METHODS

Spatial Distribution of Interactions

To test whether outgoing foragers interacted more with returning foragers than with all other ants as they approached the nest exit, we used a Monte Carlo simulation. We produced utilization distribution maps for interactions only with returning foragers and for interactions with all other ants (Fig. S1). We defined a region of interest (ROI), a circle with a diameter of two ants and a centre located one ant length from the nest exit (Fig. 2), and computed the ratio between the total number of interactions with returning foragers and the total number of interactions with other ants within the ROI. When testing whether this ratio was significantly greater in the ROI than elsewhere in the vestibule, our null hypothesis was that the ratio in the ROI was less than or equal to that ratio in any other similarly sized area elsewhere in the vestibule. We randomly selected, with replacement, 100 000 circles, the size of the ROI within the physical boundaries of the vestibule, and computed the ratio between the total number of interactions with returning foragers and the total number of interactions with other ants within each circle. We computed the probability that the ratio in the randomly selected circles was greater than or equal to the ratio in the ROI, as in Pinter-Wollman et al. (2011).

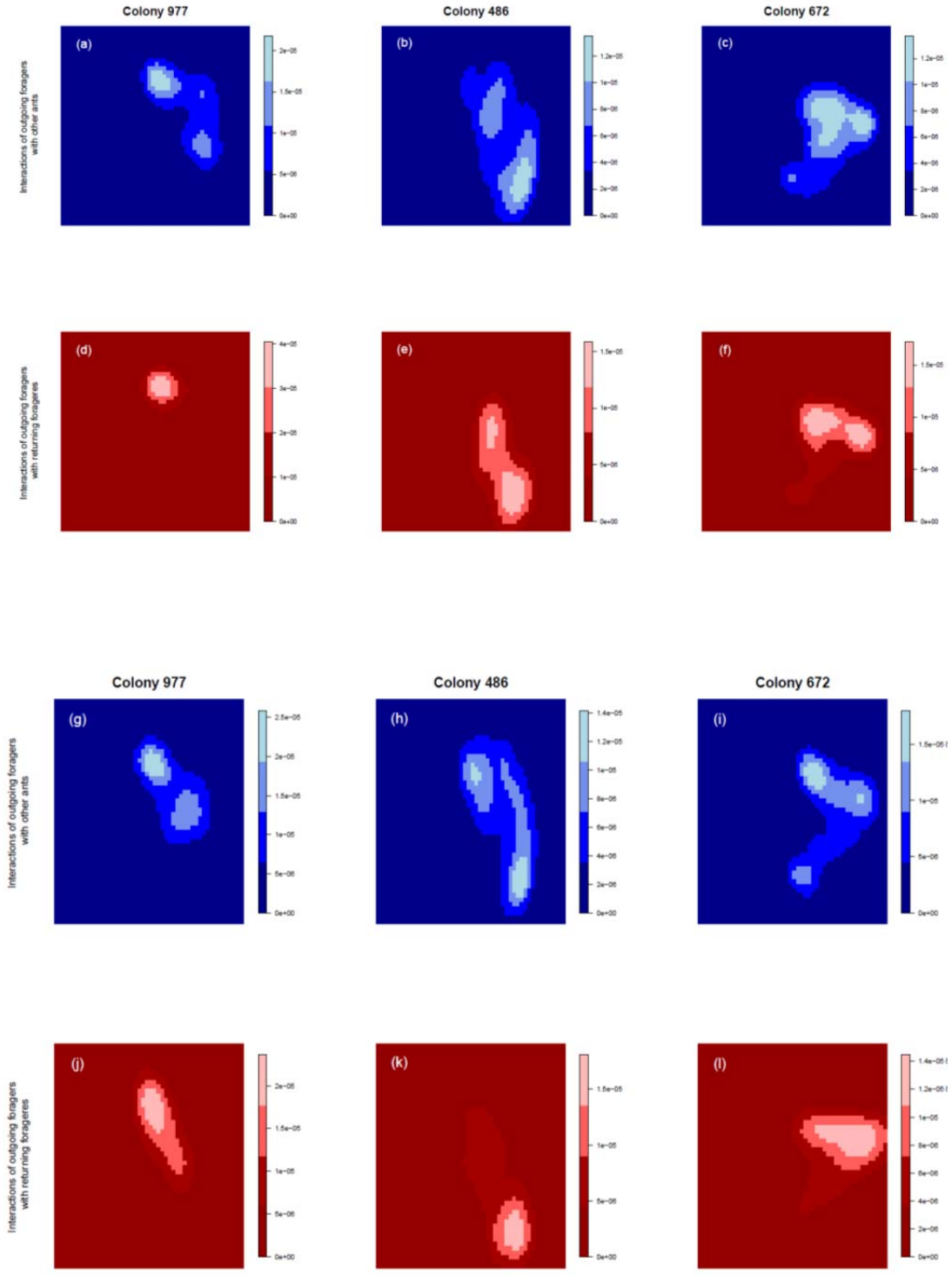

Figure S1. Spatial distribution of outgoing forager interactions with other ants (a–c, g–i) and with returning foragers (d–f, j–l) during low (a–f) and high (g–l) forager return rate periods.

RESULTS

Relationship between Forager Return Rate and Interaction Rate of Outgoing Foragers

There was a significant positive relationship between forager return rate and the average rate of interaction of outgoing foragers (linear regression: R^2= 0.92; $F_{1,4}$ = 51, P = 0.002). In addition, as the number of ants in the vestibule increased, so did the number of interactions experienced by outgoing foragers. There was a significant positive relationship between the number of ants in the vestibule and the average rate of interaction of the outgoing foragers (linear regression: R^2= 0.87, $F_{1,4}$ =33, P =0.0045).

The interaction rate of outgoing foragers increased when forager return rate increased in each of the three colonies (*t* test: low versus high return rates: colony 468: t_{177} = -9.75, P < 0.0001; colony 672: t_{162} = -4.09, P < 0.0001; colony 977: t_{25} = -4.48, P = 0.0001; Fig. S2a–c). This increase in interaction rate was a result of both an increase in the total number of interactions when forager return rate was high (*t* test: low versus high return rate periods: colony 468: t_{163} = -2.49, P = 0.01; colony 672: t_{174} = -2.36, P = 0.02; colony 977: t_{51} = 2.02, P = 0.05; Fig. S2d–f) and a decrease in the amount of time that outgoing foragers spent in the nest entrance area when forager return rate was high (colony 468: t_{107}= 3.77, P < 0.001; colony 672: t_{164} = 1.81, P = 0.07; colony 977: t_{48} = 4.21, P < 0.001; Fig. S2g–i).

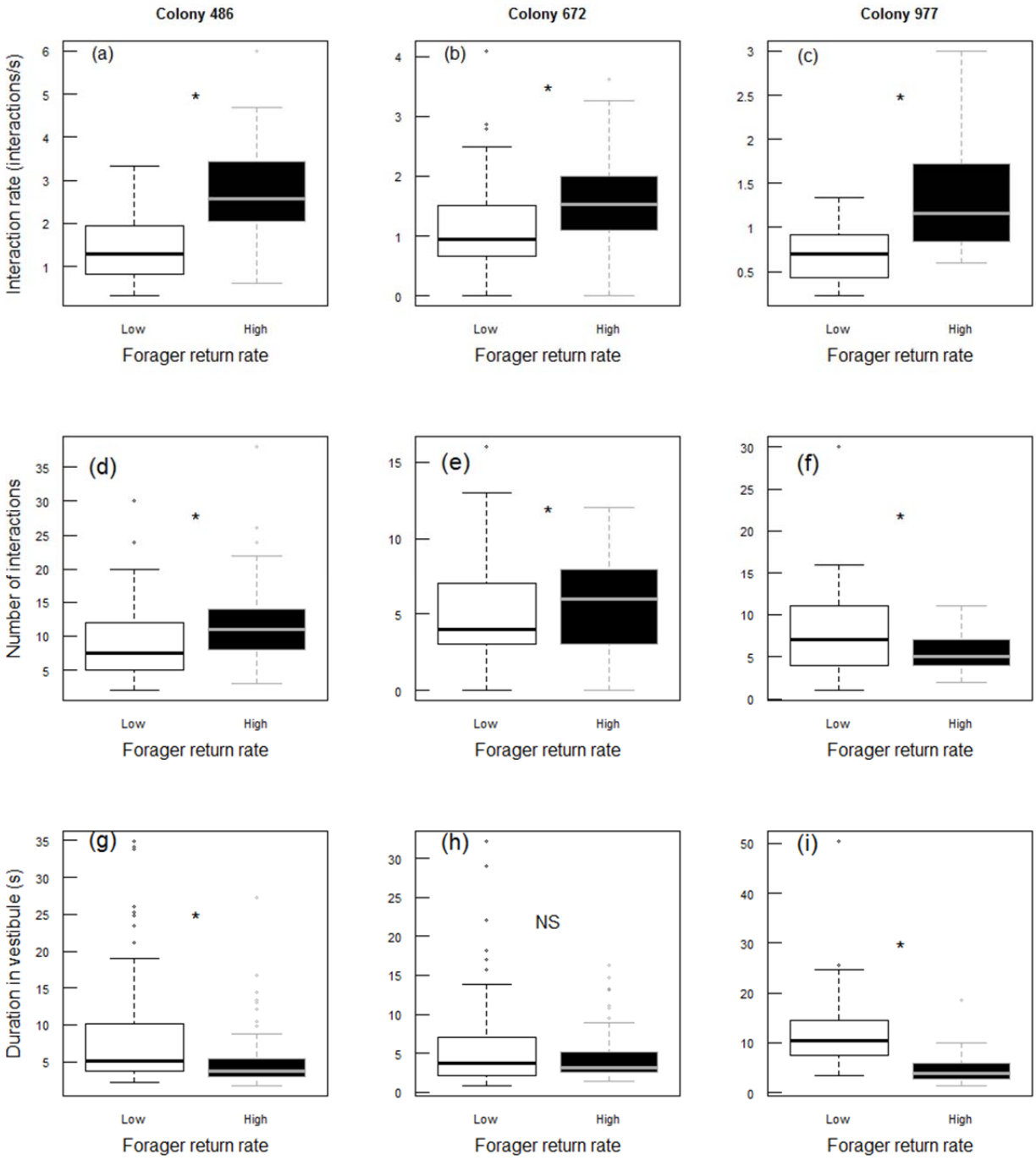

Figure S2. Difference between low (white) and high (black) return rate periods in interaction rate (a–c), total number of interactions (d–f) and in duration in the vestibule (g–i) for each of the three colonies in experiment 1. *$P < 0.05$.

The linear regression of the change over time in number of interactions before exiting the nest was significantly positive for all colonies in both the low and high return rate periods (Table S1).

Table S1

Linear regression of the relationship between the total numbers of interactions experienced by outgoing foragers in a given time frame and the time before the outgoing forager left the nest

Colony	Forager return rate period	Slope	R^2	*P*
486	Low	0.362	0.539	<0.0001
486	High	0.721	0.591	<0.0001
672	Low	0.260	0.430	<0.0001
672	High	0.300	0.450	<0.0001
977	Low	0.082	0.157	<0.0001
977	High	0.089	0.307	<0.0001

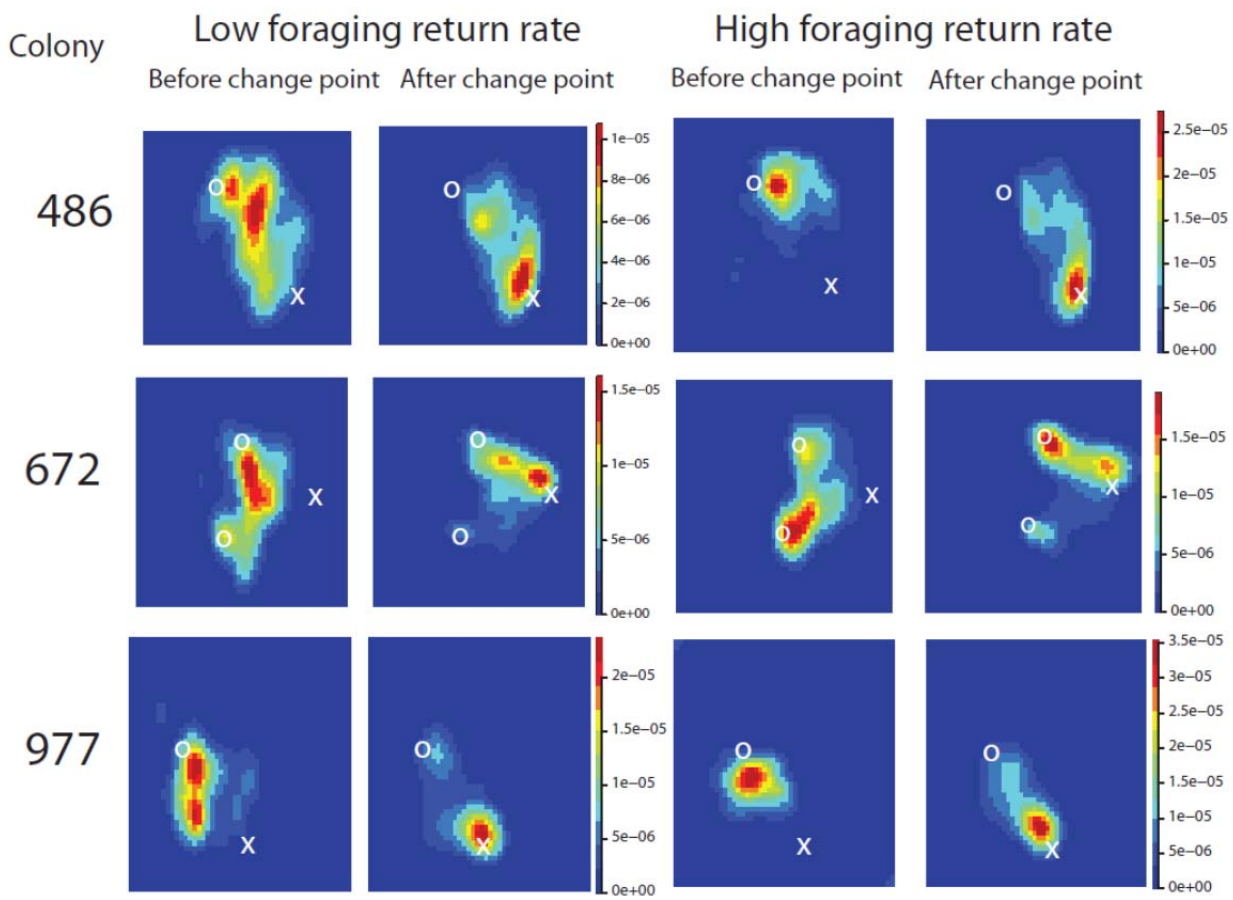

Figure S3. Spatial distribution of interactions before and after the change point in interaction rate for all colonies, and for the low and high forager return rate periods. Red indicates many interactions and blue indicates few interactions, see scale bars. Xs indicate nest exit location; Os indicate the location of the tunnels that led further into the nest.

Table S2

Slopes of the linear regression fit to the decrease in numbers of ants in the vestibule and on the foraging trail in experiment 1 after seeds were depleted

Colony	In the vestibule	Returning foragers	Outgoing foragers
486	-0.008	-0.024	-0.035
672	-0.023	-0.045	-0.038
977	-0.019	-0.026	-0.024

References

Pinter-Wollman, N., Wollman, R., Guetz, A., Holmes, S. & Gordon, D. M. 2011. The effect of individual variation on the structure and function of interaction networks in harvester ants. *Journal of the Royal Society Interface*, **8**, 1562–1573.