

P R E F A C E.

This Course of Lectures is intended to be *elementary*. By this word I mean that I propose to begin at the beginning and not to use technical words, nor to presuppose a familiarity on the part of my audience with ideas beyond those which are naturally acquired by all who have simply taken an interest in Astronomy without having had the opportunity of devoting real study to it.

But, although the course is to be essentially elementary, we shall at once find ourselves in the presence of the latest and grandest theories which have been propounded as to the nature and form of the whole universe, as far as it is within our powers to observe it. The mind cannot but be raised into higher levels when it strives to comprehend the Stars, and the interests aroused are more noble than mere idle curiosity, and more inspiring.

It is only natural, and, therefore, in the highest sense right, to look round on creation and wonder whence we come and whither we are going. Science cannot answer these questions, but she can show us how to seek for the answer. By examining the universe as it is now, we can arrive at the laws on which it proceeds, and by these laws we believe that it will be guided in the future, and that it has been guided in the past. We do not *know* that these laws are eternal, and there will be continually recurring throughout these lectures the condition, 'if the process is continuous.' We *believe* that the Earth must continue to travel round the Sun in the future, as it has done in the past, and if this remains so, we know that summer and winter and day and night shall not cease. It cannot be too often repeated, that all that we say that we know, rests at bottom on belief.

We can thus see how the proper work of the student of Astronomy is to examine the universe, with the constant desire to find out the laws by which it lives and moves. Every change that we can detect must be watched and measured and recorded. With

the more striking and obvious changes we are all familiar, and it is worth noticing that all these well-known changes are continually and regularly recurring, but at the same time are of the nature of a backward and forward motion. What is being done at one stage is undone at another, and so in a sense no progress is being made. If the Moon waxes for a fortnight, we know she will wane during the next fortnight. If the temperature rises through the spring-time it will fall during autumn, with the result that the average temperature remains the same from century to century.

These, then, are not the changes that are most important. A man is weary at night and fresh in the morning—that does not signify. But the imperceptible changes which advancing age causes are continuously in the same direction, and it is these that tell eventually. In these lectures we shall concern ourselves especially with those changes in the universe that are continuous and not compensated by a contrary swing. We shall not find them so easy of detection as the periodic changes. In the lifetime of a single man they are not appreciable, in a thousand years they produce no effect that can be measured with certainty; but in a million years the alteration is important, and will have transformed the face of the Earth and the face of the Sky. There is no limit to the time of past eternity which need check us, and there is no boundary to infinite space which can confine our speculations. There is only one consideration that can make us pause. We can never be certain that we know *all* about the change with which we are dealing, and for that reason it will be necessary to spend some time in the last two lectures in talking about the ways in which we can study the changes that we see so continually passing over the face of the heavens. To give one illustration only—we might notice that the Moon rose and subsequently set, but a very little more observation would make us modify this remark by adding 'but this occurs about an hour later each day.' At first sight such a correction might seem unimportant, but when we came to consider it we should find that it showed us that the Moon goes round the Earth, so it is distinctly important. We will devote the last two lectures to familiarizing ourselves with the more instructive changes that the unaided eye can detect on the face of the heavens.