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REPORT ON THE FIELD TRIP IN THE NORTHWESTERN HIJAZ QUADRANGLE

SAUDI ARABIA, DURING THE PERIOD FEBRUARY 21 TO MARCH 28, 1965

by

Robert F. Johnson

and

Virgil A. Trent
U. S. Geological Survey



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PREFACE

In 1963, in response to a request from the Ministry of Petroleum and Mineral Resources, the Saudi Arabian Government and the U. S. Geological Survey, U. S. Department of the Interior, with the approval of the U. S. Department of State, undertook a joint and cooperative effort to map and evaluate the mineral potential of central and western Saudi Arabia. The results of this program are being released in USGS open files in the United States and are also available in the Library of the Ministry of Petroleum and Mineral Resources. Also on open file in that office is a large amount of material, in the form of unpublished manuscripts, maps, field notes, drill logs, annotated aerial photographs, etc., that has resulted from other previous geologic work by Saudi Arabian government agencies. The Government of Saudi Arabia makes this information available to interested persons, and has set up a liberal mining code which is included in "Mineral Resources of Saudi Arabia, a Guide for Investment and Development," published in 1965 as Bulletin 1 of the Ministry of Petroleum and Mineral Resources, Directorate General of Mineral Resources, Jiddah, Saudi Arabia.

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An area in the north central part of the Northwestern Hijaz quadrangle (I-204) was the target for a mineral and geological reconnaissance under the Saudi Arabian - U. S. Geological Survey program of mineral investigations in western Saudi Arabia. Most of the work was done in a block bounded by parallels $26^{\circ}30'$ and $27^{\circ}N.$; meridians $36^{\circ}30'$ and $37^{\circ}30'E.$ A few days were spent in the block bounded by 26° and $26^{\circ}30'N.$, $38^{\circ}30'$ and $39^{\circ}E.$

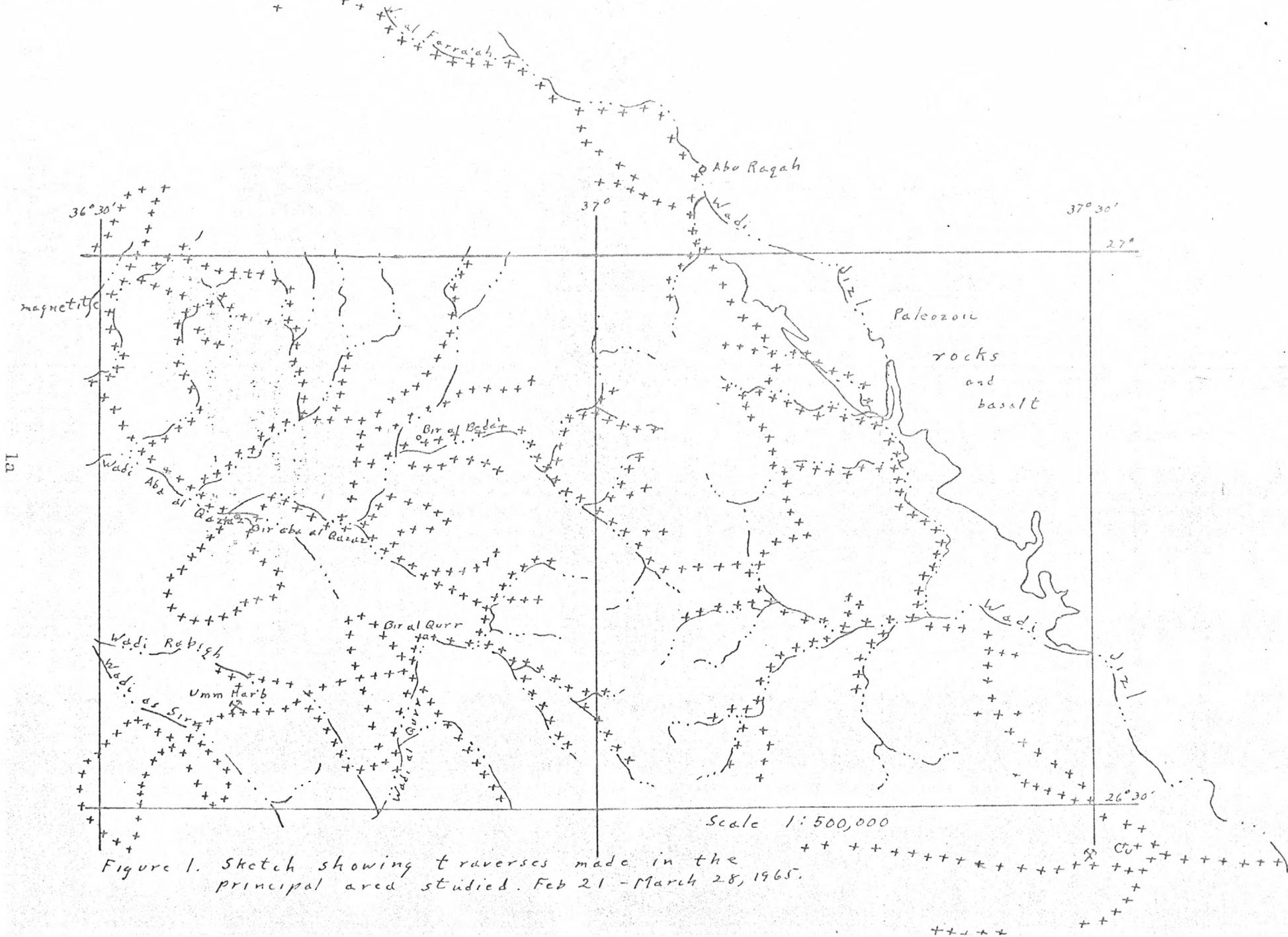
Field procedure was to follow a predetermined route with all the vehicles and make side traverses with the Land Rovers, (Fig.1). Camp was moved nearly every day to eliminate as much back-tracking as possible. Good water was obtained at Bir Abu Al Qazaz, Bir Al Qurr and Abu Raqah and was available at Bir Beda'. A special trip had to be made to Al Wajh for gasoline.

Two mineralized areas were examined during the course of the work. Numerous small bodies of magnetite occur in a ring structure in Wadi Hayyan near $27^{\circ}N.$ and $36^{\circ}30'E.$ and an ancient copper mine is located near $26^{\circ}30'N.$; $37^{\circ}30'E.$ as shown on fig.1. Elsewhere traces of copper oxides and some kyanite were the only occurrences of minerals of interest.

reference?
The western part of the area shown in figure 1 is crossed by several of the large wrench faults described by Brown. The rocks are mica schist, paragneiss, and orthogneiss. Several granitic intrusions now in part orthogneiss could be mapped in the area shows as sc on the geologic map. An area underlain

where is it

radiometric and
magnetic anomaly



by granite in Wadi Rabigh contained many quartz veins and wide areas of quartz float. Muscovite occurred in the granite suggesting the possibility of cassiterite but none was seen in the veins examined. Kyanite occurs in a gray sericite schist pendant in granite in the wrench fault zone. A kyanite boulder 20 cm in diameter was found on a small fan but the source was not located. Scattered blades of kyanite in quartz veinlets are common in the sericite schist.

The rocks are largely granitic in the vicinity of the Bir Beda' basin north and east of the wrench fault zone. East and southeast at the basin the predominant rocks are greenstone (gd) and clastic rocks of the Hadiyah formation. The rocks of the Hadiyah formation cover considerably more area than shown on the map. The granites that intrude these metavolcanic and metasedimentary rocks are without exception dry and show little contact effects.

Essentially unmetamorphosed conglomerate, varicolored clastic rocks, rhyolitic volcanic rocks and, in one area, thin-bedded, fetid limestone occur near the margin of the Paleozoic sandstones. They are probably part of the Shammar formation.

ms. 7
Biotite and hornblende schist occurs as mapped on the eastern edge of I-204 beneath the Paleozoic sandstone. The schists are of a considerably higher metamorphic grade than any adjacent rocks on the west.

The results of the mineral reconnaissance are not encouraging but two areas were seen that may warrant additional work. Numerous small bodies of magnetite occur in Wadi Hayyan characterized by an area of ring structure in dioritic rocks with some gabbro. The magnetite now exposed is not economic but the presence of magnetite over a fairly large area justifies some aeromagnetic and ground magnetometer work as proposed by Trent in another report.

The ancient copper mine near $26^{\circ}30'N. \times 37^{\circ}30'E.$ is impressive largely due to the size of the slag piles. The deposit itself is difficult to evaluate. Secondary copper minerals are abundant on fracture surfaces but their bright colors may lead to deceptively high estimates of copper content. The area should be studied in more detail, if assay results from old workings

are high enough or if geochemical samples from surrounding areas show high copper.

A side trip was made up Wadi Jizl to examine an area shown on the Hunting aerial survey to have both a magnetic and radiometric anomaly. The rocks were found to be principally rhyolite flows and conglomerate rather than 'gp' type intrusive rock. A magnetite-bearing flow or intrusive on the south side of a ridge made up of rhyolitic volcanic rocks may account for the magnetic anomaly but two traverses with geiger counters across the central part of the radiometric anomaly shown on the map failed to show any radioactivity at ground level.

