2014 GSA Annual Meeting in Vancouver, British Columbia (19–22 October 2014)

Paper No. 134-14

Presentation Time: 9:00 AM-6:30 PM

TRACKING EXTINCT GIANTS: PEDOBAROMETRY AND DISCOVERY POTENTIAL OF THE LARGEST LAND MAMMAL *(INDRICOTHERIINAE)* AND HISTORIC BIRD *(AEPYORNITHIDAE)* FOOTPRINTS

BUYNEVICH, Ilya V., Earth and Environmental Science, Temple University, Philadelphia, PA 19122, coast@temple.edu

To date, no conclusive evidence exists of the footprints of the largest terrestrial mammal (Oligocene indricotheriine rhinoceros) and historic ratite (elephant bird, *Aepyornis* sp.). Based on their paleoecology and allometry, the potential for track discovery can be assessed by addressing the filtering effects of formation-preservation-recognition biases. For indricotheres, the lack of ichnological record is due to hard-packed nature of contemporary semi-arid scrubland substrates, limited accessibility to productive Eurasian sites, and finds of skeletal remains in coarse-grained fluvial strata. Favoring track preservation are wide home/migration ranges and presence of fine-grained and lime-rich facies in fluvio-deltaic/lacustrine areas and watering holes. Based on fleshed limb dimensions of these perissodactyls, their tridactyl prints should be at least 50-60 cm in width. Scaling to elephant and rhinoceros pedobarometry (mass ~ juvenile indricotheres), digitiportal *Paraceratherium* sp. males with a conservative maximum weight of 15 tonnes likely exerted mid-stance foot pressures of ~200 kPa (edge loading ~1,500 kPa). For aepyornithids, the isolation of Madagascar and the focus on extracting skeletons and eggs from swamplands were not conducive to ichnological research. Abundant eggshell fields in coastal dunefields, likely concentrated as deflation lag of nesting sites, may provide useful information on aeolian paleo-surfaces traversed by the ratites. Their true tracks are likely to be larger than moa's (>30 cm wide) and morphologically similar to some ornithopod dinosaurs. For adults weighing 0.3-0.4 tonnes, dynamic foot pressures may have been as high as 70-80 kPa (edge loading ~300 kPa). Once paleo-surfaces at indricothere and elephant bird localities are constrained, search for naturally weathered traces can be complemented with high-frequency georadar (>500 MHz GPR) imaging for identifying traces and undertracks, especially in sand-rich hyporelief. Efforts focused on mapping tracking surfaces, combined with GPR imaging of mammoth tracks and neoichnological experiments with modern megafaunal locomotion in varying substrates, should eventually lead to trackway discoveries, shedding light on the distribution, geomorphic impact, speed, and behavior of these extinct giants.

2014 GSA Annual Meeting in Vancouver, British Columbia (19–22 October 2014)
General Information for this Meeting

Session No. 134--Booth# 252
Topics in Paleoecology: Modern Analogues and Ancient Systems (Posters)
Vancouver Convention Center-West: Exhibition Hall C
9:00 AM-6:30 PM, Monday, 20 October 2014