CHAPTER 2

LITERATURE REVIEW

The Asian Paradise Flycatcher (*Terpsiphone paradisi* Linnaeus, 1758) start breeding in early March and ends in June with the start of the rainy season. The nest is open, deeply bowl-shaped, and is built at heights of 1–3 m in a fork of a treelet or sapling such as *Schima wallichii* (DC.) Korth. (Theaceae), *Phyllanthus oxyphyllus* Miq. (Euphorbiaceae), or *Vatica lowii* King (Dipterocarpaceae). Nest materials are finely interlaced twigs and dried grasses reinforced with mosses and spider webs. Fine fibre-like materials line the inside of the nest. Clutch-size is either 2 or 3 and incubation takes 12 – 16 days. The nestlings are altricial and 9–12 days of parental care is required (Rattanadetkumjorn, 1996; Mizuta, 1998; Mizuta and Yamagishi, 1998; Khobkhet, 2001). Mizuta (1998) and Mizuta and Yamagishi (1998) studied the breeding biology of the Asian Paradise Flycatcher at Khao Pra-Bang Khram Wildlife Sanctuary, Krabi Province. They found that three types of males are found in this study area, viz. white-plumaged males with long tails (WL), rufous-plumaged males with long tails (RL), and rufous-plumaged males with short tails (RS). Each male type was found breeding between early March and mid-July. Females paired with long-tailed males lay their first eggs earlier and have larger clutch sizes than females paired with RS males. When the brood size is three, the body weight of nestlings of long-tailed males was found to be heavier than those of RS males. RS males had significantly smaller wings and tail lengths, and lighter body weight than long-tailed

males. These results may suggest that RS males are probably younger or of inferior quality than long-tailed males. Females paired with RS males may also be younger than those paired with long-tailed males because of their small clutch sizes. Old females with large clutch sizes start their breeding attempts earlier than younger females with small clutch sizes. Old females may be able to choose among many males. If females have a preference for male tail length, males with long tail feathers are likely to have higher reproductive success than males with short tail feathers. Longer tail feathers in males may be maintained by female mate choice. This conclusion was as also reached by Pujante *et al*., (2002) who studied tail length and mutual mate choice in Bearded Tits (*Panurus biarmicus*) in Austria where both sexes have a long tail, but males a longer one than females. They tested mutual mate choice to explain tail length in the Bearded Tit by using two choice situations for each sex, *i.e.* shortened vs. control tail individuals and elongated vs. control tail individuals. The experiment found that direct sexual selection seems to operate differently in the two sexes. In both situations, females spend more time with males with the longest tails and they also show sexual display behaviour only towards these males. 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. Mutual mate choice has a role in the survival of long tails in Bearded Tits and the sexual dimorphism in tail length has persisted because mate choice exerts a stronger sexual selection pressure on males than on females.

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 (Kroodsma, 1982; Sitasuwan, 2004).

Barn swallows (*Hirundo rustica*) and Jackson's widowbirds (*Euplectes jacksoni*) select males on the basis of tail length. House finches (*Carpodacus mexicanus*) select males on the basis of coloration, while Pied flycatchers (*Ficedula hypoleuca*) select males on the basis of song, whereas males benefit from pairing with healthy females that breed early because early breeding increases reproductive success (Evans, 1997a; 1997b; Lampe and Espmark, 2003). Many songbirds have song repertoires that increase with age. Having several versions of their species-specific songs may add to the effectiveness as a signal to defend a territory against intruding males and to attract females. Previous studies have found that female songbirds show stronger responses to males with larger repertoires. These males pair earlier and have higher reproductive success. Female songbirds that hear two singing males match or overlap each other's songs during a song duel, may also gain information regarding the condition or quality of males such as territory quality (Catchpole, 1987; Gil *et al.*, 2001; Leitner and Catchpole, 2002; Lampe and Espmark, 2003; Slater, 2003; Dabelsteen, 2004; Leitner and Catchpole, 2004). Female Pied Flycatchers (*Ficedula hypoleuca*) can use songs as a cue to find a high-quality territory since early arriving males may obtain the best territories and these males have more complex songs than late-arriving males. Furthermore, males defending popular territories have more complex and longer songs and are also in better physical condition than males in less popular territories (Lampe and Espmark, 2003). In a few species, songs may provide a marker of kinship such as in the Darwin's finches (*Geospiza* spp.). Males learn their songs from their fathers and females avoid mates who sing like their fathers (Slater, 2003).

Acoustic signalling in birds also has individual characteristics and includes features for contact between individuals, especially mates. In order to reproduce

successfully, members of a breeding pair must coordinate their efforts, a task which should be easier if they can recognize one another. Mate recognition should be widespread, especially where both sexes contribute substantial parental care. In long-lived species, individual recognition may allow the same pairs to form in successive years (Falls, 1982). As an example of such recognition, female Great Tits (*Parus major*) will leave the nest during incubation when their mate sings outside the nest. Playback was used to simulate such "calling out" behaviour when the mate is absent in order to investigate whether females can distinguish between the song of their mate and songs from other males. The results were clear-cut in that females leave only in response to playback of the song of their mate, even when it is preceded by playback of another male. This shows that female Great Tits can identify their mates by song. Females are usually incubating when they are called out and fed by the mate. Such feeding is probably not frequent enough to sustain the female, but this signal may tell the female that her mate is still present and able to provide food. This is important information for a female that has to decide whether to continue incubating the current clutch or to re-nest with another male (Lind *et al*., 1996). Song in temperate zone birds is mostly restricted to males, but female songs are common in the tropics and sometimes take the form of duetting interaction with males and females singing together (Farabaugh, 1982; Slater and Mann, 2004). Duetting may be used to maintain the pair bond, acoustic mate guarding, partner commitment, or synchronizing reproduction. Duetting may sometimes also involve territorial defence. For example, Tropical Boubou (*Laniarius aethiopicus*) has twelve duet types, eight are used for joint territorial defence. Two of these eight duet types are probably also used for mutual mate guarding, suggesting that individual duets can have multiple functions

(Grafe and Bitz, 2004; Grafe *et al*., 2004). Acoustic signalling in birds, especially where it involves individual recognition, can stimulate parental synchronization of clutch hatching and to communicate between parents and nestlings (Maier, 1998). Nestlings can show responses to their parents by doing vigorous begging displays that include presenting visual targets which mark the inside of their gape, stretching, wing flapping, and loud calls to stimulate the parents to provide food. This is known in the Pacific Swift (*Apus pacificus*) (Falls, 1982; Ngonjun and Sitasuwan, 2001).

There have been several habitat requirement studies for other *Terpsiphone* species, *e.g.* the Seychelles Black Paradise Flycatcher (*Terpsiphone corvina*), which is critically endangered on the basis of its small population size and restricted range (Currie *et al*., 2003a, 2003b, 2003c). This flycatcher is endemic to the Seychelles and there is a lack of understanding of its population dynamics, which has interested researchers who would like to know it's habitat requirements and also to increase the population. Neufeld (1998) and Currie *et al.* (2003a, 2003b, 2003c) reported that the territory size of the Seychelles Black Paradise Flycatcher is 1.04 ha or, if one only includes woodlands, 0.92 ha. An average of 71.9 % of tree species within the study areas are native species, the majority of which are *Calophyllum inophyllum* L. (Guttiferae) and *Terminalia catappa* L. (Combretaceae), which the flycatchers mostly (98.5 % of nests) use for nest sites. They have low breeding success and the majority of nest failures are due to nest predation. The loss of woodland habitat for nest sites has increased and that remaining has become increasingly fragmented which directly affects the birds. The most notable decreases in woodland areas has occurred primarily as a result of clearing forests for new homes or guest houses.