

“Hail, holy light ! offspring of heaven, first-born,
Or of the Eternal co-eternal beam,
Bright effluence of bright essence increate—
Thy fountain who shall tell ? Before the sun,
Before the heavens thou wert, and at the voice
Of God, as with a mantle, didst invest
The rising world of waters dark and deep.”

GENERAL FACTS.

The elementary principles of a science are sometimes so distinctly exhibited in natural appearances, that the most casual observer may acquaint himself with them, though he may not perceive their connexion or importance. But in other instances they can only be ascertained by close observation or by minute analysis. Without an acquaintance with these principles, the student only accumulates difficulties as he increases his knowledge ; it may therefore be necessary to make a few preliminary observations in relation to the nature, habit, and character of light under ordinary circumstances, when uninfluenced by the disturbing forces to which it is subject.

1. *Light requires time for its propagation from the luminous to the enlightened body.* On account of the immense velocity with which light moves, this fact could never have been ascertained by the observation of terrestrial phenomena ; for although it is true that the flash of a gun or the light of a beacon may be seen by a person one mile distant when it is invisible to a person at the distance of two miles, yet, if it were possible to measure the hundredths of a second with the same accuracy as we measure seconds, we could not ascertain the fact ; it is only by reference to the celestial bodies that we can discover the velocity of light. Aristotle taught the instantaneous progression of light ; and Chrysippus, the stoic, who was the successor of Zeno, says that its transference is like to the motion of a long rod, which moves equably through its whole length when pushed at one end. For a long series of ages philosophers acknowledged and taught this error, and M. Roemer, a native of Jutland, discovered the truth when making observations on the satellites of Jupiter. When the earth is between Jupiter and the sun, eclipses of the satellites of that planet happen eight minutes thirteen seconds earlier than they should do according to the calculations of astronomers ; and when the sun is between