

h27 Taphonomy < organic decomposition >

Lodermulch had been asked his opinion of the so-called Funambulous Evangels, who, refusing to place their feet upon the ground, went about their tasks by tightrope. In a curt voice Lodermulch exposed the fallacies of this particular doctrine. “They reckon the age of the earth at twenty-nine eons. ... They stipulate that for every square en of soil two and one quarter million men have died and laid down their dust, thus creating a dank and ubiquitous mantle of lich-mold, upon which it is sacrilege to walk. ...”
—Jack Vance, *Eyes of the Overworld*.¹

The landscape is not littered with the corpses of deceased animals. However, the daily production of carrion in grassland ecosystems, as known for Tanzania’s Serengeti savannah, is about 4.4 kilograms per square kilometer.² Evidently, land animals that die in the open leave little trace of their common passing. Upon death, what is the course of organic decomposition? From organic remains how can we infer, for example, the manner of burial or the ecological setting under which death took place. Darwin long ago was observant that cinders, stones, and bones that would litter fallow ground, soon become buried by worm castings to rest at the base of stone free mulch that, unlike the cinders, stones, and bones, is material that has passed through the gut of worms and is to the depth of their burrowings.³ The study of such things, from the time of an organism’s death until it is discovered as a fossil, is called *taphonomy*.⁴

On land, mammals and song birds have been the long term beneficiaries of the mass extinction, that made room and freed up resources for them 65.5 million years ago. The footprints of mammals, birds and crocodiles are bedding-plane trace fossils above and below the E-K boundary. Significantly, turtles and frogs among the reptiles and amphibians survived, while, strangely, dinosaurs, with their credentials of high adaptability, did not. While “one dinosaur could make many tracks but could only leave one skeleton,”⁵ dinosaur footprints stop at the boundary. Their tracks are common below.

As is evident from their rarity, preservation of land vertebrates requires extraordinary conditions. But examples of remarkable circumstances of preservation are occasionally chanced upon, as the 10 million year old mostly articulated skeletons of prehistoric rhinos, horses, camels, and birds, in the Ashfall Fossil Beds in northern Antelope County, northeastern Nebraska.⁶

An extraordinary preservation of land vertebrates, just before the E-K boundary, occurs in the Gobi desert, Mongolia, a proven treasure trove of Upper Cretaceous land-vertebrate fossils. In 1995, Demberelyin Dashzeveg reported on the highest concentration anywhere of well preserved skulls and articulated skeletons at the Ukhaa Tolgod (“brown hills”) site. The fossils (400 mammals and lizards, 100 dinosaurs, and the first found skull of the bird *Mononykus*) occur in a variety of lithologies: Cross-bedded aeolian sandstones are interbedded with moderately coarse conglomerates and mudstones. These, as well as semiarid palaeosol profiles of caliche and hardpan, suggest a scenery of dunes, interdune channels, streams and ponds, and sandstorm and flood events in a drought prone realm. The sandstones are locally highly fossiliferous and are elsewhere virtually unfossiliferous. Fossil assemblages often include only a few species. The buried large animals may have been congregating around sources of water when they were overwhelmed by sandstorms when drought or overcropping had created prairie-dustbowl (**Footnote h27.1**) blowout conditions. Flash-floods from intermittent (ephemeral) streams could have drowned the small mammals in their burrows.⁷

Can we hope that a thanatocoenosis (death assemblage) of land vertebrates will one day be found at the E-K boundary? “It can’t be too soon!” offered a listener to the lecturer who had droned on about how the difficulty of acquiring data must result in posthumous publication. □

Footnote h27.1 The term dates to the 1930’s Oklahoma “Dust Bowl” brought on by drought and turning-the-sod plowing as a weed-control measure. Food for thought in 2004 is Anthony Trewavas comment: “Both India and China now have proven examples of the benefits of GM crops to poor farmers. Herbicide-tolerant GM crops (produced by agribusiness) lead naturally to no-till agriculture, which has enormous environmental advantages over any kind of ploughed agriculture, including organic farming.”⁸