

Discovery and Analysis of a Urinary Stone from an Anglo-Saxon Burial

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A small oval shaped stone-like object was discovered within an Anglo-Saxon burial, during excavations of the Boneyard site (NHER No.1609) of the Sedgeford Historical and Archaeological Research Project (SHARP), Norfolk. Osteological analysis of the burial remains (S3010) revealed them to be those of a 13 – 15 year old individual. However, as the remains were juvenile, it was not possible to determine the sex.

It was believed, at the time of excavation, that the 'stone' could be a urinary calculus (kidney or bladder stone). Its size, shape and internal structure would suggest it is a bladder stone but this could not be conclusively determined from visual inspection alone.

Although urinary stones are not endemic in Norfolk today, bladder stone disease, in particular, has a long history of occurrence and high incidence in the county. The first written records of the disease in Norfolk date from at least the early 1560's. It has also, historically, affected young males more frequently than females. Over the years, many reasons have been advanced for the high incidence of juvenile bladder stones. However, clinical studies of urinary stone formation have failed to identify any clear-cut causes and have concluded that their formation may be multi-factorial.

The recovery of urinary calculi from the archaeological record is rare. This is not necessarily because few people suffered from urinary calculi in the past. It is thought that many biological stones do not survive in the burial environment or, they are missed by excavators who often mistake them for natural geological stones. The analytical confirmation of whether the recovered 'stone' is in fact a urinary stone was therefore critical.

The 'stone' was analysed by X-ray Diffraction (XRD) to determine its mineral composition. The data confirmed that the stone was of biological origin and revealed a composition of two mineral phases; poorly crystalline hydroxyapatite (bio-apatite) and β -tri-calcium phosphate (β -TCP, often referred to as whitlockite).

Bio-apatite is a common component of modern urinary stones. β -TCP is usually only found as a minor constituent and stones that are entirely composed of bio-apatite and β -TCP are rare. The β -TCP mineral phase suggests a urinary tract infection cause. It is a phase more frequently found in stones from females and in children, it is more commonly found in bladder than in kidney stones.

The XRD analysis of the stone, combined with osteological evidence, has enabled several conclusions about S3010. The remains are those of an individual who suffered from a primary bladder stone which formed as a result of chronic urinary tract infection. In addition, the conclusion that the remains are those of a female is very plausible. This is a different interpretation to that which would have been assumed based on the consideration historical records of urinary stone disease.

A journal paper on this research has been accepted for publication in Norfolk Archaeology in 2009. The work has also been the subject of a poster, presented at the 2007 SHARP annual open day to members of the general public funded through a Royal Society of Chemistry Grant for Public Activities.



Figure 1: Calculus recovered from the burial fill of skeleton S3010 (scale in millimetres).

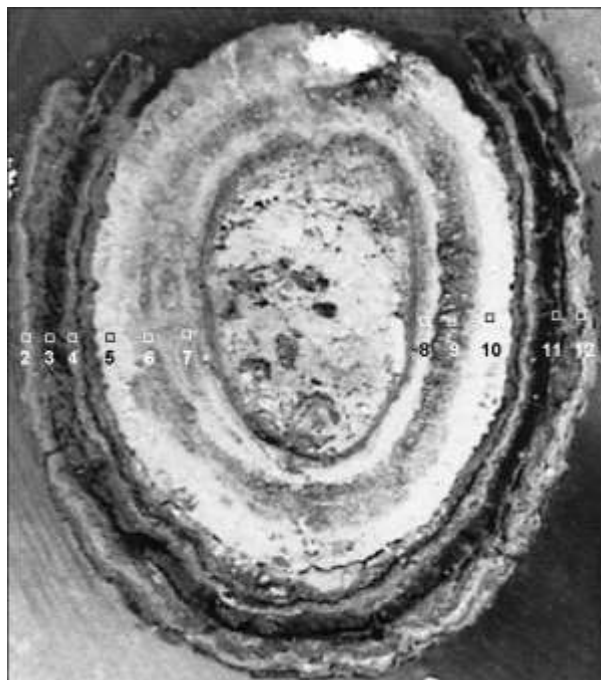


Figure 2: Scanned surface of sectioned stone, indicating scan points □, 2 – 12 (scan point 1, resin, not shown). Scale 1:7.

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