I. INTRODUCTION

Among the apes *Gorilla* and *Pongo* males represent giant forms with extreme sexual dimorphism. The two lineages in Africa and Asia respectively separated some 10–12 million years ago from a common ancestor (Hobolth et al., 2011). Although unknown, the common ancestor was likely of moderate body size and differed in body structure and locomotor behavior from these two modern ape genera. Once isolated, each branch independently evolved away from the common ancestor. *Gorilla* adapted to life on the ground in African equatorial forests, and *Pongo* to tree-living in tropical rainforests in Asia.

Even though differing markedly in locomotor anatomy (Zihlman et al., 2011), *Gorilla* and *Pongo* males converged in their large body sizes and extreme sexual dimorphism, as they evolved over millions of years in widely different geographical locations. Large body size and associated behaviors confer advantages, and aspects of their morphologies denote “prime adult male,” for *Gorilla*, “silverback male” and “flanged male” for *Pongo*.

II. MATERIALS AND METHODS

Four adult apes were dissected using the same quantitative methods: *Gorilla*, adult male (age 27 years) and female (age 27 years); *Pongo*, adult male (age 24 years), female (age 34) (Zihlman & McFarland, 2000; Zihlman & Underwood, 2019). Data were collected and analyzed on body composition and limb mass as percent of total body mass, and on muscle distribution to body segments, that is, the percent of total body muscle acting on the forelimbs, hindlimbs, and head/trunk. Data on each male were compared to the female of the species.

On the males, cranial and facial structures were dissected and measured. A domelike structure on the male *Gorilla* head is not found on females (Schmid & Straiti, 1986). Adult male *Pongo* facial structures, called fat pads or flanges, are not present in females (Winkler, 1988; Zihlman & Underwood, 2019). See Figure 1. After dissections were completed and skulls cleaned, cranial capacities (ml) were determined. See Table 1.

III. RESULTS

*Gorilla* and *Pongo* males have greater body masses than the females; in these pairs females are respectively 58% and 48% of male body mass. In body composition, males have relatively more muscle than females, most marked in gorillas. See Table 1. In body proportions male forelimbs comprise a higher percent of body mass than in females. In distribution of muscle to body segments, the males have a greater percent of muscle acting on the forelimbs than do the females. See Figure 2.

The heads of the males are defined by soft and hard tissue structures (Figure 1). The sexes differ in cranial-facial morphology that show up in side views. See Figure 3. A view from above shows less sex difference in the size and shape of the neocortex, as well as in brain size measured by cranial capacity. See Table 1 and Figure 4. Soft tissue structures of the head and neck are pronounced in the males and less developed in the females.

In *Gorilla* the dome-like structure on the head lies above the sagittal crest and consists of soft structures. See Figure 5. Well-developed sagittal and nuchal crests support a “cushion” of skin, fat, and connective tissue that constitute this cranial superstructure that may exceed 3 cm in thickness (at arrow), a discovery made during our gorilla dissections. The nuchal crest provides attachment for heavy neck muscles.

V. BIBLIOGRAPHY

[References listed here]

---

![Table 1. Sample](image1)

![Figure 2. Distribution of Mass and Muscle to Forelimb (FL) & Hindlimb (HL)](image2)

![Figure 3. Lateral View of Skulls](image3)

![Figure 4. Top Down View of Skulls](image4)

![Figure 5. Soft Tissues of the Head in Gorilla Female and Male](image5)