CHAPTER 8

DISCUSSION AND CONCLUSIONS

8.1 DISCUSSION

This chapter were discuss two aspects of factors influencing of mate selection on female and factor influencing of the breeding success of the Asian Paradise Flycatcher:

I. Influence of male characteristic on mate selection.

II. Influence of male types on the breeding success.

I. INFLUENCE OF MALE CHARACTERISTICS ON MATE SELECTION

The factors influencing male characteristics on mate selection include body size and tail length of males, territory, and song structure of males.

A. Body size and tail length of males

Mate choice in birds can depend on many factors such as morphology, sexual displays, including acoustic signals which are believed to have an important role in mate choice and reproductive behaviour in birds. Several theories of mate selection have focused on the morphology responses of the individual to potential mates. Females often prefer to mate with males with external ornaments (exaggerated features of morphology) (Kroodsma, 1982; Sitasuwan, 2004; Maier, 1998.) This was confirmed by Pujante *et al*., (2002) who studied tail length in Bearded Tits (*Panurus biarmicus*). They tested mutual mate choice to explain tail length in this bird by using

two choice situations for each sex: shortened vs. control tail individuals and elongated vs. control tail individuals. The experiment found that females spend more time with males with the longest tails and they also show sexual display behaviour only towards these males, whereas males spend time with and display towards both short-tailed and long-tailed females. Females prefer long-tailed males, whereas males do not always prefer long-tailed females. Long-tailed males had a greater chance to start becoming paired and breeding earlier than the short-tailed male type. In my study, the male type of Asian Paradise Flycatcher (the long–tailed male type and the short–tailed male type) were compared in body sizes, tail length and the date of first egg laying. Body sizes of two male types were not significantly different. The long – tailed male type started breeding earlier and the earliest date of first egg laying was on 17 March, whereas the short – tailed male type started breeding later and the first egg laying was on 5 April. There was no significant difference in earliest date of egg laying between male types. These results may indicate that the tail length of males may not be an important factor influencing mate selection in females. Sample sizes were too small to make a definite conclusion.

B. Territory and song structure of males

Bird songs have two main functions: to defend a territory and to attract a mate. It is usually the males singing songs to show their ownership of the territory and their willingness to defend it. In most species, a male bird owning a territory is essential for attracting a female and breeding successfully (Immelmann, 1980; Catchpole and Slater, 1995). Previous studies have found that female songbirds show stronger responses to males with larger repertoires. These males pair earlier and have higher reproductive success (Lampe and Espmark, 2003).

Territory is one of the factors influencing mate choice and reproductive behaviour in birds. Territory can be classified into various criteria and functions. Individual territories are used and occupied by one individual for feeding only, whereas pair territories (breeding territories) are used for breeding activities during the breeding season, which is also occupied by both sexes and their nestlings (Immelmann, 1980; Maier, 1998).

The vocalizations of the Asian Paradise Flycatcher were recorded in both study sites and consisted of an alarm call, feeding call, contact call, and flying call, but never I never heard their song in this study. No publication has dealt with Asian Paradise Flycatcher songs. Alarm and contact calls were the most vocals heard and recorded, especially during the breeding season.

The territory of the Asian Paradise was determined during the breeding season. Breeding territory was occupied by both the male and female which is also used for breeding activities.

II. INFLUENCE OF MALE TYPES ON BREEDING SUCCESS

There were many breeding behaviour observed during my study. Some of these breeding behaviours will be discussed as factors influencing male types on breeding success at both areas.

The complete breeding cycle of the Asian Paradise Flycatchers in this study was almost a month long, and similar to that reported by Mizuta (1998) and Mizuta and Yamagishi (1998), who studied the breeding biology of this species in Khao Pra–Bang Khram Wildlife Sanctuary, Krabi Province. They found that clutch sizes varied from 2 to 4 eggs and the nestlings hatched almost simultaneously. After the eggs

hatch, both parents invest in extensive of parental care. As well as providing food, they also protect their nestlings. This includes transmission of body heat to them until the fledging are able to thermoregulate on their own (Saunders, 1964; Immelmann, 1983; Maier, 1998). The frequency of feeding in the nest increased as the nestlings grew older until on day 5 and dropped continuously constancy before the date of fledging on day 11. In addition, the frequency of nest attendance increased as the nestlings grew older except the fledging day when it stopped were dropped. The frequency of brooding increased as the nestling grew older, particularly during the early nestling period. In the early nestling period altricial chicks cannot stabilize their body temperature and must be provided with warmth from the parents (Maier, 1998). In the Asian Paradise Flycatcher, both males and females spent more time brooding the nestlings in the A-B than the C-D stage because the plumage developed gradually during the A-B stage, but rapidly in the C stage when the sheaths of contour feathers opened and the chick became almost covered. This result is similar to that reported in the Common Swift (*Apus apus*) and Citrine Wagtail (*Motacilla citreola*) where the parents spent less time brooding when the nestlings were more than 6 days old (Carere and Alleva, 1998; Sciborska, 2004). There were no significant differences in the frequency of feeding visits, the frequency of nest attendance and brooding between long – tailed male type (RL and WL) and short – tailed male type (RS), and femals except in nest attendance. Male participation in nest attendance was significantly higher than females.

Parental involvement in rearing the nestlings produced a S-shaped growth curve. This is similar to that found by Sciborska (2004) who studied the growth of Citrine Wagtail nestlings (*Motacilla citreola*) and also reported that tarsus and wing

length highly correlated with the age of nestlings. In the broods which I observed, the Asian Paradise Flycatcher nestlings fledged at 10-11 days old, but were practically unable to fly and their body sizes at day 10 were less than those of adult birds, except for tarsus length which approximated that of adults (the body sizes of adult birds are taken from Mizuta, 1998; Mizuta and Yamagishi, 1998; and Ngoenjun, unpublished data). It seems that the growth of the tarsus to reach full development may be achieved by the time of leaving the nest (Sciborska, 2004).

Adults of some species of birds carry food to nestlings in their beaks. These nestlings respond to any disturbance that might signal the arrival of a parent at the nest by gaping widely and they often have brightly coloured mouth linings (Pough *et al*, 1999). It was found that Asian Paradise Flycatcher nestling usually responded when their nest was shaken whether parents were present or not by doing vigorous begging displays that include presenting the yellow markings inside their mouths, stretching, wing flapping, and making loud calls to encourage the parents to provide food. The Pacific Swift (*Apus pacificus*) shows a similar response (Falls, 1982; Ngoenjun and Sitasuwan, 2001).

Young birds reared in exposed open nests frequently flap their wings vigorously in the wind for several days before flying. This flapping may help to develop muscles, but it is unlikely that it helps the birds to learn to fly. A bird's flying abilities improve with practice for a period after it leaves the nest (Pough *et al*, 1999). Flapping behaviour was found in this study and occurred when the nestlings were 9-11 days old. The nestlings sat on the rim of the nest cup or on a branch of the nest support plant and flapped their wings several times before they fledged. The parents would swoop down near the nestlings making loud calls which appeared to stimulate the

nestlings to fly out from the nest. The nestlings then stayed with their parents for a period after they left the nest because their limited flying abilities at fledging meant they could not catch insects in the air.

A successful breeding cycle lasted 26 – 34 days, which was similar to the work reported by Mizuta (1998) and Mizuta and Yamagishi (1998). In my study, there were no differences in the breeding cycle period at two study sites and between male types. Fledgling success was 44.4 % and included 13 nests with of 25 individual from RL male type, 1 of 7 nest from WL male type and 2 nests of 4 from RS male type. These results indicate that the fledgling success were similar between long-tailed male type and short-tailed male type. Sample sizes in short-tailed male type were too small to make a definite conclusion.

8.2 CONCLUSION

The general bird behaviour included foraging, excretion, locomotion, preening, and vigilance. There was no difference in types and patterns of general behaviour between three types of males (RL, WL, and RS) and females in the study areas. The body sizes of adult RL males and adult RS males shown that there was no significant difference. The vocal communication were recorded in both study sites which consisted of an alarm call, feeding call, contact call and flying call. There was no difference in type and structure of the sound between the three types of males (RL, WL, and RS) and females.

The nest trees inhabited in open areas with shady sites usually hidden in dense shrubs and treelets at altitudes ranging from 70 – 650 meters above sea level. The nest tree habitat and random at the Chiang Dao Wildlife Research Station and Khao Pra-Bang Khram Wildlife Sanctuary were similar with highly canopy cover of dense vegetation with DBH > 5, and trees as a lower layer, but the percentages of canopy cover and number of trees sampled around nest support plants in nest sites and random plots at Chiang Dao were more highly than at Khao Pra-Bang Khram, which had lower vegetation opened area. All plots in nest sites and random plots in the two study areas were similar in forest structure with high many number of small sampled trees and contained the trees with broad canopy covering nearly tree site.

The breeding season of Asian Paradise Flycatcher at Chiang Dao started in mid-March with first egg laying on 17 March with the RL male type. At Khao Pra-Bang Khram egg laying started on 30 March with the WL male type. With RS males started egg laying on 5 April. Both males and females share all breeding activities including nest building during the breeding season. Nest materials were composed of mosses and liverworts, black hair-like fungus, fine stem plants, dry grass, spider webs, and other materials. Nesting period ranges from 10 – 17 days. The height of nests ranged from 0.75 - 2.5 m. The proportions of nest materials at both study sites were similar and there were no differences in the proportion of nest materials. Clutch sizes varied from 2 to 4 eggs, but was mostly 3. The average egg size was 15.1 ±0.4 x 20.3±1.0 mm (n=53) and the average weight was 2.4±0.1 g (n=22). There were no differences in the breeding cycle period in both study sites. A successful breeding cycle lasted 24–30 days, including 2–4 days of egg-laying, 12–15 days of incubation, and 10–11 days of parental care of nestlings in the nest. The eggs were incubated by both the

male and female. Incubation occurred on the last date of last egg laid. The longestt time of incubation by females was 40.63 minutes and by males 34.61 minutes. There was no significant difference in incubation time between males and females and among the long – tailed male type (RL and WL) and short – tailed male type (RS). The percentage of hatching success was 48.15 %. The parents started parental care after the first nestling hatched. They fed the nestlings with many types of insects includeding larvae and imagines of dragon-flies (Odonata), orthopterans (Orthoptera), larvae and imagines of butterflies and moths (Lepidoptera), larvae and imagines of flies (Diptera), bugs (Hemiptera), and other (unidentified insects). The frequency of feeding in the nest increased as the nestlings grew older until day 5 and dropped steadily to fledging (day 11). The frequency of nest attendance increased as the nestlings grew older, except on the fledging date when it stopped. The frequency of brooding increased as the nestlings grew older, particularly during the early nestling period. Parental care shows that, there were no significant differences in frequency of feeding visits, frequency of nest attendance, and brooding between males and females; long–tailed male type (RL and WL) and short–tailed male type (RS), except in nest attendance between males and females. Male participation in nest attendance was significant higher than with females.

The nestlings at hatching were almost naked, and sparsely covered with natal down. Their eyes were closed for some time after hatching and they were incapable of locomotion. The nestlings left the nest on day 10-11 before they were able to fly well. The nestlings opened their eyes on day 4-5, at first in the form of a thin slit with complete eye opening following on day 7-8. The plumage developed gradually, and this was divided into 4 stages. A-stage: the feather germs were not visible (day 1). B-

stage: the feather germs appeared continuous under the skin in all the pterylae. The allula feathers and primaries pierced the skin (up to day 4). C-stage: the skin was punctured by dorsal contour feathers. D-stage: the nestlings were almost completely covered with rufous contour feathers. The rufous vanes of flight and dorsal feathers were more than half the total length of the feathers (from day 7 onwards). The growth curve show that all measurements were highly correlated with the age of the nestlings during the period of their stay in the nest, except that body weight in the last day before fledging was slightly lower. Mean bill, wing, and tarsus lengths at 10 days were 10.4, 48.2, and 21.5 mm respectively, and the body weight was 14.7 g. The growth curves of nestlings of RL and RS males were nearly identical and there were no significant differences in body sizes between the nestlings from RL and RS males. Fledgling success was 44.4 % included 13 nests from RL male type, 1 nest from WL male type and 2 nest from RS male type.