

FORAGING BEHAVIOUR AND INTERACTIONS OF WHITEHEADED BABBLERS *TURDOIDES AFFINIS* WITH OTHER SPECIES¹

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(With three text-figures)

Whiteheaded Babblers were studied from 14th August 1979 to 7th April 1980 in a 0.2 km² partly cultivated land near Sivakasi (9°27'N., 77°49'E.) in South India. Their density in the study area was 55/km², home range of the study group was 0.16 km² and mean home area 0.06 km².

We saw neither cooperative hunting nor food sharing between adults even when large prey (e.g., a big green grasshopper) were killed and eaten. The babblers foraged mostly on ground and fed mainly on animal matter (> 80%). During dry months they intensively foraged in a small part of their home range but covered greater distance and were active at midday too. They spent more time in areas where water, food and shade were abundant.

We observed a mutually beneficial association between Black Drongo *Dicrurus adsimilis* and the babblers. Shikra *Accipiter badius* aroused most of the anti-predator responses. Redvented Bulbul *Pycnonotus cafer* and Indian Wren-Warbler *Prinia subflava* were allowed to feed within 5 m. We hypothesize that this tolerance is due to differences in foraging.

INTRODUCTION

Of the nine species of *Turdoides* in India the Jungle Babbler *Turdoides striatus* and the Common Babbler *T. caudatus* have been studied extensively (Andrews & Naik 1970, Gaston 1977, 1978b). Whiteheaded Babblers *T. affinis*, which have many of the characteristics of cooperative breeders (Emlen 1978) are distributed from the Godavari and Penganga rivers and Western Karnataka from Belgaum area south through Tamilnadu and Kerala (Ali & Ripley 1971). However, except for the ongoing comparative study of the

ecology and behaviour of the Jungle and Whiteheaded Babblers in Calicut (as reported in Zacharias & Mathew 1977) little work has been done on Whiteheaded Babblers.

It has been well established that the most important feature of vegetation for birds is structure rather than species composition (Gaston, *pers. com.*). We, however, initiated the study to find whether variation in vegetation density, size of foraging areas and number of roosting and nesting sites influence the time spent by the babblers in different parts of their home range. Interactions with other species were also recorded.

STUDY AREA

The habitat has a dry stream bordered by vegetation on either side. Approximately half of the study area was cultivated by water

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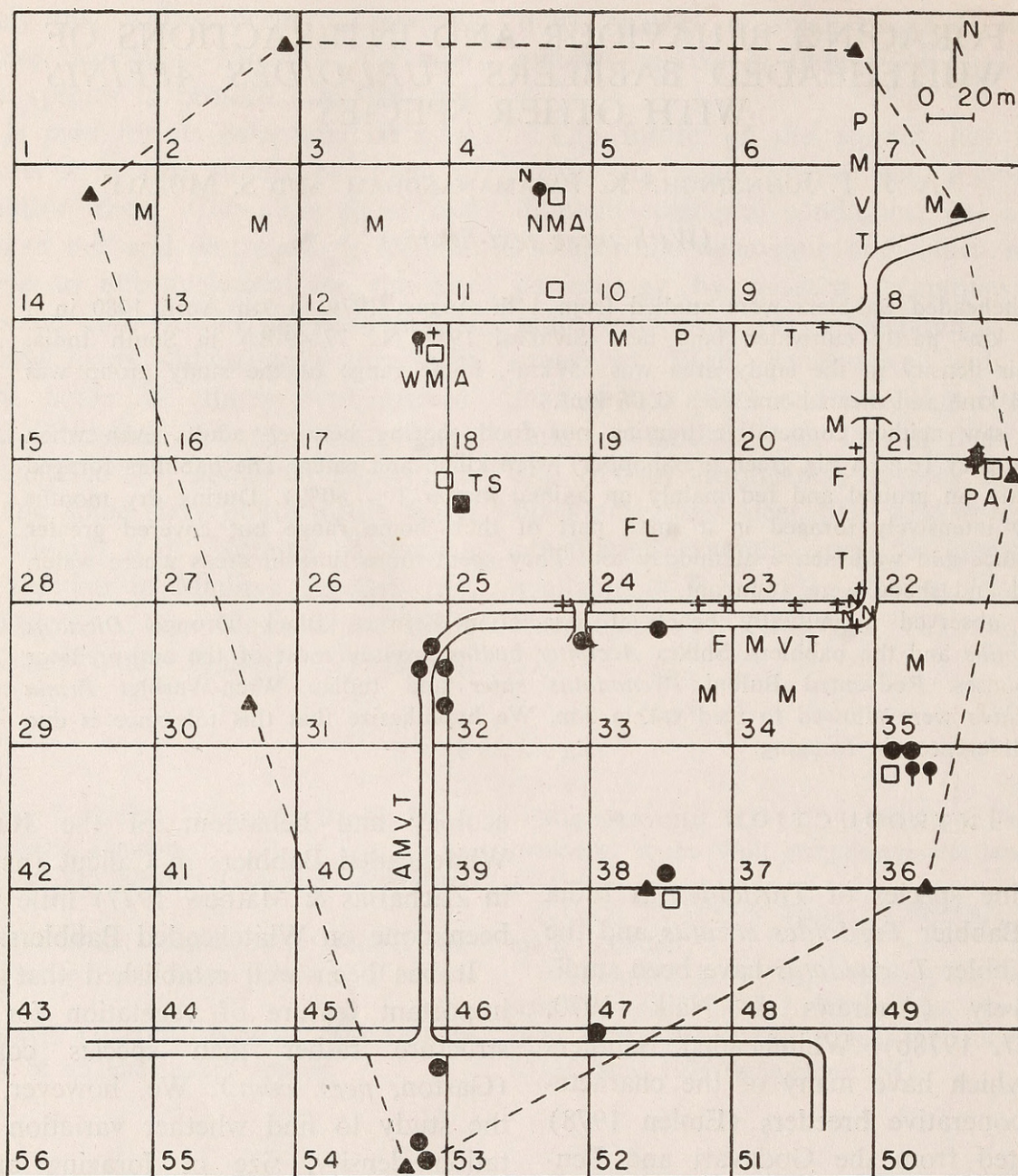


Fig.1. Map of study area showing various vegetation types, home range of the study group & other details. August 1979 to April 1980.

AMVT, FMVT, FL, etc. = various vegetation types or foraging areas.

(See Table I) □ = well, ■ = tomb, ▲ = home range boundary of study group,

● = place where group of 8 was seen, + = major roosting site, N = nesting site,

| = stone wall across stream bed, 1-56 = quadrat numbers, = = stream bed,

M = miscellaneous foraging sites.

TABLE 1

DETAILS OF THE MAJOR VEGETATION TYPES OR FORAGING AREAS SEEN IN THE STUDY AREA

Vegetation types or Foraging areas	Area in m ²	Vegetation density	Relative density of numerically abundant plant	Nesting site	Roosting site	Water	Area under shade	in quadrats
<i>Agave-Morinda</i> Vegetation Type (AMVT)	2640	0.49	<i>Agave americana</i> 37.5%	Nil	One	No perennial water	> 60%	31,32,40,45
Fallow Land (FL)	4000	0.05	<i>Morinda tomentosa</i> 85%	Nil	Nil	"	< 10%	23,24,25
<i>Fluggea-Morinda</i> Vegetation Type (FMVT)	1800	0.55	<i>Fluggea leucopyrus</i> 36%	Three	Nine	"	> 70%	33,34
North Mango Area (NMA)	600	0.19	<i>Morinda tomentosa</i> 64%	One	Nil	Perennial water (Well)	> 80%	11
West Mango Area (WMA)	375	0.22	<i>Morinda tomentosa</i> 70%	Nil	One	"	> 70%	17
<i>Morinda-Fluggea</i> Vegetation Type (MFVT)	1300	0.40	<i>Morinda tomentosa</i> 38%	Nil	Three	No perennial water	> 60%	20,21,22,23
<i>Morinda-Prosopis</i> Vegetation Type (MPVT)	1700	0.40	<i>Morinda tomentosa</i> 34%	Nil	One	"	> 70%	9,10,11,18,19,20
<i>Polyalthia</i> area (PA)	900	0.097	<i>Morinda tomentosa</i> 49%	Nil	Nil	Perennial water (Well)	> 60%	22
<i>Prosopis-Morinda</i> Vegetation Type (PMVT)	1200	0.27	<i>Prosopis juliflora</i> 37%	Nil	Nil	No perennial water	> 70%	6, 7, 8, 9
Tomb Site (TS)	1600	0.095	<i>Morinda tomentosa</i> 83%	Nil	Nil	"	< 10%	25,26

drawn from wells and other areas remained fallow except during north-east monsoon. We divided the study area into 56 quadrats of 60 m² each and based on the numerically abundant plants, their associations and terrain distinguished many vegetation types (Fig. 1). Table 1 gives details of the vegetation types.

The study group had 11 babblers and besides these there were two groups of 8 and 5 in the neighbourhood. The birds which interacted with the babblers are Black Drongo *Dicrurus adsimilis*, Shikra *Accipiter badius*, Crow Pheasant *Centropus sinensis*, Jungle Crow *Corvus macrorhynchos*, House Crow *Corvus splendens*, Tree Pie *Dendrocitta vagabunda*, Spotted Owlet *Athene brama*, Blue Jay *Coracias benghalensis*, Indian Myna *Acridotheres tristis*, Brahminy Myna *Sturnus pagodarum*, Koel *Eudynamis scolopacea*, Pied Crested Cuckoo *Clamator jacobinus* and the Grey Partridge *Francolinus pondicerianus*.

Mammals of the area are Threestriped Palm Squirrel *Funambulus palmarum*, Blacknaped Hare *Lepus nigricollis*, Common Mongoose *Herpestes edwardsi* and Jungle Cat *Felis chaus*. Reptiles seen were the Cobra *Naja naja*, Russell's Viper *Vipera russelli* and the Rat snake *Ptyas mucosus*.

METHODS

The Whiteheaded Babblers have feeble powers of flight. The maximum distance a bird covered in a non-stop flight was c. 180 m. Before flying from one area to another usually they go up a tree or tall shrub to gain height in flight. Hence it was possible to mark their foraging route and the rate of movement as they moved from one vegetation type to another.

Babblers were located mostly by their excited calls audible for > 200 m even against

wind. Whenever we decided to follow the group from the time they left the roost, we located and followed them till they roosted in the evening. Next day around 0530 hr we waited for them to commence activities. Data on the foraging routes and the rate of movement was collected once a month from August 1979 to March 1980 and the group was followed from the onset of their activity till they roosted. The babblers did not always move as a group as 2 or 3 birds sometimes lagged behind. In such cases we followed part of the group which had more members and never less than seven. As we were careful not to disturb the foraging route, we did not go close to the group. This and the habit of the babblers feeding in the interior of the shrubbery made it difficult to identify all food eaten.

RESULTS

Density and home range

Whiteheaded Babblers are cover-dependent for escaping predators. This reliance prevents them from occupying the vast stretches of tree and shrubless plains around Sivakasi. The habitable area for the three groups, including the study area, was around 0.4 km² which gives a density of 60 birds per km². The density for the study area was 55 birds per km² and the home range of the study group was c. 0.16 km².

This home range was not covered when day range length for 8 days was computed (Fig. 2) and for the estimation of home range data collected on other days were also used. The home area (area covered on single day — Madison, 1978) for 8 days ranged from 0.024 to 0.099 km², with a mean of 0.06 km².

Normally distance between neighbouring groups was between 100 and 200 m. Twice group of 11 went deep into the home range

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of group of 8 when the latter was not in that area and once the group of 8 made an inroad into the home range of group of 11 when the latter was feeding c. 200 m away. Six observations showed that group of 5 did not have a fixed home range and lived along the periphery of north-western and south-eastern parts of the study area.

Intergroup conflicts were seen on 4 occasions — thrice between group of 11 and 8 and once between group of 11 and 5. Conflicts were characterized by chases between indivi-

dual birds and loud vocalization. Physical attack on the intruder was seen twice.

Foraging behaviour

The babblers commenced feeding c. 20 minutes before sunrise. In a foraging site they moved in different directions and there was no incidence of either cooperative hunting or food sharing between adults even when large prey (e.g., a big green grasshopper) were killed and eaten. Only once we saw a babbler chasing an insect flushed by another. A babbler at a static food source like a termite

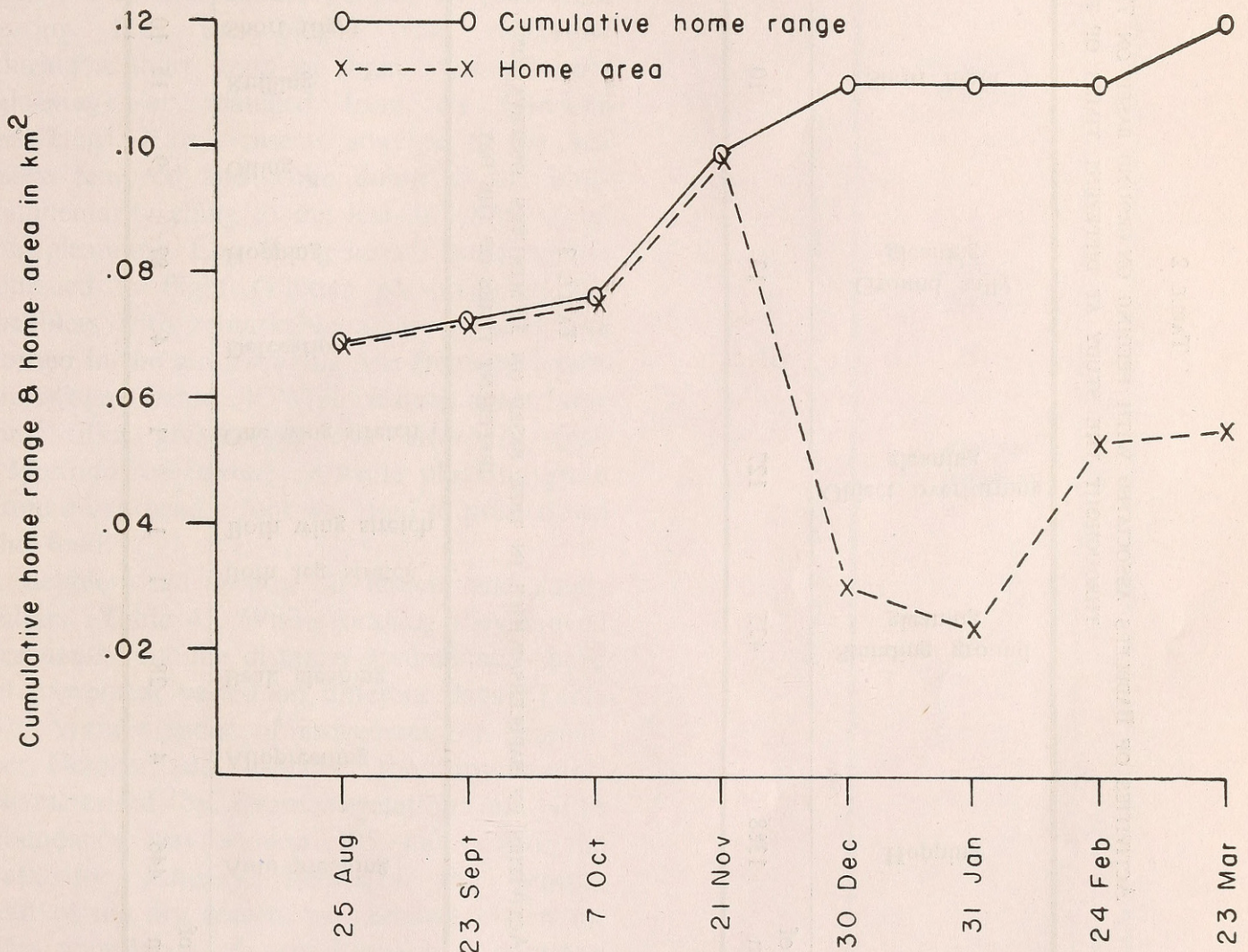


Fig. 2 Cumulative home range and home areas of the study group (25 Aug. 1979 - 23 Mar 1980)

TABLE 2

ACTIVITIES OF BABBLERS ASSOCIATED WITH FEEDING ON GROUND BASED ON 77.39 MINUTES OBSERVATION
THROUGHOUT THE STUDY AT DIFFERENT TIMES OF THE DAY

Activities	Hopping	Standing ground gleaning	Object overturning gleaning	Ground sally gleaning	Short flight	Ground hawking	Flutter pursuit	Leaf clinging gleaning
Number of times seen	1388	435	127	13	10	3	1	1

TABLE 3

ACTIVITIES OF BABBLERS WHILE IN TREE BASED ON 52 MINUTES OBSERVATIONS THROUGHOUT THE STUDY AT
DIFFERENT TIMES OF THE DAY

Activities	Auto preening	Allopreening	Beak cleaning	Both leg stretch	Both wing stretch	One wing stretch	Defecation	Hopping	Oiling	Ruffling	Short flight	Tail shake	Wing shake	Vocalization	Food begging	Foliage gleaning
Number of times seen	446	4	28	1	1	1	4	87	9	15	10	34	28	4	1	64

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colony attracted others and 3 to 5 formed a circle and ate.

The following classification of the foraging methods of babblers is based on the study of Neotropical Tyrant Flycatchers (Fitzpatrick 1980). Hopping was the major method of movement on the ground (Table 2). Standing ground gleaning (catching prey standing on the ground) was the most common method of prey capture. Frequently the babblers overturned leaves and sticks on the ground (Object overturning gleaning). In such cases it was not possible to differentiate pecking at prey from eating. Prey was picked from vegetation during a short jump or flight (Ground sally gleaning) or snatched from air (Ground hawking). Rarely insects attached to the leaf were removed and while doing so the birds momentarily clung to the leaf-tip (Leaf clinging gleaning). Low flying insects were rapidly pursued in flight (Flutter pursuit) and the babblers with remarkable agility twisted and turned in the air. Foraging was frequently seen in foliage (Table 3). While tearing apart large prey like grasshoppers or *Morinda* fruit (*Morinda tomentosa*) or while plucking grain from an earhead a foot was used to press down the food.

Babblers fed mostly on insects and caterpillars (Table 4). While foraging they moved frequently but the distance covered and speed of movement varied on different days (Table 5). Average speed of movement for September, October, and November, the rainy months, characterised by dense vegetation and fruit abundance was around 105 m/hr and the data for January, February and March, part of the dry season, was around 134 m/hr. The abundance of grasshoppers, a common prey, varied little between rainy and dry season. Grasshoppers counted along the foraging path on 2nd October were 155 and on 7th

TABLE 4
TYPES OF FOOD EATEN BY THE BABBLERS DURING THE STUDY

Type of food eaten	Adults	Insects	Caterpillars	<i>Sorghum vulgare</i>	<i>Morinda tomentosa</i>	<i>Fluggea leucopyrus</i>	Centipede	Spider	Grub
Times seen	29	22	6	5	3	2	1	1	1

TABLE 5

FORAGING DISTANCE AND SPEED OF MOVEMENT OF THE BABBLERS

Date	Total foraging time (in hours and minutes)		Total distance covered (in metres)	Speed of movement (metres per hour)
	h.	m.		
25.viii.'79	12	35	3000	239
23.ix.'79	12	34	1370	109
7.x.'79	12	32	1040	83
21.xi.'79	12	08	1500	124
30.xii.'79	12	12	1720	141
31.i.'80	12	08	1620	134
24.ii.'80	12	16	1600	130
23.iii.'80	12	38	1760	139

TABLE 6

SPEED OF MOVEMENT OF THE BABBLERS IN METRES IN DIFFERENT TIMES OF THE DAY

Date	Before 1000 hrs.	Between 1000-1400 hrs.	After 1400 hrs.
25-viii-79	308	318	146
23-ix-79	187	91	60
7-x-79	110	68	79
21-xi-79	79	162	160
30-xii-79	118	125	193
31-i-80	207	140	83
24-ii-80	212	135	78
23-iii-80	196	105	145
Total	1417	1144	944
$\bar{X}$	177	143	118

April, 1969. The Mann-Whitney U-test showed that the babblers covered more distance during the dry season ($U = 0$, $p < 0.05$) but foraged in a restricted part of their home range (Fig. 2). More distance covered by babblers in dry season may be correlated with lack of fruits. In Sivakasi, where the summer temperature in day time rises to 40°C , one may expect the babblers to cover more distance in early morning and evening and re-

main inactive at midday. The distance covered by the babblers and their speed of movement between 1000 and 1400 hr were not significantly different from data for hours between the onset of foraging and 1000 hr (Table 6).

If the time spent by the babblers in different vegetation types is calculated, with references to the area of vegetation types, it was seen that the babblers spent more time (8.61 hr) in the north mango area (see Table 1 and 7). This area until the end of November had banana plants (*Musa paradisiaca*) and throughout had abundant food perennial water. The *Fluggea-Morinda* vegetation types (Tables 1 and 7) comes as the second most intensively utilized area and the reason for this is the combined effect of the presence of nesting sites, roosting sites, vegetation density and shade. During November and December in this vegetation type the babblers fledged a cuckoo chick and in January and February 2 babbler chicks were raised. During the breeding season the group spent 13.07 hr in *Fluggea-Morinda* vegetation type and in non-breeding season 10.12 hr. Total hours of observation for the breeding and non-breeding season was 48.73 hr and 50.19 hr

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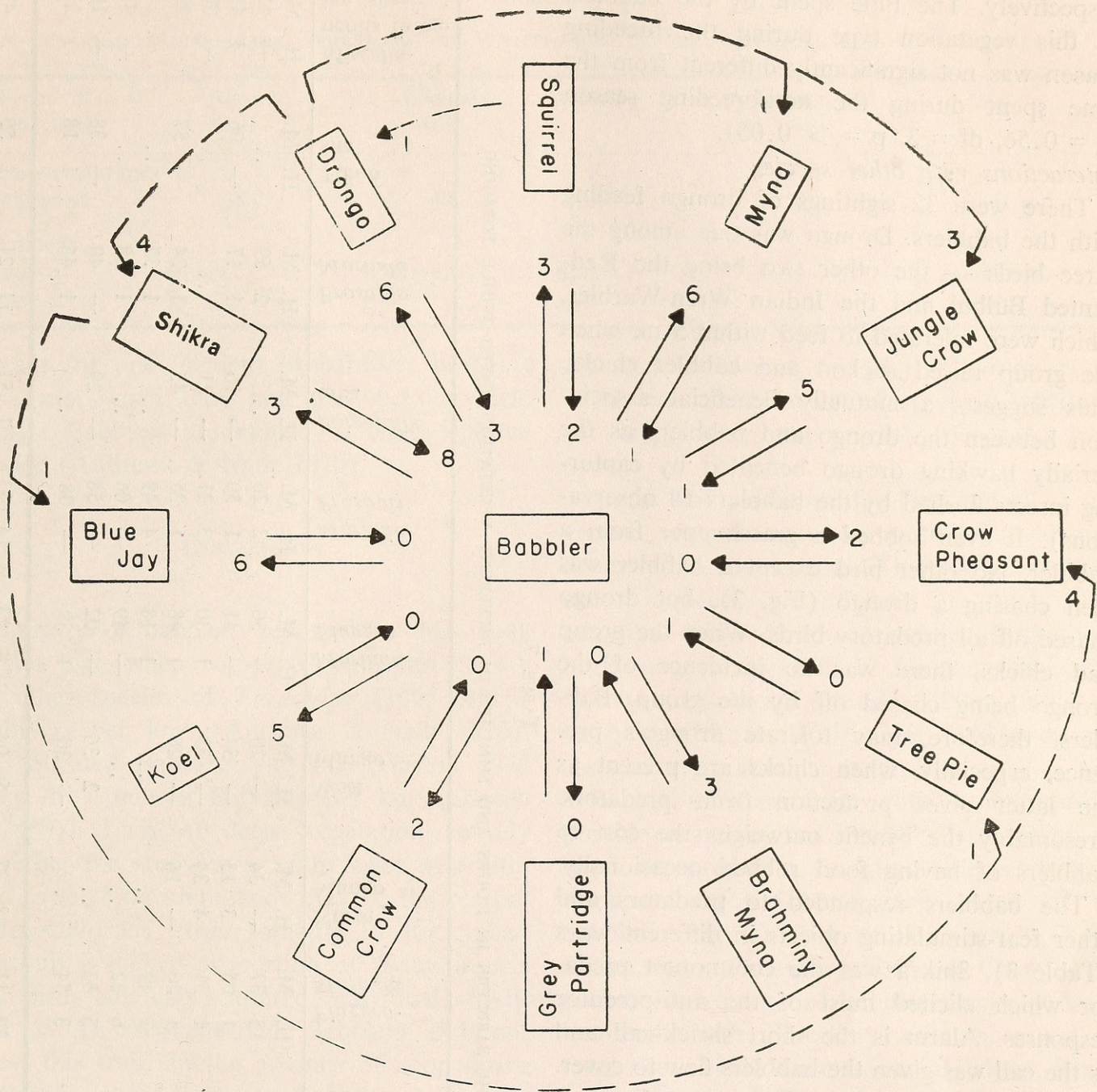


Fig. 3 Aggressive interactions between Babblers & other animals of study area. August 1979 to April 1980.

Note: **Babbler** → 6 **Drongo** = Babbler chased Drongo six times.

respectively. The time spent by the babblers in this vegetation type during the breeding season was not significantly different from the time spent during the non-breeding season ($t = 0.56$, $df = 3$, $p = > 0.05$).

Interactions with other species

There were 32 sightings of drongo feeding with the babblers. Drongo was one among the three birds — the other two being the Red-vented Bulbul and the Indian Wren-Warbler, which were tolerated to feed within 5 m, when the group raised cuckoo and babbler chicks. This suggests a mutually beneficial association between the drongo and babblers as the aerially hawking drongo benefited by capturing insects flushed by the babblers (4 observations). It even robbed a grasshopper from a babbler. No other bird except a babbler was seen chasing a drongo (Fig. 3), but drongo chased off all predatory birds. When the group had chicks, there was no incidence of the drongo being chased off by the group. Babblers, therefore, may tolerate drongo's presence, especially, when chicks are present as the latter gives protection from predators. Presumably the benefit outweighs the cost to babblers of having food robbed occasionally.

The babblers responded to predators and other fear-stimulating objects in different ways (Table 8). Shikra was the commonest predator which elicited most of the anti-predator responses. Alarm is the short shriek-call and as the call was given the babblers flew to cover. A hare in the bush, Crow-Pheasant and a shed snake skin also made the babblers to sound alarm. Excited calls sometimes lasted for more than 4 minutes and mobbing call could be differentiated from an excited call when two or more babblers called on seeing a predator. The Blacknaped Hare feeding in open did not excite babblers. Once the group lost its interest in a 2 m active snake after mobbing it for 4 minutes. Spotted Owlets were tolerated

TABLE 7
TIME SPENT BY THE BABBLERS IN HOURS AND MINUTES IN DIFFERENT VEGETATION TYPES WHILE FORAGING

Vegetation Types	Agave-Morinda	Fallow Land	Fluggea-Morinda	Mango North	Mango West	Morinda-Fluggea	Morinda-Prosopis	Polyalthia area	Prosopis-Morinda	Tomb site	Miscellaneous foraging sites
Dates	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.
25-viii-79	1 18	..	3 37	34	20	36	2 26	..	2 59	..	45
23-ix-79	2 09	..	1 05	3 13	34	41	1 30	16	1 17	06	43
7-x-79	..	..	1 31	4 34	38	30	3 21	21	..	..	37
21-xi-79	3 14	..	1 20	16	26	48	1 35	45	1 24	57	23
30-xii-79	2 39	..	1 49	..	..	18	4 49	..	1 37	..	..
31-i-80	1 48	52	6 22	..	..	49	06	..	1 38	..	33
24-ii-80	2 53	08	3 33	..	2 36	02	58	29	—	38	19
23-iii-80	1 39	17	3 54	..	30	39	08	..	1 46	1 18	27
Total	15 40	1 17	23 11	8 37	5 04	8 23	14 53	1 51	11 21	2 59	5 47

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TABLE 8

VARIOUS ANTIPREDATOR BEHAVIOUR OF WHITEHEADED BABBLERS OBSERVED DURING THE STUDY

Types of behaviour	Alarm call	Excited call	Mobbing	Hiding in cover	Chase
Number of times observed	38	17	10	14	41
Prominent causative agents	Shikra	Observer	Shikra	Shikra	Shikra, Blue Jay, Myna

except for one incident of babblers mobbing an owlet when they had the cuckoo chick. Jungle Babblers are known to chase Spotted Owlet (Andrews & Naik 1970).

DISCUSSION

Density of babblers reported in this study is not high when compared with the density of other species of *Turdoides* (1067 Jungle Babblers per km² (Andrews & Naik 1970), 133 Striated Babblers per km² [Gaston 1978 (a)]; 46 Common Babblers per km² [Gaston 1978(b)]. Lack of dense vegetation entirely covering the study area with fewer nest sites and lower food abundance may be the reason.

Insectivorous birds foraging in flocks can beat up a higher proportion of flying insects per bird than can scattered individuals (Wilson 1975). Whiteheaded Babblers did not show this trait. In the absence of cooperative foraging, group living in babblers may help them detect predators as in doves (Siegfried & Underhill 1975) but an optimum size of the group is necessary to deter predators. We observed that a group of three babblers was not successful in chasing off a shikra but nine did it effectively. Movement from one area of the home range to another, a characteristic of many territorial species, is not only

for optimization of foraging (Charnov *et al.* 1976) but also for patrolling their territories to keep away conspecifics (Gaston, *pers. com.*).

Since babblers mostly feed near or on ground, we call them near ground foragers and drongos, aerial hawkers. This foraging difference reduces competition for food. The adaptive value of mixed species flocking in birds is generally held to be connected with feeding advantages, protection from predators or both (Morse 1970). The babbler-drongo association is another example.

Babbler's interactions with other species provide examples for interspecific conflict related to predation, roosting site and food resources. Of the 10 species chased off by babblers (Fig. 3), four species (Jungle Crow, Shikra, Crow Pheasant and House Crow) were potential predators of babbler chicks. All interactions with Blue Jay were observed at roost sites. Birds, such as, Indian Myna, Brahminy Myna and Koel probably compete for the same food resource. Low (1971) found that 35 of the 38 species, that were chased off by pomacentrid fish *Pomacentrus flavi-cauda*, were food competitors, while all of the 16 species that were allowed to trespass unmolested exploited different food resources. Redvented Bulbul and Indian Wren-Warbler, which probably do not compete with babblers

for the same food resource and which cannot harm babbler chicks, were tolerated at all times and the drongo was not chased off when chicks were present. This implies that babblers know what and when to chase off from their vicinity. A proper understanding of this will be evident by further studies on this aspect.

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