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GEOLOGY OF THE NORTH HAHNS PEAK AREA, ROUTT COUNTY, COLORADO

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INTRODUCTION

The author is greatly indebted to the faculty at the University of Wyoming and to all others who made this work possible. This paper is a condensation of a Master of Arts thesis in geology submitted to the University of Wyoming.

The North Hahns Peak area includes 45 sections in and adjacent to the south half of T. 11 N., R. 85 W., Routt County, Colorado, on the western slope of the Park Range and east of the Elk Head Mountains. The elevation of the mapped area varies from 7,900 feet in the northwest corner to 10,150 feet at Dome Peak on the eastern margin. An areal geologic map is enclosed in the pocket at the back of this guidebook.

STRATIGRAPHY

The exposed sedimentary sequence in the North Hahns Peak area includes somewhat less than 3,000 feet of sedimentary rocks which range from Permian or Triassic to Middle Miocene (?) in age. The generalized stratigraphic section of the North Hahns Peak area is very similar to that described by Barnwell (1955) in the South Hahns Peak District. Thickness of units is as follows:

MIOCENE (?)	
Browns Park formation	500′+
Conglomerate	0-40′
CRETACEOUS	
Mancos shale	
Upper shale unit	600′±
Middle sandstone unit (Frontier equivalent)	55′
Lower black shale unit	250′
Cloverly formation	90-120′
JURASSIC	
Morrison formation	267′
Curtis formation	125-137′
Entrada or Nugget formation	58′
TRIASSIC	
Jelm formation	227′
PERMIAN (?) - TRIASSIC	
Chugwater formation	285′+
FAULT CONTACT WITH PRE-CAMBRIAN	
PRE-CAMBRIAN	

STRUCTURE

The north Hahns Peak area is located in a zone of adjustment related to the change in direction of the axes of two mountain ranges. The Park Range axis trends generally north, but to the east of the mapped area the axis swings northwest into the Sierra Madre Range. This change in direction of the axis of the Park Range appears to have been associated with a zone of weakness, part of which is represented by the King Solomon Creek fault. The sedimentary rocks which form a reentrant into the pre-Cambrian core of the Park Range suggest persistence of this fault zone. Beekley (1915, p. 24) reported an occurrence of infaulted redbeds, which generally aligns with the King Solomon Creek fault, in the col between Flattop Mountain and Mt. Zirkel. This indicates that a possible zone of structural weakness may extend completely across the Park Range.

The structural features of the north Hahns Peak area are the result of two principal periods of deformation; late Cretaceous-Eocene (Laramide), and the post-Middle Miocene. Laramide structure consists of uplift with extensive folding and faulting, whereas post-Middle Miocene structure is characterized by intrusion and uplift with associated faulting.

Laramide Structure

The overall Laramide structure of the mapped area south of the King Solomon Creek fault varies in detail from that to the north. The southern part of the north Hahns Peak area is the northward extension of the structure mapped by Barnwell (this guidebook) which includes two major structural elements: Farwell Mountain anticline, and Hahns Peak syncline. This is in contrast to four structural elements to the north which consist of Dome Peak anticline, a biaxial synclinal basin, a low anticlinal arch, and a shallow synclinal basin (map, in pocket). The contrast is quite striking since the axes of these folds are not continuous across the east-trending King Solomon Creek fault.

The line of weakness, King Solomon Creek fault, between the two structural divisions probably extends across the Park Range manifesting itself in the north Hahns Peak area as a scissors type fault. This fault is considered to be related to the change in direction of the axis of the Park Range from north to northwest during Laramide time. Movement on the fault was perhaps renewed during a later period because Mesozoic sediments are infaulted and form a prominent hogback

at 10,200 feet in elevation on the divide between Dome Peak and Farwell Mountain.

Post-Middle Miocene Structure

The post-Middle Miocene structure is characterized by abundant intrusives. There are two phases, a rhyolite porphyry phase and an olivine basalt phase. The rhyolite porphyry phase is considered to be the earliest, but the evidence is vague. The porphyry is discussed by Barnwell in this guidebook and is therefore not discussed in this paper. However, it is believed that trapdoor faulting accompanied the porphyry intrusions in several localities within the mapped area.

The post-Middle Miocene olivine basalt surrounds Circle Bar Basin and has the circular outcrop pattern of a cone-sheet or a ring-dike. Its thickness ranges from 10 to 30 or more feet. Columnar jointing and small vesicles up to 1 mm. in diameter are commonly found.

Possible origins for such a structure are a cone-sheet, ring-dike, folded lava flow, or a folded sill. The dips on the main body of the basalt range from 40 degrees on the north side to 80 degrees on the west and south sides. The observed dips are toward the center of the structure, but accurate dip measurements are difficult to obtain.

The inward dips omit the possibility of a ring-dike since a ring-dike is a subsidence feature, and dips are vertical or outward on such a structure. The steepness of the dips on the basalt in a bed of post-Laramide age seems to indicate that the structure is discordant. It is possible that dips were increased by intrusion of magma later than the basalt. However, this possibility is eliminated since the porphyry is considered older than the basalt. A microscopic thin-section cut from a hand specimen taken at the upper contact of the basalt and the Browns Park (?) formation strongly suggests that the basalt is an intrusive rather than an extrusive igneous body. Therefore, the structure is probably not a ring-dike, a folded sill, or a folded lava flow but is probably a cone-sheet from the available evidence.

Cone-sheets are not known to occur in sedimentary rocks, but it is likely that the sedimentary cover overlying the pre-Cambrian basement is thin. Thus, the structure is probably closely associated with crystalline rock rather than with the overlying thin sedimentary sequence.

SUMMARY

A zone of weakness appears to extend across the Park Range east of the mapped area. During the Laramide orogeny the Mesozoic rocks were strongly folded and westward thrusting occurred. The post-Middle Miocene orogeny was characterized by two intrusive phases; a rhyolite porphyry phase, and an olivine basalt phase. The basalt is intruded as a cone-sheet whereas the porphyry is intruded as stocks.

REFERENCES

Barnwell, W. W. (1955), "Geology of the South Hahns Peak District, Routt County, Colorado," This guidebook.

Beekley, A. L. (1915), "Geology and Coal Resources of North Park, Colorado," U. S. Geol. Survey Bull. 596, 121 pp.