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The Relationship between Tail Length and Elevation in Toque Macaques *(Macaca sinica)* in the Natural Habitat: usinga Quick Non-Invasive Method for Measuring Body to Tail Proportions

Michael A. Huffman[1], Raveendra Kumara[2], Charmalie A. D. Nahallage[2], Yoshi Kawamoto[1], Prasad M. Jayaweera[2]

[1]Primate Research Institute, Kyoto University, Japan; [2]Department of Sociology and Anthropology, University of Sri Jayewardenepura, Sri Lanka

huffman@pri.kyoto-u.ac.jp, charmalie2@hotmail.com

The toque macaque of Sri Lanka is classified into 3 sub-species; *Macaca sinica sinica* (dry zone), *M. s. aurifrons* (wet zone) and *M. s. opisthomelas* (hill zone), based on a combination of phenotypical traits and climatic and ecological habitat distribution. We investigated the relationship between altitude and sub-species on relative tail length. Digital profile photographs were taken of 167 individual toque macaques from 27 localities distributed along elevational (2~2129 masl) and climatic zones across the island. From these photos we created a pixelated proxy for tail length (base to tip) and body trunk length (base of neck to base of tail) of each individual macaques using "Home of LibreCAD, 2D-CAD" free ware (http://librecad.org/cms/home.html). From these measurements, we calculated a tail-to-trunk index (TT index) for the relative proportion of tail to body length. A statistically significant relationship was found between T-T index and elevation (LMM χ^2= 15.45, $p < 0.0001$). With every 100 m of elevation increase, the TT index decreased by 0.031 (SE + 0.007). This morphological variation seems to be an adaptation to environmental conditions. This simple method is a promising new application for the non-invasive morphometric analysis of species traits in the field.

Keywords: *toque macaque, non-invasive methods, morphometrics, elevation, relative tail length, relative body trunk length*