in New Hampshire and in the southeast Scottish Highlands. It would not be observed if the metamorphism resulted from deep burial in a region in which the geothermal gradient was everywhere the same and was "normal" in the sense that its curvature was as shown in figure 3. Horizontal gradients of temperature, pressure, or both during metamorphism are required to account for this distribution of kyanite and sillimanite. The existence of such horizontal gradients has previously been deduced from field studies (Harker, 1939, p. 185).

Field studies have revealed a "complete absence of cyanite from aureoles of thermal metamorphism" (Harker, 1939, p. 151), although sillimanite and andalusite are often found near the contacts of intrusive rocks. It appears that there is no known example of an igneous rock emplaced at suffiicently high pressure (and sufficiently low chemical potential of water) to make kyanite stable at the temperature prevailing in the wall rock. Once this temperature is better known, an upper limit to the pressure at which igneous rocks are known to solidify can be determined from the kyanite-sillimanite curve.

Syntectonic granites occurring in rocks in which kyanite had previously been formed through regional metamorphism are of special interest. Kyanite is never observed to persist up to the contacts, although sillimanite is characteristically present. This implies that a region of relatively high temperature or relatively low pressure existed near the contacts; the first alternative is a natural consequence of the emplacement of magma. The second alternative, which would be preferred by transformists, may require unlikely stress distributions.

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