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Much ado about nothing: The character of holes in bone

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Abstract

Larry Martin's major contribution to paleopathology was his ability to simply issues to their basics and eliminate confounding considerations. That ideology led to evaluation of bones surfaces to identify the mechanism of observed alterations. The stimulus to this study was a major problem compromising advancement of our understanding of disease through time: Recognition of alteration of surface appearance had proven a major challenge to students of physical anthropology, be they at the origin or at the culmination of their career. This is exemplified by the Irene Mound reports, wherein some anthropologists reported periosteal reaction in 100%; others, in none. While taphonomic alteration (cortical abrasion) and reactive changes (periosteal reaction) are clearly distinguishable on the basis of thermodynamic characteristics, there is merit to identification of direct observational approach.

As vocabulary has yet to be developed to distinguish the surface alterations, perhaps it is useful to consider them as pitting phenomenon and consider the individual components as pits. However, the term pit is so variably applied as to be incomprehensible in its meanings, rendering it undecipherable. Closer examination of surface defects seemed appropriate. Abraded cortical bone and that affected by taphonomic processes and others with surface pathology were therefore examined by epi-fluorescent microscopy and the surface defects/apertures contained within, characterized.

Taphonomic processes which altere bone simply expose intracortical bone in a planar manner. The related damage is visualized as adjacent channels and thin walls with flat, non-remodeled surfaces. Surface defects of vascular origin have a very characteristic appearance with internal bifurcation. This contrasts with the elevated rings surrounding Sharpey fiber insertions. Pathologic bone affected by periosteal reaction is characterized by confluent, well-defined, deep circular or elliptical holes and serpentine surface channels. New bone typically in-filled holes in a similar manner to that seen with healing trepanation. Vascular accompany new bone formation and provide insight to the pathophysiology of the thermodynamic results. Serpentine surface channels producing a filigree appearance characterize infections produced by pus-producing organisms.

Close examination of surface defects/apertures should allow students of bone (e.g., paleontologists) to distinguish taphonomic and pathologic damage. For clarification of a major challenge in evaluation of bone in the absence of soft tissue, distinguishing taphonomic and pathological damage, it turns out that the answer is in the holes.