

mary and transition class are the principal repositories of metallic ores, but in Europe they contain few saline or inflammable minerals.\* In South America, according to Humboldt, sulphur and bitumen exist in considerable quantities in rocks denominated primary.

Rocks of the transition class are not universally interposed between the primary and secondary rocks, for in some situations the transition series are entirely wanting. Thus in passing from Lyons to Clermont, in the centre of France, I observed the regular coal strata resting upon beds of sand, clay, and rounded stones which immediately cover granite.

*Secondary Rocks.*—The lower series are almost all distinctly stratified; they consist chiefly of sand-stone, soft argillaceous slate called shale, and beds of coal and iron-stone. Many of the secondary strata of this class abound exclusively in the fossil remains of vegetables, analogous to ferns, palms, and reeds; while the rocks in the former or transition class, contain almost exclusively the remains of marine animals. This change in the nature of the fossil remains in the two classes of rocks, indicates an important change in the condition of the globe, prior to the deposition of the lower series of secondary strata. The transition rocks were evidently formed under the sea, some of the beds being composed almost entirely of the exuviae of madrepores and encrini, but the terrestrial plants whose remains abound in the lower secondary strata, must have grown on land, from which the ancient ocean had retired, and the strata which contain them were probably deposited at the bottom of rivers or fresh water lakes, as marine organic remains seldom, if ever, occur in them. The upper series of secondary strata again indicate another important change of the surface of the globe. The prevailing beds in this series are stratified limestone with beds of clay shale and sand-stone interposed. The limestone has generally an earthy texture, and very rarely partakes of the hard and crystalline character of the lower limestones. The fossil remains in the upper secondary strata are, with some exceptions, those of marine animals, but of different genera or species from those in the strata below them. It is in the upper secondary strata that we first meet with remains of saurian or lizard-shaped animals, some of which were of immense size. The co-existence of dry land, at the period when most of the upper secondary strata were deposited, is, however, proved, by the occasional occurrence of terrestrial fossil plants, and the bones of fresh-water and amphibious reptiles, such as the crocodile and tortoise.

Another important fact respecting the upper series of secondary strata is, that they appear to have been formed, not only under different circumstances from the lower, but after a long interval, during

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\* Except we comprise the regular coal formation in the transition series.