ISTITUTO E MUSEO
DI STORIA DELLA SCIENZA

The simple microscope

Although the compound microscope *(fig.1)* originated with two or more lenses *(fig.2)*, the first research on insects, worms and organisms invisible to the naked eye *(fig.3)* was conducted with the simple microscope, *(fig.4)* which, into use in the second half of the 17th century *(fig.5)*, provided greater magnification and a higher degree of resolution.

The Dutch Antoni van Leeuwenhoek (1632-1723) *(fig.6)* built some 550 microscopes consisting of a single, tiny double-convex lens. Still today, nine of these extraordinary instruments exist *(fig.7)*, the best of which has a magnification power of about 270 diameters. However, some details of his drawings suggest that he owned more powerful ones, with which he could observe, starting from 1677, red blood cells, spermatozoids *(fig.8)*, rotifers, and bacteria.

Even his compatriot Jan van Musschenbroek (1687-1748), for entomological research, used a simple microscope *(fig.9)* mounted on an articulated arm that proved extremely effective. Adopted by Abraham Trembley (1710-1784), it established itself as the "aquatic" microscope *(fig.10)* of choice for observing flora and fauna from the outside of a glass vessel *(fig.11)*. In 1740 Trembley, using this type of microscope, observed the particular behavior of the "freshwater polyp" or hydra *(fig.12),* noting also its surprising ability to regenerate parts that had been amputated.

The next development in the simple microscope was Pieter Lyonnet's (1708-1789) *(fig.13)* "anatomical tablet", used, among others, by Lazzaro Spallanzani (1729-1799) *(fig.14)* for minute dissections. However, for entomological research, the Italian naturalist probably used the microscope designed by James Wilson (1655-1730) *(fig.15)* and built by John Cuff (c.1708-1772) c. 1742, also called "portable" or "pocket" microscope. A compound microscope only in appearance, this model enabled — among other things — Spallanzani in 1773 to discover tardigrades *(fig.16)* and their ability to experience repeated death/revival cycles. The phenomenon, now called anabiosis, marked one of the major turning points of 18th-C. theoretical biology.

Images

Fig.1

Compound microscopes

Fig.2

Photographic reproduction of X-ray image of Galilean compound microscope

Fig.3

Observations under the microscope

Fig.4

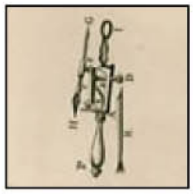


Plate depicting a botanical simple microscope

Fig.5

Botanical simple microscope

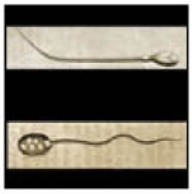
Fig.6

Antoni van Leeuwenhoek in his study

Fig.7

Antoni van Leeuwenhoek's simple microscope

Fig.8



Spermatozoids observed under the microscope

Fig.9

Musschenbroek's simple microscope

Fig.10

Plate illustrating the operation of the simple aquatic microscope

Fig.11

Simple aquatic microscope

Fig.12

Plate representing the 'freshwater polyp' or 'Hydra'

Fig.13

Lyonnet's microscope

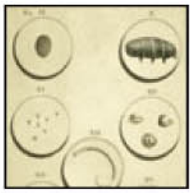
Fig.14

Portrait of Lazzaro Spallanzani

Fig.15

Plate depicting simple microscopes

Fig.16



Observations under the microscope. Digital processing