

have this power of boring into stone. Various species also bore into shells or corals. In seven years, Carrara marble, in the sea south of Long Island, became riddled with borings made by a Sponge, the *Cliona sulphurea* of Verrill. Termites, or White Ants, and many other insects, especially when in the larval state, the *Limnoria* among Crustaceans, and the *Teredo*, related to Pholas, among Mollusks, bore into wood; and the last is so destructive to ships, piles, and wharves that it is often called the *Shipworm* or *Pileworm*.

3. The tunneling of the earth by small quadrupeds, as the Mole, and by Crustaceans like the Crawfish, sometimes results in the draining of ponds, and the consequent excavation of gullies or gorges by the out-flowing waters. The tunneling of the levees of the Mississippi by Crawfish is one cause of breaks, and thereby of great floods over the country.

4. Animals using Mollusks and Echinoderms as food make great refuse-heaps, or beds of broken shells. The animals include Man, as well as other species; and the beds made by Fishes off the coast of Maine, as described by Verrill (who has drawn attention to this mode of making broken shells), are of great extent. They might be taken for beach deposits. The chief enemy of the American Oyster is a Starfish, which spreads its extensile mouth-opening over the young Oyster, and so gets it inside its stomach, and then, as the shell opens, digests the Oyster.

5. Fungi attack dead plants and animals, and rapidly destroy them. They do it by excreting ferments or poisons, which eat into and destroy the tissues. Living plants often suffer from this cause when in an enfeebled state.

6. The destruction of the vegetation of a region by insect life, and that of animals by one another, are also of great geological importance.

### III. THE ATMOSPHERE AS A MECHANICAL AGENT.

The weight of 100 cubic inches of dry air, with the barometer at 30 inches, and the thermometer at 60° F., is 31 grains; and hence it is but  $\frac{1}{81\frac{1}{3}}$  as heavy as water (or  $\frac{1}{77\frac{1}{6}}$  at 32° F.). The weight of a column of the atmosphere a square inch in area of section, when the barometric pressure is 30 inches, and the temperature 32° F., is 14.7 pounds. On this basis, the total weight of the atmosphere is about  $11\frac{2}{3}$  trillions of pounds (Herschel). In England, an atmosphere of pressure, used as a limit in connection with steam, is 29.905 inches Bar. at 32° F., or nearly  $14\frac{3}{4}$  pounds to the square inch; in France, it is 760 millimeters, or 29.922 English inches, at the same temperature.

The atmosphere, while rightly called the earth's aerial ocean, is an aerial ocean without a definite upper surface, resting on an ever-disturbing basement. It extends not only to a height of 40 miles, but, with increasing tenuity, to at least 200 miles, — meteorites having become luminous at this height as a consequence of the friction of air. An upper limit is supposed to be determined by the equilibrium between the gravitation of the molecules of the elements constituting it and the expansive force, decreasing upward, that separates the molecules.