

Tuberculosis – the diagnosis of ancient infections

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The resurgence of tuberculosis (TB) associated with AIDS and linked to overcrowding and poverty in modern populations reminds today's medical audience of the unfamiliar nature of this disease and particularly its potential for devastating effects on the human skeleton. Documentary evidence from the past shows TB to be the most serious disease in post-industrial revolution Britain but you might be unaware that extensive bone changes in excavated skeletons provides strong physical evidence of the history of TB further back into history. What benefit can be gained from studying the archaeology of infectious diseases? Are we not now facing a scenario with TB which might seem somehow familiar to our medieval ancestors - 3 million deaths a year; an inability to control its spread due in part to the loss of treatment options by the emergence of antibiotic-resistant *Mycobacteria*?

Interestingly, characteristic skeletal changes attributable to advanced untreated TB have been tracked by palaeopathologists from European medieval examples back to the Egyptian era.



Figure 1: The devastating effect of TB in bone (Photograph provided by Prof Charlotte Roberts, Durham)

An approach to diagnose TB (and other microbial diseases of the past) in these specimens by ancient DNA amplification has become a very hot topic. We have reviewed the current status of the diagnosis, pathogenesis and possible origins and evolution of *Mycobacterium tuberculosis* in the ancient world (Dixon and Roberts review). The molecular diagnosis of TB in excavated skeletal remains has become more robust in recent years and is starting to answer evolutionary questions such as the origin of TB from animals and its possible relationship to leprosy. Of particular archaeological note is the emerging debate on the diagnosis of TB from rib lesions noted from skeletal remains in Europe and the US. Anthropologists have found it difficult to agree on the nature of the infections that caused these lesions and recent DNA work from the UK has provoked debate on the various possible non-tuberculosis respiratory causes. Our own work [Gernaey *et al* 2000] on a 1200 year old individual with Potts disease and rib lesions uniquely diagnosed by two independent biomarkers of specific disease, namely DNA and mycolic acid, analysis has contributed to this discussion.

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