

planet had become the habitation of animals and plants. This bold generalization, although anticipated in some measure by Steno, a century before, in Italy, formed at the time an important step in the progress of geology, and sketched out correctly some of the leading divisions into which rocks may be separated. About half a century later, Werner, so justly celebrated for his improved methods of discriminating the mineralogical characters of rocks, attempted to improve Lehman's classification, and with this view intercalated a class, called by him "the transition formations," between the primitive and secondary. Between these last he had discovered, in northern Germany, a series of strata, which in their mineral peculiarities were of an intermediate character, partaking in some degree of the crystalline nature of micaceous schist and clay-slate, and yet exhibiting here and there signs of a mechanical origin and organic remains. For this group, therefore, forming a passage between Lehman's primitive and secondary rocks, the name of *übergang* or transition was proposed. They consisted principally of clay-slate and an argillaceous sandstone, called *grauwacke*, and partly of calcareous beds. It happened in the district which Werner first investigated, that both the primitive and transition strata were highly inclined, while the beds of the newer fossiliferous rocks, the secondary of Lehman, were horizontal. To these latter therefore, he gave the name of *flötz*, or "a level floor;" and every deposit more modern than the chalk, which was classed as the uppermost of the *flötz* series, was designated "the overflowed land," an expression which may be regarded as equivalent to alluvium, although under this appellation were confounded all the strata afterwards called tertiary, of which Werner had scarcely any knowledge. As the followers of Werner soon discovered that the inclined position of the "transition beds," and the horizontality of the *flötz*, or newer fossiliferous strata, were mere local accidents, they soon abandoned the term *flötz*; and the four divisions of the Wernerian school were then named primitive, transition, secondary, and alluvial.

As to the trappean rocks, although their igneous origin had been already demonstrated by Arduino, Fortis, Faujas, and others, and especially by Desmarest, they were all regarded by Werner as aqueous, and as mere subordinate members of the secondary series.*

The theory of Werner's was called the "Neptunian," and for many years enjoyed much popularity. It assumed that the globe had been at first invested by a universal chaotic ocean, holding the materials of all rocks in solution. From the waters of this ocean, granite, gneiss, and other crystalline formations, were first precipitated; and afterwards, when the waters were purged of these ingredients, and more nearly resembled those of our actual seas, the transition strata were deposited. These were of a mixed character, not purely chemical, because the waves and currents had already begun to wear down solid land, and to give rise to pebbles, sand, and mud; nor entirely without fossils, because a few of the first marine animals had begun to exist. After this period, the secondary for-

* See Principles of Geology, vol. i. chap. iv.