FORMATION OF FOSSILS.

1. The body of the animal or the plant or only a portion may be imbedded without further change. This is the simplest form, and fossils of this kind are comparatively recent.

2. Casts or moulds of the body may be made. This will occur under circumstances like the following: The animal becomes entombed in a deposit. In the course of time it decomposes and passes entirely away. The space once occupied by it, now empty, fills up with infiltrating material, such as lime compounds or other substance soluble in water. There will now be a perfect cast of the body, which will be revealed when the rock is broken up. If no infiltrating material reaches the cavity then a mould of the object is left. This mode of fossil formation frequently occurs with remains of shells, of which, in some rocks, excellent casts and moulds of the shells are found.

3. Replacement is one of the mostcommon ways in which fossils are formed, and gives rise to the most perfect forms we obtain. As in the preceding mode the body is imbedded in a deposit, but as particle by particle is removed while decomposition of the object is taking place they are replaced by infilitrating substances, which may be compounds of lime, iron, or silica in solution. Finally the organism is completely replaced and a fossil results which is a perfect representation of the entombed object. So perfect is this process that the very structure of the eye is retained. Some of our petrified wood from the west has been replaced by siliceous material so completely that the structure of the rings of growth and medullary rays are preserved.

Many springs at the present time contain these infiltrating compounds to such an extent that objects placed in them soon become petrified.

4. Impressions, such as tracks, rain-drop marks, etc., also may be considered as fossils indicating the former presence of their cause. These are preserved as follows: Imagine a muddy flat, bordering and partially under the sea, especially at high water, but bare when the tide recedes. At low tide a large portion of it will be exposed for at least six hours, and some of it for twelve. During the time of exposure birds and other animals may walk over it, leaving distinct foot-prints upon the soft mud. A heavy shower of rain would no doubt leave innumerable markings of the rain-drops. If all this should occur at a time followed by some hours of strong sunshine, we can easily imagine that the mud would harden so as to retain the footprints. With the returning tide the whole is covered with another coating of silt-like material. This process continues as often as the tide ebbs and flows, but sometimes more effectively than others. After a time the bed solidifies through the influence of pressure, heat, or the presence of hardening compounds within it, and a hard compact rock results. This, many years after, when the place has undergone some geological changes, becomes an exposure of rock, like our Selkirk quarry of to-day. Its layers are readily distinguished, and when split up the footprints of the birds that waded along the tidal shore long periods of time before, are observed. This mode of forming traces of footprints is well illustrated by the flats along the Bay of Fundy.

The formation of all fossils can be accounted for in some of the four ways described. We now proceed to observe what may be inferred from a fossil.

INFERENCES FROM FOSSILS—AGE.

1. The age of the deposit:—Each age, system, group or formation has fossils which are peculiar to it. If these characteristic fossils are known we can at once infer the age. A good illustration is afforded in the quarry under consideration. The fossils found in it are peculiar to the Silurian system. The trilobites are found in no strata higher than the subcarboniferous, consequently the discovery of one of these interesting relics enables us at once to infer that the rocks in which it has been found are below the carboniferous, and that true coal cannot be found in a region whore such rocks occur near the surface. It is on this account that the trilobite is an important fossil in identifying the relative position of certain beds to coal-bearing strata which are always above formations in which these fossils are found. certain fossils found in the Northwest are common to the cretaceous rocks elsewhere, hence we at once conclude that the deposits west of us, where these are found, belong to the cretaceous system although we find no chalk as in England where that substance is common among these deposits.

Early geologists were inclined to name systems from their mineral characters rather than the fossils which they contained. But fossils are now considered