

The Innermost Secrets of Rathcroghan Mound

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The innermost Rathcrogha

Joe Fenwick, Louise Geraghty, John Waddell and Kevin Barton describe how t

A cursory inspection of Rathcroghan Mound reveals it to be a large, flat-topped but otherwise unremarkable earthen mound (Fig. 1). Indeed, some have even suggested that it is little more than a scarped and sculpted glacial ridge. Nothing, however, could be further from the truth. In recent years the work of the ArchaeoGeophysical Imaging Project—a research initiative based at NUI Galway and funded by the Heritage Council—has demonstrated that its deceptively plain external appearance conceals a monument of exceptional complexity.

The mound, averaging 88m in diameter and 6m in height, is prominently located on the plains of *Mag nAí*, 5km north-west of the village of Tusk, Co. Roscommon. This area has long been recognised as the ancient pre-Christian royal capital of *Cruachain*, and its wealth of early literary associations is as impressive as the remarkably well-preserved archaeological remains that populate its landscape.

The geophysical investigations have established that Rathcroghan Mound and a cluster of surrounding monuments are contained within a vast circular enclosure, some 370m in diameter. Though some of these monuments, including a number of barrows, pillar stones and an ancient trackway, were identified prior to the survey, other significant monuments, displaying little or no surface expression, have since been discovered on and surrounding the great mound. Most remarkable of all was the revelation that the mound's summit once served as a platform for a series of impressively large circular structures. Preliminary reports of these discoveries have been published in previous issues of *Archaeology Ireland* (10 (3) and 13 (1)) and most recently in *Archaeological Prospection* (12 (1) (2005)).

A micro-topographical survey of the mound's 'flat' summit has captured the subtleties of a number of low-relief surface features, which, with the benefit of hindsight, have revealed something of the mound's subsurface features and constructional composition. It is possible to trace the faint imprint of a large circular feature, almost 22m in diameter, placed centrally on the mound (Fig. 2) and standing slightly proud of the surrounding ground. Encircling it, a number of broad, shallow depressions radiate, like spokes on a wheel, to divide the mound's summit into several distinct segments. Electrical resistance and magnetic susceptibility surveys confirmed the presence of large-scale circular and arcuate features on the mound's summit, but it was the detailed magnetic gradiometry survey that identified, in extraordinary detail, the presence of a series of well-defined circular magnetic anomalies. These are likely to represent the foundation slot-trenches of large timber structures, possibly temples, which had been built and replaced over time on the top of the mound. The largest, 32m in

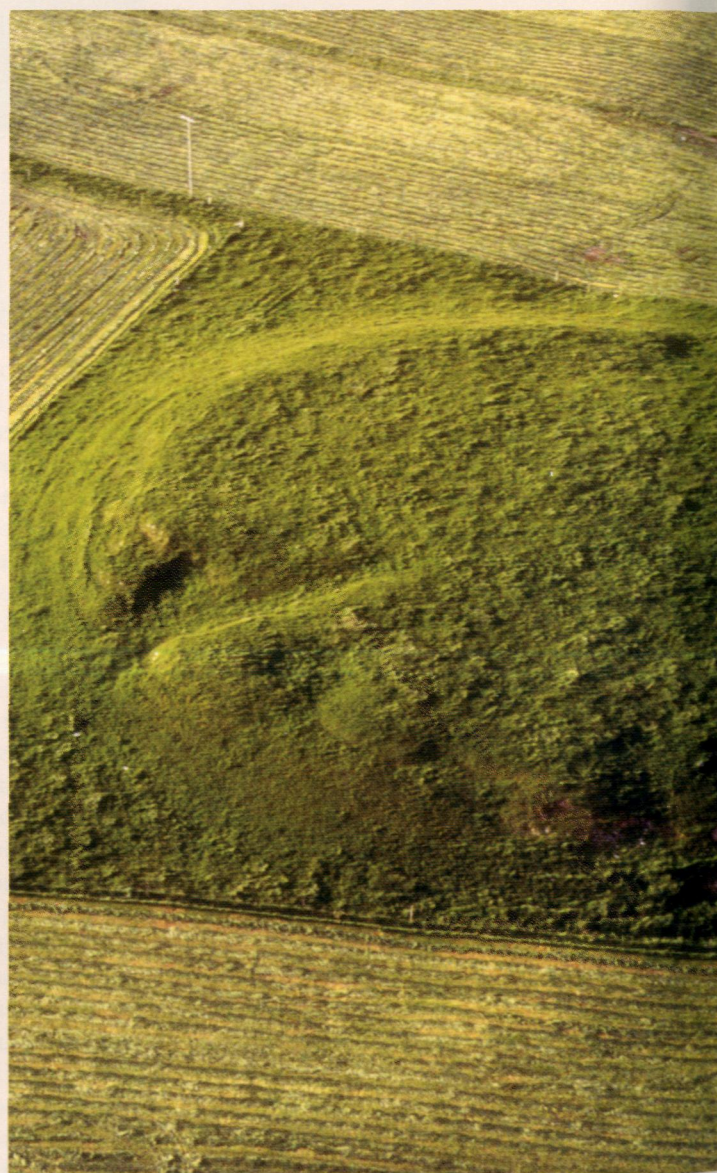


Fig. 1—Oblique aerial photograph of Rathcroghan Mo

secrets of n Mound

their long-term research project has benefited from non-invasive survey methods



und, looking north.

diameter, is of a radially opposed post-pit configuration, suggesting a structure of considerable complexity (Fig. 3). It is, however, the most magnetically distinct ring, 22m in diameter, that correlates most closely with that of the circular feature noted in the surface topography.

It is now apparent that Rathcroghan Mound, its associated 'temples', sepulchral monuments and pillar stones were enclosed within a great circular ritual 'sanctuary', and this, in turn, served as the central focus for the entire Rathcroghan complex, which extends over an area of approximately 10 square kilometres.

Though the results of the near-surface geophysical survey of Rathcroghan Mound have proven to be truly exceptional, the results of the deeper geophysical investigations are no less remarkable. Electrical resistivity tomography (ERT), electrical conductivity and ground-penetrating radar (GPR), among other techniques, were deployed to investigate the innermost core of the mound in an attempt to elucidate something of its internal structure. Initial investigations consisted of a series of parallel and transverse cross-sections across the mound (see *Archaeology Ireland* 9 (1)) in addition to an array of equi-spaced radial transects. These preliminary explorations demonstrated beyond doubt that the mound is of artificial construction, though built on the summit of a prominent glacial ridge in order to exploit an elevated and conspicuous location in the landscape. The initial survey also identified some curious internal features that warranted more detailed examination. A more intensive programme of geophysical survey was therefore initiated in an attempt to map the spatial configuration of some of these. Recent reprocessing of the ERT and GPR surveys conducted on the summit of the mound have revealed some of its innermost secrets, and hint at a constructional complexity to rival that of 'Site B' at Navan Fort.

A series of twenty closely set parallel ERT transects (employing an 'imager-cable' with 1m electrode 'a'-spacing), 2m apart and running approximately east-west, were conducted over the 'flat' summit of the mound. Res2dinv software was used to produce a series of topographically adjusted pseudo-sections (a typical example, though in this instance across the entire width of Rathcroghan Mound, is depicted in Fig. 4). In addition to cross-sectional profiles, these data were also processed to produce a series of three planometric images, based on a series of successively 'deeper' apparent resistivity values, which sampled a progressively greater volume of soil from the surface to depths of approximately 0.5m, 1.5m and 2.5m respectively (Fig. 5). This procedure revealed some unexpected and intriguing results.

The presence of a distinct annular feature of relatively high electrical resistivity, c. 22m in maximum diameter, was detected at the centre of the mound, and this anomaly persists as a distinct entity through all three images. The presence of a second larger, though less clearly defined, concentric circle of relatively high

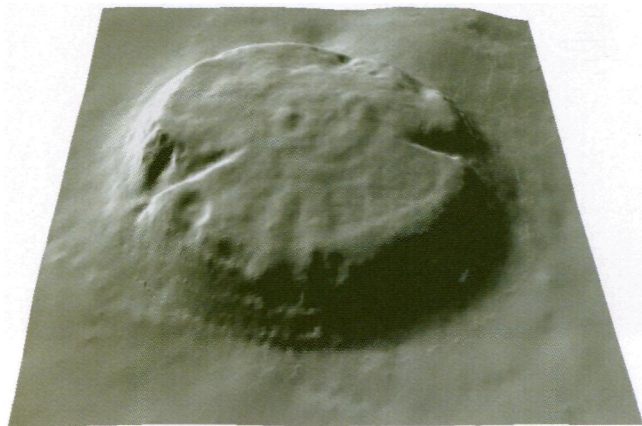


Fig. 2—Topographical shaded relief model of Rathcroghan Mound, looking north (perspective view illuminated from the north-west with vertical exaggeration of 300%).

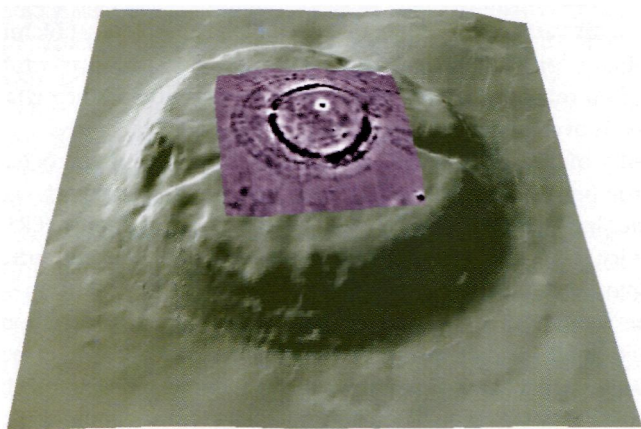


Fig. 3—Perspective view, looking north, of the fluxgate gradiometer survey of the mound's summit draped over the surface topography (vertical exaggeration of 300%).

electrical resistivity, approximately 34m in diameter, is also apparent, but this anomaly is more distinct in the two deeper levels. These extraordinary features, clearly artificial in nature, may be interpreted as concentric stony deposits or 'walls' buried within the earthen core of the mound. Though potentially buried at greater depth, they appear to be broadly concentric with some of the near-surface circular features identified in the magnetic susceptibility, electrical resistance and gradiometry surveys. Indeed, the inner 'wall' appears to be coincident with the most magnetically distinct ring noted in the latter, which in turn is expressed in the surface topography.

A more intensive GPR survey was also undertaken over the summit of Rathcroghan Mound, employing a Pulse Ekko 1000 GPR system (225MHz antenna frequency and 0.05m step interval) with the intention of producing a series of depth-calibrated time-slices through the mound. For the purposes of this survey a total of 161 parallel transects, each 50m long and set just 0.25m apart, were conducted over a rectangular area of 40m east-west by 50m north-south. The data have undergone a number of standard processing procedures in order to enhance the signal resulting from potential archaeological sources and to remove spurious reverberated reflections and noise. After applying these procedures it was possible to produce a series of depth-calibrated cross-sections. As a final procedural step each of the GPR sections was adjusted to its individual surface profile using the detailed topographical survey data (an example of a typical GPR section, across the entire width of the mound, is depicted in Fig. 6). All 161 of these sections were then combined to form a three-dimensional volume, or 'cube', using EKKO 3D software. Fortner T3D (Slicer) software was then used to visualise and extract depth-calibrated time-slice 'snapshots' through the mound.

The resulting composite GPR images are truly remarkable and have far-reaching interpretative implications for our understanding of the internal complexity and composition of the mound (Fig. 7). The GPR survey unequivocally verifies the presence of two concentric circles at depth within the core of the mound. Interestingly, in accordance with the ERT, the GPR images reveal that the outer ring, or circle, is set somewhat deeper in the mound than its smaller counterpart. The inner circle, approximately 22m in diameter, appears consistently through consecutive depth-calibrated time-slices, between approximately 1m and 2m below the summit of the

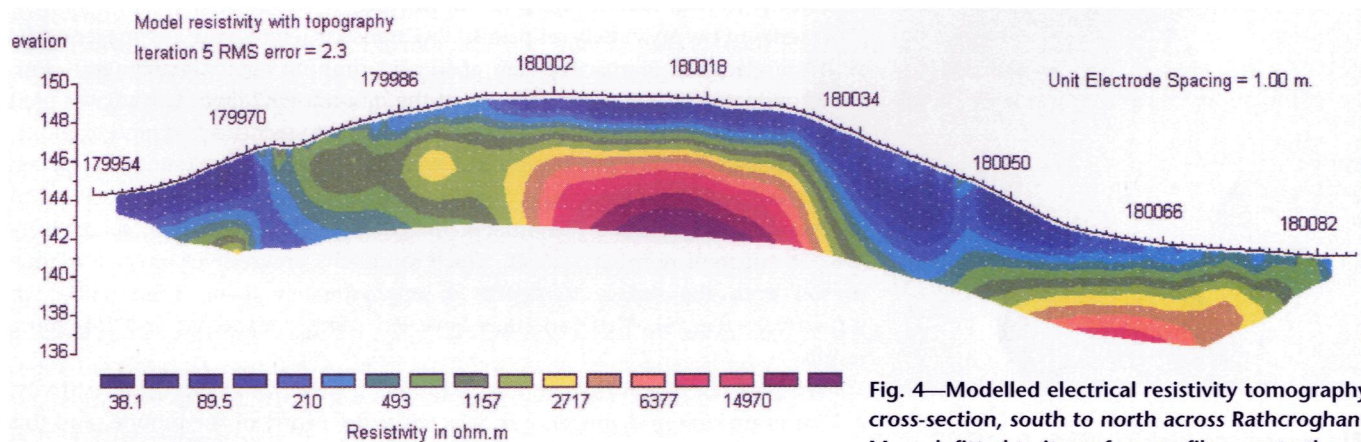


Fig. 4—Modelled electrical resistivity tomography (ERT) cross-section, south to north across Rathcroghan Mound, fitted to its surface profile — note the area of high resistivity values within the core of the mound.

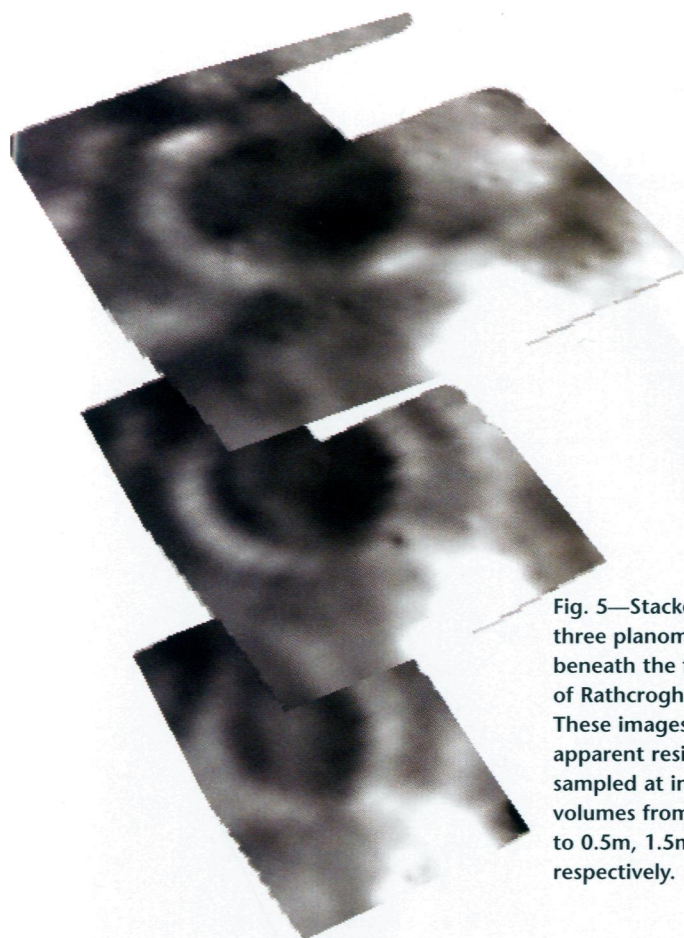


Fig. 5—Stacked-plot of three planometric images beneath the flat summit of Rathcroghan Mound. These images display the apparent resistivity sampled at increasing volumes from the surface to 0.5m, 1.5m and 2.5m respectively.

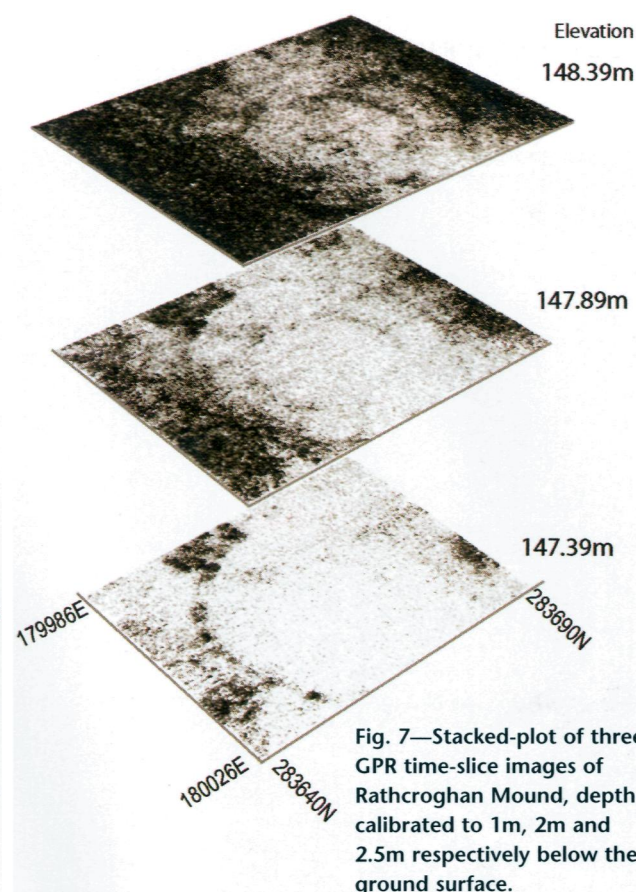


Fig. 7—Stacked-plot of three GPR time-slice images of Rathcroghan Mound, depth-calibrated to 1m, 2m and 2.5m respectively below the ground surface.

mound (i.e. between depths of 148.89m and 147.89m below Ordnance Datum—mound summit 149.89m OD), but has all but faded on reaching a depth of c. 2.5m below the surface (i.e. 147.39m OD). In contrast, the outer circle, averaging 34m in diameter, only begins to emerge at a depth of about 1.5m below the summit of the mound (i.e. 148.39m OD) but remains visible to a depth of c. 2.5m (i.e. 147.39m OD).

The integrated research design pioneered by the ArchaeoGeophysical Imaging Project, employing a wide range of survey techniques, has demonstrated the effectiveness of this strategy. Rathcroghan, for a long time considered something of an archaeological oddity, has revealed that it has more in common with the other major royal sites than was originally thought. Indeed, on the basis of the exceptional detail and clarity of the geophysical imagery alone—granted that this is but a partial picture of the mound's internal complexity—it is possible to draw compelling comparisons between the large-scale circular features at Rathcroghan and the extraordinary timber circles excavated at Navan Fort and Knockaulin, and very possibly at Ráith na Senad,

Tara, too.

Remarkably, it has been the exclusive use of non-invasive survey techniques that has provided this insight into the internal complexity of Rathcroghan Mound, its relationship with the cluster of nearby surrounding monuments and its wider landscape context. Though we have come a long way towards an understanding of Rathcroghan, the research has yet to scratch the surface.

Acknowledgements

We would like to express our gratitude to all those who assisted with the fieldwork at Rathcroghan over the years. Our thanks, too, to the staff of the Cruachan Aí Centre (www.cruachanai.com), the Tusk Action Group and the local community for their ongoing support and genuine interest in our research. We are particularly indebted to Michael and Geraldine Kelly for permitting access to their land and facilitating our work at Rathcroghan Mound, and to Kevin and Pauline McGloin, the current landowners, for continuing this spirit of goodwill and cooperation. ■

Fig. 6—Depth-calibrated GPR cross-section, employing a PulseEKKO IV 100MHz system with sampling interval of 0.25m; section west to east across Rathcroghan Mound and fitted to its surface profile.

