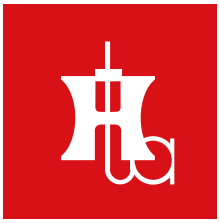
175 jaar TU Delft

Erfgoed in 33 verhalen



Histechnica
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175 jaar TU Delft – Erfgoed in 33 verhalen

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The collection of the Delft School of Microbiology

L.A. Robertson

Microbiology is the study of all microorganisms, including bacteria, yeasts, algae, protozoa and fungi. With the exception of fungi, the existence of all of these microorganisms was discovered in Delft by Antoni van Leeuwenhoek, a 17th century linen merchant and surveyor who made his own simple microscopes in his spare time. After his death in 1723, it was not until the arrival of M.W. Beijerinck to open the first industrial laboratory at J.C. van Marken's "Nederlandsche Gist en Spiritus Fabriek" (eventually Gist brocades, now part of DSM) that the study of microbiology returned to Delft. .

The name "Delft School of Microbiology" was first used by Cornelius B. van Niel of the Hopkins Marine Station in California to describe the systematic approach to the study of microbiology pioneered in Delft by Professor M.W. Beijerinck and his successors. This approach (very simply defined as "what is happening, which organism is doing it, how is it doing it and can we influence it?") laid the foundations of modern microbiology and microbiologists all over the world still claim to be members today.

The Archive of the Delft School of Microbiology, also known as the "Kamer van Beijerinck", contains many interesting and beautiful things which, when combined with other things in the collection, present a snapshot of the biological research and education being done in Delft at the end of the 19th and first half of the 20th centuries.

The beginning

In 1895, **Martinus W. Beijerinck** became the first Professor of Microbiology at what was then the Delft Polytechnical School ("Polytechnische School"). His work made the laboratory world-famous because he discovered quite few groups of important microorganisms including different sorts of bacteria, yeasts and algae. He is also credited with being the first to show that viruses exist, although he died before the electron microscope was invented, allowing them to be seen.

His successor, **Albert J. Kluyver**, changed the direction of the research a little as he investigated the ways in which microorganisms could be used, a process known today as biotechnology. Processes such as wastewater treatment, antibiotic production and fermentation all fall under this heading. His group studied not only what microorganisms could do, but also how they did it and how they could be influenced. He worked closely with Gist brocades on a number of processes including the World War 2 production of penicillin.

One of Beijerinck's students (and later Kluyver's teacher) was **Gerrit van Iterson jr**, Professor of Applied Botany. His work concentrated mostly on plants and their uses. He also introduced mathematical analysis to botany (a form of research now called biomathematics). With Beijerinck's support, he founded the Delft Botanic Garden, and was a member of the committee that formed TNO. The mathematical work described in his Doctor's thesis was so important that people still refer to it now, 100 years later.

In 1958, the Laboratory of Microbiology moved from the lab used by Beijerinck and Kluyver to a new building attached to Van Iterson's Laboratory at Julianalaan 67. All three of these Professors are regarded as founding fathers of modern biotechnological science and so, when new Professors took over, their papers and other materials were preserved. The collections were eventually merged to form the current Delft School of Microbiology Archive and Museum. The various research groups also eventually merged to form the Department of Biotechnology.

In 2016, when the Department of Biotechnology moved to a new building, the Archive and Museum moved to its current home in the Delft Science Centre.

The Collection

The most important part of the collection is paper – laboratory notebooks, lecture notes and letters between the Professors and other scientists all over the world. We also have a lot of equipment including microscopes and other laboratory and educational tools. A lot of the material is linked, giving a complete picture of a piece of research from the first discovery to the final conclusions and publication. This is important not only because it helps us to understand how the minds of these famous Professors worked, but also in education.

Together, figures 1 and 2 show how different parts of the collection support each other. Figure 1 is one of the many watercolours drawn and painted by Henriëtte Beijerinck, sister of the Professor, as wall charts to illustrate his lectures in the days before magic lanterns, slide projectors and eventually Power Point. As well as Henriëtte's work, the collection includes many other original watercolours by people employed in Van Iterson's department as well as commercially-printed series.

Figure 1 shows Henrëtte Beijerinck's drawing of Serradelle. Like other members of the pea family, this plant has root nodules (bottom right).People originally thought that these were galls (a sort of plant cancer caused by insects).

After spending a lot of time looking for the insects, Beijerinck was the first to show that the nodules are actually full of bacteria that can take nitrogen out of the air and turn it into fertiliser (popularly known as "green fertiliser"). Figure 2 shows the different stages of recording this discovery, from the root nodules through Prof Beijerinck's drawing from his laboratory notebook, Henriëtte's more detailed drawing of the bacteria made for a wall chart and a photograph of the bacteria made from the

original 19th century glass negative. We also have Prof Beijerinck's notes about the experiments, his publications about the work and the wooden blocks used to make the pictures in those publications.

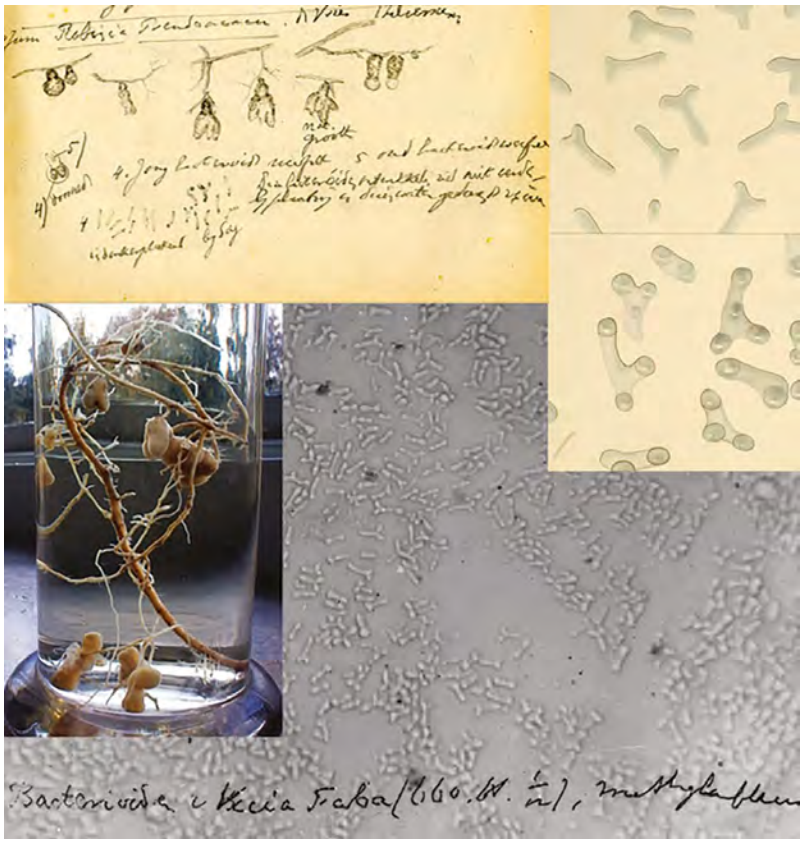
Figuur 1 | Henriëtte Beijerinck's 1898 drawing of Serradelle (also known as *Ornithopus sativus*).

Relevance

This account presents one example of how different parts of the collection support the value of other parts. There are many others - for example, we can show how people did microbiology research before the use of electricity became common and how people recorded what they saw with microscopes before suitable cameras became available. Both of these were useful when we were visited by people from a country where their laboratory only had a few hours of electricity each day. We were able to show them alternative methods to let their research continue and make the best use of their time.

Scientific progress is always built on the research of those who came before us, and knowing how our predecessors thought and approached their research is still useful today. People come to visit from all over the world, sometimes to search for information and at other times just to enjoy the historical equipment and the notes made by their scientific heroes. Images from the wall chart and glass negative collections have been used for all sorts of publications from book covers to student handbooks. Items have been lent for national and international exhibitions.

Most of all, the collection reminds us that science is not just useful, it's fun!



Figuur 2 | The root nodules (preserved in alcohol, left), Beijerinck's drawing of the root nodules and the bacteria from his laboratory notebook (top left), then Henriëtte's more detailed drawing of the bacteria (right), made from the photograph at the bottom. Understanding how the "green fertiliser" works allows us, even today, to improve the way we use it and reduce the amount of artificial chemicals we use in gardens and fields.