OBSERVATIONS OF WILD SANGIHE ISLAND TARSIERS *Tarsius sangirensis*

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ABSTRACT

Sangihe Island Tarsiers were first described in 1897 from a remote island approximately equidistant between Sulawesi and Mindanao. Subsequently, this taxon was almost completely neglected for nearly 100 years. I conducted brief surveys of *Tarsius sangirensis* in December 1995 and January 1996, and then again in July 1997. These tarsiers are clearly taxonomically separable from all other known tarsier populations at the species level. They are larger in many measurable characteristics and the tarsiers my team encountered exhibited peculiar behaviour, which I interpret as predator avoidance. Primary habitat is almost completely replaced on the island; nevertheless, my team found tarsiers in a number of highly disturbed areas. Between loss of habitat, human disturbance, and their limited extent of occurrence it can be surmised that these tarsiers are a particular priority for primate conservation.

Keywords: behaviour, biogeography, playback experiments, Sangihe, Sangir, Sulawesi, taxonomy, vocal duets

INTRODUCTION

Meyer (1897) described a tarsier, *Tarsius sangirensis*, from Sangihe Island (sometimes spelled Sangir), a volcanic island approximately midway between the northern tip of Sulawesi and the southern end of Mindanao. Following that description, *T. sangirensis* was variously treated as a subspecies of *T. tarsier* (Erxleben, 1777) (=spectrum [Pallas, 1778]) (e.g. Elliot, 1913; Sody, 1949; Hill, 1955) or as a junior synonym of that taxon (e.g. Niemitz, 1984). More recently, a few investigators working independently have offered evidence for recognizing *T. sangirensis* as a full species (e.g. Feiler, 1990; Shekelle *et al*., 1997; Groves, 1998), recommendations that were accepted in subsequent taxonomic work (e.g. Groves, 2001; Brandon-Jones et al., 2004). The purpose of this report is to report observations of wild populations of this recently re-elevated species.

METHODS

Data were collected from wild Sangihe Island Tarsiers during a field expedition to Sangihe from 20 to 28 December 1995, and a second trip from 10 to 18 July 1997. Observations were made of free-ranging tarsiers during surveys that were conducted to locate tarsier nest sites suitable for trapping tarsiers. No attempt was made to randomize the survey regime.

Tarsier vocalizations were recorded using either a Sony WMD 6C with a Sennheiser MKE 300 or a Sony TR-600 Hi8 Camcorder, with either the internal microphone or with the Sennheiser MKE 300. Tarsiers were trapped in mist nests, or caught by hand. Two different net configurations were used. The first is a 30-denier black nylon net, three feet by 42 feet, with 1.25-inch mesh (nets are sized and sold in imperial measurements). The second net is a 50-denier black nylon net, six feet by 18 feet, with 1.5-inch mesh. Neither of these net configurations was optimal. Tarsiers can climb on these nets, and sometimes rip the netting. Thus, a tarsier that entered these nets had to be quickly caught and transferred to a holding sack, or they would free themselves within a few moments. Playback speakers (Sony SRS 77G) were positioned behind the nets, and recordings of the tarsiers were used to lure them into the mist nets. Optimal time for catching tarsiers in mist nets was between 18:00 and 19:00 h. Nets were monitored continuously. Animals that entered the

nets (bats, birds, and tarsiers accounted for virtually all trappings) were removed immediately. Trapped tarsiers were transferred to cloth bird bags for temporary holding. Tarsiers were manually restrained during data collection. No sedatives were used or warranted.

Observations on trapped tarsiers included: body weight (Avinet precision spring scale S300), skull length and testicle size (Tajima carbon fiber vernier calipers), tail length (Scale), characteristics of pelage and gross morphology, and hair samples for genetic analysis; fecal and ejaculate samples were collected opportunistically. In some cases, tarsiers that were trapped at night were held until daylight for superior photographic documentation. In such cases, tarsiers were given food (grasshoppers and/or house geckos). Tarsiers were released at the point of capture. The WGS84 geographic coordinates of the capture site were determined with a Sony IPS-760 global positioning system. We scored trapped tarsiers based on characters and descriptions culled from the tarsier literature that putatively diagnose tarsiers and can be easily assessed on a live tarsier; primarily from Niemitz (1979), Musser & Dagosto (1987), and Niemitz *et al*. (1991).

Data from recaptures and subsequent observations of trapped and released tarsiers suggest that tarsiers were not harmed by these procedures. Neither is there evidence that any other vertebrate that entered the nets was harmed.

RESULTS

Sangihe Island Tarsiers are known locally as '*sengkasi*', '*senggasi*', or (rarely) '*higo*'. Tarsiers were located in secondary forest, mixed-species tree gardens, coconut groves, mangrove, and in villages. Six tarsiers, from six different sleeping sites, were trapped. The six captured tarsiers were two adult males, one adult female (not pregnant), one sub-adult male, one sub-adult female, and one pregnant adult female. Body weights for these tarsiers were 150, 120, 143, 124, 123, and 157 g respectively. Maximum cranial length for the lighter of the two adult males was 42 mm, while his tail length was 294 mm. Owing to an unfortunate accident in the field, some data on the other five tarsiers (trapped during the first survey trip) were lost, but it was recalled that the tail length for each of them exceeded the 300 mm limit of the scaled ruler (Table 1).

The coats of these tarsiers were golden brown on the back, and white on the stomach. Two adults, the heavy male and the pregnant female, had light grey fur on their faces. The fur was less woolly than tarsiers from Sulawesi and more even in colour tone. All of the trapped tarsiers had the postauricular white spots, and the paranasal black spots, that are common to all Sulawesi tarsiers. The tarsi were thinly furred on the plantar surface, while the dorsal surface was virtually hairless. The fur on the tarsi was also very short. The tail was scaly, like tarsiers from Sulawesi, and had fine, short fur that resembled neither the nearly hairless tail of *Carlito syrichta* (Linnaeus) nor the much hairier tail of Sulawesi tarsiers (Fig. 1).

Nine tarsier groups were surveyed and followed to their sleeping sites. Sleeping group sizes were six, three, two, two, two, two, two, one, one, and one. Sleeping sites of these tarsiers include vine-covered trees of various species, exposed bamboo stalks, exposed sago palm fronds (*Metroxylon sagu* Rottb.), coconut trees, and leafy areas in tall trees of various species. Previously it was reported (Leksono *et al*., 1997) that tarsiers did not sleep in coconut trees. Following the second field trip to Sangihe, and a review of our earlier notes, it was determined that Sangihe Island Tarsiers very likely do, on occasion, nest in coconut trees. One group of five tarsiers was observed

Table 1. Morphometrics of Sangihe Island Tarsiers.

#	Age-sex class	Body weight (g)	Head length (mm)	Tail length (mm)	Testicle size (mm)
1	A♂	150	Data lost	>300*	Data lost
2	A♀	143	Data lost	>300*	-
3	SA♀	123	Data lost	>300*	-
4	SA♂	124	Data lost	>300*	-
5	Pregnant A♀	157	Data lost	>300*	-
6	A♂	120	42	294	17 x 9

*Data lost

Fig. 1. Four images of *T. sangirensis* showing reduced furriness of the tail and tarsi, less woolly fur, greyish face, postauricular and paranasal spots, golden brown dorsal fur and nearly white ventral fur.

traveling together just prior to dawn. This group split up into at least three sleeping groups and chose separate sleeping sites, one on a bamboo stalk, two on a sago palm frond about 30 m away from the first, and the other two were not observed in their sleeping site (Table 2).

These tarsiers perform duet calls, as do other tarsiers of the *T. tarsier* complex. The duet call is variably performed in the morning or the evening. On no occasion were dawn duet calls given at the sleeping site. The duet call is characterized by a two-note female phrase that seemingly prompts numerous single-note male phrases in response (Fig. 2).

DISCUSSION

Sangihe Island Tarsiers can be grouped with the *Tarsius tarsier* complex with a high degree of confidence based on the following characters: presence of the duet call; presence of the postauricular white spots; presence of the paranasal black spots; light fur along the length of the tail; tail scaly and lacking a specialized sitting pad; grooming claw shorter and more claw-like; and presence of large sleeping groups (up to six individuals in *T. sangirensis*). Additionally, there is robust genetic evidence to support the hypothesis that *T. sangirensis* forms a clade with other Sulawesi tarsiers, distinct from Philippine and Western tarsiers (Shekelle, 2003). Indeed, the results of this study are interesting when compared with previous descriptions of *T. sangirensis*. For example, these findings support Meyer's (1897) original description of the taxon, noting that *T. sangirensis* can be diagnosed by having less fur on the tail and tarsi. They further support the observation of Elliot (1913) that these tarsiers may have a pale, light grey face (Note, however, that while this morphotype was present in some Sangihe Island Tarsiers, it is also present in some other tarsiers from the *T. tarsier* complex, and there are some indications that it may indicate a mature, older individual). The large body sizes of these tarsiers are not reported by others, but upon close inspection of the data tables in Musser & Dagosto (1987) it can be seen that their sample of *T. sangirensis* had the greatest skull length of any tarsier. It is also likely that these tarsiers have the longest tails of all tarsiers, but, curiously, this fact is not supported by studies of museum specimens (Musser & Dagosto, 1987; Groves, 1998). Also, Groves (1998) suggested that the postauricular white spots common to all members of the *T. tarsier* complex may be absent in *T. sangirensis*. My data refute this assertion, but do indicate that the white spots are reduced, and sometimes darker in colour.

Characters that confidently diagnose these tarsiers from other members of the *T. tarsier* complex are: different duet call; tail fur much less and shorter; tarsi fur less and shorter; body size larger. Characters that less confidently diagnose these tarsiers are: postauricular white spot smaller and sometimes darker-coloured; more white fur around lips; head sometimes has light grey fur; body with predominately golden brown fur and less mottled (woolly) in appearance; tail longer (though perhaps not when scaled to body size); sleeping group often differs from traveling group; and distinct sleeping site preference (very high on exposed stalks of bamboo,

Table 2. Group size, composition, and sleeping sites at Sangihe Islands.

Site #	Minimum size	Composition	Sleeping site	Habitat
1	6	At least 2 A♀ & at least 2 A♂	Vine covered tree	Mixed tree garden, overgrown
2	1	A♂ (46)	High on bamboo stalk	Village
3	2	1 A♀ & 1 A♂	Top coconut tree	Coconut monocrop, well-cleared
4a*	2	A♀ (47) & 1 other	Top of sago palm frond	Mixed tree garden, by small river
4b*	1	1	High on bamboo stalk	Same
4c*	2	2	?	Same
5	2	1 A♀ & 1 A♂	Vine covered tree	Mixed tree garden, overgrown
6	2	1 A♀ & 1 SA♀ (48)	High on bamboo stalk	Village
7	1	1 SA♂ (49)	Low on bamboo stalk	Cleared field
8	3	1 pregnant A♀ (50) & 2 others	Leafy area at top of ~20 m tree	Mixed tree garden, overgrown
9	2	1 A♀ & 1 other	Tall tree	Mangrove
10	2	1 A♀ & 1 A♂	Bamboo	Village

*members of 4a, 4b, and 4c were seen traveling together and are assumed to be part of the same social group.

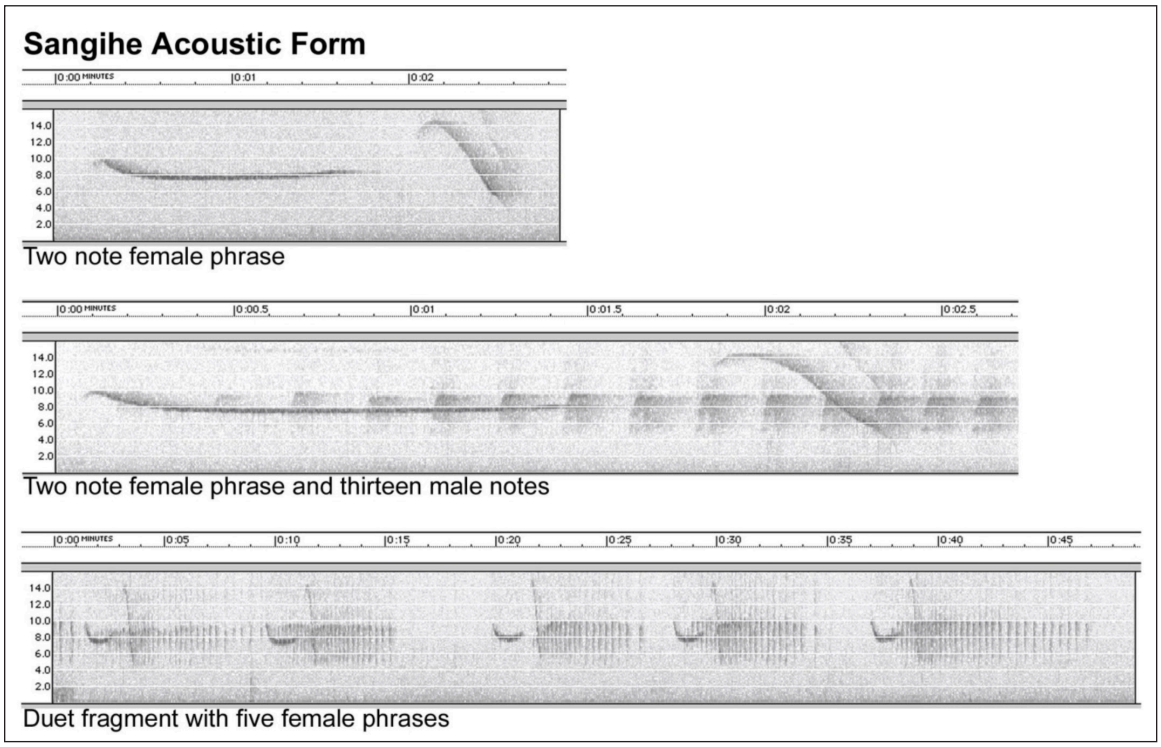

Fig. 2. Duet calls of the Sangihe Island Tarsiers.

sago palm, or tree tops). Characters that appear to be diagnostic of these tarsiers upon more thorough investigation are: eyes larger; paranasal black spots smaller; grooming claws thinner and more curved; and tail pigment dark relative to hand and feet pigment.

Of interest for conservation, virtually every person we spoke with not only knew of *senggasi*, but had either trapped *senggasi*, or knew someone who had trapped *senggasi*. Many people asked if we were looking to buy tarsiers. One older man said that he recently sold a tarsier for IDR 2,500 (about US$1 at the time). He had the understanding that the tarsier was going to be taken to the Philippines. Many people suggested there was an active flow of animals from Sangihe to the Philippines. We encountered another man who showed us a rare, endemic cuscus (possibly *Ailurops ursinus* [Temminck, 1824]) he had trapped and that he reportedly planned to sell to someone from the Philippines for IDR 50,000 (about US$20 at the time). Other evidence exists of an active black market between Sangihe and the Philippines, notably in Filipino alcoholic beverages. Although tarsiers appeared to be common on Sangihe, the active black market on the island is cause for some concern.

It is most likely that the trapped tarsiers in this study belonged to different social groups, but defining tarsier social groups on this island is problematic since groups that travel together at night did not always sleep together. Thus, it is likely that Sangihe Island Tarsier sleeping groups are not good estimators of social group size and composition, and in this way, they differ behaviourally from other species of the *T. tarsier* complex. Very little primary forest remains on Sangihe Island, and what little remains is quite remote. We did not survey that habitat, but Riley (2002) reports tarsiers there. It is possible that lack of forested land, combined with greater pressure from human predation, is related to the differences in social groupings and sleeping site preferences reported here. Comparisons with tarsiers in the remaining primary forest fragments are warranted.

Shekelle and Salim (2011) assessed the conservation status of *T. sangirensis* as Endangered B1ab(ii,iii) based upon the small extent of occurrence, the loss of almost all original habitats, the high human population density, and the lack of protection areas. Considering further the issues I report here, including anti-predator behaviour exhibited by Sangihe Island Tarsiers, the many reports of trapping tarsiers by humans, and the apparent black market, these beautiful and charismatic primates should be considered a special priority for tarsier conservation.

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