THE GEOLOGY OF THE SOUTH HAHNS PEAK DISTRICT, ROUTT COUNTY, COLORADO

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INTRODUCTION

The south Hahns Peak district is located in T. 10 N., Rs. 85 and 86 W., Routt County, Colorado. The Hahns Peak district was first described by George and Crawford (1909) in a 33 page reconnaissance report. The present paper is a condensation of a masters thesis at the University of Wyoming. The writer wishes to acknowledge the help of Dr. Brainard Mears, Jr., Dr. D. L. Blackstone, Jr., Dr. Robert Houston and Mr. James M. Hunter during its preparation. An areal geologic map is included in the pocket at the back of this guidebook.

STRATIGRAPHY

Chugwater Formation (Lower Triassic)

The Chugwater formation, 600 to 800 feet thick, consists of irregular redbeds of mudstone, siltstone and fine-grained sandstone. The formation was deposited on a Permo-Pennsylvanian erosion surface cut on pre-Cambrian rocks.

Jelm Formation (Upper Triassic)

The Jelm formation, 227 feet thick, overlies the Chugwater formation and consists of four lithologic units. The basal unit, 25 feet thick, consists of a cross-laminated clay-pebble conglomerate. The basal unit is overlain by 42 feet of purple, medium- to coarse-grained, slabby, often calcareous sandstone which is in turn overlain by 75 feet of cream-colored, thin-bedded, medium-grained sandstone interbedded with red claystone. The upper unit, 85 feet thick, is mostly covered but from isolated exposures appears to consist of red siltstone and mudstone.

Entrada Sandstone (Upper Jurassic)

The Entrada sandstone 50 to 60 feet thick, overlies the Jelm formation and consists of white to buff massive well-sorted sandstone composed of medium frosted quartz grains.

Curtis Formation (Middle Upper Jurassic)

The Curtis formation, 110 feet thick, overlies the Entrada sandstone. The formation consists of littoral deposits of black shale; calcareous, tan, ripple-marked, fucoidal shale; glauconitic, calcareous, often fossiliferous sandstone and arenaceous limestone.

Morrison Formation (Upper Jurassic)

The Morrison formation, 267 feet thick, overlies the Curtis formation and consists of 75 feet of tan, silty, often cross-laminated, fine-grained sandstone which is overlain by 192 feet of dense grey to green thin-bedded limestone of fresh water origin and interbedded variegated claystone.

Cloverly Formation (Lower (?) and Upper Cretaceous)

The Cloverly formation, 90 to 110 feet thick, overlies the Morrison formation and consists of three units. The basal unit is composed of cross-laminated chert and quartz pebble conglomerate. The middle unit consists of 25 to 35 feet of soft medium-grained often iron-stained sandstone. The upper unit is composed of 20 to 25 feet of resistant, fine- to medium-grained, well-bedded, rectangularly jointed, ferruginous, tan sandstone which is interbedded with thin black beds of shale.

Mancos Shale (Upper Cretaceous)

The Mancos shale, 900 feet thick, overlies the Cloverly formation. The basal unit, 200 to 300 feet thick, is composed of ferruginous, rectangularly jointed, black shale interbedded with thin beds of bentonite. The middle unit, 53 feet thick, consists of highly arenaceous, oil-stained, grey limestone and calcareous sandstone interbedded with bituminous black shale. Thin beds of bentonite are present at the top and bottom of the middle unit. Hunter (1955) identifies *Inoceramus perplexus* and *Prionocyclus wyomingensis* (?) of Frontier age in the limestone of the middle unit. The upper unit consists of 576 feet of grey to black shale. Hunter (1955) identifies *Inoceramus* (Haploscapha) *grandis* (Conrad, 1875) and *Ostrea congesta* (Conrad, 1843) of Niobrara age in a thin limestone bed located 875 feet above the top of the Cloverly formation and near the top of the upper unit.

Miocene (?) Conglomerate

Isolated exposures of a locally derived stream-laid conglomerate composed of large sub-angular to sub-rounded cobbles of pre-Cambrian debris are present in

the district. The conglomerate overlies the Mancos shale with angular unconformity, has a maximum thickness of 40 feet, and is thought to have been deposited as a mountainward phase of early Browns Park deposition.

Browns Park (?) Formation (Middle Miocene)

The Browns Park formation, estimated to be 1200 feet thick, overlies the Mesozoic sediments with angular unconformity and is composed of medium-hard to soft tuffaceous calcareous fine-grained quartzitic cream-colored sandstone. The sandstone contains occasional shards and rare sub-angular fine-grained fragments of sodic plagioclase. The formation is overlain by recent alluvium and debris.

STRUCTURAL GEOLOGY

The south Hahns Peak district is bounded on its east by the exposed metamorphic core of the north trending Park Range and on its west by the volcanic region known as the Elkhead mountains. The structural geology of the district is related to three periods of orogeny:

1. Permo-Pennsylvanian uplift
2. Laramide folding and faulting
3. Post Middle Miocene igneous intrusion

Permo-Pennsylvanian Uplift

The south Hahns Peak district was part of the Front Range Highland and was a source area throughout Permo-Pennsylvanian time. It is believed that the development of Laramide structure in the district was controlled by zones of crustal weakness which were inherited from this uplift.

Laramide Folding and Faulting

The Laramide orogeny formed en echelon northward trending folds in the south Hahns Peak district. One such fold is a northward trending anticline, the Farwell anticline, which bounds the east side of the south Hahns Peak district. A syncline, the Hahns Peak syncline, is adjacent to the Farwell anticline. Its steep east limb, in which Mancos shale is overturned, has been overthrust by the metamorphic core of the Farwell anticline. The syncline's west limb relatively gently rises toward a second northward trending anticline, the Elkhead anticline, which is located to the west of the south Hahns Peak district in R. 86 W. The writer believes that the Elkhead anticline, whose west limb bounds California Park, may have been thrust westward. Evidence for this suggestion lies in the presence of Lancian sediments in California Park (Fenneman and Gale, 1906).

The regularity of the northward trending folds of the region is disrupted by complex faulting in northerly, northeasterly, northwesterly and westerly directions. The northerly trend of faulting is emphasized by the Farwell thrust zone, located on the east flank of the Hahns Peak syncline. The Farwell zone can be traced 10 miles southward from the south Hahns Peak district to the Elk river, and Hunter (1955) has traced a similar zone six miles northward from the south Hahns Peak district along the west flank of Dome mountain.

The northward trend of folding and thrusting in the south Hahns Peak district is broken by northeastward and northwestward trending cross-faults. South of the Hahns Peak stock, movement on the northeastward trending faults caused the south blocks to rise or move westward and therefore resulted in a progressive westward displacement of the Farwell thrust zone in a southerly direction.

The general result of faulting has been to cut the synclinal structure west of the Farwell thrust zone into graben and horst blocks. For example, the Hahns Peak syncline is bounded on its north and south by major normal faults. The syncline is bounded on its south by a northwestward trending fault, the Hahns Peak fault, which places the Chugwater formation in fault contact with Mancos shale. The syncline is bounded on its north by the King Solomon fault (Hunter, 1955). Between the limits of these two major faults are numerous secondary cross-faults. The form of the syncline is thus a highly faulted graben bounded on its east by the Farwell thrust zone and on its north and south by upthrown blocks of normal faults.

Post Middle Miocene Igneous Intrusion

Following deposition of the Browns Park formation the Hahns Peak stock and the other intrusive bodies of the district were emplaced. The intrusive bodies take many forms but for the most part they are discordant in respect to the sedimentary formations into which they were intruded.

REFERENCES

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