

Fleas Like Elephants, Lice Like Bears: 18th Century Solar Microscope Projections Between Enlightened Natural Philosophy and Amusement For Women and Children

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ABSTRACT: Several historians of science have noted that during the second half of the eighteenth century public demonstrations formed an integral part of the enlightened culture. Central devices were the air-pump and the electrostatic generator; however, there were other devices that had also been used frequently. One of these instruments was the solar microscope.

Solar microscopes were intended for projecting microscopic specimens, thus being able to demonstrate them to an audience. Judging from the number of illustrations in textbooks as well as from the great many instruments still to be found it can be said that these items were widely spread and commonly used. It is unclear however, whether the projections were intended to be popularisations of scientific knowledge or just mere entertainment, as some 19th century publications seem to indicate. Based on the work with the instruments kept at the Deutsches Museum I am going to discuss the practice of these projections.

Several historians of science have noted that during the second half of the eighteenth century public demonstrations formed an integral part of the enlightenment culture. In this respect the air-pump and the electrostatic generator have been identified as central devices. However, there were also other pieces of equipment that had been used frequently, among them the solar microscope.

The solar microscope was developed around 1740; most authors relate it either to the instrument maker Daniel Gabriel Fahrenheit (1686-1736) or to the Prussian microscopist Johann Nathanael Lieberkühn (1711-1756). Solar microscopes were designed for projecting microscopic specimens, thus being able to demonstrate them to an audience. Simplified, it can be said that “the ordinary solar microscope for transparent objects consists of a tube, a plain mirror, an illuminating lens and an ordinary Wilson microscope” (Gehler, 1791, p. 100, see also Fig. 1).

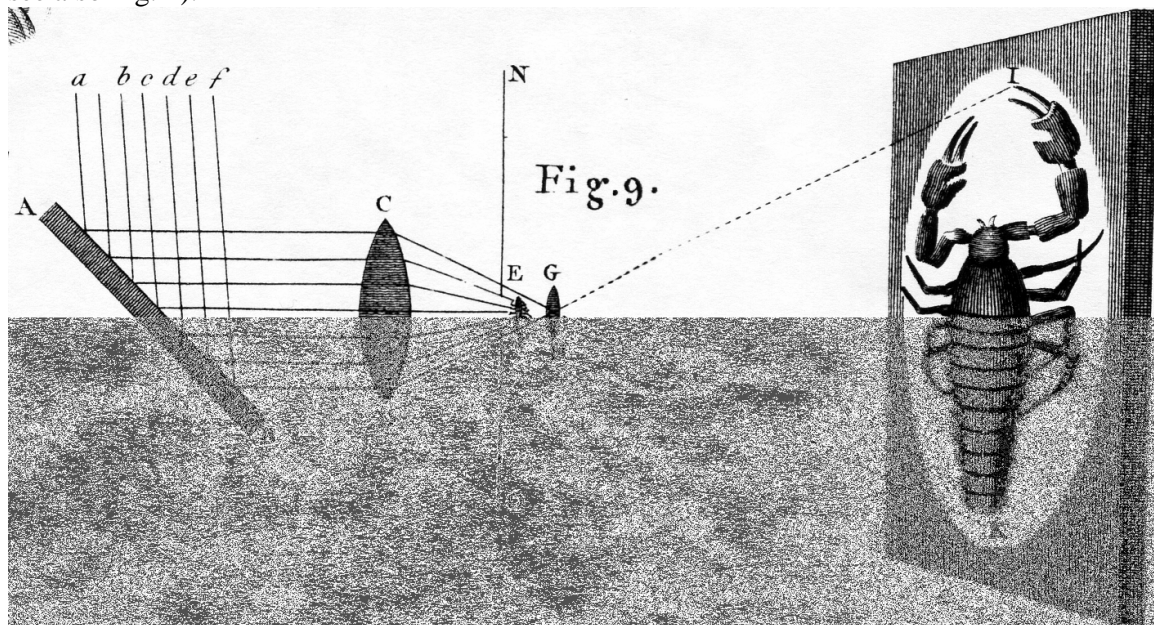


Figure1: Working principle of the solar microscope.
Table from Adams (1794), courtesy of the ‘Bakken Library Minneapolis, MN’

Solar microscopes were used in a darkened chamber; the instrument was placed into the shutter of the window in a manner that the mirror was outside. The mirror reflected sunlight onto the 'illuminating lens' (which is nothing but a condensing lens with a focal length slightly larger than the length of the tube). Shortly before the focal point of the lens, the (transparent) preparation is placed which is projected by the microscope (in many instruments just a single lens, the so-called 'Wilson pocket microscope') onto a screen.

Judging from the number of illustrations in textbooks as well as from the great many instruments still to be found it can be said that these items were widely spread and commonly used. Moreover, several characterisations in 18th century textbooks also indicate the popularity of the projections that could be realised with a solar microscope: "The sunbeams, directed from the illuminating lens onto the transparent object create on the opposite wall ... a clear and beautiful image that much enlarged than nobody could imagine who had not seen it himself" (Gehler 1791, p. 100).

However, looking into publications from the 19th century reveals an entirely different notion. A very strong statement in this respect was made by the British microscopist Goring in 1827: "The image of a common solar microscope may be considered as a mere shadow, fit only to amuse women and children ... The utmost it can do is to give us the shadow of a flea, or a louse as big as a goose or a jackass ... The swinish vulgar will always be gratified by such spectacles, because they have no idea that a microscope of any kind is to do more than exhibit objects very much dilated in point of bulk" (Goring in Altick 1978, p. 369).

Contrasting the statements of Gehler and Goring, it gets obvious that the notion of the projections has changed significantly. In order to develop an understanding of why this change may have occurred, it will be attempted to work with original eighteenth century solar microscopes. In doing so, two devices from the collections of the Deutsches Museum Munich will be used, one made by the London workshop Dollond, the other by the German instrument maker Junker. For both instruments, the original sliders with preparations that were sold with the device still exist. Moreover, it shall also be attempted to prepare own preparations. By using these devices to create projections even for an audience, it should be possible to develop an understanding of the potential of the instruments.

References

Adams, G.: 1794, *Lectures on Natural and Experimental Philosophy*, Printed by R. Hindmarsh, London; sold by the author.

Altick, R.D.: 1978, *The Shows of London*, Belknap Press, Cambridge.

Gehler, J. S. T.: 1791, *Physikalisches Wörterbuch, Part IV*, Schwickert, Leipzig.