

into such fine particles as to remain in mechanical suspension in the water. Such obdurate varieties must be examined in bulk. In the Carboniferous system, the shales that boil down completely are those in which their component argillaceous particles have been compacted merely by pressure, or with such slight cementation as could be destroyed by boiling. They are usually gray beds, such as so often accompany limestones. The black shales, on the other hand, containing a considerable proportion of bituminous cement, will not thoroughly break up even after prolonged boiling.

The drying and steeping here described may be regarded as processes of rapid artificial weathering. The effects of the heat of a fire upon shale resemble those of the sun's rays, and the soaking in water is a counterpart of the action of rain. It is surprising how easily hard, compact shale, which can with difficulty be broken or split with a hammer, may, by the method above specified, be reduced to dust or to fine granular débris, from which even delicate shells may easily be picked out entire. One may thus experimentally learn how important a part in the disintegration of rocks must be taken by the alternate desiccation and saturation of their surfaces by sunshine and shower.

**Limestone and Ironstone.**—Among fossiliferous limestones, remarkable differences are observable in the lithological condition of the inclosed fossils, and in the ease with which they can be recognized and extracted. -It is only by diligent practice that these peculiarities can be so mastered as to enable the observer to make an exhaustive collection from the rocks which he explores. In some limestones, the organic remains are specially abundant in particular layers or pockets. Fragments of these parts of the rock may be taken home, and their fossils may be extracted by fixing the block on a piece of lead 1 inch thick and about 6 inches square, and cutting out the desired specimens with hammer and chisel. Entomostraca, and other small organisms in which the valves are united, may also be obtained in a perfect condition from this class of rocks, by pounding fragments of the fossiliferous material with a hammer within the circle of a small iron ring or "washer," one-eighth of an inch in thickness. As the rock is crushed by the blows of the hammer the organisms jump out of the matrix, but are retained within the bounds of the ring, which also answers as a gauge, preventing the material from being broken too small. The pounded rock is afterward washed free from dust, dried and searched as above directed. Many limestones reveal their fossils best