

## BIRTHS OF *ALOUATTA CARAYA* AND *A. BELZEBUL* (ATELIDAE, ALOUATTINAE) IN CAPTIVITY IN BRAZIL

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The genus *Alouatta* (howler monkeys) has the largest geographic distribution of all Neotropical primate genera, occurring from Mexico to Argentina and Brazil (Neville *et al.*, 1988). Its ecology and behavior have been a recurrent topic of field research, but very few studies have been conducted in captivity due to the difficulty of keeping these primates outside of their natural environment (Kinzey, 1997). The species *A. caraya* and especially *A. belzebul* are still poorly known.

*Alouatta caraya* and *A. belzebul* live in social groups composed of two to 19 individuals. Generally, there are more adult females than adult males in the group (see Crockett and Eisenberg, 1987; Rowe, 1996). In *A. caraya*, sexual maturity is reached around 35–42 months in females and 24–37 months in males (Shoemaker, 1982). The menstrual cycle in this species lasts on average 20 days (Colillas and Coppo, 1978). Estimates of the gestation period range from 152 to 195 days (see Calegario-Marques and Bicca-Marques, 1993), whereas the interbirth interval varies from seven to 27 months (Calegario-Marques and Bicca-Marques, 1993; Lindbergh, 1978; Shoemaker, 1982; Zunino, 1996).

Howler monkeys rarely breed in captivity, but some success has been achieved with *Alouatta caraya* (see Crockett, 1998; Kinzey, 1997). Studies of *A. caraya* suggest the absence of reproductive seasonality in captivity (Colillas and Coppo, 1978; LaHue, 2000; Lindbergh, 1978; Shoemaker, 1979, 1982), although conflicting results have been obtained in the wild (Zunino, 1996; see also Calegario-Marques and Bicca-Marques, 1993; evidence of birth seasonality in wild *A. palliata*, *A. pigra* and *A. seniculus* is presented by Brockett *et al.*, 2000; Crockett and Rudran, 1987; Fedigan *et al.*, 1998; and Jones, 1980). According to Di Bitetti and Janson (2000), folivorous and large-sized Neotropical primates such as *Alouatta* tend to be non-seasonal breeders. In Argentina, however, Zunino (1996) observed a greater frequency of births during the dry season, a time of higher availability of new leaves and fruits. He related this birth seasonality to three environmental variables: Temperature, rainfall, and especially food availability (Zunino, 1996).

Here we examine whether *A. caraya* and *A. belzebul* breed seasonally in captivity in Brazil based on an analysis of the monthly distribution of birth records. Data were obtained through a questionnaire sent to Brazilian zoos. The following information was requested: Species (scientific name), date of birth, litter size, sex of offspring, and characteristics of the cage (indoor/outdoor).

A total of 48 births of *A. caraya* and nine of *A. belzebul* were recorded from 1960 to 2003 in outdoor cages at 12

Brazilian zoos (see “Acknowledgements”). It was not possible to test the data on *A. belzebul* for seasonality because of the small sample. (Data on the reproduction of this species at the National Primate Center [Kingston, 1987] were not available for this research.) Although *A. belzebul* birth records were scattered throughout the year, most of them (78%) occurred between September and February (Fig. 1).

Data on *A. caraya* were grouped (January–February, March–April, and so on) for statistical analysis because of the low frequency of birth records per month. There was no evidence of seasonality, since birth records were well distributed across the year ( $\chi^2 = 4.75$ ,  $df = 5$ , NS; Fig. 1). The analysis of birth records of *A. caraya* at 25 zoos in the USA (compiled by LaHue, 2000) corroborates the absence of seasonal reproduction of this species in captivity ( $\chi^2 = 11.02$ ,  $df = 11$ , NS; Fig. 2). This research confirms results from other studies that suggest that *A. caraya* may give birth throughout the year under the conditions of regular food availability observed in captivity (Shoemaker, 1979, 1982).

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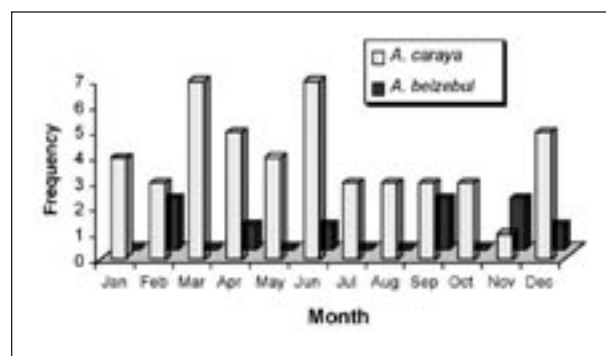


Figure 1. Monthly distribution of birth records of *A. caraya* (N = 48) and *A. belzebul* (N = 9) at Brazilian zoos.

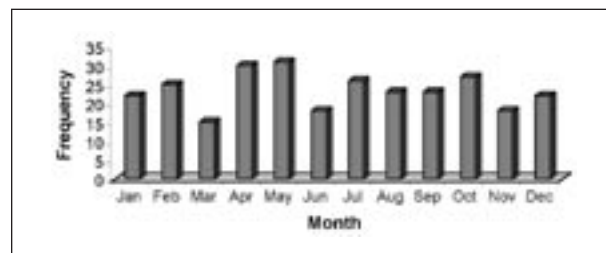


Figure 2. Monthly distribution of birth records of *A. caraya* in captivity in the U.S.A. (N = 280) (data compiled by LaHue, 2000).

Parque Zoológico de Goiânia/GO, Parque Zoobotânico de Carajás/PA and Museu Paraense Emílio Goeldi/PA.

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## WEIGHT DEVELOPMENT OF HAND-REARED CALLITRICHIDS

Michael Schröpel

Birth weights of various callitrichid species in the Magdeburg Zoo were reported by Schröpel (1989) and were compared to data from research journals. Usually, the birth weights of callitrichids may only be taken from still-born animals, or from neonates that have been neglected by their mothers and are available to be raised by hand. Hand-rearing enables firsthand observation and measurement of the weight development of the subject during ontogenesis, and allows for comparison of the subject to members of its own and other species. For parent-reared infant callitrichids that cannot be weighed, it is possible to observe their weight development through physical and behavioural development.

In general, we observed no differences between the development of parent-reared and hand-reared infant callitrichids at the Magdeburg Zoo. Even the twins of golden-handed tamarins (*Saguinus midas*) that were separated at birth – the male raised by hand, the female by her parents – did not demonstrate any differences in their morphological and behavioural development.

The infants for which weight development is reported here grew up free of disease or other complications. This report covers the cases of three (2.1) cotton-top tamarins (*Saguinus oedipus*) from two separate births in 1987, two (2.0) golden-handed tamarins (*Saguinus midas*) born at the end of 1999 and in September 2001, one (1.0) golden lion tamarin (*Leontopithecus rosalia*) born in March 2001, and seven (2.5) common marmosets (*Callithrix jacchus*) from three separate births in 2000 and 2001.

Two of the common marmosets came from a quadruple birth; the remaining two quadruplets were reared by their parents, and all four young survived. The neonate hand-reared common marmosets weighed 20 grams after their births. These weights are considered at the low end for this species. The other five hand-reared common marmosets included one set of twins and one set of triplets. The sole golden lion tamarin came from a triplet birth. One of the