# 10.4: Elements of a Circular or Near-circular Orbit

For a near-circular orbit (such as the orbits of most of the major planets), the position of perihelion and the time of perihelion passage are ill-defined, and for a perfectly circular orbit they cannot be defined at all. For a near-circular orbit, the argument of perihelion $\omega$ (or sometimes the "longitude of perihelion", $\varpi$) is retained as an element, because there is really no other way of expressing the position of perihelion, though of course the more circular the orbit the less the precision to which $\omega$ can be determined. However, rather than specify the time of perihelion passage $T$, we usually specify some instant of time called the *epoch*, which I denote by $t_0$, and then we specify either the mean anomaly at the epoch, $M_0$, or the mean longitude at the epoch, $L_0$, or the true longitude at the epoch, $l_0$. For the meanings of mean anomaly, mean longitude and true longitude, refer to section 3, especially for the meanings of "mean" and "true" in this context. Of the three, only $l_0$ makes no reference whatever to perihelion.

Note that you should not confuse the epoch for which you specify the mean anomaly or mean longitude or true longitude with the equinox and equator to which the angular elements $i$, $\Omega$ and $\omega$ are referred. These may be the same, but they need not be (and usually are not). Thus it is often convenient to refer $i$, $\Omega$ and $\omega$ to the standard epoch $\mathrm{J2000.0}$, but to give the mean longitude for an epoch during the current year.