



Searching for Syphilis

Extracting DNA from ancient bone

Narrator:

Of the three possible diseases Rivenhall Woman could have been suffering from, one is quickly discounted.

Piers Mitchell:

Rivenhall is Northern Europe; relatively cool, so it's very unlikely to be a tropical form such as Yaws. You could argue that it's less likely also to be the Bejal or endemic syphilis form because people would have been fairly well covered up for most of the year unlike the case that you might find in hotter, more arid parts of the world. However, some people do believe that non-venereal forms of treponemal disease were present in northern Europe. So when it comes down to what kind of disease this particular person had I think it's very unlikely that they had Yaws, it is likely to have either been venereal syphilis. or Bejal

Narrator:

But which one? Science may soon provide an answer. In 1998 researchers at the University of Texas sequenced the complete genome of *Treponema pallidum* - the bacterium that causes syphilis. Can DNA solve the mystery of whether Rivenhall woman had venereal syphilis or its close treponemal cousin - Bejal?

Simon Mays:

Well, although this bone is over five hundred years old, it's quite possible that there are traces of DNA, from the micro-organism which caused the disease in this individual. Only if we're successful in extracting DNA from this bone, will we be able to say which of the treponemal diseases this individual is suffering from. It's just a question of whether the techniques we have currently available, are sufficiently sensitive to do this.

Narrator:

In an attempt to find out which disease Rivenhall woman was suffering from, Mays sent samples of her bone to Biomolecular Archaeologist, Abi Bouwman who is developing new ways of detecting treponemal DNA in ancient bone.

Abi Bouwman:

What I need to do first of all is get rid of any extraneous DNA that is around, which means I have to clean off the surface to make sure there is no DNA coming from the archaeologist, or the pathologist, or hopefully from the soil getting into the bones. Then we crush up the bones and we put in chemicals that allow the DNA to be released.

It's quite difficult because you have to be incredibly careful not to contaminate your sample with anything. Everything has to be incredibly clean the whole time and it does take a long time to get the DNA out of a bone and also the DNA is in such small quantities in ancient bone that it is very hard to get out.

Narrator:

So that she can rule out the possibility of DNA contamination, Bouwman needs to run a control sample of non-diseased bone from one of the other burials. Obtaining a sample means disinterring the rest of the remains and that will give Mays his first opportunity to examine the other Rivenhall skeletons.

Simon Mays:

Given that treponemal disease is an infectious disease, the fact that we've got it present in this one individual suggests that it may have been endemic in the community, so it'd be quite

interesting to go back and look at the other two hundred or so skeletons that were excavated from the site to see whether we can find anymore evidence of treponemal disease in that community.

Narrator:

After the original excavation in the 1970s, all the remains, apart from those of Rivenhall Woman, were sealed in a disused vault in the churchyard - each skeleton numbered and packed into a separate plastic bag. It takes all day to work through the two hundred odd skeletons. Mays gets his control sample but no more cases of treponemal disease are turned up.

Simon Mays:

Well I had a look at each skeleton as it came up from the vault and there were no other signs of treponemal disease amongst all the skeletons. And this is one of the skeletons which shows no sign of infectious disease and it's the one we're gonna use for the control sample for the DNA analysis. It would have been nice to have another case but I wasn't really that surprised because syphilis very rarely shows on the bones. So although it's a transmittable disease obviously, so if it was present on one individual in a community you might expect others to have it as well, it didn't surprise me that we didn't find any additional cases.