

# Supplementary Material to “Sexual signaling strategy shows no influence on the morphometrics of firefly’s primary olfactory organs”

2025-04-01

## Contents

Figures: SM Figure 1 through Figure 2

Tables: SM Table 1 through SM Table 7

## Information about reproducibility of figures and statistics

Figures, tables, and statistical values are fully reproducible in the main manuscript as well as the supplementary material using RStudio version 2024.12.1+563 and R version 4.4.2 or higher from a R project in the Github repository: (redacted for review). All data, code, and images are available publicly in this repository. Instructions for directly reproducing this project are included in the repository.

## Full table of specimens

Individual samples of species were acquired from the entomology collection of the Los Angeles County Natural History Museum, representing 32 individual animals and 26 species, presented here in SM Table 1. Two specimens lacked abdominal segments and were unable to be sexed, and these are marked in Table 1 as “NA.”

SM Table 1: Specimens used in analysis from the Los Angeles County Natural History Museum (LACM). Specimen ID is a specimen number unless BPC (Brian Brown personal collection) or NCC (individual specimens in the LACM collection not yet given a specimen number).

Specimen ID	Species	Signal	Sex	Body length (mm)
LACM Ent 574199	Ellychnia californica	chemical	NA	10.3
BPC 1	Photinus macdermotti	visual	NA	NA
LACM Ent 574198	Ellychnia corrusca	chemical	male	9.7
LACM Ent 574194	Ellychnia simplex	chemical	male	6.7
LACM Ent 574192	Lucidota sp	chemical	male	15.6
LACM Ent 574191	Lucidota punctata	chemical	female	5.7
LACM Ent 574190	Bicellonycha sp	visual	male	11.0
LACM Ent 574189	Bicellonycha wickershamorum	visual	male	6.7
LACM Ent 574188	Phausis reticulata	both	male	7.7
LACM Ent 574187	Pyractomena angulata	visual	female	9.5
LACM Ent 574186	Pyractomena borealis	visual	male	11.2
LACM Ent 574185	Pyractomena lucifera	visual	female	10.4
LACM Ent 574184	Pyropyga nigricans	chemical	male	6.2
LACM Ent 574183	Photinus marginellus	visual	NA	4.6
LACM Ent 574182	Photinus pyralis	visual	female	17.3
NCC Ent 1	Photuris sp	visual	male	15.9
NCC Ent 2	Bicellonycha wickershamorum	visual	male	7.7
NCC Ent 3	Bicellonycha wickershamorum	visual	female	9.1

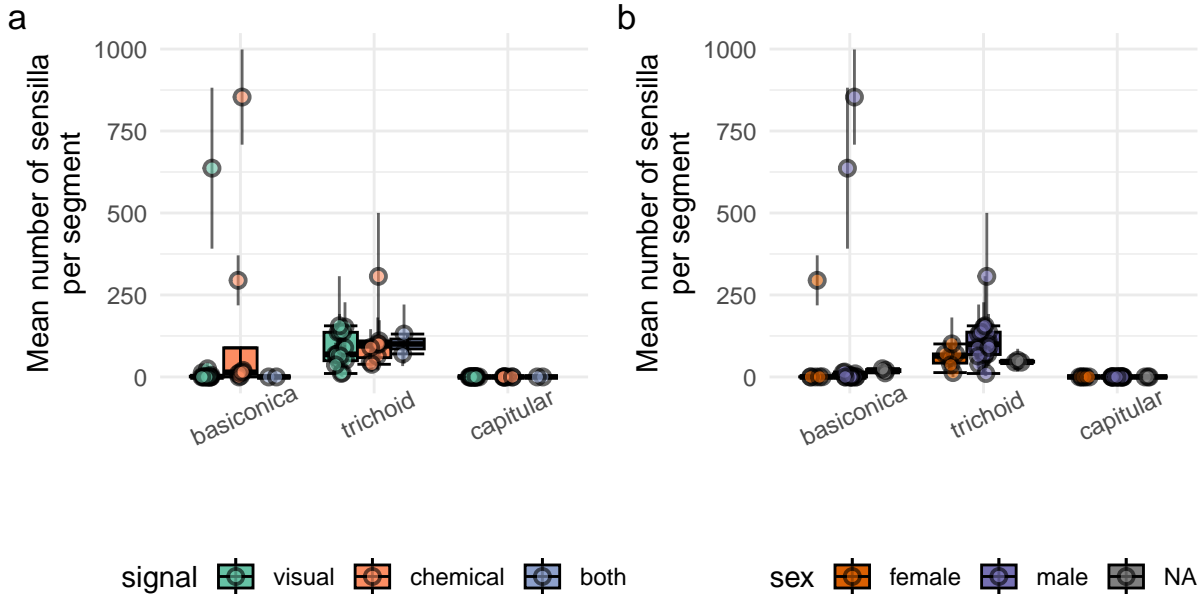
Specimen ID	Species	Signal	Sex	Body length (mm)
NCC Ent 4	Photinus scintillans	visual	male	7.6
NCC Ent 5	Photuris sp	visual	male	11.0
NCC Ent 6	Photuris flavicollis	visual	male	11.3
NCC Ent 7	Photinus pyralis	visual	male	15.7
NCC Ent 8	Photinus pyralis	visual	male	11.8
NCC Ent 9	Photinus indictus	chemical	male	5.7
NCC Ent 10	Photinus consanguineus	visual	male	9.4
NCC Ent 11	Microphotus angustus	both	male	10.4
NCC Ent 12	Cratomorphus sp	visual	female	25.5
NCC Ent 13	Aspisoma sp	visual	male	28.5
NCC Ent 14	Aspisoma sp	visual	female	13.3
NCC Ent 15	Ellychnia sp	chemical	male	12.4
NCC Ent 16	Vesta sp	visual	male	7.2
NCC Ent 17	Vesta basalis	visual	male	11.7

## Antennal morphometrics are independent of body size

Data in the manuscript are not normalized by body length because no significant relationship with body length was found among the morphometric measurements using one-way ANOVAs. This includes body length with antenna length ( $F(1, 19) = 3.92$ ,  $p = 0.06$ ), flagellar segment width ( $F(1, 23) = 0.341$ ,  $p = 0.6$ ), olfactory sensilla width ( $F(1, 23) = 0.406$ ,  $p = 0.5$ ), and olfactory sensilla length ( $F(1, 23) = 0.21$ ,  $p = 0.7$ ).

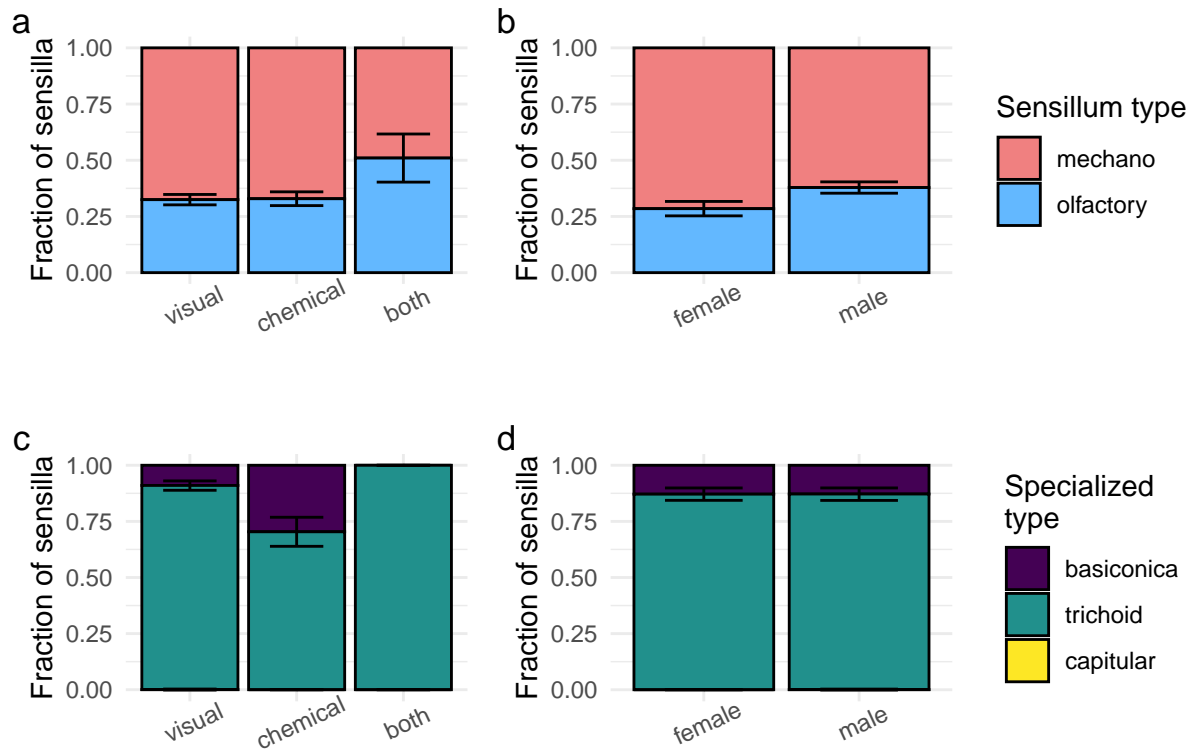
## Additional figures comparing values

Counts of olfactory sensilla per flagellar segment by type, signal, and sex are presented in SM Fig. 1.



SM Figure 1: Mean number of olfactory sensilla per flagellar segment by type, signal, and sex. a. Olfactory sensilla of each type (basiconica, trichodea, and capitular) for each type grouped by signaling strategy. b. Olfactory sensilla of each type (basiconica, trichodea, and capitular) for each type grouped by sex.

Fractions of mechanosensory and olfactory sensillum on the antennae are presented in SM Fig. 2.



SM Figure 2: Fraction of mechanosensory and olfactory sensillum coverage on the antennae. a,b: Fraction of mechanosensory or olfactory sensilla by sexual signaling strategy (a) and sex (b). c,d: Fraction of olfactory sensilla by type coverage on the antennae by sexual signaling strategy (c) and sex (d).

## Additional values from statistical comparisons

In the main manuscript's Tables 1 and 2,  $p$ -values were presented as a result of statistical comparisons. Here are additional values presented in SM Tables:

- SM Table 2: comparison values for all sensilla by signal, corresponding to comparisons in Table 1 and Fig. 2c,d.
- SM Table 3: comparison values for mechanosensory sensilla by signal, corresponding to comparisons in Table 1, Fig. 2a-d, and Fig. 5a,b.
- SM Table 4: comparison values for olfactory sensilla by signal, corresponding to comparisons in Table 1, Fig. 2a-d, Fig. 3a, and Fig. 5a,b.
- SM Table 5: comparison values for all sensilla by sex, corresponding to comparisons in Table 2 and Fig. 6c,d.
- SM Table 6: comparison values for mechanosensory sensilla by sex, corresponding to comparisons in Table 2 and Fig. 5a-d.
- SM Table 7: comparison values for olfactory sensilla by sex, corresponding to comparisons in Table 2 and Fig. 6a,b.

SM Table 2: Phylogenetically corrected comparisons of species means against signal type for all sensilla. Statistical scores ( $n$ , sample size;  $F$ -values;  $p$ -values) included for each comparison of sensillum width, sensillum length, sensilla density, mean distances between sensilla, mean count of sensilla per segment, and mean fraction of sensilla.

	Mean value (visual)	Mean value (chemical)	Sample size	F value	p value
Width	n/a	n/a	n/a	n/a	n/a
Length	n/a	n/a	n/a	n/a	n/a
Density	$3480 \pm 1000$	$3270 \pm 2000$	26	0.000671	0.76
Mean distance	$28.7 \pm 10$	$27.6 \pm 9$	26	0.0849	0.82
Count per segment	$337 \pm 300$	$614 \pm 600$	26	1.2	0.24
Fraction	n/a	n/a	n/a	n/a	n/a

SM Table 3: Phylogenetically corrected comparisons of species means against signal type for mechanosensory sensilla. Statistical scores ( $n$ , sample size;  $F$ -values;  $p$ -values) included for each comparison of sensillum width, sensillum length, sensilla density, mean distances between sensilla, mean count of sensilla per segment, and mean fraction of sensilla.

	Mean value (visual)	Mean value (chemical)	Sample size	F value	p value
Width	$2.18 \pm 0.4$	$2.51 \pm 0.7$	26	2.330	0.350
Length	$64.7 \pm 20$	$71.2 \pm 20$	26	0.896	0.563
Density	$2330 \pm 1000$	$2140 \pm 1000$	26	0.217	0.760
Mean distance	$34.2 \pm 10$	$36.2 \pm 20$	26	0.153	0.820
Count per segment	$205 \pm 90$	$358 \pm 300$	26	3.550	0.240
Fraction	$0.683 \pm 0.1$	$0.638 \pm 0.2$	26	0.346	0.730

SM Table 4: Phylogenetically corrected comparisons of species means against signal type for olfactory sensilla. Statistical scores ( $n$ , sample size;  $F$ -values;  $p$ -values) included for each comparison of sensillum width, sensillum length, sensilla density, mean distances between sensilla, mean count of sensilla per segment, and mean fraction of sensilla.

	Mean value (visual)	Mean value (chemical)	Sample size	F value	p value
Width	$1.87 \pm 0.6$	$3.07 \pm 2$	26	5.610	0.112
Length	$13.3 \pm 3$	$13.2 \pm 3$	26	0.003	0.980
Density	$1170 \pm 700$	$1160 \pm 700$	26	0.001	0.990
Mean distance	$46.5 \pm 20$	$44.2 \pm 10$	26	0.085	0.870
Count per segment	$129 \pm 200$	$248 \pm 400$	26	1.200	0.470
Fraction	$0.328 \pm 0.1$	$0.368 \pm 0.2$	26	0.227	0.780

SM Table 5: Phylogenetically corrected comparisons of species means against sex type for all sensilla. Statistical scores ( $n$ , sample size;  $F$ -values;  $p$ -values) included for each comparison of sensillum width, sensillum length, sensilla density, mean distances between sensilla, mean count of sensilla per segment, and mean fraction of sensilla.

	Mean value (female)	Mean value (male)	Sample size	F value	p value
Width	n/a	n/a	n/a	n/a	n/a
Length	n/a	n/a	n/a	n/a	n/a
Density	$3020 \pm 1000$	$3450 \pm 1000$	23	2.77	0.88
Mean distance	$33.1 \pm 20$	$27.6 \pm 9$	23	1.3	0.91
Count per segment	$342 \pm 200$	$479 \pm 500$	23	0.485	0.78
Fraction	n/a	n/a	n/a	n/a	n/a

SM Table 6: Phylogenetically corrected comparisons of species means against sex type for mechanosensory sensilla. Statistical scores ( $n$ , sample size;  $F$ -values;  $p$ -values) included for each comparison of sensillum width, sensillum length, sensilla density, mean distances between sensilla, mean count of sensilla per segment, and mean fraction of sensilla.

	Mean value (female)	Mean value (male)	Sample size	F value	p value
Width	$2.18 \pm 0.3$	$2.28 \pm 0.6$	23	0.300	0.679
Length	$63.4 \pm 7$	$68.1 \pm 20$	23	0.356	0.665
Density	$2260 \pm 1000$	$2150 \pm 1000$	23	0.053	0.880
Mean distance	$36.7 \pm 10$	$35.9 \pm 10$	23	0.019	0.910
Count per segment	$225 \pm 100$	$262 \pm 200$	23	0.136	0.780
Fraction	$0.732 \pm 0.1$	$0.627 \pm 0.1$	23	2.620	0.280

SM Table 7: Phylogenetically corrected comparisons of species means against sex type for mechanosensory sensilla. Statistical scores ( $n$ , sample size;  $F$ -values;  $p$ -values) included for each comparison of sensillum width, sensillum length, sensilla density, mean distances between sensilla, mean count of sensilla per segment, and mean fraction of sensilla.

	Mean value (female)	Mean value (male)	Sample size	F value	p value
Width	$2.86 \pm 2$	$2.34 \pm 1$	23	1.060	0.469
Length	$13.6 \pm 1$	$12.6 \pm 3$	23	0.560	0.604
Density	$799 \pm 400$	$1340 \pm 800$	23	2.770	0.220

	Mean value (female)	Mean value (male)	Sample size	F value	p value
Mean distance	$54.1 \pm 20$	$43.3 \pm 20$	23	1.300	0.420
Count per segment	$115 \pm 200$	$211 \pm 300$	23	0.485	0.620
Fraction	$0.291 \pm 0.1$	$0.382 \pm 0.1$	23	2.110	0.300