MEERS QUARTZITE

C. A. MERRITT, University of Oklahoma, Norman

The oldest known rock in Oklahoma, the Meers quartzite, is exposed near Meers, in the Wichita Mountains. This rock was described by Taylor (1915), who mapped two small outcrops near Meers and one south of Mount Scott. Later, Hoffman (1930) studied this area and reported that the rock mapped as quartzite south of Mount Scott was in reality a granophyre. He, however, found a new quartzite outcrop some four miles west of Meers.

The intrusion of a gabbro magma into the original Meers sandstone has produced an unusual series of contact metamorphic rocks, which are described in this paper.

There are two small outcrops of quartzite in the vicinity of Meers. These are surrounded entirely by gabbro and are interpreted as roof pendants in the igneous rock. The gabbro is the oldest of the Pre-Cambrian igneous rocks in the Wichita Mountains; the Meers quartzite, therefore, is the oldest rock in this area.

The smaller of the two quartzite exposures is found along the road, five-eights of a mile south of the Meers post office. It is 1500 feet long and 50 to 100 feet wide. A few hundred feet to the southwest, and separated from it by gabbro, is a second quartzite outcrop. The later occurs along the banks and in the creek bottom of Medicine Bluff Creek. It is one-half mile wide and roughly circular in outline.

The quartzite shows no evidence of the original sandstone bedding, though there is considerable variation in the size of the quartz grains in different parts of the outcrops, which may indicate the presence of more than one bed.

The quartzite is dense, compact, and breaks across the quartz grains. It varies in color from light gray to buff, and in places has a smoky appearance. The grains are angular to rounded and range in size from 0.1 to 3.0 mm in diameter, with the average being 0.2 to 0.3 mm. The grains fit closely together. Thin sections from the central part of the larger outcrop show quartz varying in amount from 85 to 95 percent, sillimanite 5 to 10 percent, and biotite 1 to 3 percent and traces of zircon, apatite, rutile, and muscovite. The biotite, sillimanite, and magnetite are usually clustered together. The biotite has been partially altered to chlorite. The sillimanite is present as slender prisms up to 0.5 mm in length. The rutile occurs as minute needles in the quartz and some of these needles cut across the boundaries of the quartz grains, showing they were introduced later.

Rock samples taken from an old prospector's pit in the larger quartzite outcrop show a different type of contact metamorphism. This test pit is located on the bank of Medicine Bluff Creek, approximately one-half mile west of the road. The quartzite contains considerable feldspar as a cement between the quartz grains. The feldspar has been introduced by magmatic solutions from the adjacent magma. A few of the quartz grains have been replaced partially by feldspar. The latter is in part orthoclase, in part plagioclase, and in part micropegmatite.

In this same test pit there is a mottled pink-and-black rock which macroscopically resembles granite. The mode of this rock is quartz 64 percent, orthoclase 10 percent, mircoline 5 percent, plagioclase (probably labradorite) 10 percent, biotite 10 percent, and muscovite 1 percent with traces of zircon and magnetite. The feldspars have been altered largely to kaolin, and the biotite partially to chlorite. The quartz contains numerous minute rutile needles. The quartz grains resemble those of the Meers quartzite and a few grains show partial replacement by feldspar. The feldspar is present as a cement between the quartz grains. One crystal of biotite is traversed by a muscovite veinlet and this mineral also has replaced biotite along cleavage lines. This granite-appearing rock is a feldspathic quartzite.

The rock described above grades into a dark gabbro-appearing rock. Its mode is quartz 55 percent, labradorite 28 percent, chlorite 10 percent, magnetite 5 percent, biotite 2 percent, hypersthene 1 percent, apatite 1 percent, and diopside 1 percent with traces of myrmekite, rutile, kaolin, sericite, and zircon. The feldspar acts as a cement between the quartz grains. The rock apparently is the product of a gabbroic magma invading the original Meers sandstone but not assimilating the quartz grains to any marked extent.

This latter rock in turn grades into a dark gabbro-appearing rock whose mode is labradorite 41 percent, quartz 28 percent, biotite 15 percent, magnetite 10 percent, hornblende 3 percent, and apatite 3 percent with a trace of zircon. Many rutile needles are present in the quartz. Apatite is unusually abundant in this specimen and shows good crystal outline, 0.2 mm in length. Coronas of biotite can be observed around some of the hornblende and quartz grains and are interpreted as reaction rims due to the alteration of the minerals by basic magma. A few stringers of magnetite traverse feldspar crystals. The paragenesis of the minerals is (1) quartz oldest, (2) feldspar, (3) hornblende, and (4) biotite, with magnetite being later than feldspar but its age relative to hornblende and biotite being obscure.

This rock appears to be a hybrid mixture of quartzite and gabbro. It probably was formed by an injection of a gabbroic magma into the Meers sandstone. Some of the original quartz grains were assimilated by the magma but most of the quartz was unaltered.

The rocks south of the prospect pit are quartz-gabbros. A thin section from the Hazel quarry at Mount Sheridan, one mile south, has the following mode: Labradorite 45 percent, diopside 20 percent, biotite 10 percent, hornblende 8 percent, serpentine 8 percent, quartz 3 percent, magnetite 3 percent, chlorite 2 percent, and kaolin 1 percent with trace of apatite. Hoffman reported 5 percent hypersthene and 3 percent quartz in a thin section from this quarry. The absence of hypersthene in the specimen studied by the writer indicates spotty distribution of this mineral in the quartz-gabbro. This basic rock is cut by many aplite, diabase, and quartz dikes.

The rocks of the Meers—Mount Sheridan area show a sequence of metamorphic zones around the gabbro contact. The gabbroic magma intruded the old Meers sandstone and partially assimilated some of the quartz forming a quartz-gabbro, which in turn grades into a mixed quartzite-gabbro. A little farther from the contact, feldspar was introduced into the sandstone producing a feldspathic quartzite, with the feldspar locally becoming so abundant that the resulting rock macroscopically resembles granite. Still farther from the contact the sandstone was changed to a quartzite containing sillimanite and rutile.

The third outcrop of Meers quartzite is exposed in SE¼ SW¼ SE¼, T. 4 N., R. 14 W. about four miles west of Meers. It is 50 by 200 feet, elongated northwest-southeast, and entirely surrounded by Lugert granite. It is cut by a granite dike, 1 mm wide. Hoffman described the quartzite as follows, "It is unlike the mass included within the gabbro for sillimanite and biotite are absent. There is an abundance of small magnetite grains. Apatite and zircon are present in moderate amounts, but mostly in grains less than 0.03 mms. in diameter.

"The quartz grains vary from 0.7 to 1.0 mm. in length. They depart from a rounded form and fit closely against one another."

This outcrop of quartzite, some four miles west of the others, shows that the original sandstone beds covered a sizeable area. The region has not been investigated in detail and additional outcrops of Meers quartzite probably will be discovered in the future.

LITERATURE CITED

Hoffman, M. G. 1930. Geology and petrology of the Wichita Mountains. Bull. Okla. Geol. Surv. *52*: 7-83.

Taylor, C. H. 1915. Granites of Oklahoma. Bull. Okla. Geol. Surv. *20*: 5-108.