

Bunter.

Upper (Röth).—Red and green marls, with gypsum in the lower part, and sometimes beds of rock-salt—250 to 300 feet. Occasional bands of dolomite, Rhizocorallium dolomite of Thuringia, yield a number of fossils: Rhizocorallium jenense, probably a sponge, Myophoria costata, M. vulgaris, Gervillia socialis, Myacites mactroides, the Ammonite Beneckeia tenuis. The Myophoria is specially characteristic. The plants of this stage consist chiefly of Voltzia, with ferns and horse-tails: Anomopteris, Equisetum.

Middle.—Coarse-grained sandstones, 1000 feet, sometimes incoherent, with wayboards of Estheria-shale; amphibian footprints and remains of labyrinthodonts.

Lower.—Fine reddish argillaceous false-bedded sandstone, Grès des Vosges, several hundred feet thick, often micaceous and fissile, with occasional interstratifications of dolomite and of the marly oolitic limestone called "Rogenstein." Fossils extremely scarce; Estheria minuta occurs in some layers.

The Bunter division, in the north and centre of Germany, lies conformably on and passes insensibly into the Zechstein. Except in the dolomite beds of the Röth, it is usually barren of organic remains. The plants already known include Equisetum arenaceum, one or two ferns, and a few conifers, Albertia and Voltzia. The lamellibranch Myophoria costata is found in the upper division all over Germany. Numerous footprints occur on the sandstones, and the bones of labyrinthodonts as well as of fish have been obtained.

In the Vosges, the Bunter (Grès bigarré, Vosgian) consists of (1) a lower coarse red unfossiliferous sandstone (Grès des Vosges) resting conformably on the red Permian sandstone and marked by the frequent crystalline condition of its quartz-grains (crystalline sandstone, p. 232); also by its quartz-conglomerates, which occasionally reach a thickness of more than 1600 feet; (2) an upper series of red sandstones, surmounted by marls, forming the Grès bigarré, and containing among other fossils Voltzia, Albertia, Equisetum, arenaceum, Myophoria, Nothosaurus Schimperii, Menodon plicatus, Odontosaurus Voltzii, Mastodonsaurus waslenensis. The Muschelkalk in the same region is a compact gray limestone capable of subdivision into three zones, as in Ger-

²⁰ * The Avicula contorta zone (see Dr. A. von Dittmar, "Die Contorta-Zone," Munich, 1864) ranges from the Carpathians to the north of Ireland and from Sweden to the hills of Lombardy. In northern and western Europe, it forms part of a thin littoral or shallow-water formation, which over the region of the Alps expands into a massive calcareous series, that accumulated in a deeper and clearer sea. It is well developed also in northern Italy. See Stoppani, "Geologie et Paleontologie des Couches à Avicula Contorta en Lombardie," Milan, 1881.

²¹ * It is deserving of notice that while in the pelagic or Alpine facies of the Trias fish remains are on the whole scarce, and only occur in numbers at a few places, they are widely distributed and tolerably abundant throughout the German Trias. See O. Jaekel, Abhand. Geol. Specialkart. Elsass-Lothr. iii. Heft iv. 1889.