

THE RIDDLE OF THE UNIVERSE

again it had the honor of opening out entirely new paths and infinitely enlarging our outlook on the universe. The invention of photography and photometry, and especially of spectral analysis (in 1860 by Bunsen and Kirchoff), introduced physics and chemistry into astronomy and led to cosmological conclusions of the utmost importance. It was now made perfectly clear that matter is the same throughout the universe, and that its physical and chemical properties in the most distant stars do not differ from those of the earth under our feet.

The monistic conviction, which we thus arrived at, of the physical and chemical unity of the entire cosmos is certainly one of the most valuable general truths which we owe to astrophysics, the new branch of astronomy which is honorably associated with the name of Friedrich Zöllner. Not less important is the clear knowledge we have obtained that the same laws of mechanical development that we have on the earth rule throughout the infinite universe. A vast, all-embracing metamorphosis goes on continuously in all parts of the universe, just as it is found in the geological history of the earth; it can be traced in the evolution of its living inhabitants as surely as in the history of peoples or in the life of each human individual. In one part of space we perceive, with the aid of our best telescopes, vast *nebulæ* of glowing, infinitely attenuated gas; we see in them the embryos of heavenly bodies, billions of miles away, in the first stage of their development. In some of these "stellar embryos" the chemical elements do not seem to be differentiated yet, but still buried in the homogeneous primitive matter (*prothyl*) at an enormous temperature (calculated to run into millions of degrees); it is possible that the origi-