

indeed, also assumes only narrow limits for the alternating variation in the obliquity of the ecliptic, but considers it more advisable not to assign to it a determinate number. "La diminution lente et séculaire de l'obliquité de l'écliptique," says he, "offre des états alternatifs qui produisent une oscillation éternelle, comprise entre des limites fixes. La théorie n'a pas encore pu parvenir à déterminer ces limites; mais d'après la constitution du système planétaire, elle a démontré qu'elles existent et qu'elles sont *très peu étendues*. Ainsi, à ne considérer que le seul effet des causes constantes qui agissent actuellement sur le système du monde, on peut affirmer que le plan de l'écliptique *n'a jamais coïncidé* et ne *coïncidera jamais* avec le plan de l'équateur, phénomène qui, s'il arrivait, produirait sur le Terre le (prétendu !) printemps perpétuel."*—Biot, *Traité d'Astronomie Physique*, 3d ed., 1847, tom. iv., p. 91.

While the nutation of the Earth's axis discovered by Bradley depends merely upon the influence of the Sun and the Earth's satellite upon the oblate figure of our planet, the increase and decrease in the obliquity of the ecliptic is the consequence of the variable position of all the planets. At the present time, these are so situated that their united influence upon the Earth's orbit produces a diminution in the obliquity of the ecliptic. This obliquity amounts, according to Bessel, to $0''\cdot457$ annually. At the end of many thousand years, the situation of the planetary orbits and their nodes (their points of intersection with the ecliptic) will be so different, that the advance of the equinoxes will be converted into a retrogression, and consequently an increase in the obliquity of the ecliptic. Theory teaches us that these increases and diminutions occupy periods of very unequal duration. The most ancient astronomical observations which have come down to us, with accurate numerical data, reach back to the year 1104 before Christ, and testify to the extreme antiquity of Chinese civilization. The literary remains are scarcely a century more

* "The slight and secular variation of the obliquity of the ecliptic presents alternating states, which produce an eternal oscillation comprised within fixed limits. Theory has not been able to determine those limits; but, according to the constitution of the planetary system, it has been proved that they exist, and that they are of *very slight extent*. Thus, to consider only the effect of the permanent causes which act upon the system of the world, it may be affirmed that the plane of the ecliptic *never has and never will* coincide with the plane of the equator, a phenomenon which, if it took place, would produce upon the Earth the (pretended !) eternal spring.