

Rates of swarming and absconding in the giant honey bee, *Apis dorsata* F.

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Abstract. The frequency and timing of swarming and absconding of the giant honey bee *Apis dorsata* F. at 5 perennial nesting sites located in and around Bangalore district during 1986–88 are determined. The percentages of swarming and absconding are very high and both these migratory activities occur regularly and at definite times of the year. Swarming was noticed both during October–November and in April, while absconding was observed during May to July. Swarming and absconding together caused migration in *Apis dorsata*.

Keywords. *Apis dorsata*; swarming; absconding; honeybee; rockbee.

1. Introduction

The giant honeybee *Apis dorsata* F. still exists as a wild bee (Beeson 1941; Lindauer 1957; Abrol 1985). This species builds its single large comb in an open place suspended from branches of tall trees, big rocks, water tanks and buildings (Deodikar *et al* 1977; Chandrasekhara Reddy 1983; Ahmed and Abbas 1985). Although its nests are sometimes found singly, the rockbee is highly gregarious and nests in groups ranging from a few to few hundreds nests (Shankar Reddy 1988). It is highly migratory in nature and normally moves from place to place. Only some of the reasons for such migration are known (Sihag 1982).

General information on migration, swarming and absconding are available for African and European bees (Attridge 1917; Demuth 1921; Allen 1956; Smith 1960; Martin 1963; Simpson and Riedel 1963; Butler 1967; Butler and Simpson 1967; Simpson 1973; Burgett 1974; Fletcher 1975, 1976, 1978; Fletcher and Tribe 1977; Fell *et al* 1977; Winston *et al* 1979; Caron 1979, 1981; Lensky and Seifert 1980; Page 1981). However, no detailed information on the nature of swarming, absconding and migration in the giant honeybee *A. dorsata*, the largest honey producing species in India is available. This paper reports the results of a two year study on the frequency and timing of absconding and swarming and their possible relationship with migration.

2. Materials and methods

Five perennial multiple colony nesting sites were selected for studying swarming and absconding behaviour. These nesting sites are located in the Bangalore district.

2.1 Swarming

All 5 nesting sites were observed weekly for the presence of occupied and deserted

combs and daily for the emergence and settlement of swarms. The total numbers of swarms issued, swarms settling within the nesting sites, swarms leaving their respective nesting sites and swarms coming from other nesting sites were recorded. The size of the population of each colony and the variation in colony number at each nesting site were recorded to classify the swarms as immigrant and emigrant swarms.

2.2 *Absconding*

Departure of any colony without emergence of the new queen(s) or over-crowding of bees was considered as absconding. All colonies were observed weekly and the total number of colonies absconded in all 5 nesting sites during the study period was recorded.

3. Results

Number of colonies, both live and deserted in each of the 5 nesting sites for each month are shown for two years in table 1. Live colonies were present in all 5 nesting sites throughout the period 1986–88 except at nesting site-1 in July. However, deserted colonies were noticed only during May to July. The number of live colonies varied from 0–108, while the number of absconding colonies varied from 0–54.

Data on the numbers of occupied and deserted combs at the 5 nesting sites were subjected to ANOVA (table 2). Our results show that the variation between the groups is significant ($P < 0.01$). Further, on subjecting these data to Tukey measure we find that the mean differences between groups 2 and 1, 2 and 3, 2 and 4 for occupied combs and groups 2 and 1, 2 and 3, 2 and 4, 2 and 5 for deserted combs are significant. However, the mean differences between all other groups are not significant (table 3).

Table 4 shows the incidence of swarming and absconding for the period 1986–88. A total of 336 colonies were observed and the percentage of absconding and swarming ranged from 81–100 and 53–108 respectively of the total colony population of all nesting sites. The number of swarms settled within the respective nesting sites were greater than emigrant swarms. Emigrant swarms were noticed in nest site 3–5 and the percentage varied from 8–28 of the total swarms issued, while immigrant swarms were noticed in nesting sites 1 and 2 with a minimum and maximum per cent of 19 and 29 respectively. The minimum and maximum per cent of swarms settled within the respective nesting site were 53 and 81 respectively.

The percentage of colonies absconding or swarming in each month for the two years are shown in figure 1. The period of absconding was almost same in both the years except that maximum per cent in the first year was 79 when compared to 53 in the second year. The occurrence of swarming during 1986–87 and 1987–88 showed variation in peak per cent activity; there were two peaks of swarming during 1986–87 against three during 1987–88. Peak swarming activity was observed during November and April for the year 1986–87; October, January and April for the year 1987–88.

Table 1. Monthly occupied and deserted colonies of *A. dorsata* during 1986–88.

Month	Nest site number									
	1		2		3		4		5	
	1986–87	1987–88	1986–87	1987–88	1986–87	1987–88	1986–87	1987–88	1986–87	1987–88
August										
Occupied	2	3	10	8	5	6	3	5	8	7
Deserted	0	0	0	0	0	0	0	0	0	0
September										
Occupied	3	5	10	8	5	8	3	8	9	7
Deserted	0	0	0	0	0	0	0	0	0	0
October										
Occupied	3	7	8	7	8	13	4	8	11	13
Deserted	0	0	2	1	0	0	0	0	0	0
November										
Occupied	5	8	8	7	11	13	6	11	14	16
Deserted	0	0	0	0	0	0	0	0	0	0
December										
Occupied	5	10	15	9	13	13	7	12	14	18
Deserted	0	0	0	0	0	0	0	0	0	0
January										
Occupied	5	13	35	9	13	15	7	15	13	20
Deserted	0	0	0	0	0	0	0	0	1	0
February										
Occupied	6	13	35	25	13	16	7	16	13	20
Deserted	0	0	0	0	0	0	0	0	0	0
March										
Occupied	6	14	38	42	18	19	9	18	21	25
Deserted	0	0	0	0	0	0	0	0	0	0
April										
Occupied	7	15	72	108	25	22	13	20	26	28
Deserted	0	0	0	0	0	0	0	0	0	0
May										
Occupied	4	8	58	51	18	14	9	14	14	19
Deserted	3	7	14	54	7	8	4	6	12	9
June										
Occupied	1	4	35	20	9	8	5	7	9	8
Deserted	2	3	22	31	9	6	4	7	5	11
July										
Occupied	0	2	8	8	3	5	1	3	5	5
Deserted	1	2	27	12	6	3	4	4	4	3

4. Discussion

Our results indicate that the variation in the number of occupied and deserted combs between the 5 nesting sites during 1986–88 is significant, the nest density is high and that approximately the same number of live colonies are always present inspite of heavy migration.

Table 2. ANOVA table of a 5 group design of occupied and deserted colonies of *A. dorsata*.

	Source of variance	
	Between groups	Within groups
Sum of squares		
Occupied	5489.36	18597.44
Deserted	2267.8	1280.5
Degrees of freedom		
Occupied	4	115
Deserted	4	25
Mean square/variance		
Occupied	1372.34	161.716
Deserted	566.95	51.22
<i>F</i>		
Occupied	8.486	—
Deserted	11.069	—

Table 3. Tukey's measure for data in table 1.

		X ₁	X ₂	X ₃	X ₄	X ₅	
X ₁	Occupied	6.208	—	19.583*	6.0	2.583	8.084
	Deserted	3	—	23.833*	3.5	1.83	4.33
X ₂	Occupied	25.791	19.583*	—	13.583*	17*	11.499
	Deserted	26.833	23.833	—	20.333*	22.003*	19.503*
X ₃	Occupied	12.208	6.0	13.583*	—	3.417	2.084
	Deserted	6.5	3.5	20.333*	—	2.33	0.83
X ₄	Occupied	8.791	2.583	17*	3.417	—	5.501
	Deserted	4.83	1.83	22.003*	2.33	—	2.5
X ₅	Occupied	14.292	8.084	11.499	2.084	5.501	—
	Deserted	7.33	4.33	19.503*	0.83	2.5	—

Occupied HSD = 12.246; deserted HSD = 15.105.

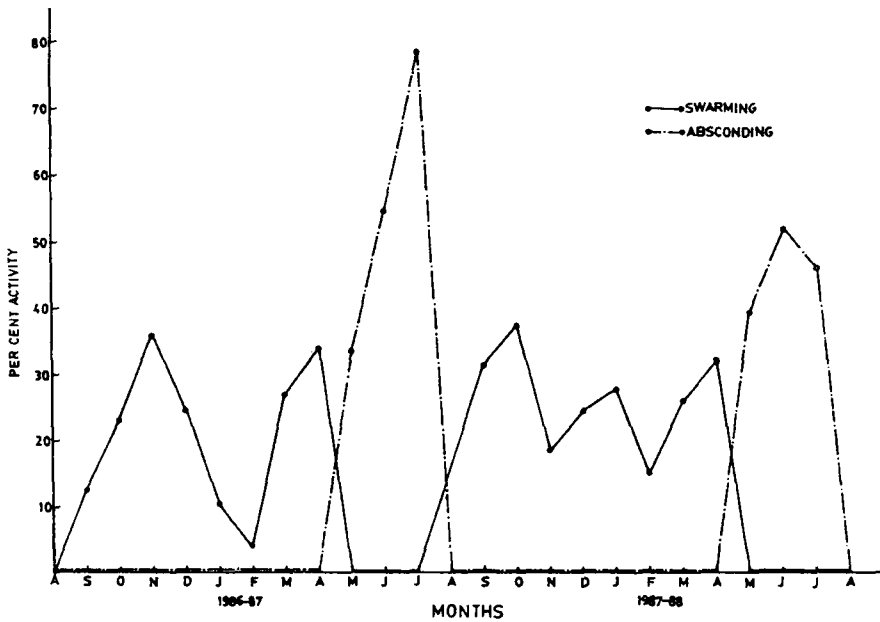
*Mean difference are significant.

The timing of swarming in all 5 nesting sites confirms that swarming takes place at a particular time of the year. Swarming in honey bees is a natural way of population dispersal and colony multiplication.

Very high incidences of absconding in all 5 nest sites indicate that absconding is an annual phenomenon and is observed during May to July each year. Similar behaviour has been observed in other species of honeybees (Fletcher 1975, 1976; Woyke 1976). Swarming and absconding together cause extensive migration in *A. dorsata*.

Table 4. Annual percentage of swarming and absconding in different nest sites of *A. dorsata* during 1986–88.

Nest site Number	Year	Number of colonies observed	Swarms settled within the nest sites (%)	Immigrant swarms (%)	Emigrant swarms (%)	Total per-cent of swarms issued	
						Swarming (%)	Absconding (%)
1	1986–87	7	71	29	0	71	100
	1987–88	15	53	27	0	53	87
2	1986–87	72	69	19	0	69	94
	1987–88	108	65	28	0	65	93
3	1986–87	25	80	0	28	108	68
	1987–88	22	73	0	23	96	77
4	1986–87	23	77	0	15	92	92
	1987–88	20	75	0	15	90	85
5	1986–87	26	81	0	8	89	81
	1987–88	28	75	0	14	89	82

**Figure 1.** Monthly per cent of swarming and absconding behaviour of *A. dorsata*.

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