

consequently differ, at the least, in the ratio of 1 : 154), the relative distances also of the fixed stars from each other, and the configuration of the constellations themselves, can not in long periods remain the same. The Southern Cross will not always shine in the heavens exactly in its present form, for the four stars of which it consists move with unequal velocity in different paths. How many thousand years will elapse before its total dissolution can not be calculated. In the relations of space and the duration of time, no absolute idea can be attached to the terms *great* and *small*.

In order to comprehend under one general point of view the changes that take place in the heavens, and all the modifications which in the course of centuries occur in the *physiognomic character* of the vault of heaven, or in the aspect of the firmament from any particular spot, we must reckon as the active causes of this change : (1), the precession of the equinoxes and the mutation of the earth's axis, by the combined operation of which new stars appear above the horizon, and others become invisible ; (2), the periodical and non-periodical variations in the brightness of many of the fixed stars ; (3), the sudden appearance of new stars, of which a few have continued to shine in the heavens ; (4), the revolution of telescopic double stars round a common center of gravity. Among these so-called fixed stars, which change slowly and unequally both in the intensity of their light and in their position, twenty principal planets move in a more rapid course, five of them being accompanied by twenty satellites. Besides the innumerable, but undoubtedly rotatory fixed stars, forty moving planetary bodies have up to this time (October, 1850) been discovered. In the time of Copernicus and of Tycho Brahe, the great improver of the science of observation, only seven were known. Nearly two hundred comets, five of which have short periods of revolution and are interior, or, in other words, are inclosed within those of the principal planets, still remain to be mentioned in our list of planetary bodies. Next to the actual planets and the new cosmical bodies which shine forth suddenly as stars of the first magnitude, the comets, when, during their usually brief appearance they are visible to the naked eye, contribute the most vivid animation to the rich *picture*—I had almost said the impressive *landscape*—of the starry heavens.

The knowledge of the proper motion of the fixed stars is closely connected historically with the progress of the sci-