CHAPTER 2

FROM OPTICAL PRINCIPLE TO A PRACTICAL INSTRUMENT

SOME NOTES ABOUT THE HISTORY OF THE MICROSCOPE

While lenses, used as magnifying glasses or primitive spectacles, were known by the end of the thirteenth century, the use of apparatus consisting of a combination of two lenses (astronomic telescopes and compound microscopes) is of much more recent origin. In the beginning of the seventeenth century Gallileo made his famous discoveries of celestial bodies with a telescope, consisting of a convex and a concave lens placed at a certain distance apart. The oldest-known descriptions and illustrations\(^1\) of a compound microscope come from Holland; opinions differ as to who may be considered its inventor, if anyone.

Important scientific investigators in the second half of the seventeenth century who were engaged in systematic application of this microscope for biological and medical purposes were Marcello Malpighi in Italy and Robert Hooke, curator of experiments at the Royal Society in London. In 1665 Hooke published an illustrated book 'Micrographia'. In this curious collection of observations of such divergent objects as the leaves of the stinging nettle, the anatomy of a louse, the eyes of insects and the functioning of an alcohol thermometer, also the first description is given of 'cellulae' in different botanical tissues, amongst which cork. This first evidence for the existence of cellular structures in living organisms - regarded as a curiosity by his contemporaries - was given by Hooke on the basis of observations made with the only microscope in the possession of the Royal Society in this period, of which a description together with a picture was given in the preface of the 'Micrographia'. It is known that these instruments cost about three pounds (a large sum in those days) and that they had a magnification of 30-40\(\times\); a few have still been preserved. At both ends of the often ingeniously decorated tube a simple objective lens and a simple eyepiece were mounted. The light from a candle or spirit flame could be concentrated

\(^1\) A drawing has been found in a diary of Isaack Beeckman of Middelburg from the year 1625; the instrument depicted probably was manufactured by the spectacle maker Zacharias Jansen at Middelburg.
on the object by means of a glass sphere filled with water (fig. 2.1); after inclining the tube forwards so that it adopted a horizontal position, observation with transmitted light was possible.

Even if it is taken into account that the focussing (with the thread of a screw) was somewhat crude, it can be said that Hooke’s instrument as a whole showed a certain degree of technical perfection. In comparison, the microscope shown in fig. 2.2 dating from the same period makes a very primitive and small impression. Yet, spectacular discoveries have been made with this type of instrument by Anthoni van Leeuwenhoek, citizen of the city of Delft in Holland and ‘amateur’ research-worker. It should be noted in passing that the gap between professional and amateur scientist was really not great in that period. It may be of some interest in this connection