

# Observations on the Siamese Fireback *Lophura diardi* in Khao Yai National Park, Thailand

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The social behaviour of the Near Threatened Siamese Fireback *Lophura diardi* was studied in Khao Yai National Park, Thailand, during May 2002–April 2003. Seven types of displays were recorded: wing-whirring, threatening, chasing, fighting, courtship, and submissive and displacement behaviour. The wing-whirring display was performed chiefly by males. Single males gave whirring displays more often than multiple-male groups, while males in male-only groups performed whirring more often than those in mixed-sex groups. Birds wing-whirred more frequently in the breeding season than the non-breeding season. Wing-whirring did not appear to be part of courtship behaviour, but was more likely related to dominance or territoriality.

## INTRODUCTION

The Siamese Fireback *Lophura diardi* is found in mainland South-East Asia in Cambodia, Lao PDR, Vietnam, eastern Myanmar, and northern and eastern Thailand (Johnsgard 1999). It is classified globally as Near Threatened (BirdLife International 2001). Like other *Lophura* spp. pheasants, it has been relatively little studied in the wild. There have been recent studies on captive propagation (Boonsanong and Ruknongped 2000a,b) and genetics (Randi *et al.* 2001), but few details are known about its ecology and behaviour. The objectives of this study were to examine the types and functions of the displays, determine the composition of social groups and investigate the breeding system of the species.

## STUDY AREA AND METHODS

The study was conducted on the lower slopes of Khao Khieo, Khao Yai National Park, Thailand, (14°24'N 101°22'E) during May 2002–April 2003. The study site was in semi-evergreen forest at c.760 m. Observations were made at c.06h00–18h00 on 8–13 days per month. The observer (NP) walked slowly along 2 km of road until Siamese Firebacks were encountered. They were then followed as closely as possible without disturbing them. The date, time, group composition, duration and type of all behaviours and displays were noted, and were assigned to sex and individual where possible.

## RESULTS

A total of 232 encounters with Siamese Fireback were made during 136 days of fieldwork. Birds were followed for a combined total of 2,609 minutes during 173 encounters (the remaining 59 encounters were too brief to conduct observations). Encounters lasted up to 229 minutes (median: 8 minutes), but most were relatively short because the birds were shy and it was not usually possible to follow them when they moved into dense vegetation.

### Displays

Seven types of display were recorded.

#### *Wing-whirring*

In this display, birds stood erect and flapped their

outstretched wings noisily for c.2–5 seconds. Sonagrams indicated that the wings were flapped 10.8–11.4 times per second (N = 3; Fig. 1). The flapping occurred in two bouts of flaps separated by an interval of 0.25–0.27 sec. The duration of each element was 0.009–0.049 seconds. During wing-whirring by males, the golden-yellow feathers on the lower back and rump were prominent. Wing-whirring was observed 474 times, during 77 out of 232 encounters. This display was mainly given by males (99.2% of 474 wing-whirrs, 96.1% of 77 encounters involving wing-whirrs). Females wing-whirred only rarely (0.8% of 474 wing-whirrs, 3.9% of 77 encounters involving wing-whirrs). There was no detectable difference between the sexes in their posture when wing-whirring nor in the sound made.

Wing-whirring was given both by solitary males (54.7% of 470 male wing-whirrs) and by males in flocks (45.3% of 470 male wing-whirrs), although usually only one male appeared to wing-whirr in any flock (77.7% of 27 encounters involving wing-whirrs in flocks). Males often wing-whirred preceding and/or following fighting, chasing and threatening (11% of 470 male wing-whirrs). When a male Siamese Fireback heard the whirring sound from another individual, it usually responded by stopping any activity, holding its head up, standing erect and looking around (21 out of 31 encounters, 68%), gave whirring in response (nine encounters, 29%), or moved toward the sound and chased the bird involved (one out of 31 encounters, 3%). Rarely, Siamese Firebacks whirred in response to the sound of a falling branch (once) or to a loud call from muntjac deer *Muntiacus muntjak* (twice).

Individuals could not usually be distinguished and hence identified from one encounter to another. However,

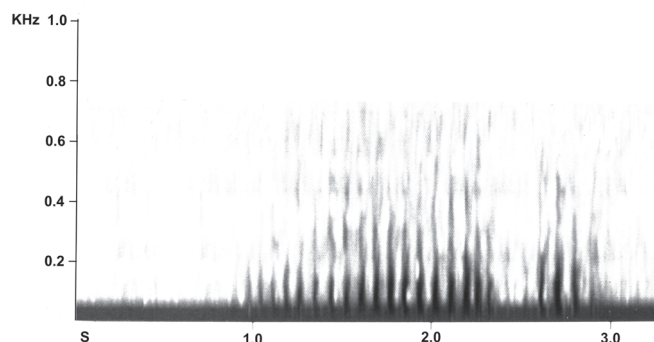
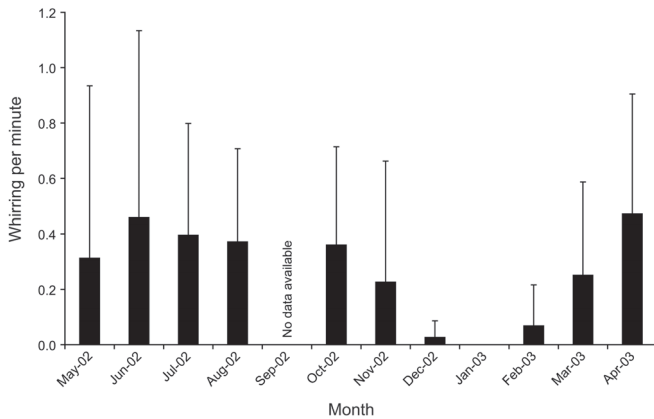


Figure 1. Sonagram of a typical single bout of wing-whirring by male Siamese Fireback.



**Figure 2.** Mean (+S.E.) rate at which Siamese Fireback males gave wing-whirrs through the year.

when flocks were observed, an effort was made to distinguish between individuals during the period of observation, and the maximum whirring rate was calculated from the individual that whirred most frequently. Using these data, solitary males whirred more often than the apparently dominant male in multiple-male groups (0.40 whirring bouts/minute,  $N = 54$  encounters and 758 observation-minutes vs. 0.16 whirring bouts/minute,  $N = 33$  encounters and 231 observation-minutes; Mann-Whitney U-Test:  $Z = -2.528$ ,  $P = 0.011$ ) or in mixed-sex groups (0.15 whirring bouts/minute,  $N = 76$  encounters, 1,462 observation-minutes;  $Z = -2.936$ ,  $P = 0.003$ ). Males never whirred to females.

Siamese Firebacks showed wing-whirring displays almost throughout the year. The rate of whirring was lowest during November–February. No whirring was heard in January, but the whirring-rate increased from February until April (Fig. 2). Birds whirred in the presumed breeding season (March–June) more than in the non-breeding season ( $Z = -2.69$ ,  $P < 0.05$ ).

#### Threatening

Typically the threatening display involved an aggressor moving to within c.1 m of another individual, turning to face it, and pecking at the other individual, although without actual physical contact. It was usually performed when one bird displaced another at a food resource (at least half of occasions observed). The threatening display was usually given by a male to another male (seven times, 70%), but occasionally also by a male to a female (twice, 20%) and a female to a female (once, 10%). The threatened birds responded by showing submissive postures (five times), displacement behaviour (twice; see below) or by walking away (twice, including one occasion when a female responded by leaping into the air before walking away).

#### Chasing

This was when one individual ran at, and displaced, another individual. It was sometimes accompanied by a high-pitched *veed* call given by the chaser. Chasing was usually preceded by whirring or threat (41.7% of 12 observations) and in four out of 12 observations of chasing (33%), it was followed by fighting. Chasing was only seen between males.

#### Fighting

Fighting was defined as an aggressive, head-on confrontation between two individuals, involving physical

contact. Invariably this involved both birds clashing as they jumped into the air. Fighting was observed on 11 occasions and lasted up to two minutes; it was only seen between males.

#### Submissive

In this display, the bird lowered its head in response to threatening behaviour from another individual. Eight occasions (89%) involved males responding to threatening males (three of these occasions involved fighting), and one occasion (11%) involved a female responding to a threatening male.

#### Courtship

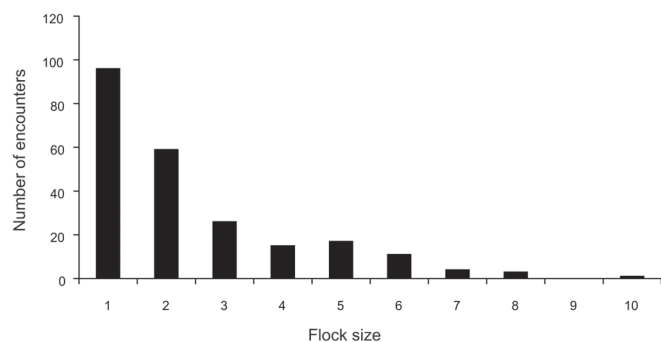
This typically began with the male running around a female while she remained still. Then the male moved to her side, fanning his tail side-to-side, then moved in front of her and pecked her neck and red facial skin on each side alternately. No copulation was observed. Courtship displays were observed four times: on 13 August, 18 December and 20 and 21 January. All the observations of courtship were made in flocks of 4–7 individuals; the other flock-members foraged nearby during courtship displays. The duration of courtship display was 2–13 minutes.

#### Displacement behaviour

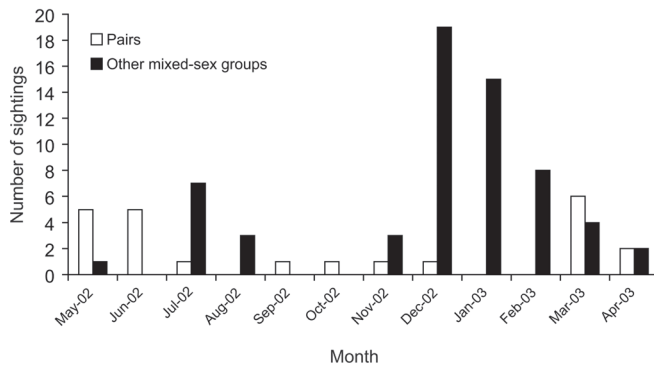
Displacement behaviours are usually given in situations in which there is a conflict between two mutually exclusive actions (McFarland 1981). Possible displacement behaviours we observed included bill-wiping on the ground after fighting with a male Silver Pheasant *Lophura nycthemera* (once), pecking at the ground when threatened by another male (once), and preening by a female when another female threatened her (once).

#### Group-size and composition

Flock-size ranged up to ten individuals (median group size=2; Fig. 3). Most encounters were with single males (86 of 232 encounters, 37.1%), or mixed-sex flocks (62 encounters, 26.7%), with the remainder comprising pairs (23 encounters, 10%), male-only flocks (49 encounters, 21.1%), female-only flocks (2 encounters, 0.9%) and single females (10 encounters, 4.3%). Among mixed-sex flocks, males outnumbered females in 46.8% (29 of 62 encounters), females outnumbered males in 29% (18 encounters) and equal numbers were found in 24.2% (15 encounters). During the probable breeding season (March–June), significantly more pairs (18 encounters)



**Figure 3.** Frequency distribution of encounters of Siamese Fireback flocks of different sizes.



**Figure 4.** Seasonal occurrence of pairs and other mixed-sex flocks of Siamese Fireback.

were found than other mixed-sex flock combinations (seven encounters) ( $\chi^2 = 4.84$ ,  $df = 1$ ,  $P = 0.028$ ; Fig. 4). Single females and female-only groups were found in June, December, March and April, while male-only flocks were encountered almost throughout the year.

### Interactions with other species

Silver Pheasant and Red Junglefowl *Gallus gallus* were seen a total of 66 and 178 times, respectively. During 40 encounters with Siamese Firebacks (17.2% of 232 encounters), distributed throughout the year, a single male Silver Pheasant (presumably the same individual) associated with the flock of Siamese Firebacks. On 11 occasions (during February and March), the male Silver Pheasant displayed aggression to a male Siamese Fireback by threatening (five occasions), chasing (three) and fighting (three). Usually (10 occasions) the male Silver Pheasant appeared to be dominant, with the male Siamese Fireback showing displacement behaviour (bill wiping) and submissive postures following the interaction. However, on one occasion a male Siamese Fireback apparently won the bout, and the Silver Pheasant flew off.

Red Junglefowl also accompanied Siamese Firebacks on 11 occasions (4.7%); involving a single male junglefowl (eight occasions), a single female (two occasions) and a pair (one occasion). On one occasion, a male Red Junglefowl threatened a male Siamese Fireback and displaced it from a food resource.

## DISCUSSION

Wing-whirring displays are prominent in several pheasant taxa such as *Tragopan* spp., *Syrmaticus* spp. and *Lophura* spp. (Johnsgard 1999). Some previous authors have stated that wing-whirring in *Lophura* spp. was associated with courtship displays (e.g. Silver Pheasant: Beebe 1918–1922; Imperial Pheasant *L. imperialis*: Delacour 1977 and Swinhoe's Pheasant *L. swinhoii*: Johnsgard 1999). In Kalij Pheasant *L. leucomelanos*, both sexes showed peak wing-whirring activity at the beginning of the main phase of courtship, but there was no indication that wing-whirring had a courtship function (Breuer and Thomas 1990). Davison (1981) observed that male Crested Firebacks *L. ignita* in Malaysia wing-whirred only during the period when pairs were encountered (May–June) and he also proposed that wing-whirring was linked with mate attraction. The present study found that male Siamese Firebacks neither wing-whirred during courtship-related

displays, nor whirred directly to females. Moreover, males in all-male groups whirred more than those in mixed-sex groups. Wing-whirring in Siamese Firebacks therefore did not appear to be linked with courtship behaviour.

Wing-whirring in *Lophura* has also previously been suggested as a male-male challenge display (del Hoyo *et al.* 1994), or for territorial advertisement (Johnsgard 1999). Breuer and Thomas (1990) proposed that wing-whirring in Kalij Pheasant was linked with a territorial function even in the females because this display contains an aggressive component. Wing-flapping in domestic chickens *Gallus gallus domesticus* has been shown to be linked with social rank: dominant males wing-flapped significantly more often than subordinate males in the presence of a model female (Leonard and Zanette 1998). Rimlinger (1985) suggested that male Bulwer's Pheasants *Lophura bulweri* may identify each other's ranges through hearing whirring, even when the other males were out of view.

Wing-whirring in the Siamese Fireback is probably related either to male territoriality or to threat and dominance among males. The fact that single males whirred more frequently than did males in groups does not necessarily rule out any link with dominance hierarchy. It could be that males join flocks for feeding or anti-predation benefits, having already established dominance relations through listening to each other wing-whirring solitarily.

Although male wing-whirring was not associated with courtship display it could still play a role in mate attraction. Females would be expected to prefer a high-ranking male that would provide increased access to resources or higher reproductive success (Graves *et al.* 1985, Leonard and Zanette 1998). If wing-whirring is related to social rank and male quality, it would be in a female's interest to select a partner who whirrs at a high rate. Female domestic chickens have been reported to select their mates from among those that had the highest wing-flapping rate (Leonard and Zanette 1998).

During our study, Siamese Fireback groups varied in size and sex composition. The sex composition in groups presumably reflects the mating system (Lack 1968). The preponderance of males in mixed-sex groups indicates that Siamese Fireback does not practise harem polygyny because in polygynous species groups are usually composed of one male and several females (Collias and Saichuae 1967, del Hoyo *et al.* 1994). The fact that pairs were mainly found during the breeding season strongly suggests monogamy. Alternatively, one dominant male could accompany, and mate with, two or more females in succession (successive or sequential polygyny) or achieve the majority of matings within the group. Marking birds so that they are individually recognisable, in combination with genetic studies, would help to resolve these speculations about the mating system. Since both Siamese Fireback and Silver Pheasant were found in the study area, detailed studies should also be initiated to determine their ecological relationships and the types of interaction between them.

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