ROOSEVELT GABBROS (RAGGEDY MOUNTAIN GABBRO GROUP) WICHITA MOUNTAINS

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INTRODUCTION

Intrusive into the Glen Mountains Layered Complex, the lower formation of the Raggedy Mountain Gabbro Group, is a series of biotite-amphibole–bearing gabbroic rocks of tholeiitic affinity, collectively given the formation name "Roosevelt Gabbros" by Powell and others (1980). Three members have been formally named: Mount Sheridan Gabbro, Sandy Creek Gabbro, and Glen Creek Gabbro (table 2; figs. 2, 7). The latter two are discussed in some detail in this guidebook and are included among the scheduled stops. Another member, the Mount Baker hornblende gabbro, has been recognized informally (Stockton and Giddens, this guidebook).

GENERAL CHARACTERISTICS

The Roosevelt Gabbros form dikes, sills, and irregular bodies within the Glen Mountains Layered Complex. They are in turn intruded by younger intermediate rocks (Otter Creek Microdiorite and Cold Springs Breccia; table 2) as well as by granitic rocks, some of which belong to the Wichita Granite Group; others are presently unclassified and may or may not belong to the Wichita Granite Group (fig. 6).

In contrast to the Glen Mountains Layered Complex, with its *anhydrous* primary mineral assemblages, the Roosevelt Gabbros are characterized by primary magmatic hydrous phases. Biotite (or phlogopite), readily discernible on fresh rock surfaces, provides a distinctive field criterion for recognition. Amphibole and octahedral mica are typically present, the two collectively ranging in abundance from about 1 percent to 25 percent of the mode. Although they are late in the crystallization sequence relative to olivine, plagioclase, clinopyroxene, and orthopyroxene, the hydrous phases have every appearance of being primary magmatic, and not deuteric or hydrothermal. This characteristic, together with the comparatively great abundance and larger grain sizes, sets these hydrous magmatic phases and the rocks that contain them apart from the strictly deuteric, phlogopitic biotite found in trace amounts in some rocks of the Glen Mountains Layered Complex.

Where relatively abundant in the Roosevelt Gabbros, the amphibole and (or) micas form large poikilitic crystals enveloping unaltered plagioclase, olivine, pyroxene, and Fe–Ti oxides. In extreme cases (uncommon), pyroxene may be lacking in olivine-rich gabbro, with its textural position occupied instead by amphibole and phlogopite (see later section on the Glen Creek Gabbro). In a single thin section, olivine may be rimmed by orthopyroxene, amphibole, and (or) phlogopite, illustrating variable behavior of the residual liquid relative to the olivine peritectic reaction. Accessory phases, variably present in the Roosevelt Gabbros, include ilmenite, magnetite, apatite, pyrite, chalcopyrite, pyrrhotite, and sporadic pleonaste spinel. Fractionated lithologies contain quartz, K-feldspar, and zircon.

Amphibole compositions in the Roosevelt Gabbros range from titanian–magnesian hastingsite to kaersutite ($TiO_2 > 4.5$ percent); mica ranges from phlogopite (4 to 6.6 percent TiO_2) in olivine-bearing rocks, to titaniferous biotite ($TiO_2 > 5.5$ percent) in olivine-free rocks.

Bulk compositions of the Roosevelt Gabbros (table 15) resemble the high-TiO_2–high-P_2O_5–low-Al_2O_3 magmas recognized in the Keweenawan of Upper Michigan (Wilband and Wasuwanich, 1980). Their hydrous character could have been derived from melting of hydrous upper-mantle source rock, or it could be the result of contamination in the crust. Their principal interest lies in their crystallization behavior as hydrous olivine tholeiites, and in their chemical contrast to the probable parental magma for the Glen Mountains Layered Complex (anhydrous high-Al_2O_3 tholeiite) (Powell, 1981). This suggests a bimodality of basic magmatism that is becoming more widely recognized in other provinces (for example, Weiblen and Morey, 1980).

DIFFERENTIATION

Larger bodies of the Roosevelt Gabbros are internally differentiated. Both the Sandy Creek Gabbro (Powell and others, 1980) and the Mount Sheridan Gabbro (Powell and Fischer, 1976; Powell and others, 1980) are internally fractionated and show continuous gradation, with concomitant cryptic variation, from olivine gabbro to quartz-bearing gabbro–diorite or ferrogranodiorite. This observation is critical to the understanding of gabbro–granite relations in the Wichita province. Where contact zones are visible between gabbro and sizable bodies of younger Wichita Granite, the latter generally lie above the former. This relationship, together with the presence of granophyric texture in some granite bodies, has contributed to earlier interpretations of a direct fractionation relationship between the two rock groups (for example, Hoffman, 1930; Hamilton, 1956, 1959). Quite aside from the fact that granitic material in the province is much too voluminous relative to the basic rocks to have been derived from the latter by differentiation, the intrusive relations—both regional and local—demonstrate that the gran-