Rhætic.

Rhætic (Rhät, Infra-Lias).—Gray sandy clays and fine-grained sandstones, containing Equisetum, Asplenites and cycads (Zamites, Pterophyllum), sometimes forming thin seams of coal—Cardium phillipianum (rhæticum), Avicula (Cassianella) contorta, Estheria minuta, Nothosaurus, Trematosaurus, Belodon and Microlestes antiquus.[20*]

Keuper.

Keupermergel, Gypskeuper.—Bright red, green and mottled marls, with an underlying set of beds of gypsum and rock-salt. In some places where sandstones appear they contain numerous plants, Equisetum columnare, Pterophyllum, etc., and labyrinthodont and fish remains[21*]—300 to 1000 feet.

Lettenkohle, Kohlenkeuper.—Gray sandstones and dark marls and clays, with abundant plants, sometimes forming thin seams of an earthy hardly workable coal—Lettenkohle—about 230 feet. The plants include, besides those above mentioned, the conifers Araucarioxylon thuringicum, Voltzia heterophylla, etc. A few shells have been obtained from this group, especially from a band of dolomite at its upper limit, Lingula tenuissima, Myophoria Goldfussi, M. transversa, Anoplophora, Gervillia. Some of the shales are crowded with small phyllopod crustacea: Estheria minuta, also Bairdia. Remains of fish—Acrodus, Hybodus, Ceratodus—and of the Mastodonsaurus Jægeri and Nothosaurus have been obtained.

Muschelkalk.

Upper Limestone, capable of subdivision into two groups, a lower hard encrinite limestone (Trochitenkalk) and an upper group of thin limestone with argillaceous partings, known as the Nodosus group from the abundance of Ceratites nodosus—200 to 400 feet. In some regions a third still higher group of dolomites and limestones is called the Trigonus group from the prevalence in it of Trigonodus Sandbergeri. The upper Muschelkalk is by far the most abundantly fossiliferous division of the German Trias. Among its fossils, Nautilus bidorsatus, Lima striata, Myophoria vulgaris, Trigonodus Sandbergeri and Terebratula vulgaris are specially characteristic, with Encrinus liliiformis in the lower and Ceratites nodosus in the upper part of the rock. Some parts of the lower limestones are almost wholly made up of crinoid stems.

Middle Limestone and Anhydrite, consisting of dolomites with anhydrite, gypsum and rock-salt. Nearly devoid of organic remains, though bones and teeth of saurians have been found—200 to 400 feet.

Lower Limestone, Wellenkalk, consisting of limestones and dolomites, Wellendolomite, with in the upper part bands of porous limestone known as Schaumkalk—160 to 500 feet. This zone is on the whole poor in fossils, save in the limestone bands, some of which form a lower zone full of Encrinus liliiformis, while a higher zone is characterized by Myophoria orbicularis. The upper portion of the limestone, however, is highly fossiliferous, and has yielded a number of brachiopods (Spiriferina fragilis, S. hirsuta, Athyris trigonella, Terebratula vulgaris, T. angusta), numerous lamellibranchs, especially the widespread genus Myophoria, (M. vulgaris, elegans, cardissoides), Gervillia costata, Monotis Alberti, and some ammonites (Beneckeia, Ceratites, etc.).

Untersuch. i. part i. 1886; H. Bücking and E. Schumacher, op. cit. ii. part ii. 1889; E. W. Benecke and L. van Wervecke, op. cit. iii. part i. 1890; and the Jahrbuch of the Prussian Geological Survey. Detailed measured sections of the Muschelkalk and Lettenkohle in Franconia are given by F. v. Sandberger, Verh. Phys. Med. Ges. Würzburg, xxvi. 1892, No. 7. S. Passarge, "Das Röth im östlichen Thüringien," Jena, 1891.

* For foot-notes see next page.