## THE RIDDLE OF THE UNIVERSE

erably enlarged. We now know that the huge mountains of the palæozoic, mesozoic, and cenozoic formations have taken, not thousands, but millions of years in their growth. In the third place, we now know that all the countless fossils that are found in those formations are not " sports of nature," as was believed one hundred and fifty years ago, but the petrified remains of organisms that lived in earlier periods of the earth's history, and arose by gradual transformation from a long series of ancestors.

## III.-PROGRESS OF PHYSICS AND CHEMISTRY

The many important discoveries which these fundamental sciences have made during the nineteenth century are so well known, and their practical application in every branch of modern life is so obvious, that we need not discuss them in detail here. In particular, the application of steam and electricity has given to our nineteenth century its characteristic " machiniststamp." But the colossal progress of inorganic and organic chemistry is not less important. All branches of modern civilization-medicine and technology, industry and agriculture, mining and forestry, land and water transport-have been so much improved in the course of the century, especially in the second half, that our ancestors of the eighteenth century would find themselves in a new world, could they return. But more valuable and important still is the great theoretical expansion of our knowledge of nature, which we owe to the establishment of the law of substance. Once Lavoisier (1789) had established the law of the persistence of matter, and Dalton (1808) had founded his new atomic theory with its assistance, a way was open to