Xenoliths

In distinct contrast to the rhyolites, the granites commonly have inclusions. Most of these seem to be igneous inclusions derived from other known parts of the Wichita province, or sedimentary inclusions attributed to the Tillman Group. There are no known or presently recognized fragments of the lower to middle crust, or the mantle, either as rocks or as xenocrysts. Merritt (1958) and Gibson (1981) presented data and interpretations for xenoliths in the western Wichitas. The Lugert Granite in the west, and the Mount Scott Granite in the east, seem to carry the most xenoliths. Basically, there are three principal types of inclusions: basaltic, rhyolitic, and sedimentary (quartzite to graywacke). None of these has been well studied in the east, and it is increasingly clear that the significance of the whole set needs to be reevaluated. As in the west, the mafic ones are mostly fine grained, consisting of hornblende ± biotite + plagioclase and are assumed to be recrystallized basalts from the Navajoe Mountain Group (Ham and others, 1964). Coarse-grained inclusions, such as gabbros or anorthosites that could be related to the Raggedy Mountain Gabbro Group (either Glen Mountains Layered Complex or the Roosevelt Gabbros), are exceedingly rare to nonexistent. There are some fragments in granitoid dikes, but many of these occurrences are associated with the Cold Springs Breccia, whose granitoid component may not be related to the Wichita Granite Group. This lack of gabbros is not explained. Since the rocks of the layered complex are highly anorthositic, perhaps disaggregation by the silicic magma on intrusion might have contributed plagioclase as individual grains to the granite rather than as rock fragments.

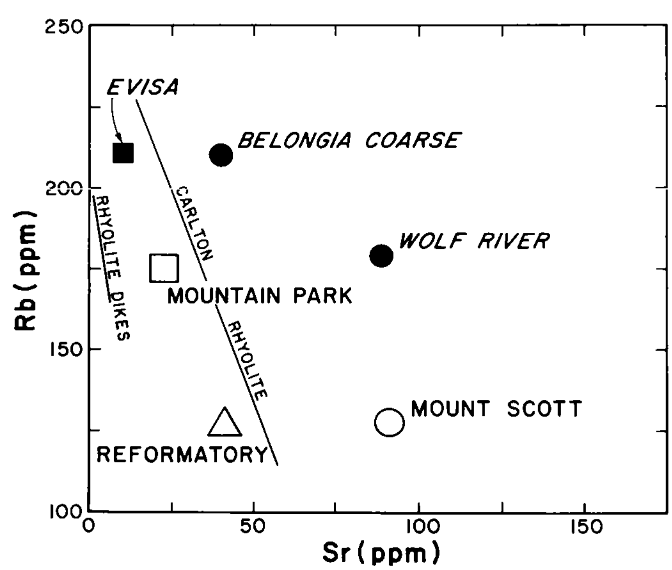

Figure 18. Averaged Rb versus averaged Sr for the three recognized chemical classes of Wichita granites. Limited data-ranges are shown for rhyolite dikes and Carlton Rhyolite Group. Data for an older, but somewhat comparable, A-type suite are presented from Wolf River Batholith of Wisconsin, from main phase and a differentiate known as Belongia Coarse (Anderson and Cullers, 1978). An average for A-type granitoids from Evisa (Corsica) also is given (Bonin and others, 1978).

The most straightforward linkage between inclusions and original rock is found in the metarhyolite. The petrographic character of these xenoliths is similar to Carlton rhyolites, except for recrystallization and a coarsening of the groundmass. As detailed mapping goes on, more of these are being found in every granite (see Stops 5 and 6).

The most puzzling are the metasedimentary xenoliths. The Meers Quartzite was recognized in the east many years ago (Taylor, 1915), and problems associated with it are discussed in the next section. Historically, highly quartz-rich metasediments usually have been found first, and those with compositions similar to graywacke have been grouped with rhyolite or fine-grained granite and not recognized until later (see Sides and Miller, this guidebook). It is not clear where or what the source terranes were. Ham and others (1964) put all these with the Tillman, but no extensive study has been done.

MEERS QUARTZITE

Background

The Meers Quartzite, as xenoliths in gabbro, was first recognized and identified by Taylor (1915) in the eastern Wichitas. However, the formal stratigraphic name dates from Hoffman (1930). Hoffman (1930), Merritt (1948), and Ham and others (1964) provided most of the descriptive material. The type outcrop was taken to be the outcrop south of Meers. Hoffman (1930) found additional outcrops of quartzite in granite, but he also decided that the largest outcrop originally mapped by Taylor, south of Mount Scott, was a granophyre. All subsequent workers until now, except Chase (Chase and others, 1956), accepted Hoffman's interpretation. My own work, plus that of Sides and Miller (this guidebook), indicates that Taylor was correct and that Hoffman was incorrect in the Mount Scott area.

How did this confusion arise, and how was it propagated? Hoffman (1930) was impressed with the granophyric textures so common in most of the granites. Some rather more fine-grained, equigranular rocks, with abundant quartz plus alkali feldspar, and noticeable "snowflake" texture (Anderson, 1969, 1970)—where quartz poikilitically surrounds and encloses alkali feldspars—were grouped by Hoffman into the Davidson Granophyre. In fact, Hoffman included two different kinds of rocks with the Davidson: hornfelsed Carlton Rhyolite, and the graywacke facies of the Meers Quartzite. Ham and others (1964) saw clearly that this hornfelsed rock resulted from reheating of rhyolite near intrusive contacts with the Mount Scott Granite. They used this as one key factor in establishing the relative ages of rhyolite and granite. During their reconnaissance surface work, they found additional outcrops and recognized that a wider range of metasedimentary types existed under the Meers designation, but they did not realize that part of the Davidson of Hoffman was metasedi-