



ISTITUTO E MUSEO DI STORIA DELLA SCIENZA

The compound microscope

The first (fig.1) microscopes (fig.2) were produced around the same time as the telescope (fig.3). They also had two or more lenses, but with an objective lens of shorter focal length.

The invention is attributed to Galileo (1564-1642) (fig.4), although, in the 17th century, the claim was contested by others. In *Il Saggiatore* [The Assayer] (Rome, 1623) (fig.5), written between 1619 and 1622 and published in 1623, the Pisan scientist mentioned a "telescope modified to see objects very close". In 1625 a member of the Accademia dei Lincei (fig.6) and friend of Galileo, Johannes Faber (1574-1629) conferred on the instrument, until then called "occhialino", "cannoncino", "perspicillo", and "occhiale", the name of "microscope".

The first microscopes of the Galilean type (fig.7) had, like the telescope, a concave lens and a convex one mounted in a rigid tube. Thanks to these simple optical devices the philosophers of nature could now gaze on a new and marvelous world (fig.8, 9, 10), which was later to allow the development of both medical-biological disciplines and naturalist ones.

The fame of Galileo's optical instruments inspired a search for new solutions (fig.11). In the 1620s, microscopes of the Keplerian type (fig.12, 13), composed of convex lenses that furnished a reversed image, were developed. In the second half of the century, remarkable results were achieved by the Italian instrument-makers Eustachio Divini (1610-1685) (fig.14) and Giuseppe Campani (1635-1715) (fig.15), while in England levels of excellence were reached by Robert Hooke (1635-1702/03) (fig.16, 17). During this same period some important treatises on the construction techniques of microscopes appeared (fig.18), of which *La dioptrique oculaire* (Parigi, 1671) (fig.19), published in 1671, by the Capuchin monk Chérubin d'Orléans (1613-1697) is a splendid example.

In the 18th century the instrument became popular among the upper classes, who used it as a refined intellectual *divertissement* (fig.20). The English instrument-makers introduced some innovations, especially in the mechanics of the instrument (fig.21, 22). Its optical performance was, in fact, still mediocre, because of spherical aberration and chromatic aberration (fig.23), which were eliminated only in the first half of the 19th century, thanks also to the work of Giovan Battista Amici (1786-1863) (fig.24).

Images

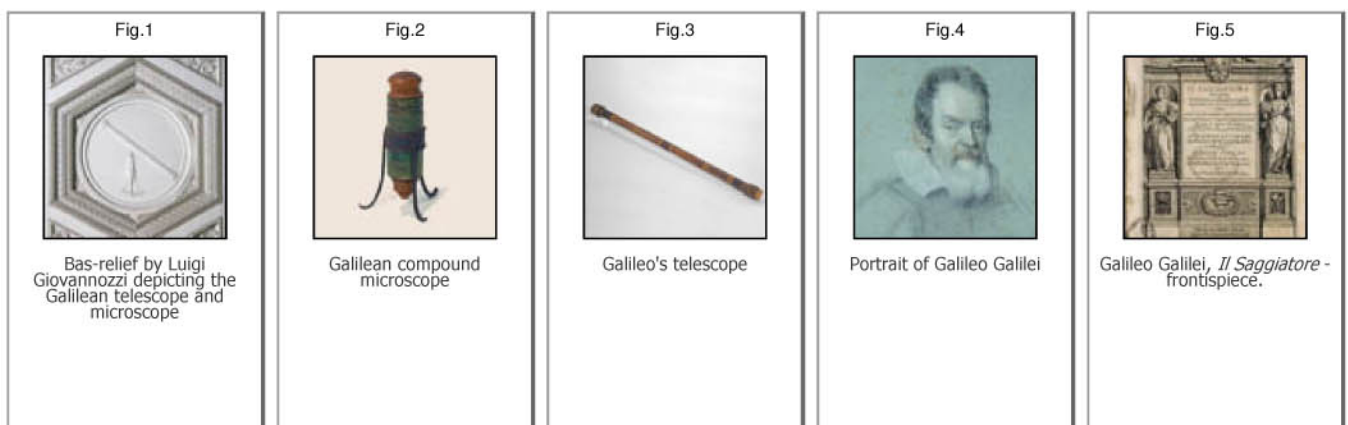
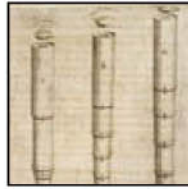


Fig.6



Emblem of the Accademia dei Lincei

Fig.7



Manuscript folio illustrating the "Manner of using the microscope"

Fig.8



A fly's eye, engraving

Fig.9



Persio tradotto in verso sciolto e dichiarato da Francesco Stelluti

Fig.10



Drawing of a louse observed under the microscope

Fig.11



Lamphouse microscope

Fig.12



Portrait of Johannes Kepler

Fig.13



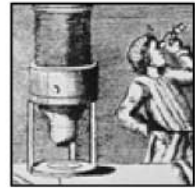
Johannes Kepler, *Dioptrice* - frontispiece

Fig.14



Eustachio Divini's microscope

Fig.15



Giuseppe Campani's microscope

Fig.16



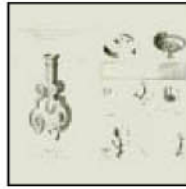
Robert Hooke's microscope

Fig.17



Portrait of Robert Hooke

Fig.18



Chérubin d'Orléans, *La dioptrique oculaire*, Paris, 1671 - plates 30, 31

Fig.19



Chérubin d'Orléans, *La dioptrique oculaire*, Paris, 1671 - frontispiece

Fig.20



Silver microscope

Fig.21



Cuff-type microscope

Fig.22



Cuff-type microscope, engraving

Fig.23



A fly's foot (*Scatophaga*). Microphotograph by Giorgio Roster

Fig.24



Portrait of Giovanni Battista Amici by Michele Gordigiani, Florence, Galleria d'Arte Moderna, Palazzo Pitti