

THE ORIGINS OF BIOLOGICAL MICROSCOPY

A Demonstration by
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A RECONSTRUCTION OF THE EARLY RESEARCH WORK IN BIOLOGICAL MICROSCOPY DATING FROM THE SEVENTEENTH AND EIGHTEENTH CENTURIES, PRESENTED AT CARLTON HOUSE TERRACE FOR THE ROYAL SOCIETY CONVERSAZIONE OF 10 MAY 1984

The founders of the modern era of microscopical biology were capable of research of a higher quality than it is popular to concede. Two parallel programmes of research have thrown new light on this discipline. In the first of these, the original specimens prepared by Leeuwenhoek in the seventeenth century have been found in virtually original condition and have been subjected to detailed microscopical examination. Not only have they revealed something of the methods used in the earliest days of microscopy, but they show something of Leeuwenhoek himself — his own cells appear to be attached to the specimens. A parallel investigation has documented a range of microscopes, identified as being "low-power dissecting instruments", which are actually precision microscopes capable of generating high magnifications with surprisingly good resolution of fine detail. The man who made them was Robert Bancks, and this previously widely-ignored instrument maker seems to have evolved a design which gave rise to the Victorian microscopes with which we are more familiar. Though he is regarded as a historical figure of no great importance, it transpires that Bancks made microscopes for Robert Brown (who named the nucleus, and after whom "Brownian Motion" is named), the great botanists Bentham and Hooker, Charles Darwin, and was appointed instrument maker to the then Prince of Wales (later George IV).

Thonis Leeuwenhoek was born in 1632. He grew up known as Antony and acquired the "van" as an affectation in January 1685: as Antony van Leeuwenhoek he is rightly regarded as the father of the microscope. He devoted himself to the subject for fifty years, yet did not start his scientific career until middle-aged. However he was still dictating notes on his work within days of his death at the age of 90 in 1723. Much mystery has surrounded his methods of working, and many of his microscopes are now missing (one collection was mislaid from the Royal Society in the 1820s and has never been recovered). However, a set of nine packets that had contained Leeuwenhoek's own specimens was brought to light in 1981



1: The packets of specimens Leeuwenhoek sent to London on 1st June 1674, at the moment of their re-discovery in 1981.



2: A presumptive leucocyte (white blood cell) and surrounding bacteria (cocci) on a section of elder-pith from Leeuwenhoek.

during the present research. They show how Leeuwenhoek cut his sections, some reveal red and white blood cells probably deposited from the razor blade he used, or perhaps from his coughing; and it has been possible to re-constitute some of the original species of microscopical life he discovered from their dried remains.

Leeuwenhoek used a single lens as his magnifier, a system which provides better images than might be imagined. Bancks brought the so-called simple microscope to a fine state of technical development for its time. His microscopes featured condensers, fine-focussing and many other features of later compound microscopes. Doubt has often been expressed over the detail such instruments could reveal. Many of the pioneering experiments have now been recreated, using original methods where appropriate, and the observation of nuclei and of cytoplasmic streaming have been demonstrated. A range of single lens microscopes is demonstrated, with later compound instruments for the purposes of comparison.

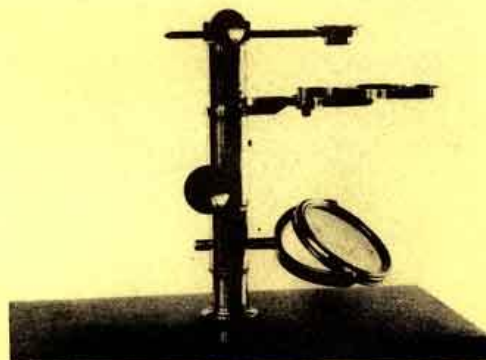


Fig 3: A simple microscope made by Bancks in the early 19th century and used by Brown in his work on the cell nucleus.