

Public Data File 86-86g

STURUCTURE AND STRATIGRAPHY OF THE NORTHEASTERN OKPILAK BATHOLITH  
AND JAGO RIVER AREA, ROMANZOF MOUNTAINS, NORTHEASTERN BROOKS RANGE,  
ALASKA.

BY

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## INTRODUCTION

This public data file is a preliminary report of data collected during the 1986 field season in the Romanzof Mountains, northeastern Brooks Range, Alaska. This is part of the work for a M.S. degree with the Department of Geology and Geophysics, University of Alaska-Fairbanks. The field area is located within the Arctic National Wildlife Refuge (ANWR). The objective of the project was to examine the lithostratigraphy and structural relationships of the strata in the Jago River area, especially those overlying the northeastern Okpilak Batholith, (Devonian), in contrast to the rocks north of the pluton forming Marie Mountain and east across the Jago River to western Leffingwell Ridge. A determination of the relative timing of deformational events that can be observed in the area have local as well as regional implications regarding the tectonics of this part of the Brooks Range.

## GEOLOGIC SETTING

The Romanzof Mountains are geologically unique in northeastern Alaska because they contain the only exposed granitic plutonic rocks of the northern Brooks Range. These are the Okpilak Batholith and the Jago Stock, which coincide with a major north-south structural boundary. The structural province west of the batholith is characterized by large anticlines with pre-Mississippian rocks

exposed in their cores, and complex folding with local thrust faulting in the Mississippian and younger rocks. The Franklin Mountains, to the west of the batholith, are succeeded to the north by shorter wavelength anticlines comprising a series of front ranges, including the Shublik and Sadlerochit Mountains. The eastern structural province is characterized by a broad arcuate uplift, which exposes pre-Mississippian and younger rocks, and has no front ranges. Thrust faulting in both the pre-Mississippian and younger rocks appears to have been an integral part of the structural evolution of the eastern province. The Okpilak Batholith occurs along, and may be genetically related to, the formation of the boundary between the two structural provinces. (Wallace, 1986 personal comm.). By studying the relationships between the pluton and the overlying sediments, I hope to determine the effects of the pluton on local and potentially regional structural development.

#### METHODS

Due to the remoteness of this region, dominantly reconnaissance-scale studies have been completed, Sable (1977), Reiser et al. (1980), and Bader (1984). These studies have provided an understanding of the broad geologic framework and the tectonic significance of the region. My geologic mapping was done on a 1:25,000 scale base of the Demarcation Point B 5 quadrangle, with the aid of natural color airphotos of a 1:18,000 scale. Significant portions of the base topographic map do not accurately represent the actual topography because of cloud cover on the original

(oblique) airphotos taken in 1956. This is especially true of the range front east of the Jago River.

The majority of the sedimentary rocks in the map area have been overprinted with a pervasive axial-planar cleavage which generally has obscured original sedimentary structures. The Mississippian and younger strata generally exhibit cleavage attitudes of N35-65E 30-50 SE, and should be classified as low-grade metamorphic rocks.

The structures which bound the Okpilak Batholith to the east are discordant with local and regional structures. Three hogbacks of pre-Mississippian phyllites overlain by Mississippian Kekiktuk Conglomerate and Mississippian to Pennsylvanian Lisburne Limestone dip generally to the northeast. The pre-Mississippian phyllites, vary in thickness and occurrence. The Kekiktuk Conglomerate is dominantly a clean quartz-rich sand which exhibits crossbedding and graded bedding in a number of localities. It unconformably overlies the pre-Mississippian phyllites and granites. The Kekiktuk Conglomerate varies in thickness and is gently warped in this area. The Mississippian Kayak is missing and the contact between the Kekiktuk Conglomerate and the Lisburne Group above is ambiguous. The lower portion of the Lisburne exhibits a strong cleavage and has a number of minor folds that plunge from ten to twenty degrees to the northeast. It appears that the Lisburne Group is detached from the Kekiktuk Conglomerate.

On the north side of the Batholith, 2.5 miles west of the Jago River along a drainage which feeds the McCall Creek, is an interesting exposure of Devonian through Permian rocks. The

Devonian granite (porphyritic facies), is overlain by a relatively thin sequence of pre-Mississippian phyllites, and an augen gneiss. The Mississippian Kekiktuk Conglomerate unconformably overlies these rocks. At the base it is metamorphosed, but non-schistose. The upper section is schistose, overlain by sheared Mississippian to Pennsylvanian Lisburne Limestone. Further up in the Lisburne, is a hornfelsic limestone, overlain by lower-grade metamorphosed limestones. The Permian Echooka overlies the Lisburne and exhibits a slaty cleavage. The apparent thermal effects of the pluton increase down section.

North of the pluton, especially east and west of Marie Mountain, the Mississippian through Permian are involved in a large north-overtured anticline which strikes generally northeast. It seems to plunge to the west below Marie Mountain, and then resurface west of Marie Mountain. This public data file report and geologic map contains preliminary information on the bedrock geology and structure of the northeastern Okpilak Batholith, Jago River area, Romanzof Mountains, Northeastern Brooks Range, Alaska. Modifications are anticipated with continued data analysis.

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