he could lay his hands on. They were the world's first high-power microscopes.

Leeuwenhoek's microscopes were as little like the shining instruments of modern scientific laboratories as can be imagined. The lens, not much bigger than a pin-head, was mounted in a little hole in the middle of a flat piece of brass. In front of that, on the end of a screw that moved it up or down, was a small pointed holder on which the object to be squinted at could be placed. That was all. The rest depended on the skill, patience, and keenness of vision of Antony van Leeuwenhoek.

The Dutch official-hobbyist looked for the "little animals," as he called all the wriggling bits of life he saw through his lenses, in all kinds of things; rain, snow, well and river water, as well as water in which he had soaked pepper, nutmeg, wheat, etc. He described the swarming life he saw in the amateur's non-technical language, speaking of heads, tails, legs, claws, and ears.

Wrote London

There seem to have been no scientists in the Delft neighborhood who were interested in the results of Leeuwenhoek's peerings, so he wrote long letters about them to the secretary of the then new Royal Society in London, whose name was Henry Oldenburg.

It is one of these letters, written on Oct. 9, 1676, that contains the first recognizable descriptions of what we now know as bacteria. This is the letter that is photographically reproduced and translated in full for the first time by Dr. Cohen.

The letter as transmitted to the Royal Society is not in Leeuwenhoek's own handwriting. It was copied from his notes by a handwriting expert, just as a present-day scientist, not too proud of his own handwriting, might get a typist to copy his manuscript for him. The handwriting is smooth and clerkly, but hard to read now because of changes in forms of letters.

But Antony Leeuwenhoek had no cause to be ashamed of his own script. His signature at the end of the letter, written with a bit of flourish, is clear, firm, and regular, even though a bit angular and rough as compared with the copyist's handwriting.

Amateur though he was, Leeuwenhoek had the attitude of a true scientist toward his work. He described exactly what he saw in plain and straightforward language, and here and there on the margin of the manuscript he made little sketches to make his descriptions clearer.

Even more important as evidence of his scientific spirit, when he ventured an opinion that was primarily speculative, he made it clear that he looked upon it as opinion and not as established fact. That may be one of the reasons why after 250 years and more he is still highly honored by all scientists.

Leeuwenhoek was (*Turn to Page 415*)

● Earth Trembles

Information collected by Science Service from seismological observatories and relayed to the U. S. Coast and Geodetic Survey resulted in the location of the following preliminary epicenters:

Friday, June 10, 1:06 p. m., E.S.T.
On coast of the state of Oaxaca, Mexico. Latitude 16.4 degrees north, longitude 98 degrees west.

Wednesday, June 15, 2:43.8 a. m., E. S. T.
Off the coast of central Chile; a fairly strong shock. Latitude 31 degrees south, longitude 72 degrees west.

Thursday, June 16, 10:15.2 a. m., Manila Time
Near southern Japanese islands; a strong shock. Latitude 27 degrees north, longitude 127 degrees east.

For stations cooperating with Science Service in reporting earthquakes recorded on their seismographs see SNL May 21.

folders on a shelf, or in a large flat box, for permanent keeping.

Plants should be as newly picked as possible when they are put into the folders for pressing. They will then lie more naturally, and make better-looking specimens. Wilted plants are harder to arrange, and don't look well after they are pressed. If the plant is not too big it should be whole, including both flowers and at least part of the root. If necessary, bend the stem to make it fit into the folder.

While you can make your pressing equipment out of materials that don't cost you a cent, as we have seen, there is one item you should get if you can possibly scrape up the money. That is a good magnifying glass. Not the big kind with a handle, which old people use for reading fine print, but the smaller kind with two lenses at opposite ends of a cylinder, that swings into a frame to protect it when not in use. This kind of magnifier is called a doublet.

Every boy and girl should carry a doublet magnifier, just as he (or she) should have a pocket-knife. These lenses are highly useful not only for examining the fine hairs, veins, etc., on plants, but for looking at a thousand other things. With a doublet you open up a whole new world in your everyday surroundings, that you have never before seen.

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From Page 410

apparently interested first in what we now known as protozoa, one-celled primitive animals, for he devotes a great deal of space to descriptions of their appearance and behavior. They are larger and livelier than bacteria, and therefore easier to observe. But that he saw bacteria there is no doubt.

On the third page of the letter to the Royal Society, he describes the gradual disappearance of a certain kind of microscopic animals over a period of about two weeks. But as the first animalcules dwindled in numbers he notes the appearance of smaller creatures: "I now saw some few animalcules, so small that even through my microscope they almost eluded the eye. And I stopped my observations."

To this, Dr. Cohen appends the remark, "Bacteria, together with protozoa, are doubtless referred to here."

A little further along, describing what he saw in water in which he had soaked some whole peppercorns, Leeuwenhoek writes more in detail.

"The fourth sort of animalcules, which floated about amongst the other three sorts, were incredibly small; indeed, so small, in my sight, that I judged if all 100 of these very small animalcules were stretched out against one another, they would not reach the length of a coarse sand-grain. This being true, then ten hundred thousand of these living creatures should not be able to fill the volume of a coarse sand-grain.

"I discovered yet a fifth sort which had about the thickness of the last-mentioned animalcules, and which were about twice as long."

These "animalcules," Dr. Cohen notes, were "evidently bacteria."

In this very simple language, then, is recorded a hobbyist's discovery of a class of organisms that play vastly important roles in human sickness and health, in farming and industry—invisibly small yet potently great lives that determine the way the whole world runs.

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METEOROLOGY

Weathermen Should Make Greater Use of Clouds

See Front Cover

WEATHERMEN are commonly supposed to go out on the roof, take a look at the clouds, and come back in to tell us what the weather's going to be tomorrow. But really they don't use clouds nearly as much as they should, Prof. Charles F. Brooks of Harvard University indicated before the meeting of the American Meteorological Society.

Forecasters in the United States, excepting only the ones on the Pacific Coast, have the advantage of having a whole continent at their backs, with a good telegraphic network to let them know where storms are and in what direction they are moving, Prof. Brooks said. Hence they depend very much on this "synoptic" service and tend to neglect the cloud-watching that would help them to improve their score of correct forecasts.

Local weather-watchers base their forecasts almost entirely on their knowledge of cloud behavior, Prof. Brooks pointed out. With sufficient experience, such an observer can make forecasts for from six to twelve hours ahead with better success than a meteorologist who depends entirely on telegraphic reports. But if the meteorologist were to combine a study of the telegrams with judicious cloud-watching he could excel the local weather prophet in both range and accuracy.

Clouds can be useful to students of the weather in other ways, too, Prof. Brooks stated. Their formation and behavior, their direction and rate of travel, can be read by one who has the scientific background in terms of wind direction and velocity, temperature and humidity aloft, and the arrival of polar and tropical air masses.

The illustration on the front cover of this week's SCIENCE NEWS LETTER shows a weather man at Mt. Washington Observatory measuring the rate of travel of the beautiful clouds above him.

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PSYCHIATRY

Currents From Eyes May Aid Study of Brain Ills

MINIATURE electric currents that accompany eye movements can be "tapped," amplified and used to aid in the study of certain abnormal brain conditions by a new method reported by Dr. Ward C. Halstead, staff member of the Otho S. A. Sprague Memorial Institute in the division of psychiatry of the University of Chicago Clinics.

Location of brain lesions, which has been facilitated previously by the tapping of the electric currents from the brain itself, known popularly as brain waves, may also be aided by the study of the eye currents, it is hoped.

The new method is especially adapted to the study of mental disease patients, Dr. Halstead said (*Journal of Psychology*) because with it reliable records can be obtained while the subject is walking about. Records can also be made when the patient's eyes are closed, and an attempt will be made later to measure eye movements in this way while the subject is asleep.

Science News Letter, June 25, 1938