

Supplemental Information

**Human scent guides mosquito thermotaxis
and host selection under naturalistic conditions**

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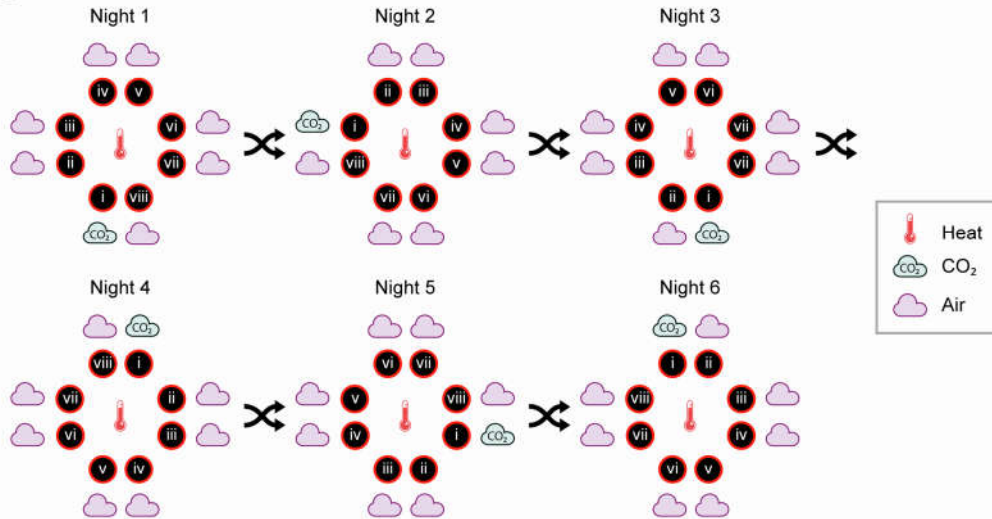
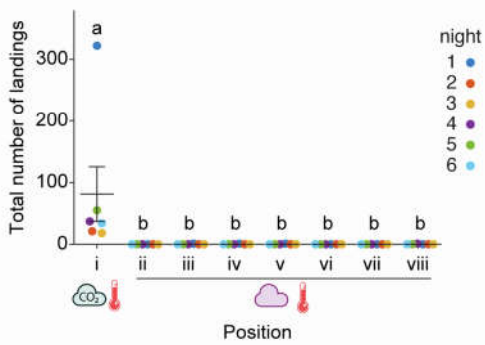
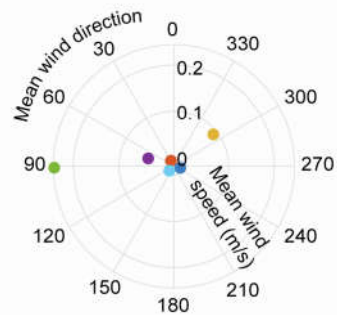
A**B****C****D****E**

Figure S1. Interior view of the semi-field system with an eight-choice OGTA configuration; and stimulus rotation scheme, total number of mosquito landings and wind conditions for eight-choice OGTA trials with CO₂ versus background air under semi-field conditions. Related to Figure 2, Figure 3 and Data S1G.

(A) Eight OGTA's arranged in an octagonal array are connected to the tents outside the perimeter of the flight cage arena via ducting through window access ports in each side of the cage.

(B) Close-up view of OGTA landing platform.

(C) Stimulus position and rotation. The CO₂ stimulus (position i) was shuffled every night. The control positions (ii-viii, air) were labeled in reference to the stimulus position in a clockwise manner. All platforms were heated to 35°C.

(D) Total number of mosquito landings per night. Mean \pm SEM plotted. n = 6 trials. The letters indicate significant differences ($p < 0.05$): Observed inter-individual mean total landing differences were compared (based on 5,000 permutation resampling simulations) against the null hypothesis assuming these arise only from positional bias, with Benjamini-Hochberg correction.

(E) Mean wind speed vs mean wind direction from 20:00 hours (time of mosquito release in cage) to 4:00 hours (end of the experiment).

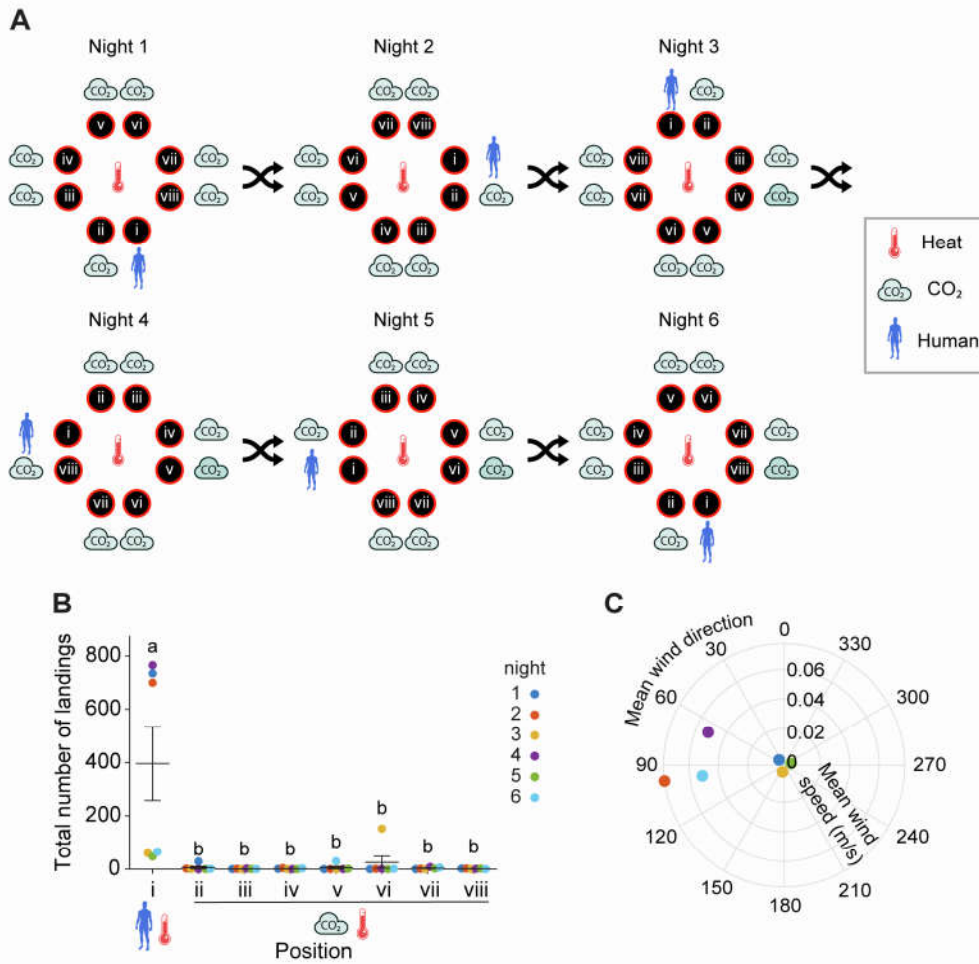


Figure S2. Stimulus rotation scheme, total number of mosquito landings and wind conditions for eight-choice OGTA trials with human whole body odor versus CO₂ under semi-field conditions. Related to Figure 4 and Data S1H.

(A) Stimulus position and rotation. The human stimulus (position i) was shuffled every night. The control positions (ii-viii, CO₂) were labeled in reference to the stimulus position in a clockwise manner. All OGTA platforms were heated to 35°C.

(B) Total number of mosquito landings per night. Mean ± SEM plotted. n = 6 trials. The letters indicate significant differences (p < 0.05): Observed inter-individual mean total landing differences were compared (based on 5,000 permutation resampling simulations) against the null hypothesis assuming these arise only from positional bias, with Benjamini-Hochberg correction.

(C) Mean wind speed vs mean wind direction from 20:00 hours (mosquito release time in the cage) to 4:00 hours (end of the experiment).

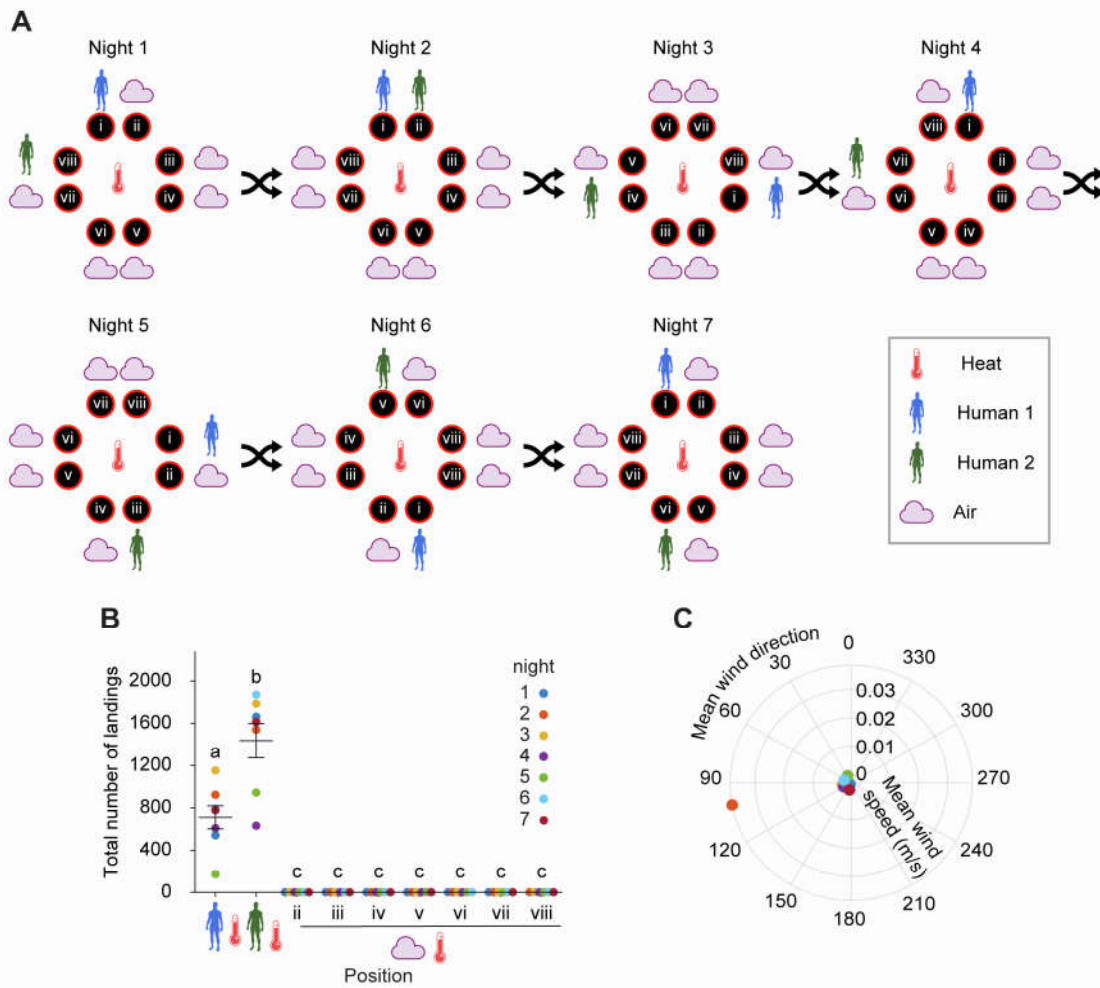


Figure S3. Stimulus rotation scheme, total number of mosquito landings and wind conditions for eight-choice OGTA trials with body odor from two humans versus background air under semi-field conditions. Related to Figure 5 and Data S11.

(A) Stimulus position and rotation. The position of Human 1 (blue) and the position of Human 2 (green) relative to Human 1 were shuffled every night. The control positions (air) and the position of Human 2 were labeled in reference to Human 1. Human 2 could take any of the positions ii-viii.

(B) Total number of mosquito landings per night. Mean \pm SEM plotted. $n = 7$ trials (control positions have 6 data points since one of the positions was occupied by Human 2 every night). The letters indicate significant differences ($p < 0.05$): Observed inter-individual mean total landing differences were compared (based on 5,000 permutation resampling simulations) against the null hypothesis assuming these arise only from positional bias, with Benjamini-Hochberg correction.

(C) Mean wind speed vs mean wind direction from 20:00 hours (mosquito release time in the cage) to 4:00 hours (end of the experiment).

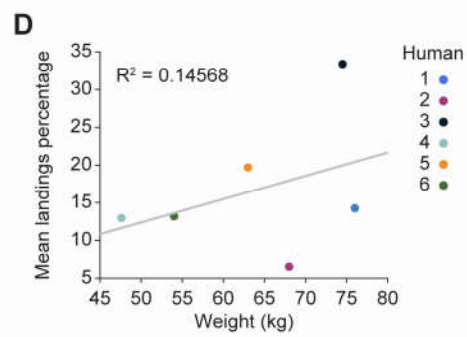
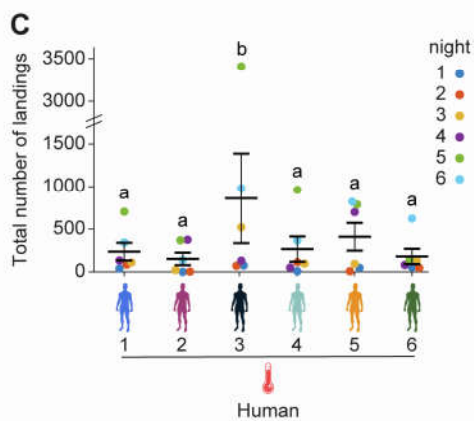
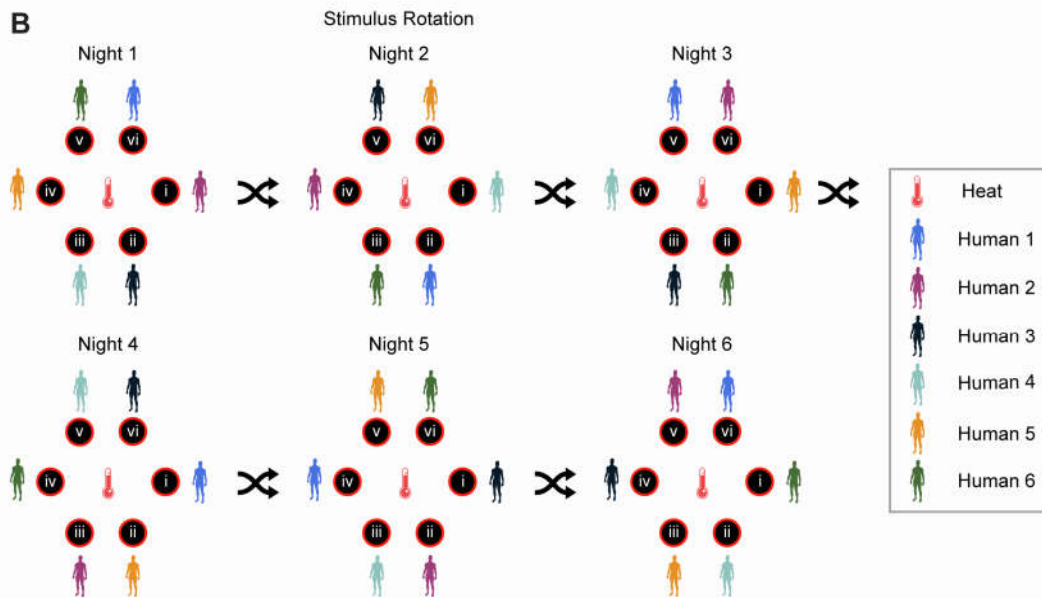
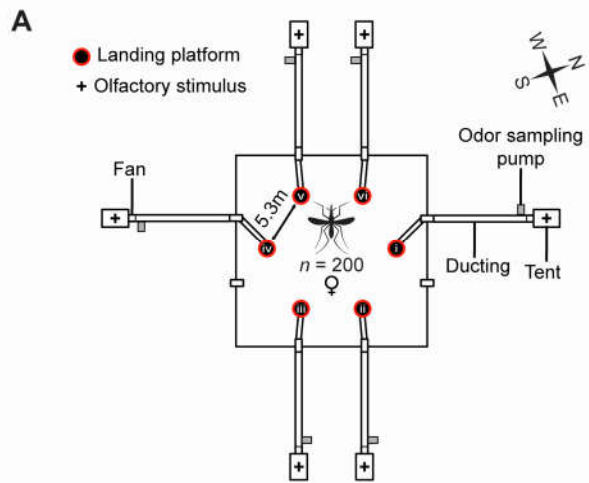


Figure S4. Six-choice assay configuration, stimulus rotation scheme, total number of mosquito landings and the effect of body weight on landings during trials with body odor from six humans under semi-field conditions. Related to Figure 6, Table S1 and Data S1J.

(A) Schematic of six-choice assay configuration. Stimulus positions were numbered relative to their position in the cage. An odor sampling pump was added to the ducting path after the fan.

(B) Stimulus position and rotation for each replicate night. The positions of all humans were shuffled every night.

(C) Total number of mosquito landings on platforms per night per human. Mean \pm SEM plotted. $n = 6$ trials. The letters indicate significant differences ($p < 0.05$): Observed inter-individual mean total landing differences were compared (based on 5,000 permutation resampling simulations) against the null hypothesis assuming these arise only from positional bias, with Benjamini-Hochberg correction.

(D) Participant weight versus the mean landings percentage. Coefficient of determination $R^2 = 0.14568$.

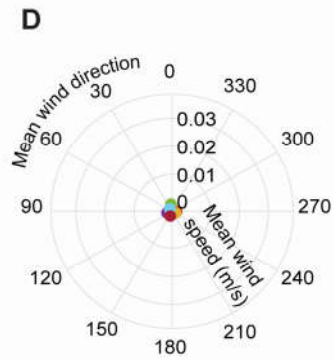
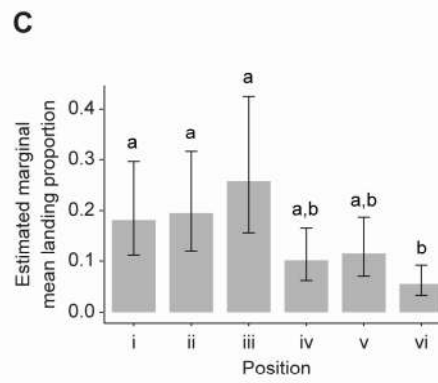
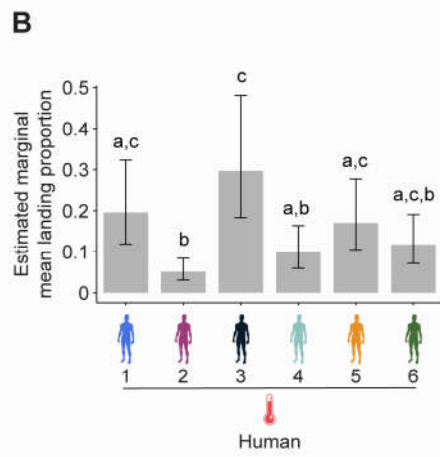
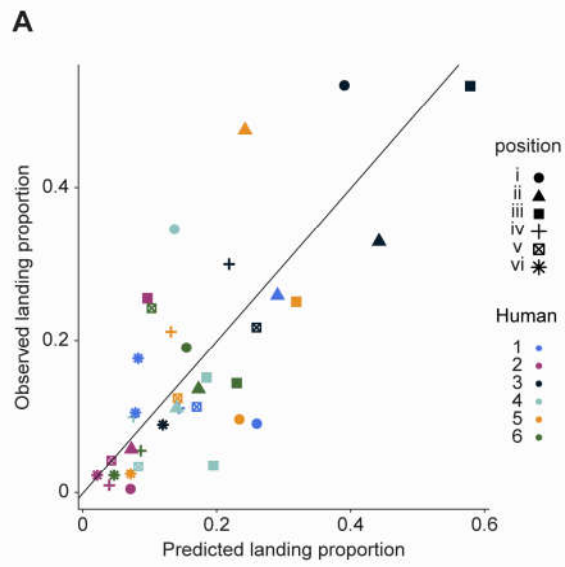


Figure S5. Summary of general linearized model output evaluating the effects of humidity, temperature, human and position on proportional mosquito landings, and wind conditions in six-choice assays. Related to Figure 6, Figure S4, Table S1, Data S1K and Data S1L.

(A) Negative binomial regression model output plotting observed vs predicted proportions of mosquito landings across all replicates.

(B) Estimated marginal means with all predictor factors held constant in the model except for human subject.

(C) Estimated marginal means with all predictor factors in the model held constant except for platform position. Letters for panels B and C indicate significant differences (pairwise comparisons with Tukey's method, $p < 0.05$). Error bars denote 95% confidence intervals.

(D) Mean wind speed vs mean wind direction from 20:00 hours (mosquito release time in the cage) to 1:00 hours (end of the experiment).

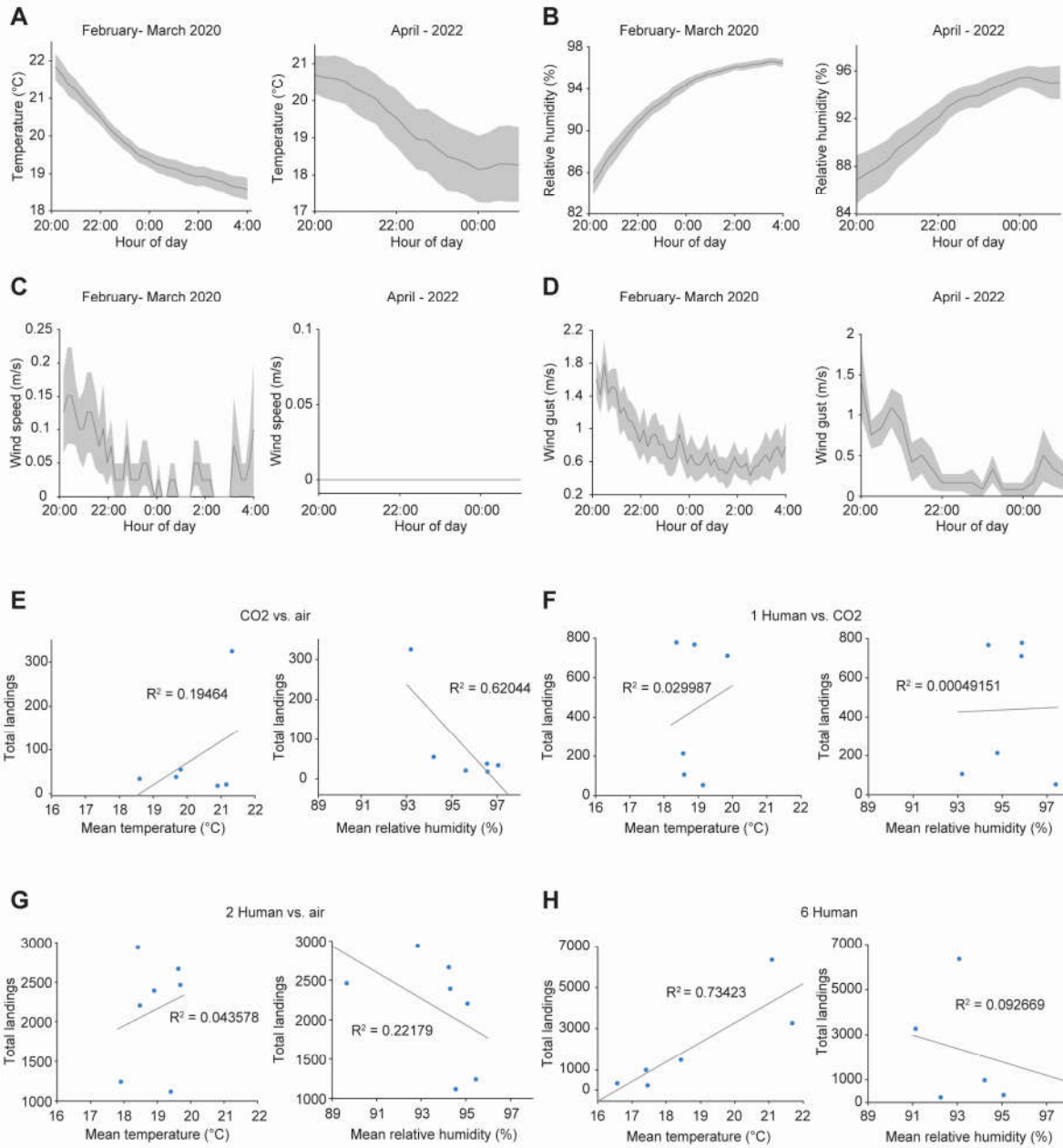


Figure S6. Mean weather conditions during experimental nights across test periods; and correlation between mean temperature or mean relative humidity conditions and total mosquito landings per nightly trial during the different semi-field experiments. Related to Figure 3, Figure 4, Figure 5 and Figure 6.

Experiments in the semi-field system were carried across two test periods: 2020 (i.e. CO₂ versus environmental air, human whole body odor versus CO₂ and human whole body odor sourced from two humans versus environmental air) and 2022 (i.e. six-choice assays with a cohort of six humans). Weather condition data is plotted between the time of mosquito release in the cage (20:00 hours) and the end of the experiment (4:00 hours for data collected in 2020 and 1:00 hours for data collected in 2022). The data was collected by a weather station adjacent to the flight cage and averaged over the 19 total nights of experiments for 2020 and 6 for 2022. Mean ± SEM plotted.

(A) Temperature conditions during 2020 and 2022 test periods.

(B) Relative humidity conditions during 2020 and 2022 test periods.

(C) Wind speed conditions during 2020 and 2022 test periods.

(D) Wind gust conditions during 2020 and 2022 test periods.

(E – F) Correlations between mean temperature (left) or mean relative humidity conditions (right) and total mosquito landings per nightly trial. Experiment type is indicated by an abbreviated code: CO₂ emissions reflective of a large human versus environmental air (CO₂ vs. air), whole body odor from one human versus CO₂ emissions reflective of a large human (1 Human vs. CO₂), human whole body odor sourced from two humans versus environmental air (2 Human vs. air), and (h) six-choice assays with a cohort of six humans (6 Human).

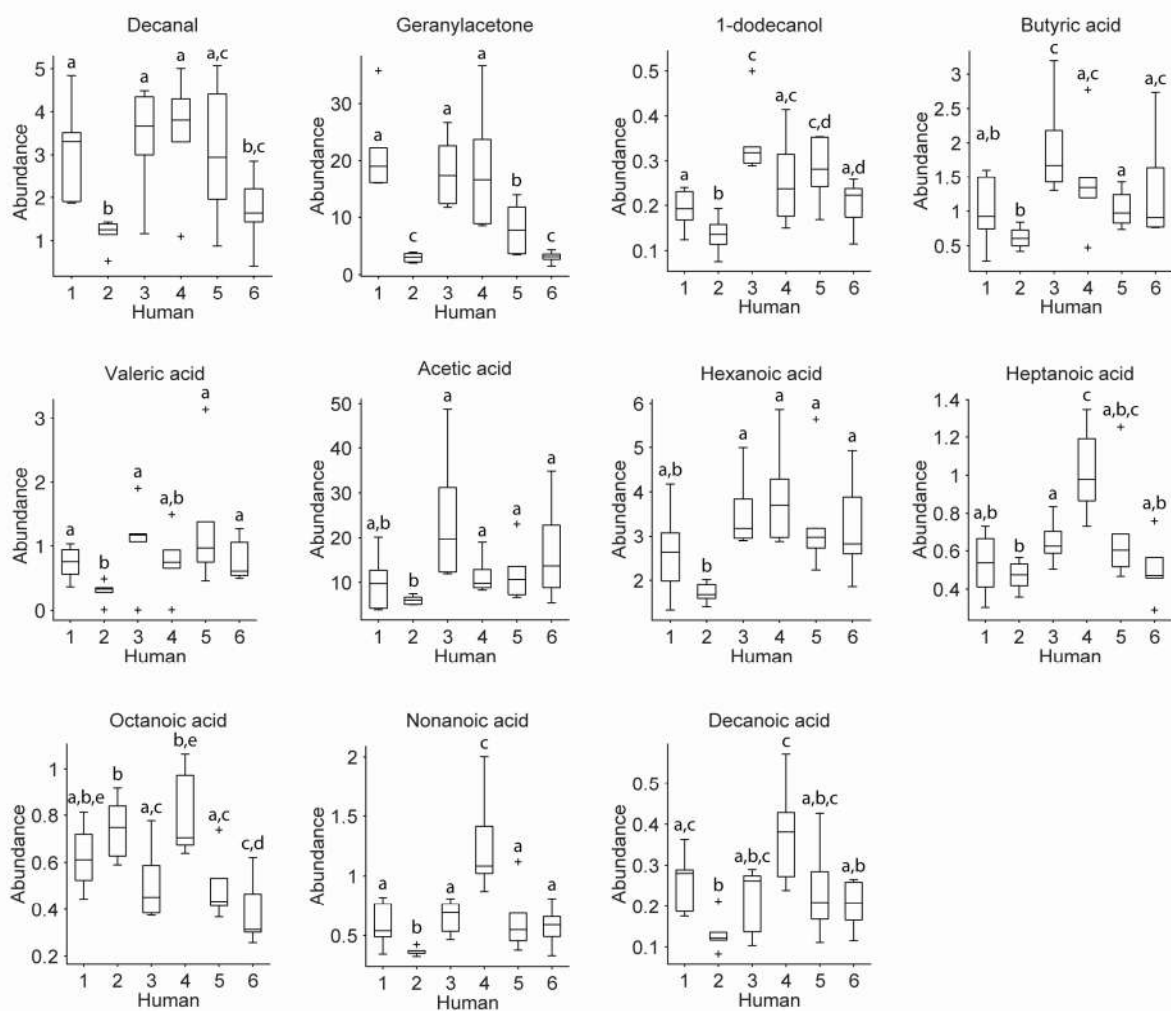


Figure S7. Variation in the abundance of additional human-derived volatile organic compounds from individuals in the six-choice assay. Related to Figure 7, Data S1M and Data S2.

Abundances of 11/15 identified volatile organic compounds detected in whole body odor demonstrating substantial variation between participants. The other 4 compounds are plotted in Figure 7. The line indicates the median, the box marks the lower and upper quartile, and the whiskers the 1.5 interquartile distance; outliers are indicated by black crosses. $n = 6$ trials. The letters indicate significant differences in compound abundance between humans: Fisher's exact permutation tests with Benjamini-Hochberg correction.

Characteristic	log(IRR) ^a	95% CI ^b	p-value
(Intercept)	-1.3	-2.1, -0.51	<0.001
Human			
Human 1	—	—	
Human 2	-1.3	-2.1, -0.54	<0.001
Human 3	0.42	-0.34, 1.2	0.242
Human 4	-0.68	-1.5, 0.11	0.067
Human 5	-0.14	-0.91, 0.62	0.694
Human 6	-0.51	-1.3, 0.25	0.15
Position			
Position 1	—	—	
Position 2	0.07	-0.66, 0.80	0.84
Position 3	0.35	-0.39, 1.1	0.327
Position 4	-0.58	-1.3, 0.13	0.099
Position 5	-0.46	-1.2, 0.28	0.193
Position 6	-1.2	-2.0, -0.39	<0.001
scale(rel_humid)	-0.01	-0.25, 0.24	0.914
scale(temp)	-0.03	-0.27, 0.22	0.824

^a IRR = Incidence Rate Ratio

^b CI = Confidence Interval

Table S1. Negative binomial regression model. Related to Figure 6, Figure S4 and Figure S5.