

# The ischial callosities of Sulawesi macaques

Berry Juliandi<sup>1\*</sup>, Bambang Suryobroto<sup>1</sup>, Dyah Perwitasari-Farajallah<sup>1,2</sup>

<sup>1</sup>Division of Animal Biosystematic and Ecology, Department of Biology, Bogor Agricultural University, Bogor, Indonesia

<sup>2</sup>Primate Research Center, Bogor Agricultural University, Bogor, Indonesia

**email:** Berry Juliandi ([bjuliandi@ipb.ac.id](mailto:bjuliandi@ipb.ac.id))

\*Correspondence to Berry Juliandi, Department of Biology, Bogor Agricultural University, Darmaga, Bogor 16680, Indonesia

## Abstract

Sulawesi island has a high level of endemism, including the seven species of monkey from the genus *Macaca* (macaques). These monkeys have a pair of sitting pads, termed ischial callosities that have diverse shapes and previously were described verbally only. Although useful, these verbal descriptions cannot fully describe shape variation and are somewhat subjective, and cannot directly be used to analyze relationships among species. Here, we report a quantitative analysis of shape of Sulawesi macaque ischial callosities using geometric morphometric tools to optimally describe shape variation and objectively reconstruct general pattern of callosity shapes. By quantification of shape variation, we compare the relationships of each Sulawesi macaque species with each other and with the two geographically neighboring macaque species, *M. nemestrina* and *M. fascicularis*, by consensus coordinates of the callosity outlines. The Sulawesi macaques have a wider degree of variation compared with *M. fascicularis* and *M. nemestrina*; variation exists in the dorsal part and in the bending of the callosity. There are three general types of callosity shape in Sulawesi macaques: oval without bending (*M. tonkeana* and *M. maurus*), oval with outward bending (*M. ochreata* and *M. brunnescens*), and oval or reniform with inward bending (*M. hecki*, *M. nigrescens*, and *M. nigra*). These types are congruent with their geographical distribution. The pathway of shape change may have started from oval without bending in the center and the southern peninsula, to outward bending in the southeastern species, and to oval or reniform with inward bending in the northern species. *Am. J. Primatol.* 71:1021-1031, 2009. © 2009 Wiley-Liss, Inc.

## Keywords

ischial callosities • Sulawesi macaques • morphometrics

---

Received: 16 January 2009; Revised: 12 August 2009; Accepted: 13 August 2009