

Abstract Submitted
for the OSF19 Meeting of
The American Physical Society

Avian incubation period and embryonic metabolism from egg geometry via conservation of energy SCOTT LEE, University of Toledo, JOSHUA THOMAS, Clarkson University, MAX COOLEY, RICHARD IRVING, University of Toledo — Conservation of energy is applied to the growth of an avian embryo inside its egg. The resulting theoretical model predicts the incubation period, embryonic metabolism and hatching mass of the bird using the surface area and volume of the egg of that species. Our model makes three assumptions: 1.) the hatching mass is related to the volume of the egg, 2.) the maximum metabolic rate of the embryo is related to the surface area of the egg, and 3.) the adult mass is related to the volume of the egg. These assumptions are tested by evaluating data for extant birds. This model can be applied to any avian species for which an intact egg exists, including extinct species. The embryonic metabolism and incubation period for two extinct species, including the giant elephant bird (*Aepyornis maximus*), are calculated.

Scott Lee
University of Toledo

Date submitted: 03 Sep 2019

Electronic form version 1.4