

**A note on the sexual behaviour of proboscis monkeys at Labuk Bay, Sandakan, Sabah****Introduction**

In proboscis monkeys, sexual behaviour between an adult male (ADM) and adult female (ADF) culminates to mounting and copulation (Hollihn, 1973; Yeager, 1990; Boonratana, 1993; Murai, 2006). The sexual activity is initiated by the ADF. To solicit sex, the ADF would stare at the ADM, shake her head or display facial expressions such as face pouting, lip pursing and nose twitching. If receptive, the ADM would make the same facial expressions and sometimes vocalise. They would then move towards each other with the ADF turning away and presenting her ano-genital region to the ADM. A female proboscis monkey reaches sexual maturity in the wild at ~60 months (Murai, 2004). When in heat, the external genitalia of an ADF would become swollen and conspicuously pink (Murai, 2006).

Copulations are often single mounts (Yeager, 1990; Boonratana, 1993; Murai 2006). The male mounts from the rear, grasping the female by the torso (Fig. 1). Proboscis monkeys copulate during the oestrus and anoestrus cycles, and even during pregnancy (Hollihn, 1973; Griner, 1980). The gestation period is ~6 months and a single offspring is born which remains with the mother for 1–2 y (Griner, 1980; Rowe, 1996). Male offspring would disperse and join the all male unit (AMU) while female offspring would form the harem.

**Study site**

The study on the sexual behaviour of proboscis monkeys was conducted at Zones A and B of the Labuk Bay Proboscis Monkey Sanctuary (LBPMS). Located ~48 km west of Sandakan in Sabah, the sanctuary (263 ha) is surrounded by tracts of oil palm plantations except the northern part, which borders the Sulu Sea. Please refer to Tangah (2013) for description of study site at LBPMS.

**Materials and methods**

Direct observations on the sexual behaviour of proboscis monkeys in the study area were made based on the opportunistic survey method described by Altmann (1974). The study conducted from October 2008 to July 2009 involved sighting with binoculars, recording with Canon video camera, counting and timing of copulatory bouts within the various core groups. All alpha males (ADM) were identified and the total number of adult females (ADF) enumerated in each group. The duration of copulation was correlated with temperature, rainfall and tides.

Air temperature and daily rainfall data were collected from the meteorological station at the Sandakan airport located ~38 km from LBPMS, whilst tide data were downloaded from the Meteorological Department of Malaysia (MDM) website. The overall climate of LBPMS was expected to be similar to that recorded at the Sandakan airport and all secondary data were obtained with permission granted by MDM.



**Fig. 1** The pleasurable sexual experience begins (left) which culminates to mounting and copulation (right)

**Results and discussion**

Data on the following environmental factors (temperature, rainfall, tide) were obtained for the study period. Air temperature ranged from 26°C (min) to 29°C (max) with the mean at 28°C. Daily rainfall ranged from 0 mm (min) to 35 mm (max) with the mean at 7.3 mm. Tidal regime ranged from 0.2 m (low) to 2.9 m (high) with the mean at 1.4 m.

**Table 1** Copulations by adult male (ADM) proboscis monkeys observed at LBPMS

Date	ID	Time	Duration (second)	Temperature (°C)	Rainfall (mm)	Tide (m)
Zone A						
20 Oct 2008	ADM 2	08.55 am	65	28.2	9.2	0.4
21 Oct 2008	ADM 2	16.40 pm	49	28.4	4.2	0.2
22 Oct 2008	ADM 3	08.35 am	48	26.8	35	1.2
14 Nov 2008	ADM 2	09.53 am	65	27.0	7.8	0.9
15 Nov 2008	ADM 2	10.07 am	99	26.1	2.8	0.3
15 Dec 2008	ADM 3	16.34 pm	81	28.0	15	1.1
20 Jan 2009	ADM 2	10.07 am	67	26.0	14	0.9
12 Jan 2009	ADM 3	08.25 am	49	26.8	0.0	0.6
17 Feb 2009	ADM 3	16.55 am	81	28.0	0.0	1.0
17 Mar 2009	ADM 3	17.11 pm	39	27.6	29	1.6
23 Mar 2009	ADM 2	15.29 pm	87	28.1	0.0	1.0
26 Mar 2009	ADM 2	14.32 pm	97	27.3	0.6	0.8
27 Mar 2009	ADM 3	08.42 am	63	28.1	0.0	0.8
14 May 2009	ADM 3	14.52 pm	27	28.1	0.0	2.0
14 May 2009	ADM 3	14.58 pm	38	28.1	0.0	2.0
14 May 2009	ADM 3	16.07 pm	63	28.1	0.0	2.0
24 Jun 2009	ADM 3	10.08 am	64	28.8	3.6	2.0
25 Jun 2009	ADM 2	09.52 am	95	27.9	1.6	1.8
Zone B						
15 Oct 2008	ADM 1	11.50 am	47	28.1	0.0	1.8
21 Nov 2008	ADM 4	09.36 am	72	26.4	25	1.2
21 Nov 2008	ADM 5	16.56 pm	95	26.4	25	1.3
16 Jan 2009	ADM 4	12.07 pm	73	26.8	0.9	1.0
16 Apr 2009	ADM 6	16.54 pm	45	28.1	0.4	1.7
07 Jul 2009	ADM 4	16.43 pm	56	27.4	0.0	0.3

ADM 1 = Rivaldo, ADM 2 = John, ADM 3 = Jonathan, ADM 4 = KK, ADM 5 = Owen and ADM 6 = Ronaldo.

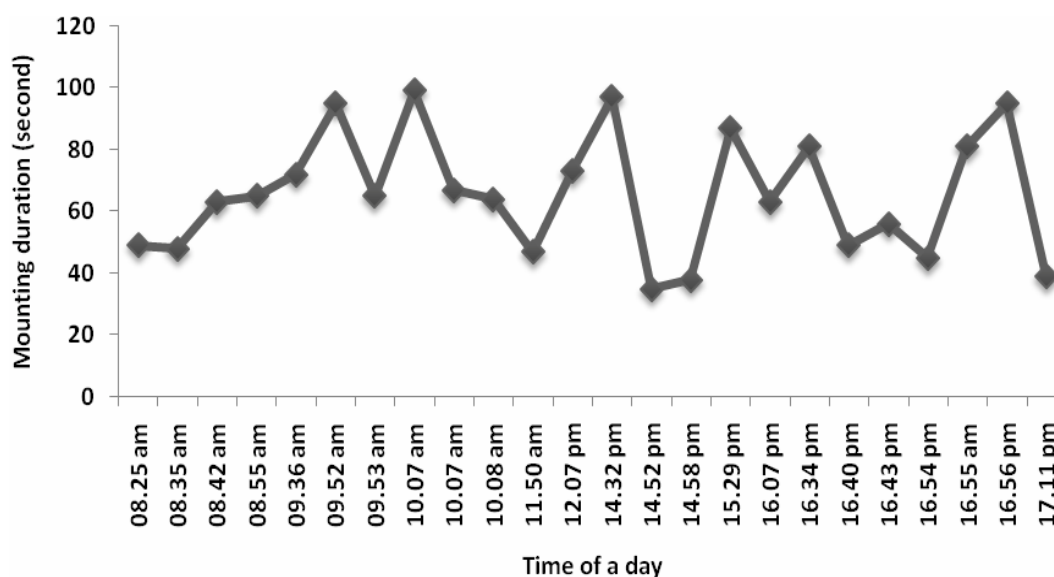
This study assumed that tide level might influence the sexual behaviour of proboscis monkeys. During low tides, they can walk on the soft mangrove mud with their webbed feet (Bennett & Sebastian, 1988). No mating was observed during high tide (> 1 m) as the forest floor is completely submerged and the proboscis monkeys have to stay on branches of mangrove trees. The sexual behaviour of six alpha males was monitored (Tables 1 and 2). Copulations took place on mangrove trees (15 observations), on feeding platforms (six observations) and on the forest floor (three observations). Of the 24 bouts in total, the minimum duration was 27 s and maximum duration was 99 s with mean of 65 s. A total of 18 bouts were recorded in Zone A with eight bouts performed by ADM 2 and 10 by ADM 3. For the Guinness Book of Records, ADM 3 mounted three different ADF in succession on 14 May 2009 from 14:52–16:07 h (Table 1). Was he truly the super stud that afternoon or he obliged three ADF in heat? In Zone B, only six bouts were recorded suggesting the possibility of competition pressure among the core groups. Tangah (2013) had earlier reported that the five focal groups in Zone B are very territorial as their movement pattern highly overlapped.

**Table 2** Frequency of copulatory bouts per adult male (ADM) proboscis monkey

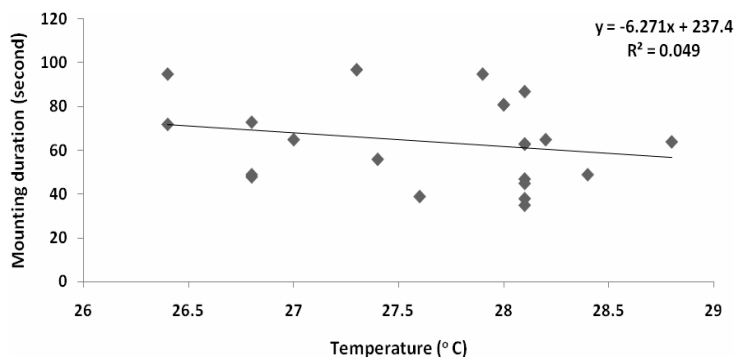
ID	Zone	Duration (s)	No. of copulation
ADM 2	A	49–99	8
ADM 3	A	27–81	8
ADM 1	B	47	1
ADM 4	B	39–81	5
ADM 5	B	95	1
ADM 6	B	45	1

ADM 1 = Rivaldo, ADM 2 = John, ADM 3 = Jonathan, ADM 4 = KK, ADM 5 = Owen and ADM 6 = Ronaldo.

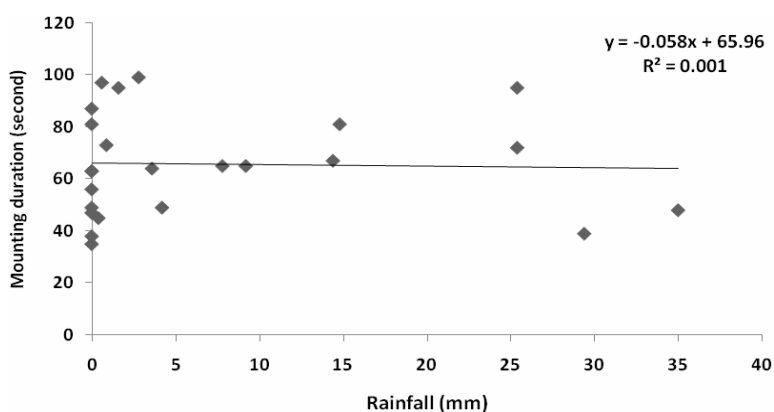
In this study, there was no apparent time of the day (08:25–17:11 h) with greater sexual activities (Fig. 2). Regression analysis indicated higher copulation duration when there was no rain, temperature at 28°C and tide at < 1 m (Figs. 3, 4 & 5). Copulatory bouts ranged from 27–99 s in LBPMS (this study) whereas Boonratana (1993, 2011) reported bouts of 12–40 s for wild populations in Sukau. At the sanctuary, it is easier to make ground observations by exploring the forest whilst at Sukau, observations have to be made from the boat. Previous studies and also this study indicated that environmental factors such as tide, rainfall and temperature do not necessary affect the mating behaviour of proboscis monkeys. Information on the sexual behaviour of proboscis monkeys in mangrove habitats is limited. Further investigations are warranted as such knowledge are vital in sustaining viable populations of proboscis monkeys in isolated mangrove forest habitats such as those at LBPMS.



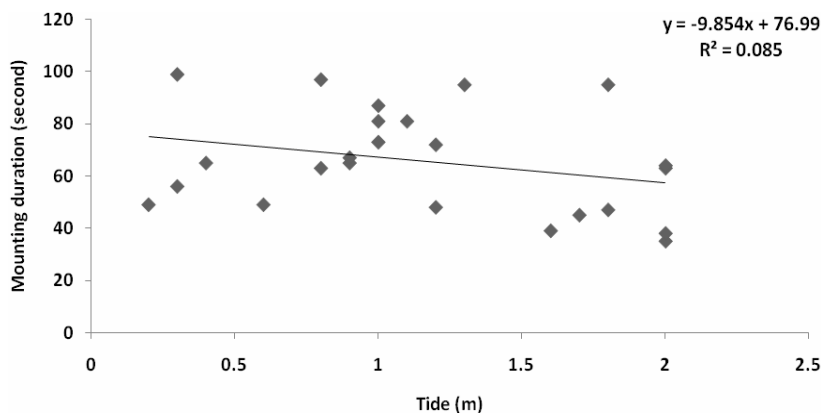
**Fig. 2** Duration of copulation by all alpha males at different times of the day



**Fig. 3** Copulation duration of proboscis monkeys versus temperature



**Fig. 4** Copulation duration of proboscis monkeys versus rainfall



**Fig. 5** Copulation duration of proboscis monkeys versus tide

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## Joseph Tangah

Head of Forest Conservation, Forest Research Centre,  
Sabah Forestry Department, Sandakan, Sabah

E-mail: Joseph.Tangah@sabah.gov.my