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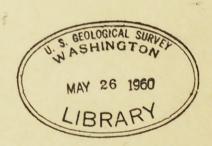
Department of the Interior
U.S. Geological Survey

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Special Report No. 9
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By

William A. Fischer

November 1949

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INTRODUCTION

Recent interest in the anticlines near the headwaters of the Utukok River has prompted the issuance of two special reports. This, the first of the two reports, deals with the Driftwood anticline, the second will consider the Awuna anticline and the western part of the Carbon Creek anticline.

At present, only trimetrogon photography is available in this area. This limits the accuracy and completeness of the photographic studies. Vertical photos were flown this summer but they will probably not be available for study before the November meeting. At such time as they are received a more thorough photo investigation will be made.

FIELD INFORMATION

The Utukok River was traversed in the summer of 1947 by R. M. Thompson and W. L. Barksdale. The following pertinent statements on the geology of the Driftwood anticline have been extracted from their field notes. These are direct quotations except where otherwise indicated. Comments im parenthesis are added where necessary.

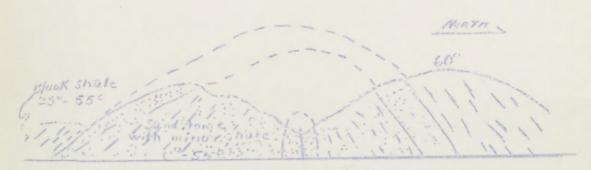
Thompson, R. M., Field Notebook, Pg. 14

"The tight anticline that runs east of Camp #2 disappears under a large flat terrace ten miles or so east of the (Utukok) river. This terrace is free from tundra over much of the west and south parts and the gravels drape over the edges obscuring both bedrock and the true gravel thickness but it appears to be fairly thick. The flat occupies about the 2000 contour. On the east and north a thin tundra caps the gravel. This would appear to be an excellent airbase site, since drainage is good and the heaving problem is therefore likely not present.

The Upper-Lower Cretaceous, (Killik-Nanushuk), contact is obscure, but limited exposures seem to place it along the E-W drainage south of Meat Mountain, or slightly to the north of the drainage."

Thompson, R. M., Field Notebook, Pg. 15

"The Camp #2 anticline broadens out so much on the west side of the river that there must be a tear fault along the river. This probably relieved the northward compressive forces on the west while on the east the anticline became tightly folded to recumbent.



Section west side of Utukok River

Following this section westward it is seen to plunge gently toward the Kokolik Divide. It is a fair looking anticline with a small amount of probable closure. However, the sandstone series is thin and the shale sequence is thick so that it is probably economically insignificant."

Thompson, R. M., Field Notebook, Pg. 8

"The exposures at the mouth of Adventure Creek tie in with the tightly folded anticline to the north of the ridge on which Camp #2 is situated. These exposures have black shales and sandstone beds that are highly crumpled and locally overturned. It is impractical to measure a section in such material."

Thompson, R. M., Field Notebook, Pg. 6

"We are apparently camped on the north (South??) limb of a tight fold in the Lower Cretaceous rocks. These rocks differ from the Lower Cretaceous to the north (south??) in that they are predominately fine-grained sandstone, light greenish gray, better sorted, although not entirely clean. The sandstone does not look marine and since it is tightly folded and since it has nearly flat-lying beds on both sides of it at what appears to be a large angular unconformity, the best interpretation is Lower Cretaceous, (Killik). It is cut off on the east-by a terrace."

Thompson, R. M., Field Notebook, Pg. 4

(Speaking of the Lower Gretaceous and Triassic sediments south of the anticline, between it and the mountain front). "The sediments are all dirty, poorly sorted, indicating rapid local sedimentation. The conglomerate and sandstone are not calcareous and probably have moderate porosity. Diastrophism has probably destroyed or hopelessly complicated any potential oil fields in such material."

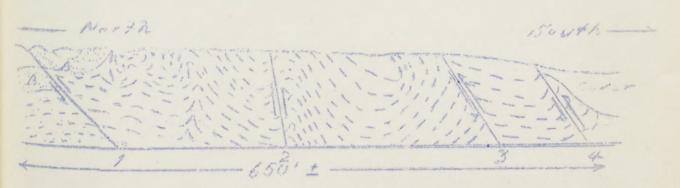
Barksdale, W. L., Field Notebook, Pg. 6

(Extract, not quote). The Lisburne limestone at the front of the mountains is apparently overturned with the Noatak sandstone lying conformably on top. Only about 700 feet of the Lisburne is exposed.

Thompson, R. M., Field Notebook, Pg. 30

(Speaking of a series of bluffs along the Utukok River five to seven miles north of the axis of the Driftwood anticline). "These bluffs are cut in highly deformed Lower Cretaceous shale, fine-grained sandstone and siltstone beds. One cut will have vertical beds, the next horizontal, and so on. To measure a Lower Cretaceous section in such complex outcrops would require a field season and then the figures would be unreliable."

"Below is a sketch of a typical Lower Cretaceous exposure as shown in a big river cut between stations 26 and 28." (Approximately seven miles north of the axis of Driftwood anticline)



"Bed A is a massive concretionary siltstone, it has only about 20° of displacement. Thrusts 263 may be large, displacement not apparent."

The notes of both Thompson and Barksdale indicate a marked angular unconformity between the shale section surrounding this anticline and the overlying sandstone. This angular difference seems to be about thirty degrees just north of the Driftwood anticline and to diminish quite rapidly toward the coast.

PHOTO STUDY NOTES

The Driftwood anticline is a tightly folded structure. Strata in the vicinity of the axis are nearly vertical and are in places overturned. The structure is recumbent in the area just east of the Utukok and possibly also in the vicinity of the extreme western end of the fold.

Plunge of the Driftwood anticline to the west is certain. Because only trimetrogon photos are now available in this area, the amount of plunge cannot be calculated. It is estimated to be on the order of 1000 feet. The eastern part of the anticline is obscured by the huge gravel terrace mentioned by Thompson. Plunge to the east may possibly occur beneath the gravel terrace. A bedding trace along the north limb of the anticline curves southward just before it disappears under the terrace. This trace rises in elevation as it curves southward so that it may not be indicative of plunge but merely an expression of topography as related to structure. It seems quite probable that neither photo analyses nor field studies will be able to prove plunge to the east. It is within the realm of possibility that closure of no, more than 200 feet might be inferred from a comprehensive study of the strikes far out on the flanks.

Photo studies and the stream pattern in the area strongly substantiate the tear fault postulated by Thompson at the point at which the Utukok River crossed the structure. It is impossible to estimate the displacement of this fault but the fault at the surface does not appear to be large. There are some indications on the photos of additional tear faults also striking in a general north-south direction but the evidence is not conclusive. The rather strange behavior of the axial plane of the anticline, particularly its partial recumbence and the tendency of the fold to become asymmetric near the western plunge, could be due to a thrust fault. Such a fault, if present, would lie near and parallel to the anticlinal axis. It could not extend westward as far as the point at which the anticline disappears. (Approximately 161°25° W. Longitude).

Stratigraphically, the crest of the anticline lies just below the Killik-Nanushuk contact. Killik sediments of indeterminate thickness and at least 2000; of Triassic rock overlie the Lisburne in this area.

Dips in the section south of the structure and extending to the Lisburne at the front of the brooks hange are quite steep and average at least thirty degrees. The linear distance is approximately twelve miles. If there were no duplication of beds in this interval, more than 30,000 feet of sediments would be represented. With the available photos it is impossible to estimate how much of this section is repeated due to folding and/or faulting. It seems quite probable, however, that it would take a very deep test to reach the level of the Lisburne.

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