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Michael BAIGENT  
University of Kent

Robert EISENMAN  
California State University Long Beach

### **A GROUND-PENETRATING RADAR SURVEY TESTING THE CLAIM FOR EARTHQUAKE DAMAGE OF THE SECOND TEMPLE RUINS AT KHIRBET QUMRAN**

During January 1992, a survey of Khirbet Qumran and the surrounding area was conducted under the leadership of Professor Robert Eisenman of California State University Long Beach. This was part of a project initiated in 1988 which aimed at recording all the caves, traces of habitation, defence installations, and water control systems from Qumran to Ein Gedi. The 1992 survey was, for the first time in Israel, to include the use of 'subsurface interface radar' equipment. A permit for this was issued by Yitzhak Magen on 17 October 1991 on behalf of the Israel Antiquities Authority.

As the use of this ground-penetrating radar equipment and the interpretation of the results requires considerable technical expertise, we were fortunate in obtaining the support of the equipment manufacturers – Geophysical Survey Systems, Inc. – and both the Manager of European operations, Mr. Greg Mills and an English commercial operator of the equipment, Mr. Tony Woods. Both arranged to spend a week on site with us in order to operate the equipment.

This equipment has the advantage of being portable although it does need to be powered by a generator. Its use is straightforward: a transducer, connected by cables (up to 200 feet long) to a control unit, is moved manually at a constant speed along a straight path.

A radar impulse generator within the transducer transmits electromagnetic impulses into the earth. Any deviation from the homogeneity of the earth reflects some of the transmitted energy. Thus any interface between earth and a void, earth and a rock or stone structure, or even earth of one type and earth of another, causes a reflection and so is revealed on the computer monitor. The difference between earth, rock or a void can also be noted by their different characteristics on the screen. The depth to which it can penetrate depends upon the conditions; equipment of the type we used could reach two metres in sandstone and up to forty metres in sand and salt. A new generation of more powerful equipment has since become available.

While we undertook a comprehensive radar scan of all the ruins of Qumran, the plateau area and the cliff face, one of the prime tasks was to investigate the claims for earthquake damage, claims upon which crucial points of the historical interpretation of the ruins have been pegged.

The first exploratory excavation of the Second Temple ruins at Khirbet Qumran was conducted by Father Roland de Vaux in 1951. Subsequently, from 1953 to 1956, annual excavations were undertaken.<sup>1</sup> De Vaux discovered that great destruction had been caused by a fire leading to the partial or complete abandonment of the site.<sup>2</sup> This fire was dated to some time near the beginning of the reign of Herod the Great (37-4BCE). The cause of this destructive fire was not obvious but a large crack was found running through a cistern (locus 48 and 49 on de Vaux's plan) and de Vaux argued that this had been caused by one of the earthquakes endemic to the region. He considered that this was the earthquake of 31 BCE mentioned by Josephus.<sup>3</sup> De Vaux further concluded that this earthquake had caused the fire which, in turn, had caused the abandonment of the site.

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<sup>1</sup> Preliminary reports were published in: R. de Vaux, *Fouilles au Khirbet Qumrân. Rapport préliminaire sur la deuxième campagne*, "Revue Biblique" 61 (1954), pp. 206-236, and R. de Vaux, *Fouilles de Khirbet Qumrân. Rapport préliminaire sur les 3<sup>e</sup>, 4<sup>e</sup>, et 5<sup>e</sup> campagnes*, "Revue Biblique" 63 (1956), pp. 533-577.

<sup>2</sup> R. de Vaux, *Archaeology and the Dead Sea Scrolls*, Oxford (The British Academy), 1977, pp. 21-24.

<sup>3</sup> R. de Vaux, *ibid*, pp. 23-24. The earthquake is referred to by Josephus, in *War*, 1.370-72 and *Antiquities* 15.121-147.

Not all his colleagues agreed: Josef Milik, a member of the International Team, refused to commit himself to the link between the fire and earthquake, writing in 1959 that,

“the archaeological evidence from Qumran is not unambiguous as to the order of these two events... the thick layers of ashes suggests a very violent conflagration, better to be explained as a result of a conscious attempt to burn down the whole building; so the ashes may show the traces of an intentional destruction of Qumran”.<sup>4</sup>

At issue here is the natural or intentional destruction of the buildings at Qumran with the implications this has for the historical reconstruction of the events – if the destruction was intentional and occurred during the reign of Herod the Great then it would be reasonable to assume that the inhabitants of Qumran at the time were militantly opposed to that ruler.

Were the destruction to be natural then there would be no strong reason to assume that Herod the Great and the Qumran sectaries stood in opposition to each other spiritually, politically, or both. The relationship between them might be seen as similar to that of the Pharisees and Herod as described by Josephus. Doubt has been fairly cast upon the existence of such a harmonious relationship given the violent nature of some of the ideological positions expressed in the Qumran documents, for example, *The War Scroll*, and the strong condemnation of sexual practices of the Herodian genre in *The Temple Scroll*.<sup>5</sup> Robert Eisenman pointed out as long ago as 1983 that the sectarian position of Qumran opposed that of Herod and that this was the most likely explanation for the sites destruction and abandonment until the end of the latter's reign.<sup>6</sup>

However, if the destruction was indeed caused by the violent earthquake of 31 B.C., then this would strengthen de Vaux's assertion of a causal link between the damaged cistern and the destructive fire. This, in turn, if true, would provide an important key to the history

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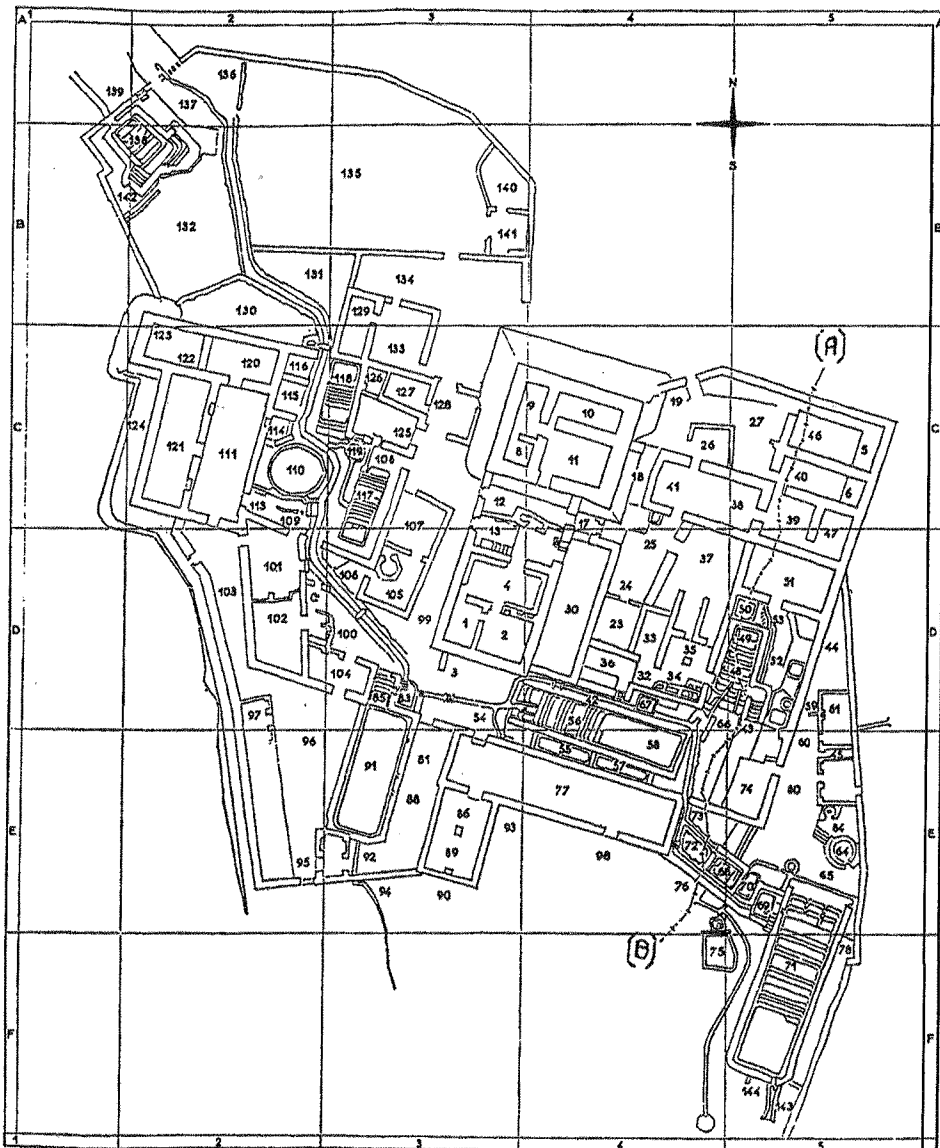
<sup>4</sup> J. T. Milik, *Ten Years of Discovery in the Wilderness of Judaea*, trans. J. Strugnell, London (SCM Press), 1959, p. 52.

<sup>5</sup> 11Q19, *The Temple Scroll*, Col. LXVI, 12-16, in F. Garcia Martinez, *The Dead Sea Scrolls Translated*, trans. Wilfred G. E. Watson, Leiden (E. J. Brill), 1994, p. 179.

<sup>6</sup> R. Eisenman, *Maccabees, Zadokites, Christians and Qumran*, Leiden (E. J. Brill), 1983, pp. 24-25.

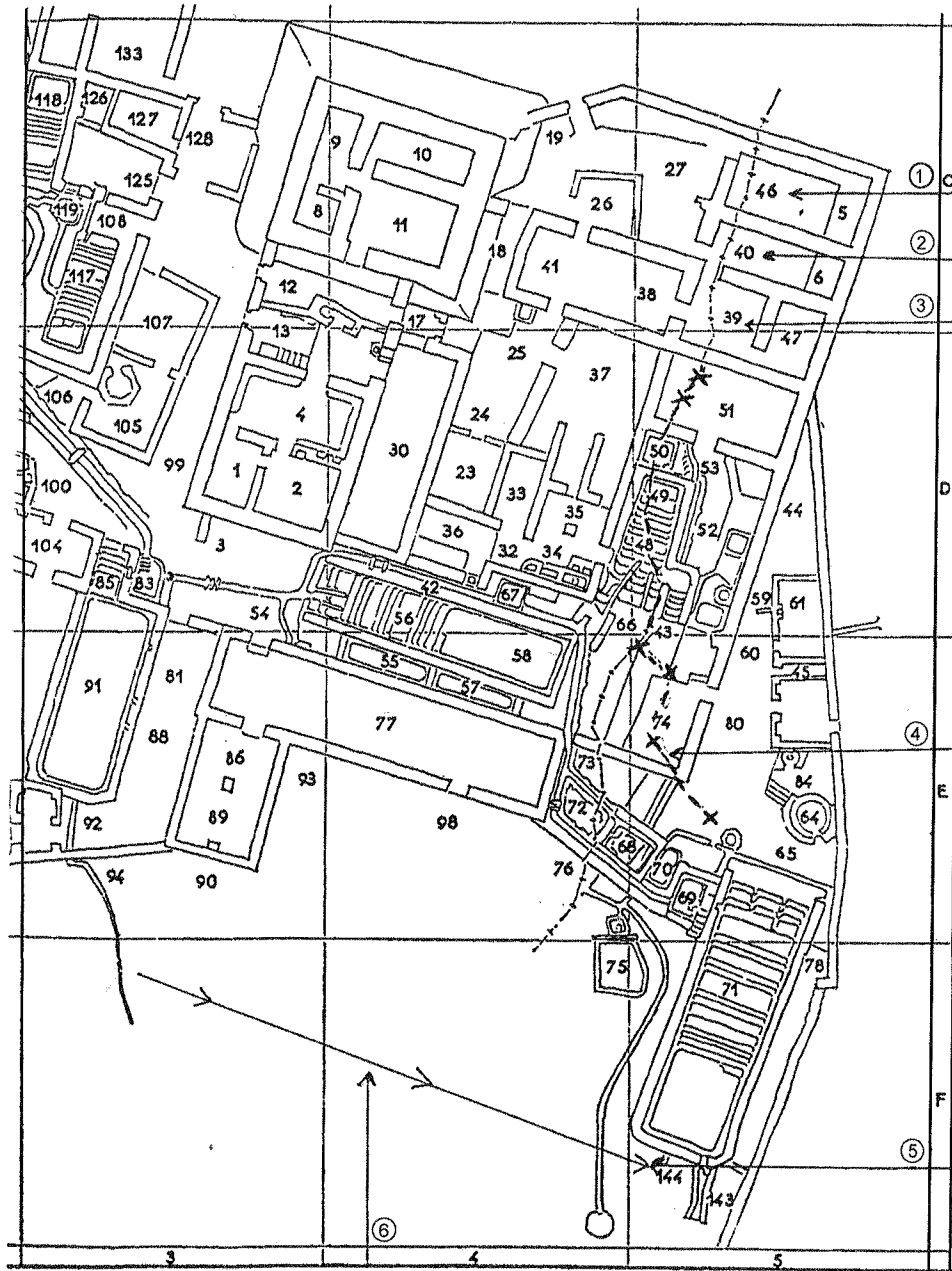
# R. de Vaux's evidence for an earthquake at Khirbet Qumran

From: R. De Vaux, *Archaeology and the Dead Sea Scrolls*, Oxford: The British Academy, 1977, plate. XXXIX.



Khirbet Qumran in Period Ib and II (schematic plan and position of the loci).  
De Vaux's earthquake fault line is plotted from [A] to [B] on his map.

Results of the radar groundscan across de Vaux's plotted fault-line



1, 2, 3 - No evidence of a fault-line in this locus; 4 - Actual fault-line  
 5 - No evidence of fault during this groundscan run; 6 - Groundscan run  
 towards locus 144.

of the site and the religious and political allegiance of its inhabitants. For example, Geza Vermes, while cautious, did repeat the connection of earthquake damage and fire in the first two editions of his widely read publication, *The Dead Sea Scrolls in English*. Vermes explained that the Qumran community,

“... came to an end as the result of an earthquake which brought down the buildings and disrupted community life: Josephus reports that a catastrophe of this nature occurred in the area in 31 B.C. Subsequently, the monastery lay deserted for some years. But this theory of de Vaux is to be accepted with caution, particularly since ten coins of the reign of Herod the Great (37-4 B.C.) have also been found.”<sup>7</sup>

However, Vermes, in his third edition of this work in 1987, dropped all reference to this earthquake.<sup>8</sup> Nevertheless, de Vaux's reconstruction continued to be maintained: Frank Moore Cross in 1992 wrote of;

“the destruction of its [Qumran] buildings in the earthquake of 31 B.C., reported by the first-century historian Josephus.”<sup>9</sup>

In 1994, Florentino Garcia Martinez in his *The Dead Sea Scrolls Translated*, was rather less certain, writing that,

“This phase lasted a long time (until the reign of Herod the Great, 37-4 BCE) and ended suddenly through earthquake or fire, or from the effect of both, as can clearly be seen in the ruins.”<sup>10</sup>

#### The Groundscan Survey.

The survey of the ruins of Khirbet Qumran with ground-penetrating radar equipment began on 3 January 1992 and continued until 19 January. For reference we used the map made by de Vaux's during his excavations of 1951-56 and his numeration of the loci.<sup>11</sup>

<sup>7</sup> G. V e r m e s, *The Dead Sea Scrolls in English*, second edition, Harmondsworth (Penguin Books), 1977, p. 54.

<sup>8</sup> G. V e r m e s, *The Dead Sea Scrolls in English*, third edition, Sheffield (JSOT Press), 1987.

<sup>9</sup> F. M. C r o s s, The Historical Context of the Scrolls [in:] H. Shanks, (ed.), *Understanding the Dead Sea Scrolls*, London (SPCK), 1993, p. 22.

<sup>10</sup> F. G a r c i a M a r t i n e z, *The Dead Sea Scrolls Translated*, p. xxxix.

<sup>11</sup> De Vaux, *Archaeology and the Dead Sea Scrolls*, plate XXXIX.

Referring to de Vaux's map, the damaged cistern is numbered locus 49 and locus 48. De Vaux shows a large crack which runs through it, one which can be easily seen at the site. The existence of this crack, which must have rendered the cistern useless to the Qumran sectaries, is not in doubt. However, de Vaux then extends this crack south through loci 66, 73, 72 and 76 of his excavation map. He extends it north through loci 50, 51, 39, 40, 46 and beyond the outer wall of the buildings.

In order to check that de Vaux's 'fault-line' was accurate, we first ran our radar transducer across locus 46, the northern-most room shown with a fault. There was no evidence of any shifting of the ground here. We repeated the procedure in locus 40 and locus 39; again there was no evidence of any shifting. We next made a run across the northern third of locus 51. We discovered a fault-line exactly where de Vaux had one marked. As a check we made another run across the lower third of locus 51. Again we noted a fault where de Vaux had also noted one.

We next ran the radar transducer across the northern quarter of loci 66 and 43 revealed a fault very near where de Vaux had marked one. But we subsequently discovered that the fault diverged markedly from that shown by de Vaux.

A second run slightly to the south across loci 43 and 66 (just north of locus 74) revealed a fault-line but one which lay well to the east of that marked by de Vaux. A run across the southern quarter of locus 74 revealed a fault approximately midway across the locus. A further run across the southern part of locus 65 to locus 73 revealed a fault just north-west of a small circular structure, perhaps a basin.

Finally, we ran the radar transducer across a line beyond the southern wall of the ruins at an angle of approximately 120 degrees east which ended at locus 144. There was clear evidence of continuous earth layers with no displacement. The conclusion was that the earthquake line as noted by de Vaux in his map does not exist.

Displacement does exist but a displacement which curves from locus 65, through loci 74, 43, 66, 48, 49, 50 and ends within locus 51. The two ground-penetrating radar specialists, widely experienced in such survey work, concluded that this displacement was an example of local subsidence affecting a small part of the ruins; it was not evidence for a destructive earthquake at Qumran.