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## Discovering the Secrets of Stonehenge

*A revolutionary new idea on the movement of big monument stones like those at Stonehenge has been put forward by an archaeology student at the University of Exeter.*

Whilst an undergraduate, Andrew Young saw a correlation between standing stone circles in Aberdeenshire, Scotland and a concentration of carved stone balls, which may have been used to help transport the big stones by functioning like ball bearings.

Young discovered that many of the late Neolithic stone balls had a diameter within a millimetre of each other, which he felt indicated they would have been used together in some way rather than individually. By plotting on a map where the carved balls were found, he realized they were all within the vicinity of Neolithic monuments known as Recumbent Stone Circles. These stone circle monuments in Aberdeenshire share an equivalent form to Stonehenge, yet with some much larger stones.

To test his theory Young built a model using small wooden balls which were placed in a grooved piece of wood molding, similar to a railway track but with a groove rather than a rail. The balls were spread apart and a mirror image of the track was placed on top supporting a wood platform. He then placed concrete slabs on the tracks, to replicate a heavy weight.

Young said, "I then sat on top of the slabs to add extra weight. The true test was when a colleague used his index finger to move me forward, a mere push and the slabs and I shot forward with great ease. This proved the balls could move large heavy objects and could be a viable explanation of how giant stones were moved, especially in relation to where the stone balls were originally found."

A further experiment on a much larger scale was arranged with the financial assistance of Gemini Productions and WGBH, Boston for NOVA, an American documentary TV programme. They were focusing on Stonehenge and wanted to see if a team of archaeology students directed by Professor Bruce Bradley, a lead archaeologist at the University of Exeter could build and test a life size model using wood that might reflect how massive stones could have been moved across the landscape. Previous experiments, which others have carried out to move large stones had not been particularly effective. The building of a hardened surface to roll logs on and the trench experiments only moved the stone with great effort and if they had

been moved in this way the hardened surface or trench would show up in the archaeological record, however these have not been found.

In the large scale experiment, green wood was used for cost purposes. Neolithic people would have had access to much better materials, such as cured oak, which is extremely tough and was in abundance due to the great forests at the time. They also had the technical ability to cut long timber planks, known through archaeological evidence of planks used as a way of creating tracks for people to walk on through bogs. The experiment used hand shaped granite spheres as well as wooden spheres.

Professor Bradley said, "Our experiment had to go for the much cheaper option of green wood, which is relatively soft, however, we successfully moved extremely heavy weights at a pace. The demonstration indicated that big stones could have been moved using this ball bearing system with roughly ten oxen and may have been able to transport stones up to ten miles per day. This method also has no lasting impact on the landscape, as the tracks with the ball bearings are moved along leap frogging each other as the tracks get moved up the line."

He added, "It demonstrates that the concept works. It does not prove that Neolithic people used this method, but it was and is possible. This is a radical new departure, because previous ideas were not particularly effective in transporting large stones and left unanswered questions about the archaeological record they would have left behind."

The next stage in the project is to collaborate with the engineering experts at the University who can calculate the loads which could be transported using various combinations of variables such as hard wood and U-shaped grooves. This will provide the mathematical evidence to see how much force would be needed to get the stone moving and to keep it moving. This will enable the project team to gain an even greater understanding of how stones may have been transported across huge distances and even up hills. The ultimate goal is for a full scale experiment in Aberdeenshire using more authentic materials, stone balls and a team of Oxen.