and large upturning, and its border of lower heat; for it is surrounded by regions of little or no heat. There will be, therefore, gradation in effects in one direction or another.

But it is to be noted that the heat generated in metamorphic regions by the movements does not vary with the variations in dip of the several successive plications, but with the general character of the great range of flexures and their relation to the direction of the chief source of the movements. The cause is regional in its action, not local. The successive flexures may vary from vertical anticlines and synclines to those of very low angle, having nearly horizontal bedding for a mile or more along the axial part of the plications; and yet the gneiss or mica schist of the beds shows no corresponding change in texture. This fact is well illustrated in the Taconic Range, and in the crystalline region along the Housatonic River east of Derby, Conn.

Where the heat is of low grade, the moisture present may partly remain as a constituent of the new rocks; but under intenser conditions, only anhydrous kinds will be made. A penumbra of hydromica and chlorite schists, with coarse mica schists and gneiss making the hotter belt beyond, is, therefore, to be looked for.

Going from New Haven, Conn., 20 miles westward, where the rocks make a single conformable series in anticlines and synclines, there is a regular gradation from chloritic and hydromica schists, with gray slightly crystalline limestone, to mica schists and gneiss, and coarsely porphyritic gneiss; and at 17 miles, the gneiss and mica schist overlie a stratum of coarsely crystallized limestone in a very low and long syncline. In a similar manner, the Taconic metamorphic region on the borders of New England and New York, as already explained, increases in grade of metamorphism, both from north to south and from west to east.

Again, the Bernardston Devonian rocks, of one epoch of metamorphism, mentioned on page 310, bear on this point; and so do the facts from California, that in the altered Cretaceous series the rocks, diabase, dioryte, gabbro occur as results of metamorphism, and that the feldspars, labradorite, and oligoclase, are found even in half-altered sandstone. (Becker, 1888.) It is thus plain that among metamorphic rocks, as well as those of deep-seated igneous origin, kind of rock and grade of crystallization are not evidence of differences in geological age.

In some cases the bedding of rocks has been obliterated by metamorphic action, without their reaching the condition of plasticity, in consequence of a tendency to promiscuous crystallization in the grains of the constituent minerals. This is true, for the most part, of rocks consisting of hornblende alone (hornblendyte), hornblende and a feldspar (dioryte, labradioryte), feldspar (felsyte), feldspar and quartz (granulyte or mica-less granite, quartz-felsyte), serpentine, and some others.

A bedded structure may also be obliterated by the soldering together of layers, when the rock is subjected to heavy pressure, and all evidence of it may disappear, unless the layers differ in color or constitution; as has happened in a portion of the marble of Rutland, Vt., and in other cases,