

TR12-99-103
**22, 23, 24. GEOLOGY OF THE JORDAN
RIVER AREA BETWEEN JERICHO
AND RUTLAND**

by W. R. Moore

INTRODUCTION

In the vicinity of three of the proposed dam sites on the Jordan River large scale faulting with common directions was observed. Some of the faults appeared to be of regional significance having a large influence on both the course of the Jordan River and on the present topography. As very little was known of the geology of this area of the Midlands, it appeared that more knowledge of these faults was necessary in order to evaluate the suitability of the sites. Those areas not previously investigated were mapped making a total of thirty-six square miles altogether. Unfortunately no contours were available and the map (fig. 39) was compiled from aerial photographs with little ground control. Detailed mapping of the dam sites occupied about two weeks' field time and the regional mapping connecting these areas took up a further week in the field.

STRATIGRAPHY

Two-thirds of the area is comprised of Triassic sediments and Jurassic dolerite while Permian and Recent sediments and Tertiary basalts cover the remainder.

Permian Sediments

FERNTREE SILTSTONE FORMATION (Banks & Hale, 1957)

The older sediments exposed in the area are the well bedded, closely jointed, unfossiliferous siltstone of probable Permian age which is 150 to 200 feet thick. In weathered exposures the siltstone is mottled grey and white and contains scattered erratics. It has been correlated with the Ferntree Formation of the Hobart district. The sediments outcrop in the SW corner of the area and underlie the Triassic rocks with a very low angle of unconformity (1° - 2°) on the S bank of the Jordan River $1\frac{1}{2}$ miles SW of Rutland. The contact between the Permian and the Triassic sequence is not exposed as there are no outcrops in the 4 feet between the Ferntree Formation and the overlying basal conglomerate of the Triassic rocks.

Triassic Sediments

ROSS SANDSTONE FORMATION (Nye, 1924)

Cliffs 200 feet high form excellent exposures in the Rutland-Jericho area where the Jordan River has, for most of its course, cut a narrow trench-like valley in the soft Triassic sediments.

At the base of the Triassic is a fine quartz conglomerate. Two other outcrops of this have been found in the Rutland area but the beds below it are not exposed. Overlying this is a sequence of fine grained, thickly bedded quartz sandstone which commonly shows coarse cross-bedding. One thin bed (or lens) of feldspathic sandstone was found together with rare outcrops of micaceous mudstone.

The Triassic sediments which cover a wide area around Rutland and Jericho all belong to the Ross Sandstone Formation. They appear to be 200 to 300 feet thick at Rutland but greater thicknesses occur at Spring Hill.

Recent Sediments

Recent gravel, sand and clay cover the floor of the Jordan Valley. Larger areas of such sediment are present at the Exe Rivulet and Jericho basins.

IGNEOUS ROCKS

Jurassic Dolerite

Dolerite sills up to several hundred feet thick form the high areas which cap the Triassic sediments at Spring Hill and Northumbria Hill. In addition to these, thin (ten feet thick) sills are present within the Triassic rocks exposed in the head of a small valley two miles N of Spring Hill.

Dykes range in size from 30 chains wide and $1\frac{1}{2}$ miles long (as that S of the Exe Rivulet basin) to small outcrops 30 feet wide (as that exposed in a quarry $\frac{1}{2}$ mile downstream from the Jericho dam site).

The texture of the dolerite varies from a coarsely crystalline granophyric variety which outcrops near the top of Northumbria Hill to a micro-crystalline type at the contacts. Vertical jointing in the dolerite is often very intense and closely spaced, especially in thin sills capping Triassic sediments and in dykes of all thicknesses.

Tertiary Basalt

Thin dykes of olivine basalt which intruded along faults occur in three widely spaced areas. The only extensive area (40-50 feet thick) of flow basalt occurs on the northern slope of Spring Hill.

STRUCTURE

In other areas in Southern Tasmania, because of the abundance of coarse cross-bedding, the structure of the Triassic sediments has been difficult to interpret. In the Rutland-Jericho area, however, large cliff exposures, often cut in two directions by the incised meanders of the Jordan River, allowed reliable dip directions to be obtained. Structural interpretation was further facilitated by the numerous strike ridges with conspicuous dip slopes.

Regionally the Triassic sediments swing in a broad arc which encloses what appears to be the nose of a large, shallow asymmetrical structural basin. In the E, near Jericho, the Triassic rocks form a series of NW-SE strike ridges with dip slopes to the SW. In the N in the vicinity of the Exe Rivulet however, the ridges strike E-W with dip slopes to the S while in the W, in the Rutland area, the strike of the ridges is NE-SW with dip slopes dominantly to the SE.

The Triassic sediments surround a central mass of dolerite which is on the axis of the structure (see fig. 39). The basin is not produced by folding but is thought to be the result of a complex pattern of faulting. These faults were originally Jurassic but in some cases were demonstrably reactivated in post-dolerite time, e.g., those which are now occupied by Tertiary basalt. The tilting of the Triassic sediments may have occurred penecontemporaneously with the intrusion of the dolerite or may have occurred later when some of the faults were reactivated.

The presence of basal Triassic and underlying Permian sediments on the western flank of this structure and the fact that the Ross sandstone is thinner in the W than in the E indicates that the structure is asymmetrical. In the Apsley area a thicker Triassic sequence including feldspathic sandstone as well as the Ross sandstone implies a shallow plunge to the S.

In the NE of the area a series of NW-SE trending faults cut Triassic sediments (which are capped with Jurassic dolerite) and form a series of stepped strike ridges which reach a maximum

elevation of 1,898 feet on Northumbria Hill. The faults down-throw to the NE and the tilted fault blocks dip SW. In the down-faulted areas between them a system of low NW-SE trending valleys has developed, one of which is occupied by the Jordan River.

This series of faults persists from Jericho, N to beyond Mt Anstey and S to beyond Spring Hill. The SE extension of the faults has been noted by Leaman (pers. comm.) as a major structure in the Lake Tiberias area, extending from there further S to beyond Colebrook. These faults may have developed in pre-dolerite time and have been reactivated since then, the last demonstrable movement occurring during the Tertiary.

The E margin of the wide dolerite dyke which trends N along the centre of the area mapped is formed from the coalescence of two NW trending faults originating near Spring Hill. The dolerite in the dyke is intensely jointed by closely spaced N-S joints (perhaps indicating that vertical movement accompanied the intrusion) while that at the dyke margins is chilled and brecciated. The enclosing Triassic sediments are also brecciated and on the E margin only, small plugs of Tertiary basalt occur. The presence of these plugs within the faults in the area indicates reactivation during Tertiary time.

In the Rutland region the dominant strike ridge direction is NE-SW. Exceptions to this are two NW-SE vertically faulted igneous contacts—one of them with a NW-SE strike ridge. Most ridges have dip slopes to the SE with the exception of those N of Rutland where tilting is to the NW. The strike ridges are thought to be low fault scarps which were produced from two NE-SW faults running parallel to each other and to the Lower Marsh Road.

Complicating this picture of two major fault directions (NE-SW and NW-SE) are a series of minor E-W faults which occur throughout the area. The number of small E-W dolerite dykes in the area appears to indicate that these faults were in existence during the Jurassic. However, as one set of these faults have offset and uplifted the dolerite to different levels, they were probably reactivated during the Tertiary.

The NE-SW faults parallel the direction of a major fault which separates the high plateau of Table Mountain and Woods Quoin from the area mapped. This fault appears to pass approximately four miles W of the NW corner of the map near the end of the western extension of Lower Marsh Road. This NE-SW system of faults persists through to the eastern margin of the Central Plateau.

It seems likely that, as some of the NW-SE faults appear to be such large structures in the area mapped, they will also extend through to the margin of the plateau. From the available maps of other areas of the Midlands it appears likely that these two fault systems are widespread.

From Lake Tiberias to Jericho the valley of the Jordan River is controlled by faulting. Below the Jericho dam site (see fig. 39) the river flows eastwards for one mile along an inferred E-W fault. It then changes course abruptly and flows NE along an inferred

NE-SW fault. In this area the river is flowing in a wide, open valley but downstream enters a deep narrow gorge cut in Triassic sediments when it again changes its course and meanders SW to the Exe Rivulet dam site. This latter section of the river's course beyond Rutland appears to be controlled by pre-Quaternary topography which was, in turn, probably influenced by a soft cover of sediments (Tertiary?) now removed by erosion.

References

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