

ENDOCRANIAL VOLUME IS VARIABLE AND HERITABLE BUT  
IS NOT RELATED TO FITNESS IN A FREE-RANGING PRIMATE

Abigail Elise Colby

**Abstract**

Large relative brain size is a defining characteristic of the order Primates. Arguably, this can be attributed to selection for behavioral aptitudes linked to a larger brain size. In order for selection of a trait to occur, the trait must vary, that variation must be heritable, and enhance fitness in an organism. In this study, I use a quantitative genetic approach to investigate the production and maintenance of variation in endocranial volume (a proxy for brain size) in a population of free-ranging rhesus macaques. I measured the endocranial volume and body mass proxies (femur diameter and femur length) of 542 (300 females, 242 males) rhesus macaques from Cayo Santiago. I investigated variation in endocranial volume within and between sexes. Using a genetic pedigree, I estimated heritability of absolute and relative endocranial volume, and selection gradients of both traits as well as estimated body mass in the sample. Within this population, both absolute and relative endocranial volume display variation and sexual dimorphism (males have significantly larger absolute and relative endocranial volumes than females). Both absolute and relative endocranial volume are highly heritable, but I found no evidence of selection for either. These findings suggest either that endocranial volume is not undergoing selection, or that selection is neither linear nor quadratic (e.g. balancing and/or disruptive selection); therefore, I was not able to detect it using the models I employed in this study.