



FIGURE 9.28 Ray diagram for the formation of image by a compound microscope.

microscope or magnifier, produces the final image, which is enlarged and virtual. The first inverted image is thus near (at or within) the focal plane of the eyepiece, at a distance appropriate for final image formation at infinity, or a little closer for image formation at the near point. Clearly, the final image is inverted with respect to the original object.

We now obtain the magnification due to a compound microscope. The ray diagram of Fig. 9.28 shows that the (linear) magnification due to the objective, namely h'/h , equals

$$m_o = \frac{h'}{h} = \frac{L}{f_o} \quad (9.43)$$

where we have used the result

$$\tan \beta = \left(\frac{h}{f_o} \right) = \left(\frac{h'}{L} \right)$$

Here h' is the size of the first image, the object size being h and f_o being the focal length of the objective. The first image is formed near the focal point of the eyepiece. The distance L , i.e., the distance between the second focal point of the objective and the first focal point of the eyepiece (focal length f_e) is called the tube length of the compound microscope.

As the first inverted image is near the focal point of the eyepiece, we use the result from the discussion above for the simple microscope to obtain the (angular) magnification m_e due to it [Eq. (9.39)], when the final image is formed at the near point, is

$$m_e = \left(1 + \frac{D}{f_e} \right) \quad [9.44(a)]$$