Supplementary Materials

Bright lights, big city: an experimental assessment of short-term behavioral and performance effects of artificial light at night on *Anolis* lizards

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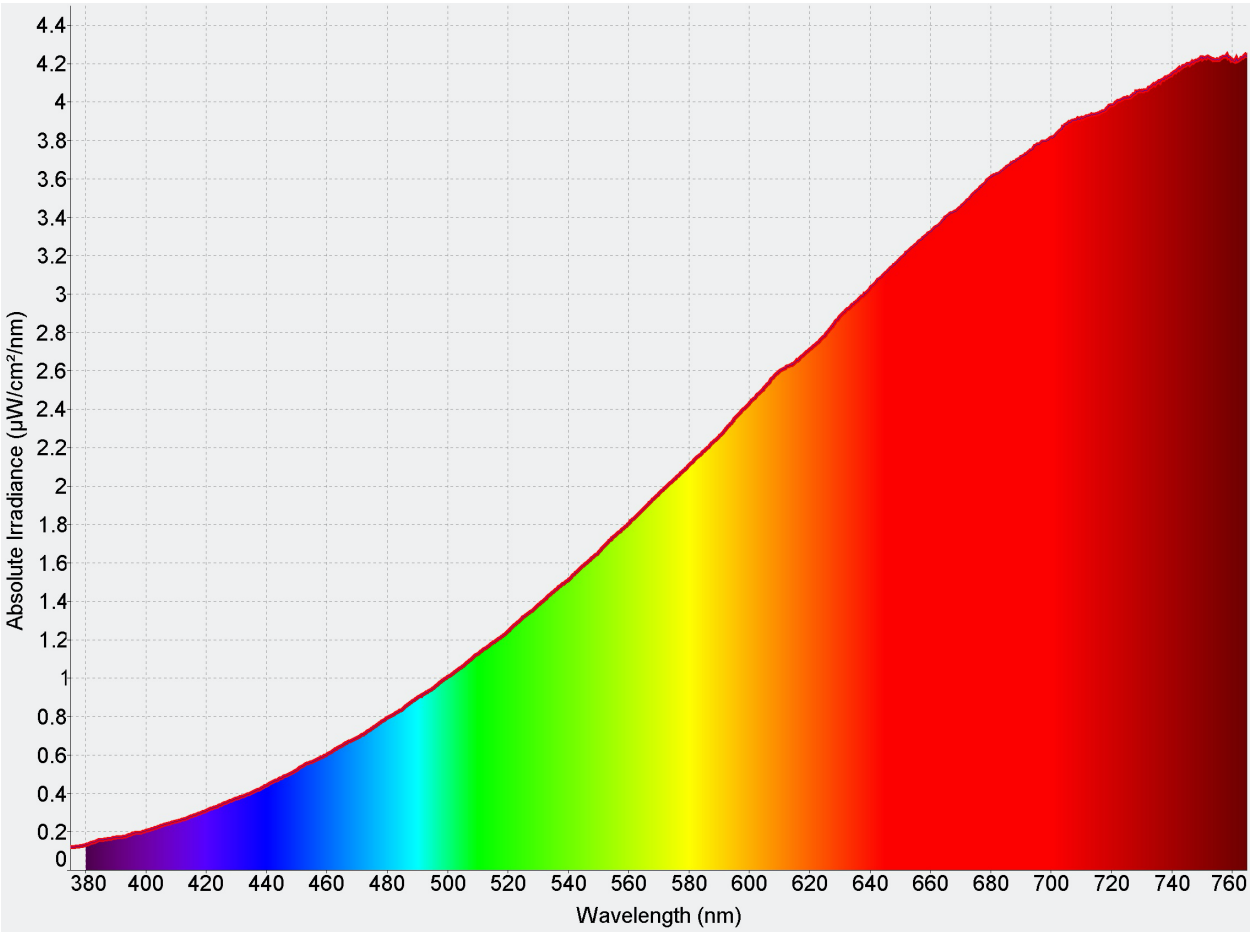
Supplementary Fig S2. c) Experimental lighting in ALAN plots produced a mixture of perches that were lit with others being unlit or in shadows, and (d-e) anoles were observed sleeping on nighttime perches in lit areas.

c)

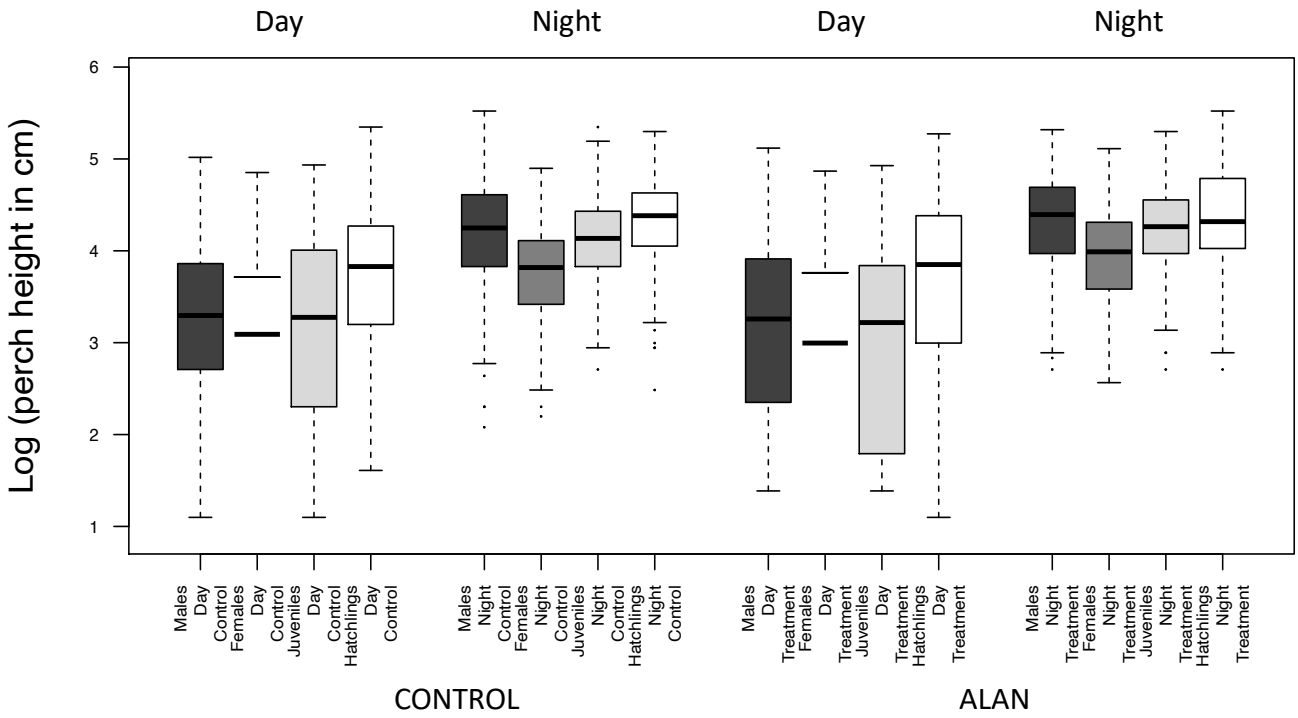
d)

e)

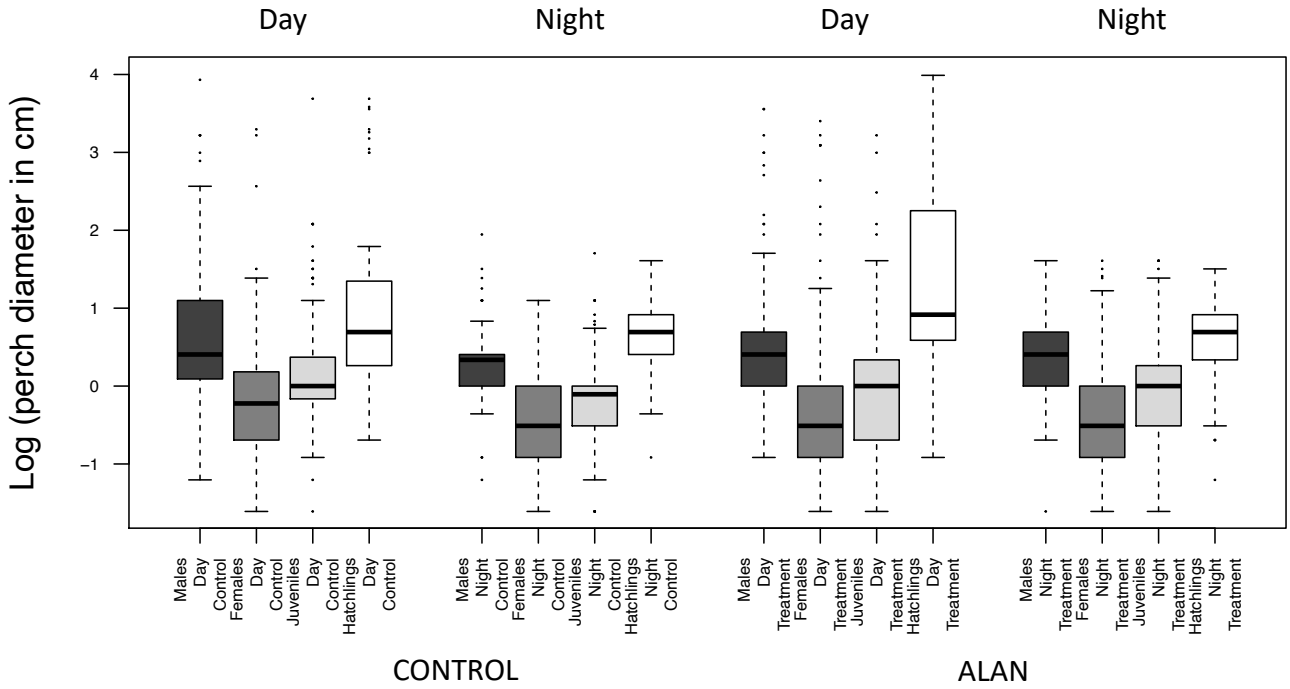
Supplementary Fig S3. Absolute irradiance output spectrum for the 150-watt halogen bulb (GE) used to create ALAN treatments taken with cosine corrected probe on JAZ spectrometer (Ocean Optics).



Supplementary Fig. S4 Box plots showing perch heights (log transformed) during the day and night for brown anoles in sex/size categories (i.e., adult males, adult females, juveniles and hatchlings) for the control and ALAN treatment plots. No difference in perch height was detected for the interaction between experimental treatment and time period.



Supplementary Fig. S5 Box plots showing perch diameters (log transformed) during the day and night for brown anoles in sex/size categories (i.e., adult males, adult females, juveniles and hatchlings) for the control and ALAN treatment plots. No difference in perch diameter was detected due to the interaction between treatment and time period.



Supplementary Table S1 Results from mixed model analyses testing for differences in the number of arthropods sampled (log transformed) in bowl traps by the experimental treatment (i.e., ALAN vs. control), time period (i.e., three time periods with the first being pre-ALAN exposure) and their interaction during the a) day and b) night. Analyses include total number of arthropods and the numbers of Diptera, Hymenoptera and Crustacea, the three most common orders. P-values for significant effects are in bold.

a) Day

	Factor	**Estimate**	**SE**	**df**	**t**	**p**
Total arthropods	(Intercept)	4.37	0.24	39	18.31	**< 0.0001**
	Experimental treatment	0.13	0.34	18	0.40	0.70
	Time period	-0.19	0.11	39	-1.79	0.08
	Exp. Treat. x Time period	-0.09	0.15	39	-0.57	0.57
Diptera	(Intercept)	31.24	0.28	39	11.27	**< 0.0001**
	Experimental treatment	0.38	0.39	18	0.97	0.35
	Time period	-0.10	0.12	39	-0.87	0.39
	Exp. Treat. x Time period	-0.13	0.17	39	-0.74	0.47
Hymenoptera	(Intercept)	30.28	0.33	39	9.30	**< 0.0001**
	Experimental treatment	-0.35	0.46	18	-0.76	0.46
	Time period	-0.11	0.13	39	-0.85	0.40
	Exp. Treat. x Time period	0.09	0.18	39	0.51	0.61
Crustacea	(Intercept)	3.50	0.54	39	6.52	**< 0.0001**
	Experimental treatment	-0.08	0.76	18	-0.10	0.20
	Time period	-0.72	0.24	39	-3.01	**< 0.01**
	Exp. Treat. x Time period	0.11	0.34	39	0.33	0.74

b) Night

	Factor	**Estimate**	**SE**	**df**	**t**	**p**
Total arthropods	(Intercept)	4.69	0.27	36	17.15	**< 0.0001**
	Experimental treatment	-0.01	0.40	36	-0.02	0.98
	Time period	-0.51	0.12	36	-4.27	**< 0.0001**
	Exp. Treat. x Time period	0.06	0.17	36	0.32	0.75
Diptera	(Intercept)	29.77	0.40	36	7.43	**< 0.0001**
	Experimental treatment	-0.56	0.59	36	-0.94	0.35
	Time period	-0.45	0.18	36	-2.46	**0.02**
	Exp. Treat. x Time period	0.35	0.27	36	1.31	0.20
Hymenoptera	(Intercept)	3.28	0.44	36	7.42	**< 0.0001**
	Experimental treatment	0.16	0.65	36	0.25	0.81
	Time period	-0.43	0.18	36	-2.43	**0.02**
	Exp. Treat. x Time period	-0.03	0.26	36	-0.11	0.91
Crustacea	(Intercept)	3.64	0.40	36	9.20	**< 0.0001**
	Experimental treatment	-0.30	0.58	36	-0.52	0.61

Time period	-0.73	0.17	36	-4.31	**< 0.0001**
Exp. Treat. x Time period	0.17	0.25	36	0.69	0.49

Supplementary Table S2 Results from mixed model analyses testing for differences in the number of arthropods sampled in sticky traps by the experimental treatment (i.e., ALAN vs. control), time period (i.e., three time periods with the first being pre-ALAN exposure) and their interaction during the a) day and b) night.

a) Day

Factor	Estimate	SE	z	p
(Intercept)	10.92	0.33	3.29	< 0.001
Experimental treatment	-0.31	0.49	-0.63	0.53
Time period	-0.29	0.17	-1.69	0.09
Experimental treatment x Time period	0.21	0.24	0.86	0.39

b) Night

Factor	Estimate	SE	z	p
(Intercept)	0.40	0.34	1.18	0.24
Experimental treatment	-0.86	0.63	-1.37	0.17
Time period	0.22	0.15	1.46	0.15
Experimental treatment x Time period	0.03	0.27	0.12	0.91

Supplementary Table S3. Percentage of brown anoles observed on different substrate types. Artificial substrates include garden hoses, metal posts, PVC pipes, plastic signs and sprinklers. Data are divided by sex/size class, day/night and pre- and post-initiation of the artificial light treatment.

				Substrate type								
Control/Treatment	Sex/Size Class	Day/Night	Pre/Post-ALAN	Branch	Cycad or palm leaf/stem/frond	Cycad trunk	Grass	Ground	Leaf	Rock	Tree trunk	Artificial
DAN Control	Female	Day	Pre-ALAN	4%	42%	2%	0%	22%	1%	0%	16%	13%
DAN Control	Female	Day	Post-ALAN	10%	50%	0%	0%	15%	0%	0%	9%	16%
DAN Control	Female	Night	Pre-ALAN	0%	97%	0%	0%	0%	3%	0%	0%	0%
DAN Control	Female	Night	Post-ALAN	1%	95%	0%	0%	0%	4%	0%	0%	0%
DAN Control	Juvenile/Hatchling	Day	Pre-ALAN	4%	56%	3%	0%	25%	1%	0%	4%	7%
DAN Control	Juvenile/Hatchling	Day	Post-ALAN	5%	62%	1%	0%	19%	0%	0%	4%	8%
DAN Control	Juvenile/Hatchling	Night	Pre-ALAN	1%	94%	0%	1%	0%	3%	0%	1%	0%
DAN Control	Juvenile/Hatchling	Night	Post-ALAN	0%	92%	0%	3%	0%	4%	0%	1%	0%
DAN Control	Male	Day	Pre-ALAN	9%	38%	1%	0%	11%	0%	1%	18%	22%
DAN Control	Male	Day	Post-ALAN	9%	49%	0%	0%	7%	1%	0%	13%	21%
DAN Control	Male	Night	Pre-ALAN	0%	96%	0%	0%	0%	3%	0%	0%	1%
DAN Control	Male	Night	Post-ALAN	0%	97%	0%	0%	0%	3%	0%	0%	0%
ALAN Treatment	Female	Day	Pre-ALAN	15%	31%	1%	0%	27%	0%	0%	12%	14%
ALAN Treatment	Female	Day	Post-ALAN	11%	38%	2%	0%	15%	1%	1%	14%	17%
ALAN Treatment	Female	Night	Pre-ALAN	1%	85%	0%	0%	1%	13%	0%	1%	0%
ALAN Treatment	Female	Night	Post-ALAN	1%	84%	0%	0%	0%	15%	0%	0%	0%
ALAN Treatment	Juvenile/Hatchling	Day	Pre-ALAN	10%	44%	3%	0%	35%	1%	0%	6%	2%
ALAN Treatment	Juvenile/Hatchling	Day	Post-ALAN	7%	48%	0%	1%	27%	1%	1%	11%	4%
ALAN Treatment	Juvenile/Hatchling	Night	Pre-ALAN	2%	79%	0%	0%	1%	15%	0%	4%	0%
ALAN Treatment	Juvenile/Hatchling	Night	Post-ALAN	2%	74%	0%	1%	0%	21%	0%	2%	0%
ALAN Treatment	Male	Day	Pre-ALAN	10%	36%	3%	0%	10%	0%	1%	18%	22%
ALAN Treatment	Male	Day	Post-ALAN	7%	36%	1%	0%	13%	1%	0%	28%	14%
ALAN Treatment	Male	Night	Pre-ALAN	2%	88%	0%	0%	0%	9%	0%	1%	0%
ALAN Treatment	Male	Night	Post-ALAN	3%	82%	0%	0%	0%	14%	0%	1%	0%

Supplementary Table S4. Sample sizes, means and standard deviations (SD) for brown anole perch height, perch diameter, perch inclination and lizard orientation from control and ALAN treatment plots. Data are divided by sex/size class, day/night and pre- and post-initiation of the artificial light treatment.

				Perch Height (cm)			Perch Diameter (cm)			Perch Inclination (°)			Lizard Orientation (°)		
Control/Treatment	Sex/Size Class	Day/Night	Pre/Post-ALAN	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
DAN Control	Female	Day	Pre-ALAN	148	36.6	30.5	109	4.0	5.9	150	35.8	36.7	123	35.4	37.9
DAN Control	Female	Day	Post-ALAN	163	35.1	31.2	139	3.3	6.0	165	33.5	35.3	164	32.9	35.4
DAN Control	Female	Night	Pre-ALAN	120	79.7	33.9	120	1.9	1.1	117	41.5	32.5	113	41.5	35.2
DAN Control	Female	Night	Post-ALAN	132	77.2	43.3	130	1.5	0.8	131	40.7	30.6	131	40.6	31.0
DAN Control	Juvenile/Hatchling	Day	Pre-ALAN	291	31.4	35.2	199	2.3	4.5	309	36.0	38.5	219	29.5	35.9
DAN Control	Juvenile/Hatchling	Day	Post-ALAN	307	30.7	28.9	241	1.7	3.7	305	30.4	33.4	304	28.8	32.9
DAN Control	Juvenile/Hatchling	Night	Pre-ALAN	325	58.8	28.0	324	1.2	4.7	321	35.5	33.1	284	31.9	33.3
DAN Control	Juvenile/Hatchling	Night	Post-ALAN	298	60.7	32.0	293	0.9	0.6	297	39.8	31.8	297	38.8	31.5
DAN Control	Male	Day	Pre-ALAN	136	62.9	50.0	117	6.0	9.2	119	42.6	37.8	104	41.3	37.0
DAN Control	Male	Day	Post-ALAN	140	53.3	40.9	128	4.0	6.9	142	38.6	37.0	142	35.6	36.2
DAN Control	Male	Night	Pre-ALAN	94	90.8	33.5	94	2.2	1.1	93	38.9	36.3	87	44.4	36.5
DAN Control	Male	Night	Post-ALAN	115	83.9	40.3	115	2.1	0.8	114	43.0	31.4	114	40.1	31.9
ALAN Treatment	Female	Day	Pre-ALAN	145	41.6	48.9	104	4.1	6.7	141	33.6	37.0	127	28.1	36.4
ALAN Treatment	Female	Day	Post-ALAN	151	35.9	33.2	125	3.1	5.6	152	37.7	37.9	152	36.9	37.1
ALAN Treatment	Female	Night	Pre-ALAN	117	83.4	39.8	115	2.3	5.4	113	36.7	33.5	109	39.0	35.3
ALAN Treatment	Female	Night	Post-ALAN	134	81.8	37.9	133	1.6	0.9	131	38.7	32.3	132	37.7	31.8
ALAN Treatment	Juvenile/Hatchling	Day	Pre-ALAN	235	22.4	26.2	144	1.8	3.3	238	28.6	35.4	178	21.9	33.0
ALAN Treatment	Juvenile/Hatchling	Day	Post-ALAN	277	27.4	27.1	203	2.2	4.7	275	23.3	31.3	275	20.0	28.4
ALAN Treatment	Juvenile/Hatchling	Night	Pre-ALAN	244	60.2	32.2	242	1.1	0.8	239	35.0	34.9	215	35.7	36.4
ALAN Treatment	Juvenile/Hatchling	Night	Post-ALAN	372	65.2	32.6	371	1.0	0.9	369	29.5	32.0	369	28.6	31.4
ALAN Treatment	Male	Day	Pre-ALAN	128	62.2	45.7	113	5.4	7.8	122	34.3	36.6	107	47.4	39.5
ALAN Treatment	Male	Day	Post-ALAN	136	53.3	41.4	113	6.8	8.8	134	43.2	39.1	135	42.7	38.6
ALAN Treatment	Male	Night	Pre-ALAN	89	93.6	39.2	88	2.3	1.1	86	42.0	34.4	85	38.9	34.4
ALAN Treatment	Male	Night	Post-ALAN	105	89.8	49.0	105	2.0	0.8	103	42.1	31.2	103	39.2	30.2

Supplementary Table S5. Percentage of observations of brown anoles in the shade or sun during the day and in the dark, shadow or artificial light during the night. Data are divided by sex/size class, day/night and pre- and post-initiation of the artificial light treatment. Pre-ALAN exposure to light at night was inferred to be zero given the lack of artificial lighting in our study plots and lack of lizards exposed to light at night in controls after the initiation of the ALAN treatment (shown in italics).

				Daytime basking		Nighttime ALAN exposure		
Control/Treatment	Sex/Size Class	Day/Night	Pre/Post-ALAN	Shade	Sun	Dark	Shadow	Light
DAN Control	Female	Day	Pre-ALAN	66%	34%			
DAN Control	Female	Day	Post-ALAN	66%	34%			
DAN Control	Female	Night	Pre-ALAN			*100%*	*0%*	*0%*
DAN Control	Female	Night	Post-ALAN			100%	0%	0%
DAN Control	Juvenile/Hatchling	Day	Pre-ALAN	78%	22%			
DAN Control	Juvenile/Hatchling	Day	Post-ALAN	75%	25%			
DAN Control	Juvenile/Hatchling	Night	Pre-ALAN			*100%*	*0%*	*0%*
DAN Control	Juvenile/Hatchling	Night	Post-ALAN			100%	0%	0%
DAN Control	Male	Day	Pre-ALAN	66%	34%			
DAN Control	Male	Day	Post-ALAN	73%	27%			
DAN Control	Male	Night	Pre-ALAN			*100%*	*0%*	*0%*
DAN Control	Male	Night	Post-ALAN			100%	0%	0%
ALAN Treatment	Female	Day	Pre-ALAN	69%	31%			
ALAN Treatment	Female	Day	Post-ALAN	75%	25%			
ALAN Treatment	Female	Night	Pre-ALAN			*100%*	*0%*	*0%*
ALAN Treatment	Female	Night	Post-ALAN			42%	22%	36%
ALAN Treatment	Juvenile/Hatchling	Day	Pre-ALAN	70%	30%			
ALAN Treatment	Juvenile/Hatchling	Day	Post-ALAN	70%	30%			
ALAN Treatment	Juvenile/Hatchling	Night	Pre-ALAN			*100%*	*0%*	*0%*
ALAN Treatment	Juvenile/Hatchling	Night	Post-ALAN			45%	24%	31%
ALAN Treatment	Male	Day	Pre-ALAN	77%	23%			
ALAN Treatment	Male	Day	Post-ALAN	66%	34%			
ALAN Treatment	Male	Night	Pre-ALAN			*100%*	*0%*	*0%*
ALAN Treatment	Male	Night	Post-ALAN			39%	24%	36%

Supplementary Table S6. Results of generalized linear models testing for differences in behavior due to experimental treatment (i.e., ALAN vs. control), time period (i.e., three time periods with the first being pre-ALAN exposure) and the interaction between experimental treatment and time period. Observation time was included as a covariate in all analyses. Significant p-values are indicated in bold.

Modelling:	Factor	Estimate	SE	t	p
Change in perch: males	(Intercept)	0.68	0.44	1.55	0.12
	Experimental treatment	0.05	0.27	0.18	0.85
	Time period	0.29	0.26	1.12	0.26
	Observation time	0.01	0.02	0.46	0.65
	Experimental treatment*Time period	-0.68	0.39	-1.73	0.09
Change in perch: females	(Intercept)	0.15	0.52	0.28	0.78
	Experimental treatment	-0.19	0.26	-0.72	0.47
	Time period	-0.29	0.28	-1.01	0.31
	Observation time	0.04	0.03	1.63	0.11
	Experimental treatment*Time period	0.29	0.40	0.71	0.48
Dewlap: males	(Intercept)	24.68	0.40	6.17	**<0.0001**
	Experimental treatment	0.31	0.21	1.49	0.14
	Time period	0.08	0.22	0.37	0.71
	Observation time	0.05	0.02	2.71	**0.01**
	Experimental treatment*Time period	-0.09	0.29	-0.30	0.77
Dewlap: females	(Intercept)	-9.02	5.36	-1.68	0.09
	Experimental treatment	0.95	0.89	1.07	0.29
	Time period	-0.41	1.36	-0.30	0.76
	Observation time	0.44	0.26	1.69	0.09
	Experimental treatment*Time period	-0.65	1.78	-0.37	0.71
Pushup: males	(Intercept)	2.46	0.51	4.85	**<0.0001**
	Experimental treatment	0.08	0.28	0.27	0.79
	Time period	0.07	0.28	0.26	0.80
	Observation time	0.04	0.02	1.58	0.12
	Experimental treatment*Time period	-0.20	0.40	-0.51	0.61
Pushup: females	(Intercept)	-0.67	1.17	-0.57	0.57

	Experimental treatment	-0.23	0.45	-0.51	0.61
	Time period	-0.40	0.51	-0.78	0.44
	Observation time	0.11	0.06	1.83	0.07
	Experimental treatment*Time period	0.85	0.69	1.23	0.22
Headbob: males	(Intercept)	2.57	0.57	4.48	**<0.0001**
	Experimental treatment	-0.03	0.28	-0.12	0.90
	Time period	-0.14	0.29	-0.47	0.64
	Observation time	0.06	0.03	2.21	**0.03**
	Experimental treatment*Time period	0.08	0.41	0.19	0.85
Headbob: females	(Intercept)	-0.81	1.33	-0.61	0.54
	Experimental treatment	0.13	0.37	0.34	0.73
	Time period	-0.13	0.43	-0.29	0.77
	Observation time	0.17	0.07	2.63	**0.01**
	Experimental treatment*Time period	0.42	0.57	0.74	0.46
Run: males	(Intercept)	0.85	0.47	1.80	0.07
	Experimental treatment	0.09	0.28	0.30	0.76
	Time period	-0.35	0.32	-1.08	0.28
	Observation time	0.00	0.02	-0.09	0.93
	Experimental treatment*Time period	-0.10	0.45	-0.23	0.82
Run: females	(Intercept)	0.40	0.63	0.63	0.53
	Experimental treatment	-0.16	0.30	-0.54	0.59
	Time period	-0.87	0.40	-2.18	**0.03**
	Observation time	0.04	0.03	1.16	0.25
	Experimental treatment*Time period	0.72	0.53	1.37	0.17
Jump: males	(Intercept)	0.56	0.49	1.14	0.26
	Experimental treatment	-0.07	0.31	-0.22	0.83
	Time period	0.45	0.28	1.62	0.11
	Observation time	0.01	0.02	0.56	0.58
	Experimental treatment*Time period	-0.87	0.45	-1.93	0.06
Jump: females	(Intercept)	-0.18	0.60	-0.29	0.77
	Experimental treatment	0.02	0.27	0.08	0.94
	Time period	-0.31	0.31	-1.00	0.32
	Observation time	0.06	0.03	1.93	0.06
	Experimental treatment*Time period	0.11	0.44	0.26	0.80

Crawl: males	(Intercept)	0.24	0.54	0.46	0.65
	Experimental treatment	0.39	0.29	1.37	0.17
	Time period	0.27	0.30	0.92	0.36
	Observation time	0.05	0.03	1.93	0.06
	Experimental treatment*Time period	-0.48	0.40	-1.21	0.23
Crawl: females	(Intercept)	0.32	0.60	0.54	0.59
	Experimental treatment	0.01	0.27	0.03	0.98
	Time period	-0.27	0.31	-0.88	0.38
	Observation time	0.05	0.03	1.78	0.08
	Experimental treatment*Time period	-0.06	0.44	-0.14	0.89