

teeth of some peculiar ganoids (*Macropetalichthys*, *Onychodus*).

In the Marcellus shale, Hamilton beds, and Genesee shale remains of land-plants occur, but much less abundantly than among the rocks of New Brunswick. Brachiopods are especially abundant among the sandy beds in the centre of the formation. They comprise, as in Europe, many broad-winged spirifers (*S. mucronatus*, etc.), with species of *Productus*, *Chonetes*, *Athyris*, etc. The earliest American *Goniatites* have been noticed in these beds. Newberry has described a gigantic fish (*Dinichthys*) from the Black Shale of Ohio.

The Portage and Chemung groups have yielded land-plants and fucoids, also some crinoids, numerous broad-winged spirifers, with *Aviculæ* and a few other lamelli-branches. These strata, in the New York region, consist of shales and laminated sandstones, which there attain a maximum thickness of upward of 2000 feet, but die out entirely toward the interior. They are covered by a mass of red sandstones and conglomerates—the Catskill group, which is 2000 or 3000 feet thick in the Catskill Mountains, and thickens along the Appalachian region to 5000 or 6000 feet. These red arenaceous rocks bear a striking similarity in their lithological and biological characters to the Old Red Sandstone of Europe. As a whole they are unfossiliferous, but they have yielded some ferns like those of the Upper Old Red Sandstone of Ireland and Scotland (*Archæopteris*), some characteristic genera of fish, as *Holoptychius* and *Bothriolepis*, and a large lamellibranch closely resembling the Irish *Anodonta*. The Old Red Sandstone development, found on the eastern side of the crystalline ridge which runs southward from Canada far into the States, is described at p. 1332.

Asia.—From southwestern China, Richthofen brought a series of marine fossils which show the presence there of strata probably referable to Middle and Upper Devonian horizons. Out of 28 species named by Kayser, no fewer than 13 are cosmopolitan, including such familiar forms as *Rhynchonella cuboides*, *R. pugnus*, *Pentamerus galeatus*, *Atrypa reticularis* (var. *desquamata*), *Merista plebeia*, *Spirifer Verneuli*, *Orthis striatula*, *Productus subaculeatus*, *Strophalosia productoides*, *Aulopora tubæformis*.¹⁵¹

¹⁵¹ Richthofen, "China," vol. iv. p. 75.