

from the great phenomena of the metamorphism of organic life,* have led, through the admirable labors of Deshayes and Lyell, to the most marked results, especially with reference to the different groups of the tertiary formations, which contain a considerable number of accurately investigated structures. Agassiz, who has examined 1700 species of fossil fishes, and who estimates the number of living species which have either been described or are preserved in museums at 8000, expressly says, in his masterly work, that, "with the exception of a few small fossil fishes peculiar to the argillaceous geodes of Greenland, he has not found any animal of this class in all the transition, secondary or tertiary formations, which is specifically identical with any still extant fish." He subjoins the important observation "that in the lower tertiary formations, for instance, in the coarse granular calcareous beds, and in the London clay,† one third of the fossil fishes belong to wholly extinct families. Not a single species of a still extant family is to be found under the chalk, while the remarkable family of the *Sauroidi* (fishes with enameled scales), almost allied to reptiles, and which are found from the coal beds—in which the larger species lie—to the chalk, where they occur individually, bear the same relation to the two families (the *Lepidosteus* and *Polypterus*) which inhabit the American rivers and the Nile, as our present elephants and tapirs do to the *Mastodon* and *Anaplotherium* of the primitive world."‡

The beds of chalk which contain two of these sauroid fishes and gigantic reptiles, and a whole extinct world of corals and muscles, have been proved by Ehrenberg's beautiful discoveries to consist of microscopic *Polythalamia*, many of which still exist in our seas, and in the middle latitudes of the North Sea and Baltic. The first group of tertiary formations above the chalk, which has been designated as belonging to the *Eocene Period*, does not, therefore, merit that designation, since "the dawn of the world in which we live extends much further back in the history of the past than we have hitherto supposed."§

As we have already seen, fishes, which are the most ancient of all vertebrata, are found in the silurian transition strata,

* Cuvier, *Recherches sur les Ossemens Fossiles*, t. i., p. 52-57. See, also, the geological scale of epochs in Phillips's *Geology*, 1837, p. 166-185.

† [See *Wonders of Geology*, vol. i., p. 230.]—*Tr*

‡ Agassiz, *Poissons Fossiles*, t. i., p. 30, and t. iii., p. 1-52; Buckland, *Geology*, vol. i., p. 273-277.

§ Ehrenberg, *Ueber noch jetzt lebende Thierarten der Kreidebildung*, in the *Abhandl. der Berliner Akad.*, 1839, s. 164.