

phibius (major), *Hyæna* (3 sp.), *Felis* (3 sp.), *Ursus etruscus*, *Machairodus* (3 sp.), *Equus Stenonis*, *Bos etruscus*, *Cervus* (5 sp.), *Palæoryx*, *Palæoreas*, *Castor*, *Hystrix*, *Lepus arvicola*.¹¹¹ These strata are sometimes grouped as a higher zone of the Pliocene series under the name of Arnusian.¹¹²

Germany.—The absence of marine Pliocene formations in Germany has been already referred to. Among the lacustrine and fluviatile deposits of the period, however, numerous remains of the terrestrial flora and fauna have been preserved. One of the most celebrated localities for the discovery of these remains lies in the Mainz basin, where at Eppelsheim, near Worms, above the Miocene beds, described on p. 1639, a group of sands and gravels with lignite (Knochen-sand), from 20 to 30 feet thick, has yielded a considerable number of mammalian bones. Among these the *Deinotherium giganteum* occurs, showing the long survival of this animal in central Europe; also *Mastodon angustidens*, *Rhinoceros incisivus*, and other species, *Hippotherium gracile*, several species of *Sus*, five or more of *Cervus*, and some of *Felis*.

Interesting collections of the terrestrial fauna of the period have been preserved in the calcareous tuffs of mineral springs in different parts of Germany. Besides numerous remains of land-plants, large numbers of land and fresh-water shells have been obtained from these deposits, which in some cases point to a colder climate than now exists. In the Franconian Alb, for instance, the occurrence of alpine and northern European forms of land-shells (*Patula solaria*, *Clausilia densestriata*, *C. filograna*, *Helix vicina*, *Pupa pagodula*, *Isthmia costulata*) has been noted. The mammals include many extinct as well as some still living forms (*Elephas antiquus*, *Rhinoceros Merkii*, *Sus scrofa*, *Cervus elaphus*, *C. capreolus*, *Bos primigenius*, *Equus caballus*, *Ursus spelæus*, *Meles vulgaris*, *Hyæna spelæa*).¹¹³

Vienna Basin.—In consecutive conformable order above the

¹¹¹ C. J. Forsyth Major, Q. J. Geol. Soc. xli. 1885, p. 1.

¹¹² Mr. C. Reid suggests that the lignite deposits of the Val d'Arno (with *Tapirus*) may be much older than the rest of the lacustrine strata (with *Mastodon* and *Elephas*). A large proportion of the plants in them is extinct, and the tapir is the only animal whose remains are found in them. They may possibly be even Miocene.

¹¹³ F. von Sandberger, "Land und Süßwasser Conchylien der Vorwelt," 1875, p. 936; Sitzb. Bayer. Akad. xxiii. 1893, Heft 1; Hellmann, *Palæontographica*, suppl.