

AN AVIAN BOTULISM EPIZOOTIC AFFECTING A NESTING SITE POPULATION OF
PRESBYORNIS ON A CARBONATE MUDFLAT SHORELINE OF EOCENE FOSSIL LAKE

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The shorebird-duck mosaic bird, *Presbyornis*, is best known from the Eocene Green River Formation where it often occurs in local monospecific bonebeds suggestive of mass mortality events. The sedimentology, XRD mineralogy, paleontology, and taphonomy of one of these *Presbyornis* bonebeds was studied on the south margin of Eocene Fossil Lake, Lincoln County, Wyoming. Many mechanisms have been proposed for mass mortality of waterfowl. The evidence from this site is most consistent with an interpretation of mass avian death due to ingestion of *Clostridium botulinum* neurotoxin.

Presbyornis is important because it is one of a small group of three known Paleocene and Eocene "transitional shorebirds" or "shorebird-modern order mosaics". Recent theory on the evolution of birds has focused attention on this group of "transitional shorebirds" which may have been the avian survivors of the K-T extinctions. These survivors may represent a species bottleneck from which all modern birds evolved explosively in the early Tertiary.

At this *Presbyornis* site, two distinct mass mortality events are evident. The first event (lowest in the section) is a widespread aquatic gastropod mortality with localized eggshell and a few *Presbyornis* bones. The second event (1 cm. higher) is a broad strandline of at least 58 *Presbyornis* carcasses (MNI=58). The gastropod mortality occurred on a surface of nondeposition and is separated from the avian mortality event by 1 cm. of ostracodal calcimicrite.

The surface of nondeposition may represent a time when the gastropods colonized the lake bottom. This colonization was likely followed by a rapid lake regression which exposed the carbonate mudflat, killed the gastropods, and enhanced the incubation of *C. botulinum*. The exposed mudflat accumulated eggshell fragments and few bones, as neurotoxins killed a large number of *Presbyornis*. Disarticulation of the avian carcasses preceded another freshwater transgression of the lake which moved the avian bones into strandlines and preserved them within the next unit of rapidly deposited ostracodal calcimicrite.

Analogous modern avian botulism epizootics are often preceded by a mass mortality of aquatic invertebrates which are exposed and killed by rapid shoreline regression. Subsequent to invertebrate death, *C. botulinum* is incubated in decomposing carcasses by exposure on a warm mudflat. Ingestion of these incubated neurotoxins by waterfowl causes rapid avian death. Strandlines of avian carcasses accumulate on receding waterlines.

Characteristics of this bonebed and paleoenvironment are consistent with an interpretation of mass avian mortality by ingestion of *C. botulinum* neurotoxin.