

against each other gradually reduce these to a state of sand or clay, and in this way are produced the materials which make up the sands, loams and conglomerates. These, by the various changes which are taking place in the earth's surface, become buried under other deposits and are acted upon by the agencies of heat, pressure and other causes till they become firm and enter into the solid constituents of the earth's crust. The softer muds and silts of the beach also undergo a change and pass into shales. This material is deposited under quieter conditions, in sheltered bays or creeks, where the finer earth particles held in water, are gradually deposited. Shales pass into slates through the formation of cleavage planes which have been induced by pressure in the shaly mass, and by hardening through metamorphic agencies. Wherever organic life has existed on the beach or shore, these remains gradually become entombed and we now find the impression of the long extinct bird, fish, plant or insect, often so perfectly preserved that the most delicate points of structure can be readily determined. These organic remains are found to vary in character at different horizons, so that what are found in one rock series often do not appear in others more recent; and upon this peculiarity of distribution, paleontologists and geologists have built up a scheme of rock formations, which comprises all the sediments from the Laurentian time or the original deposition of the earth's crust, down to the present day, each division of which is distinguished by certain fossil forms peculiar in large part to itself. In this way we can depict the whole life history of the globe, from the advent of the first forms, through plant, fish, bird, reptile, etc., to the mammalia, and up to the highest type of all the genus *Homo*, or man himself.

While, however, sedimentary rocks are deposited as sands, clays or calcareous matter in generally horizontal attitudes, such as we see in the strata surrounding this city, very frequently these strata are tilted at all angles, and in some cases completely overturned. This change in position is accompanied often by a change in the character of the original sediments, and is due to some agency, either of contraction or shrinking of the crust or to dislocations which have produced crumplings, upheavals, displacements, etc. In this way sandstones have been