

The fishes of the brown-coal near Bonn are found in a bituminous shale, called paper-coal, from being divisible into extremely thin leaves. The individuals are very numerous; but they appear to belong to a small number of species, some of which were referred by Agassiz to the genera *Leuciscus*, *Aspius*, and *Perca*. The remains of frogs also, of extinct species, have been discovered in the paper-coal; and a complete series may be seen in the museum at Bonn, from the most imperfect state of the tadpole to that of the full-grown animal. With these a salamander, scarcely distinguishable from the recent species, has been found, and the remains of many insects.

A vast deposit of gravel, chiefly composed of pebbles of white quartz, but containing also a few fragments of other rocks, lies over the brown-coal, forming sometimes only a thin covering, at others attaining a thickness of more than 100 feet. This gravel is very distinct in character from that now forming the bed of the Rhine. It is called "*Kiesel gerölle*" by the Germans, often reaches great elevations, and is covered in several places with volcanic ejections. It is evident that the country has undergone great changes in its physical geography since this gravel was formed; for its position has scarcely any relation to the existing drainage, and the great valley of the Rhine and all the more modern volcanic rocks of the same region are posterior to it in date.

Some of the newest beds of volcanic sand, pumice, and scorix, are interstratified near Andernach and elsewhere with the loam called loess, which was before described as being full of land and freshwater shells of recent species, and referable to the Post-Pliocene period. I have before hinted (see p. 123), that this intercalation of volcanic matter between beds of loess may possibly be explained without supposing the last eruptions of the Lower Eifel to have taken place so recently as the era of the deposition of the loess.

The igneous rocks of the Westerwald, and of the mountains called the Siebengebirge, consist partly of basaltic and partly of trachytic lavas, the latter being in general the more ancient of the two. There are many varieties of trachyte, some of which are highly crystalline, resembling a coarse-grained granite, with large separate crystals of felspar. Trachytic tuff is also very abundant. These formations, some of which were certainly contemporaneous with the origin of the brown-coal, were the first of a long series of eruptions, the more recent of which happened when the country had acquired nearly all its present geographical features.

*Newer volcanos of the Eifel.—Lake craters.*—As I recognized in the more modern volcanos of the Eifel characters distinct from any previously observed by me in those of France, Italy, or Spain, I shall briefly describe them. The fundamental rocks of the district are gray and red

nology be adopted, I would strongly urge the necessity of referring the Hempstead beds of the Isle of Wight and the Limburg strata to one and the same period, whether it be named Lower Miocene or Upper Eocene.