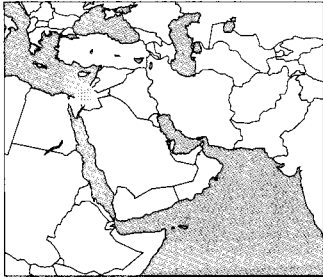


The spatial and temporal behaviour of a Common Swift *Apus apus* colony in Tel Aviv

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Studies at a colony of Common Swifts *Apus apus* in Tel Aviv, Israel, revealed the presence of a territorial colony breeding system and regular daily timetable, corresponding well with the species' behaviour in central Europe. With respect to the species' time budgets in Tel Aviv, it appears that Common Swifts spend more time feeding than engaged in social flights.

INTRODUCTION

DURING FEBRUARY–APRIL 2000 I studied a colony of Common Swift *Apus apus* in Tel Aviv, Israel, especially their spatial and temporal behaviour. Urban Common Swifts in central Europe exhibit a colony territory (Tigges 1995, 1999) and follow a rather precise daily timetable (Tigges 2000). I sought to observe this particular behaviour, as the Tel Aviv colony is very different from that in Berlin, Germany, which I had studied earlier, and my objective was to discover whether the species' social organisation in the former breeding area was similar or different. Both groups inhabit urban areas, but otherwise exhibit wholly different structure and conditions: that in central Europe consists of a small colony with 15 members and only 1–2 breeding pairs, the Middle Eastern group consists of nearly 100 breeding pairs (Shirihai 1996). The colony in Berlin is situated centrally within a built-up area and surrounded by other colonies—the Tel Aviv colony is established on the edge of the city in a lone building with much open space around it. Due to its geographical location, the duration of twilight is much shorter in the Middle East, which may influence behaviour.

STUDY SITE

Nesting places of the colony in Tel Aviv are sited exclusively on a building, c. 30 m high, standing alone (hereafter referred to as the 'colony building'). The nearest houses are 100–175 metres distant and these surround the colony building on three sides. On the fourth side, in the west, is an open area. The majority of the nests are placed under overhanging walls, between 20 metres and 30 metres above ground.

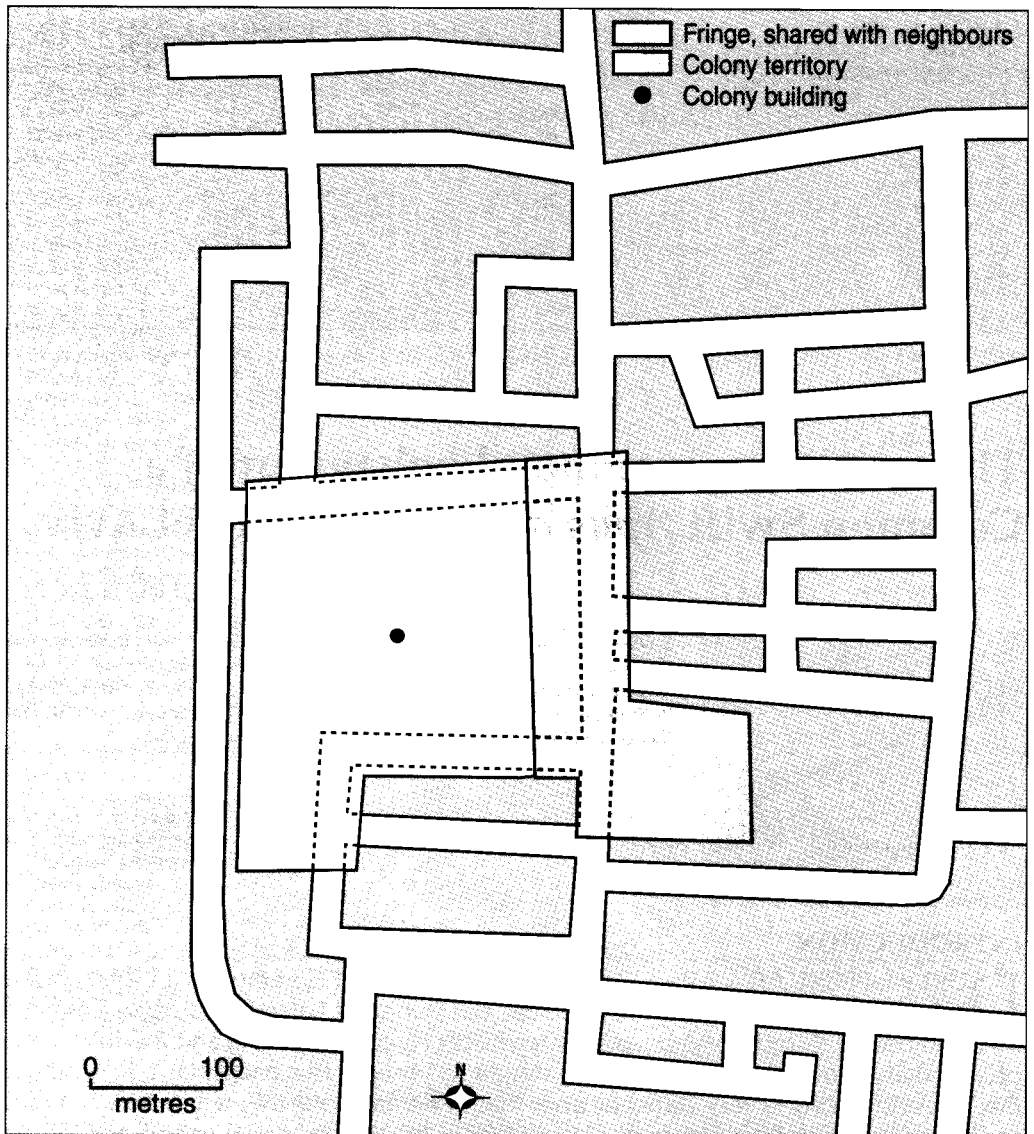


Figure 1. Map showing the colony building and territory on the outskirts of Tel Aviv, adapted from the Tel Aviv Map and Guide (1997).

TERRITORY

The first breeders arrived in Tel Aviv on 23 February (Tigges 2001). During these early stages the birds flew above neighbouring houses to the east, and were not observed to enter the space around the colony building until 27 February, when several arrived from the west at c. 16:45. They flew above it and the surrounding open space. Further east they mixed with others of the species. In total, 40 Common Swifts circled the colony building and at least 16 were observed to enter it. Six did not enter the central building, instead flying around the nearest adjacent house to the north until 17:47 (dusk was at 17:36).

Over the following days, birds arrived around 17.00 over the colony building, always from the east, while those swifts over neighbouring houses appeared more than 10 minutes earlier.

After the first eggs were laid (20–26 March), those swifts in the study colony flew almost exclusively around the colony building and the surrounding open space between the street in the west and the houses to the north, south and east, which delimited the colony territory. Colony members shared the latter vector with swifts from colonies to the east, which entered the colony up to approximately 40 metres west of the street. The limit of their occurrence within the colony territory was difficult to determine because there was no topographical feature useful in delimiting the extent of their flights.

TIMETABLE

During late February until the first week of April, the birds returned to the colony in the afternoon from c. 2 hours before sunset, but principally at 16.50–17.20. From the last week of March, flights were as follows: the swifts arrived between c. 16.00 and 17:15 and this period lasted 15–20 minutes. During this time swifts passed the observation point both east–west and vice versa. These birds headed straight over the colony area and did not circle or join in the group flights of the colony members.

On 28 March, at 17.10, I witnessed some interesting behaviour, in which two birds that were seeking suitable nesting sites, including by touching the walls of a house within the border of the colony to the east. For c. 2.5 minutes they were observed circling the area before they disappeared above the houses of the latter colony's territory. This observation agrees with my thesis (Tigges 1999) that birds search for a nest site only within their colony's own territory.

RESULTS

As observed, the swifts followed a definite timetable and spent the morning and evening within a defined territory. They left the territory in the morning and returned in the afternoon, 15–90 minutes before sunset. The territory of the colony was delimited by houses and roads, and was divided into a centre (or core area), used almost exclusively by colony members, and a fringe that was also used by birds from neighbouring colonies. According to the topography the territory was nearly square, with extensions into the open areas in the south-west and north-east, where there was a one-storey house. The colony territory measured c. 90,000 m².

These findings correspond with my findings in Berlin, where swifts also exhibited a definite timetable and territorial behaviour. The only difference is in the duration of time spent in the territory in the evenings. While swifts in Berlin returned to spend 2–4 hours within the colony territory, those in Tel Aviv did so for only 15–90 minutes in the early breeding season. This difference is certainly due to the shorter twilight period in Israel. Given that we assume that swifts feed during the day, while outside the colony territory, and only take additional food in the territory, it appears that the intake of food during the day is more important than engaging in social flights within the territory.

DISCUSSION

It is well known that Common Swift orients the borders of its territories according to topography and that the fringes of territories are used by neighbours (Tigges 1999). Fringes are broader above open places. Given that in Tel Aviv almost the entire territory consists of open areas, some problems were encountered in attempting to ascertain its borders in the east and west. To determine the territory of the colony, the birds' flights were closely observed for approximately 40 hours. The colony airspace was also crossed by non-members of the colony, but, as mentioned, the latter were easily identified, as their flight was direct, not circling. The main part of the colony

territory, in the north and south, was easy to delimit, because no other colonies abutted it in these vectors. To the west, the birds mostly flew only as far as the nearest streets (or the trees) but occasionally entered the large adjacent territory, sometimes to some distance. However, as this area was not regularly flown over, it is not considered part of the colony's territory. Only in the east was the situation complicated, due to the presence of two neighbouring colonies and much open space over which the birds had poor lines of orientation, such as a line of houses or trees, to determine territory boundaries. Members from the colony to the east exhibited varied daily behaviour, sometimes hardly crossing the street, at other times flying 30–40 metres beyond it before returning to their colony.

At 90,000 m² the size of the colony territory is smaller than that in Berlin by 120,000 m², although the number of members is several times larger. This demonstrates that territory borders are not determined by the number of colony members, but according to the presence of orientation points, such as lines of houses or trees. In Tel Aviv, the unclear border in the east and—but much less so—in the west underline this conclusion, because open spaces become areas of common usage. That space around the colony building is exclusively used by colony members clearly demonstrates the strong advantages of a true territory. That birds from neighbouring colonies will overfly the territory is obviously less of a negative result than the benefits of a defined colony territory, which reduces levels of disturbance during breeding and intraspecific aggression (Tigges 1999).

The geographical conditions in Tel Aviv reduced the daily period of social flights above the colony territory sometimes to just 15 minutes. Unlike central Europe, where swifts fly over the territory for at least 90 minutes, this phase is much shorter in the Middle East because of the shorter days, and shorter twilight period. Swifts in downtown Tel Aviv were absent from the city ~~until~~^{from} 09.00 (i.e. ~~much later than at the study colony~~). During the early breeding season, those birds not on nests were absent 8–9 hours from the colonies, usually outside the city. On average this is approximately the same time as in central Europe. Of course, in the latter region, these periods away from the colony were measured throughout the complete duration of the species' presence on the breeding grounds, and includes the greater part of the non-breeders, who only arrive about halfway through the nesting season but play a major role in the social dynamics of the population. It is unknown when non-breeders arrive in Tel Aviv.

During the observations, there were never more than c. 40 individuals in the colony territory, suggesting that the number of breeders was probably many fewer than 100 pairs. Ringing and a census of the colony in April 2002 by Allon Bear *et al.* confirmed this impression: the number of breeding pairs has decreased from c. 100 in 1990 to approximately 35 in 2002.

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