

TARSIER LONGEVITY: DATA FROM A RECAPTURE IN THE WILD AND FROM CAPTIVE ANIMALS

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ABSTRACT

We report the longevity record for *T. bancanus* in captivity: born September 15, 1988 died April 25, 2006; current age 17 years, 7 months, 13 days, for *T. syrichta* in captivity (14 years, 80 days; minimum age \approx 16 years), and for *T. tarsier?* in the wild (8 years and 3 months between captures; minimum age \approx 10 years and 9 months). The first of these records is the longevity record for any tarsier in any condition. The last of these records is the longevity record for any wild tarsier. Ulmer (1960) predicted that tarsier longevity in the wild might exceed twenty years. Several tarsiers that survived 12-14 years in captivity exhibited behavior that was interpreted to indicate advanced age, but did not show clinical signs of old age.

Keywords: *Tarsius tarsier*, *T. spectrum*, *T. syrichta*, *T. bancanus*, life-span, life history, longevity.

INTRODUCTION

Ulmer (1960) reported that a captive *T. syrichta* died after 12 years 2 months in captivity—the maximum known longevity for a tarsier at the time—and speculated that tarsiers may live as long as 20 years in the wild based on the fact that post-mortem examination of the captive animal did not reveal evidence of advanced aging in the dentition, heart, kidneys, arteries, nor ovaries that would allow him to categorize the animal as being “old”. In recent years, several Philippine Tarsiers, *Tarsius syrichta*, have survived 10-14 years in captivity (Fitch-Snyder 2003). Such individuals are described as having the gestalt of old animals, although post-mortem examinations have not yet revealed conclusive evidence of advanced age in these animals (Mark Campbell, Cincinnati Zoo Veterinarian, personal communication). On the evening of June 30, 1999 a wild caught Philippine Tarsier died in the Cincinnati Zoo. The tarsier in question, a female named Tasaday (Philippine Tarsier Studbook record #1083), had been captured on the island of Leyte on April 11, 1985 (Fitch-Snyder 1994). This animal spent 14 years and 80 days in captivity. This surpassed the previous maximum known longevity for a tarsier. The animal was adult at the time of capture and estimated to have been born in 1983, making her about 16 years old when she died.

Surprisingly, even this is not the current longevity record for tarsiers in captivity. One *T. bancanus borneanus* in the Cleveland Zoo was born at the US National Zoo in Washington D.C. on September 15, 1988. She surpassed the longevity record in captivity on December 5th, 2002, and perished on April 25, 2006, age 17 years, 7 months, 13 days.

Niemitz (1979) trapped an adult male *Tarsius bancanus borneanus* in 1972 near Kuching (Sarawak, East Malaysia) that had previously been trapped by Fogden (1974) in 1965 and 1966. The animal was adult at the time of first capture, so Niemitz estimated the minimum age of this animal to be eight years. Prior to this report, that was greatest estimated minimum age for any wild tarsier, and indeed, the only published recapture of a wild tarsier of non-trivial age (i.e. greater than 1-2 years).

METHODS

Tarsiers were trapped in an isolated forest patch surrounded by alang-alang grassland near the village of Batuputih within the Tangkoko Dua Saudara Nature Reserve in the province of North Sulawesi, Indonesia between November 1987 and June 1988 (AN), and again between November 16, 1995 and June 1, 1996 (MS) (Nietsch 1993, Shekelle 2003). The site was resurveyed in July 1997, shortly after the

surrounding grasslands had burned. No tarsiers were found.

Tarsiers were trapped in mist nests (AN, MS), or caught by hand during the daytime while sleeping (AN). Animals were given colored numbered leg bands and released. No sedatives were used nor warranted. Observations on trapped tarsiers include: body weight (Avinet Precision Spring Scale S300 for MS; Pesola Spring Scale for AN), skull length (Tajima Carbon Fiber Vernier Calipers for MS; Gneupel Vernier Calliper for AN), tail length (metal ruler in 1 mm graduates), characteristics of pelage and gross morphology, and hair samples for genetic analysis. Shekelle recorded the WGS84 geographic coordinates of the capture site with a Sony IPS-760 global positioning system.

RESULTS

On the evening of June 1, 1996, an adult female tarsier entered a mist net near Batuputih, on the edge of Tangkoko Nature Reserve, North Sulawesi (Indonesia) wearing an aluminum leg band numbered 0021. In her mouth she carried a suckling infant. Inquiries led to the discovery that this same tarsier had been trapped at 10 am on March 9, 1988. At the time of the initial capture, the female was trapped in association with an adult male and a subadult male. The female was determined to be sexually mature and the subadult male was assumed to be her offspring. A conservative estimate of her minimum age at the time of first capture was 2 years 6 months (17 months at first conception + 6 months gestation + 7 month old subadult offspring). Our best estimate of the animal's minimum age upon recapture, therefore, is 10 years 9 months (2 years, 6 months upon initial capture + 8 years, 3 months between captures) (see below for discussion of estimating minimum age in wild tarsiers).

When first captured, the orange tinge that indicates relatively youthful tarsiers was noted, while upon recapture her pelage did not offer any particular indications of age, having neither an orange tinge, nor gray around the face and head that might indicate relatively older animals (discussions of relative age based on pelage are found in Nietsch, 1993, and concur with unpublished data of Shekelle).

Her teeth did not show obvious wear. Dental wear in tarsiers appears to be minimal, with only one individual out of 101 wild caught Eastern tarsiers having dental wear that was obvious to the naked eye (unpublished data, Shekelle).

Comparisons of the tarsier upon first capture and upon recapture are presented in Table 1. It is apparent that her weight did not change much—101 g to 104 g. Her tail may have grown slightly—231 mm to 242 mm—or there may be some interobserver measurement errors. Her head did not likely shrink, and the discrepancy—41 mm to 38 mm—is likely the result of interobserver measurement error. Shekelle found variation in this measurement to be low, particularly relative to intraobserver error, and abandoned this measurement (2003, unpublished data). Upon first capture, the tarsier was in a simple family group—one adult male, one adult female, and one immature offspring. Upon recapture she was part of a more complex group that included one adult male, one adult female, two subadult females, and one infant male (probably born in late May 1996).

Review of our notes has not yet determined the relationship between the trapping sites (i.e., was she trapped at the same site, or did she migrate?). Both trapping records show that the nest tree was a large strangler fig, but this is a common nest site for Eastern Tarsiers in primary forest.

Upon first capture, all tarsiers in the group were found to be suffering from orange ectoparasites around the anogenital region and the base of the ears. This is a common condition among Eastern tarsiers, which upon closer examination has always been shown to be mites (see Merker 2003). Upon recapture, the tarsier was healthy and no parasitic infestations were noted.

DISCUSSION

Eight years and three months elapsed between captures of the wild tarsier that we report on, but we can use information about tarsier life history to better estimate the animal's minimum age upon recapture. First, the animal was sexually reproductive

Table 1. Recapture of an Adult Female Spectral Tarsier, *Tarsius spectrum*, from Tangkoko Nature Reserve.

	1988 (Nietsch)	1996 (Shekelle)	
capture date	09 March 1988	01 June 1996	
weight	104 g	101 g	
tail	231 mm	242 mm	
head	41 mm	38 mm	
in social group with:	adult male (120 g) subadult male (100 g)	infant (37 g) adult male (117 g) subadult female (104 g) subadult female (110 g) (recaptured)	01 Jun 96 16 Nov 95 16 Nov 95 01 Jan 96 01 Jun 96
location	"Cathedral Tree"	Tangkoko 2	01°33.916' N 125°09.890' E
condition upon capture	all had orange ectoparasites in the anogenital region and base of ears	no problems	
other	orange tinge suggests young animal	no signs of advanced age	

at the time of initial capture. There has been speculation about the age that tarsiers reach sexual maturity. Roberts (1994) reported that one captive-born female *T. bancanus borneanus* first gave birth at 922 days old, indicating she was sexually mature at 744 days (i.e. 2 years and 2 weeks), assuming a 178 day gestation period. Other estimates are based primarily upon observations of tarsiers in the wild, and may therefore be less rigorous. Niemitz (1977, 1979) reported sexual maturity for tarsiers from Tangkoko, *T. tarsier?* (= *T. spectrum?*) to be 518 days (i.e. a little more than 1 year 5 months), and for *T. bancanus* to be 11 months. Fogden (1974) stated that *T. bancanus* females may reproduce within one year. MacKinnon and MacKinnon (1980) stated that female tarsiers at Tangkoko with their parents until adulthood, and their observations showed that female offspring still lived with the parents in their second year. Thus, using Niemitz's estimate of 17 months—the youngest report of sexual maturity for any tarsier in the *T. tarsier* species complex—we assume this animal's minimum age at first conception was 17 months.

We can add the age of the subadult male to her age, assuming he was her offspring. Estimating the age of a 100 gram subadult tarsier male is a difficult task because the animal's weight is so close to the final adult weight—that is, the area where the growth

curve becomes nearly level—such that there must be very large error bars around the estimate. Nietsch (1993) argued that a 100 gram *T. tarsiers* (ie Tangkoko), male or female, will be at least one year old, which accords with MacKinnon and MacKinnon (1980) who reported that yearling tarsiers were still visibly smaller than their parents. On the other hand, Gursky (1997) provided formulas for tarsier body weight growth curves based upon data from captive *T. bancanus* (Roberts 1994), captive *T. syrichta* (Haring and Wright 1989), and her own data on 2 wild tarsier from Tangkoko (*T. tarsier?*) infants (1997)—curves that she stated do not differ statistically. The estimates based upon these formulas are 121 days, 206 days, 160 days, and 172 days, respectively. It is important to note, however, that none of these curves are designed (nor necessarily valid) for body weights as large as 100 grams. Furthermore, the curve for *T. bancanus* shows that by around 90 grams, the curve is clearly leveling off. Thus, these formulas are very likely to underestimate the age for a 100 g animal. Consequently, we conclude that 206 days (a little less than 7 months) is a safe estimate of the animal's minimum age, and is even likely to be an underestimate of the subadult tarsier's age,

The gestation period in tarsiers is about 6 months. Izard et al. (1985) measured it as being 178

days for captive *T. bancanus borneanus*. Gursky (1997) reported observations of wild female *T. tarsier*? from Tangkoko, North Sulawesi, that allowed her to estimate gestation length in two pregnancies as 195 days (+/- 3 days), and either 193 days or 182 days (+/- 4 days) (uncertainty derives from two observed copulations separated by 9 days). Gursky estimated gestation to average 191 days in this species. Recently, the interbirth interval in *T. tarsier*, from Maros, South Sulawesi, was measured in captivity as a surprisingly short 172 days (June 29th to December 18th, 2002), which not only confirms the postpartum estrous noted by Roberts (1994) in captive *T. bancanus borneanus*, but also indicates a gestation period shorter than that found in other studies (MS, unpublished data). The animal in the present study

was trapped and retrapped at Tangkoko and we use Gursky's estimate of gestation length among Tangkoko tarsiers, 191 days on average, rounded down to six months to calculate minimum age.

SUMMARY

The longevity record for *T. syrichta* in captivity is 14 years and 80 days—a wild-caught animal with a minimum age of about 16 years old (Fitch-Snyder 2003). Several captive *T. syrichta* have survived beyond the previous longevity record of 12 years (Fitch-Snyder 2003, Ulmer 1960). The longevity record of *T. bancanus* in captivity is 17 years, 7 months and 13 days. Relatively few *T. bancanus* have been held in captivity compared to *T. syrichta* (Fitch-Snyder 2003). Far fewer Eastern tarsiers have ever been held in zoos or primate centers than either Western or Philippine tarsiers, and we know very little about that species' longevity in captivity (Fitch Snyder 2003). Evidence from captive *T. syrichta* and *T. bancanus* shows that tarsiers behave like old animals by 14-16 years, although they do not show clinical signs of aging. There are too few data to know if longevity varies among tarsier species.

We present data from a female tarsier that was re-trapped in the wild—first in March of 1988 and again in June of 1996. We estimate the minimum age of this animal as being 10 years and 9 months at the time of recapture. This is the current longevity record for any wild tarsier. Relative signs of advanced age, such as graying of the pelage around the face and head and noticeable dental wear, were not noticed in this animal (Figure 1). Thus, it may be that the tarsier in question was not particularly old, and that some tarsiers survive in the wild longer than this individual. Physical indicators of advanced age are very rare in both captive and wild tarsiers. While there is no direct evidence that any tarsier has lived longer than about 16 years, neither is there evidence to refute the speculation by Ulmer that a tarsier's natural life span may exceed 20 years.



Figure 1: a photograph of the recaptured tarsier with her newborn infant.

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REFERENCES

- Fitch-Snyder H. 1994. *Asian Prosimian: North American Regional Studbook*. Zoological Society of San Diego. San Diego.
- Fitch-Snyder H. 2003. History of Captive Tarsier Conservation. In *Tarsiers: Past, Present, and Future*. Wright PC, Simons EL, Gursky S. (eds) pp:277-295. New Brunswick: Rutgers UP.
- Fogden, MPL. 1974. A Preliminary Field-Study of the Western Tarsier, *Tarsius bancanus* Horsfield. In *Prosimian Biology*. Martin, RD, GA. Doyle, AC. Walker(eds) pp:151-165.
- Gursky, S. 1997. Modeling Maternal Time Budgets: The Impact of Lactation and Infant Transport on the Time Budget of the Spectral Tarsier, *Tarsius spectrum*. PhD. Thesis. SUNY, Stony Brook, New York.
- Haring, D & P. Wright. 1989. Hand-Raising an Infant Tarsier, *Tarsius syrichta*. *Zoo Biology* 8:265-274.
- Izard, MK, PC. Wright & EL. Simons. 1985. Gestation length in *Tarsius bancanus*. *Amer. J. Primatol.* 9:327-331.
- MacKinnon J & K. MacKinnon. 1980. The behavior of wild spectral tarsiers. *Int. J. Primatol* 1:361-379.
- Merker, S. 2003. Vom Aussterben bedroht oder anpassungsfähig? - Der Koboldmaki *Tarsius diana* in den Regenwäldern Sulawesi. PhD. Thesis. University of Goettingen, Germany.
- Niemitz, C. 1979. Outline of the behavior of *Tarsius bancanus*. In *The Study of Prosimian Behavior*. Doyle GA, Martin RD (eds) pp:631-660. New York.
- Nietsch, A. 1993. Beiträge zur Biologie von *Tarsius spectrum* in Sulawesi - Zur Morphometrie, Entwicklung sowie zum Verhalten unter halbfreien und unter Freilandbedingungen, PhD. Thesis, Freie Universität Berlin 1993.
- Roberts, M. 1994. Growth, Development, and Parental Care Patterns in the Western Tarsiers, *Tarsius bancanus*, in captivity: Evidence for a Slow Life History and Non-Monogamous Mating System. *Int. J. Primatol* 25(1):1-28.
- Niemitz, C. 1977. Zur Funktionsmorphologie und Biometrie der Gattung *Tarsius* Storr, 1780 (Mammalia, Primates, Tarsiidae). *Cour Forsch Inst Senckenberg* 25:1-160.
- Shekelle, M. 2003. Taxonomy and Biogeography of Eastern Tarsiers. PhD. Thesis. Washington University, St. Louis.
- Ulmer, F 1960. A Longevity record for the Mindanao Tarsier. *J. Mamm.* 1960:41:512.