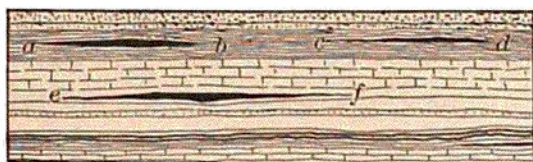


shales; or conglomerates with shales and coal-beds; or conglomerates with limestones and sandstones; or shales and sandstones alone.

The thickness of each stratum also varies much, being but a few feet in some cases, and hundreds of feet in others; and the same stratum may change in a few miles from 100 feet to 10, or disappear altogether, or change from one of shale, or of limestone, to one of sandstone, and so on. In the Coal-formation of Nova Scotia there are 15,000 feet of stratified beds, consisting of a series of strata mainly of sandstones, shales, and conglomerates, with some beds of coal; and in the Coal-formation of Pennsylvania there are 6000 to 7000 feet of a similar character.

In many cases a bed of limestone thins out at short intervals, and is thus in isolated pieces, 100 to 1000 feet, or more, long, called *lenticular* masses,

60.



shale or sandstone occupying the interval. This results from the varying conditions in the seas in which the beds were made, some portions being favorable for the animals that make shells and other calcareous materials from which limestones are formed, when the

larger part is unfavorable. Such lenticular masses (*ab, cd, ef*, Fig. 60) may consist of iron-ore, such ores being often deposited locally in marshes or shallow basins, on sea-borders, as well as in interior ponds or shallow lakes.

A *seam* is a thin layer intercalated between layers and differing from them in composition. Thus, there are seams of coal, of quartz, of iron-ore. *Seams* become *beds*, or are so called, when they are of considerable thickness; as, for example, *coal-beds*. Such seams are sometimes popularly, but wrongly, called *veins*.

The beds or layers of rock may be (1) *massive*, that is, of great thickness without division into subordinate layers; or (2) *thick-bedded*, or (3) *thin-bedded*, or (4) *laminated*, or (5) *shaly*. The flagging-stone, much used in Eastern cities of this country, is a good example of a *laminated* sandstone. Such a variety of sandstone is often called *flags*.

(6) *Stratulate* structure is one made up of very thin and even layers, separable or not, as a bed of slate, a bed of clay in a river-valley, stalagmite, and agate. It is often called a banded structure.

(7) *Slaty* structure is much like shaly, and frequently a shale is called a *slate*. But the shale is stratulated parallel to the planes of deposition, and the structure is due more or less to the pressure of the overlying material; while slate (roofing-slate) has much more even layers, with a smoother surface, and has derived the slaty structure from lateral pressure, as explained beyond (page 112).

(8) A *cross-bedded* structure characterizes a layer when it is obliquely laminated, as in three of the layers in Fig. 61. Such layers generally alternate with horizontally bedded layers. This style of bedding is made by a strong movement of a current over a sandy bottom, as in the move-