In the case of amygdale descriptions, there is often an underlying assumption that the zeolites have been deposited from magmatic solutions with falling temperature during initial cooling of a lava flow. It may well be that minor coatings of zeolites on the walls of cavities in some massive flows may have this origin but zeolites are rare or absent in the vesicles of newly cooled lavas. Walker (1951) has shown convincingly that zeolite deposition in the Garron plateau of Ireland post-dates effusion and cooling of a pile of some forty to fifty flows, in all about 1000 ft thick. It is in a sense metamorphic, as has also been shown for the Keweenaw amygdaloids.

The present writers consider that sequences in cavities may be related to falling temperatures during initial cooling of a thick lava flow or intrusion, to rising temperatures and pressure following burial, to rising temperature resulting from new intrusions of magma or new influxes of hot gases or solutions, or to falling temperature when these conditions are relaxed. Thus McLintock (1915) has clearly described a consistent sequence epidote–prehnite–scolecite in olivine basalts of Ben More, Mull, which he attributes to increasing hydration with falling temperature in agreement with Cornu's "rule" (1908), followed by a reverse sequence of dehydration culminating in garnet, and promoted by the thermal metamorphic effects of a subsequent intrusion.

Published zeolite sequences often show no obvious consistent trend. Nevertheless in view of the difficulties outlined above, we do not consider that this fact should outweigh the evidence from well-studied hydrothermal and regionally altered areas where with increasing temperatures progressively less hydrous zeolites tend to form.

A general correlation also emerges between the silica content of zeolites and the availability of free silica. Thus descriptions given above, together with observations of many other writers, show that the typical zeolites in veins and joints of quartz-bearing rocks are stilbite, heulandite, laumontite and analcime. Other zeolites in such environments appear to be quantitatively insignificant, although scolecite and chabazite are reported by Niggli *et al.* (1940) in "Alpine cleft" localities in quartzose rocks such as gneisses and the Aar granite. The amygdale sequence mordenite, heulandite, chabazite, stilbite, accompanied by quartz, chalcedony or opal reported by Mason and Greenberg (1953) from southern Brazil is one of increasing hydration in silica-rich zeolites, except for chabazite which is rare and was generally found to occur alone. Observations at Wairakei and Yugawara show that mordenite is typical of active thermal areas where silica activity is particularly high, although it also occurs in tholeiitic basalt amygdales.

In contrast, the main lime zeolites of the Garron Plateau olivine basalts are chabazite, levyne, thomsonite, natrolite, mesolite and phillipsite (Walker, 1951), all these tending to be low in silica, and similar assemblages have been reported from many other undersaturated rocks. In considerations of phase equilibria, it is much more important to know the phases which actually coexist with each other than the inferred order of their crystallization. We believe that the grouping of zeolites in Fig. 5 illustrates their general tendency to occur in immediate environments, A supersaturated with respect to quartz, i.e. coexisting with opal,