

material evidence of an epoch of violence and catastrophe : and with this deposit the *Upper Silurian* began.

The Upper Silurian has also its three great periods,—the *NIA-GARA*, the *ONONDAGA*, and the *LOWER HELDERBERG*, besides many subordinate epochs,—each characterized by its peculiar organic remains,—each evidence of the nearly or quite universal devastation that preceded it, and of the act of omnipotence that reinstated life on the globe,—each, too, bearing evidence of shallow or only moderately deep waters when they were formed ; and the *Onondaga Period*,—the period of the New York salt rocks—telling of a half-emerged continent of considerable extent.

Another devastation took place, and then opened, as De Verneuil has shown, the *Devonian Age* or *Age of Fishes*. It commenced, like the Upper Silurian, with coarse sandstones, evidence of a time of violence ; these were followed by another grit rock, whose few organic remains show that life had already reappeared. Then another change,—a change evidently in depth of water,—and limestones were forming over the continent, from the Hudson far westward : the whole surface became an exuberant coral reef, far exceeding in extent, if not in brilliancy, any modern coral sea ; for such was a portion, at least, of the *UPPER HELDERBERG Period*.

Again there was a general devastation, leaving not a trace of the former life in the wide seas ; and where were coral reefs, especially in the more eastern portion of the continental seas, sandstones and shales accumulated for thousands of feet in thickness, with rarely a thin layer of limestone. Thus passed the *HAMILTON*, *CHEMUNG* and *CATSKILL Periods*, of the *Devonian age*. The life of these regions, which in some epochs was exceedingly profuse, was three or four times destroyed and renewed—not renewed by a re-creation of the same species, but by others ; and although mostly like the earlier in genera, yet each having characteristic marks of the period to which it belonged. And while these *Devonian Periods* were passing, the first land plants appeared, foretellers of the age of verdure, next to follow.

Then come vast beds of conglomerate, a natural opening of a new chapter in the record, and here it is convenient to place the beginning of the *Carboniferous Age*, or the *Age of Acrogens*. Sandstones and shales succeeded, reaching a thickness in *Pennsylvania* and *New Jersey*, according to the Professors *Rogers*, of thousands of feet ; while in the basin of the *Ohio* and *Mississippi*,