Appendix S1

Dietary sodium levels affect grasshopper growth and performance

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Table S1. Correlations between elements and PC axes. Biplot of PCA is shown in Fig. S2.

element	PC1	PC2	PC3
N	-0.44	-0.02	0.58
C	0.81	0.47	0.31
H	0.92	0.35	0.05
Al	-0.89	0.08	0.09
B	-0.64	0.09	0.65
Ba	-0.98	0.13	-0.01
Ca	-0.95	0.04	0.19
Cd	-0.98	-0.08	0.04
Cr	-0.87	-0.41	0.15
Cu	0.63	-0.15	0.66
Fe	-0.84	-0.36	0.32
K	-0.81	0.27	-0.35
Mg	-0.84	0.40	-0.18
Mn	-0.86	0.41	-0.17
Mo	0.54	0.34	0.27
Na	-0.30	-0.80	-0.47
P	-0.87	0.44	0.01
Pb	-0.98	-0.12	0.14
S	-0.84	0.52	-0.08
Si	-0.11	-0.70	0.17
Zn	-0.98	-0.04	0.12

Table S2. ANCOVA used to test for differences in the slope of the relationships between eye and femur length for the three grasshopper diets (control, medium sodium, and high sodium) from the two nymph experiments ("exp", solitary and nymph colony). Eye length is the response variable and all interactions between femur length, diet, and experiment were examined as predictor variables.

	df	Sum Sq.	Mean Sq.	F	*P*
femur	1	11.66	11.66	414.68	< 0.001
diet	2	0.11	0.05	1.88	0.157
exp	1	0.10	0.10	3.48	0.064
*femur*diet*	2	0.28	0.14	4.92	0.009
*femur*exp*	1	0.04	0.04	1.40	0.239
*diet*exp*	2	0.11	0.06	1.98	0.142
*femur*diet*exp*	2	0.02	0.01	0.32	0.725
Residuals	135	3.80	0.03		

Figure S1. Experimental setup for grasshopper colonies (A), a colony housing box (B), and setup for grasshopper in the solitary experiment (C).

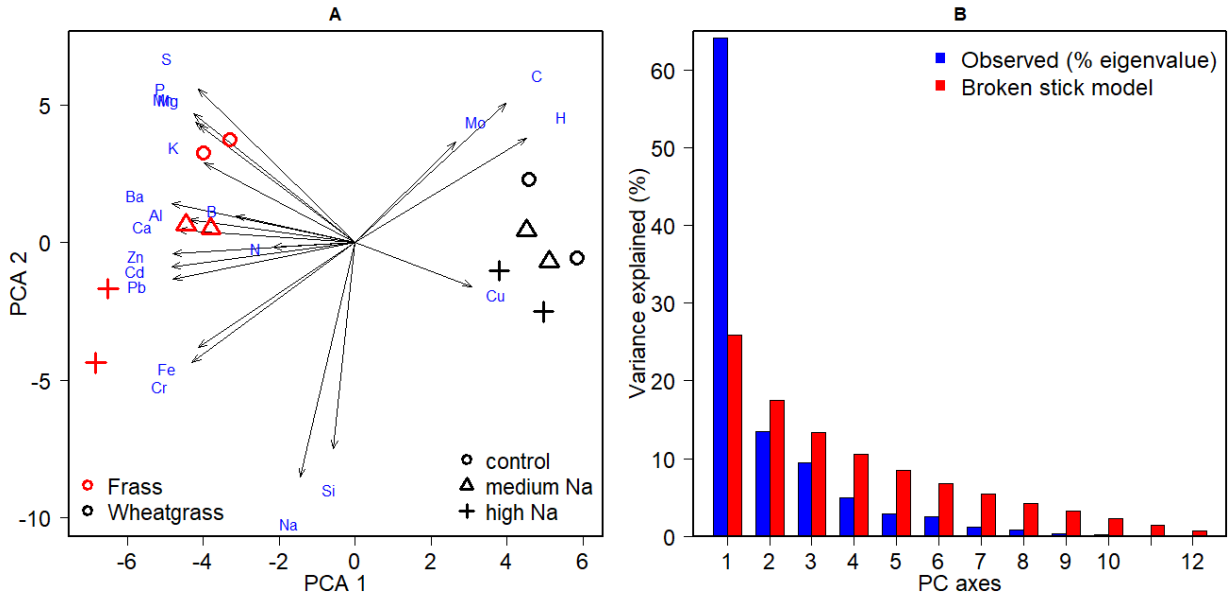

Figure S2. The Principle Component Analysis (PCA) of elemental chemistry in wheat grass and frass samples (A) had one significant axis (B). Correlations between the first three PC axes and elements are provided in Table S1. While the second axis was not significant, it explained 80% of the variation in Na and exhibited the treatment effects of increasing Na from control to high sodium diets for both wheatgrass and frass.

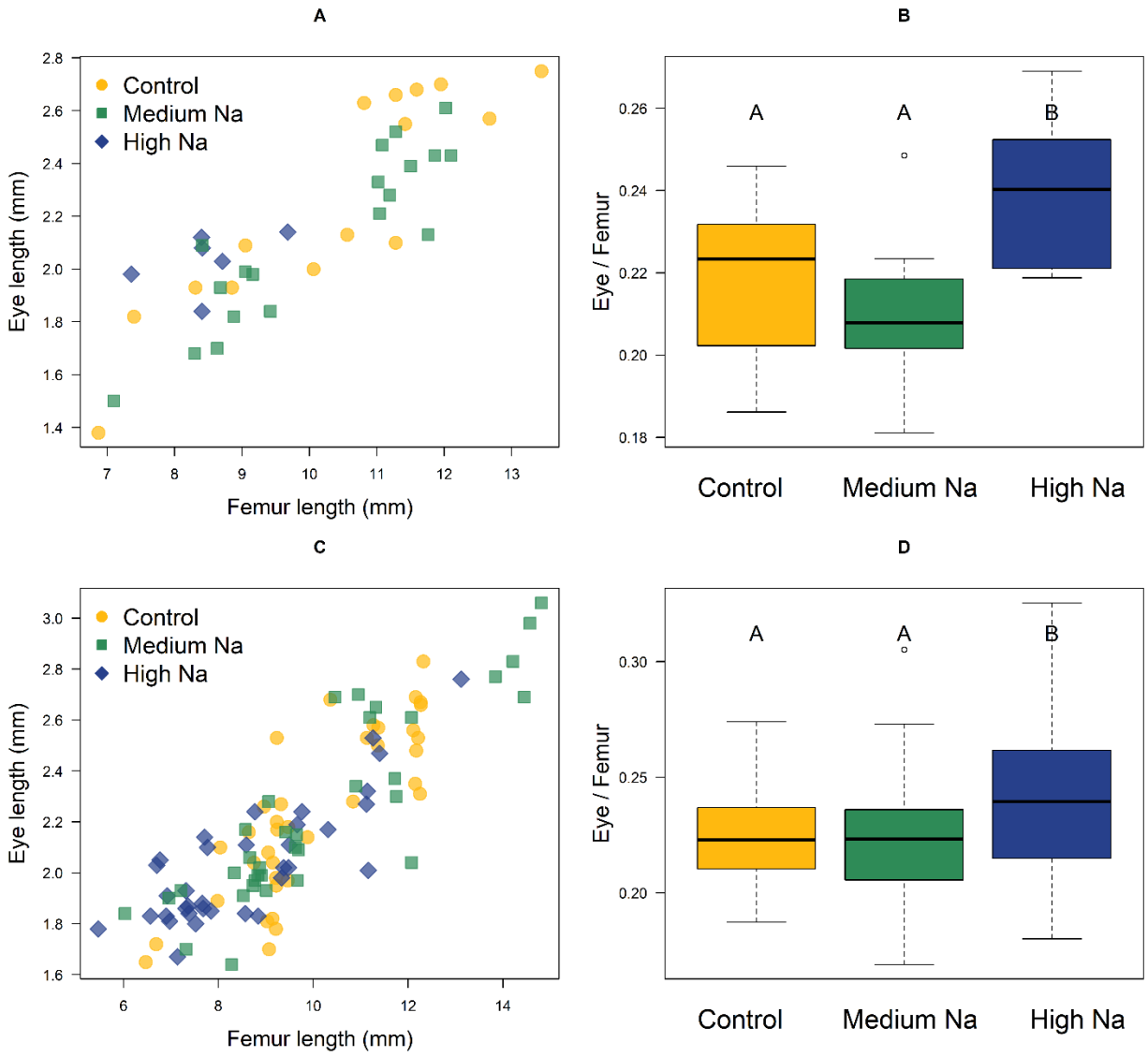

Figure S3. Eye to femur ratio of grasshoppers on three diets varying in sodium content, split by the solitary experiment (A & B) and the nymph colony experiment (C & D). In the solitary experiment, grasshoppers had larger eye to femur ratios than grasshoppers on the control diet (Tukey's HSD, $P = 0.03$) or the medium sodium diet (Tukey's HSD, $P = 0.001$; B). In the nymph colony experiment, grasshoppers had larger eye to femur ratios than grasshoppers on the control diet (Tukey's HSD, $P = 0.02$) or the medium sodium diet (Tukey's HSD, $P = 0.03$; D).

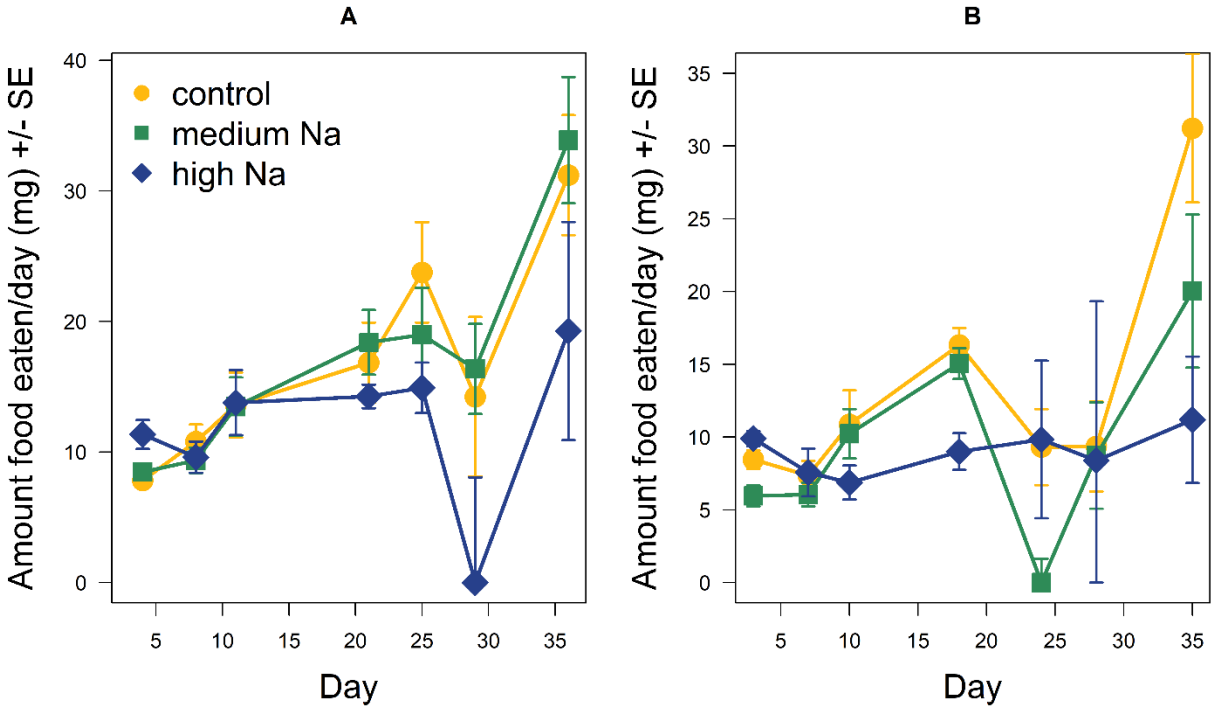

Figure S4. Amount eaten over time for grasshoppers in the nymph colony (A) and solitary (B) experiments. Colonies affected by mold are excluded.

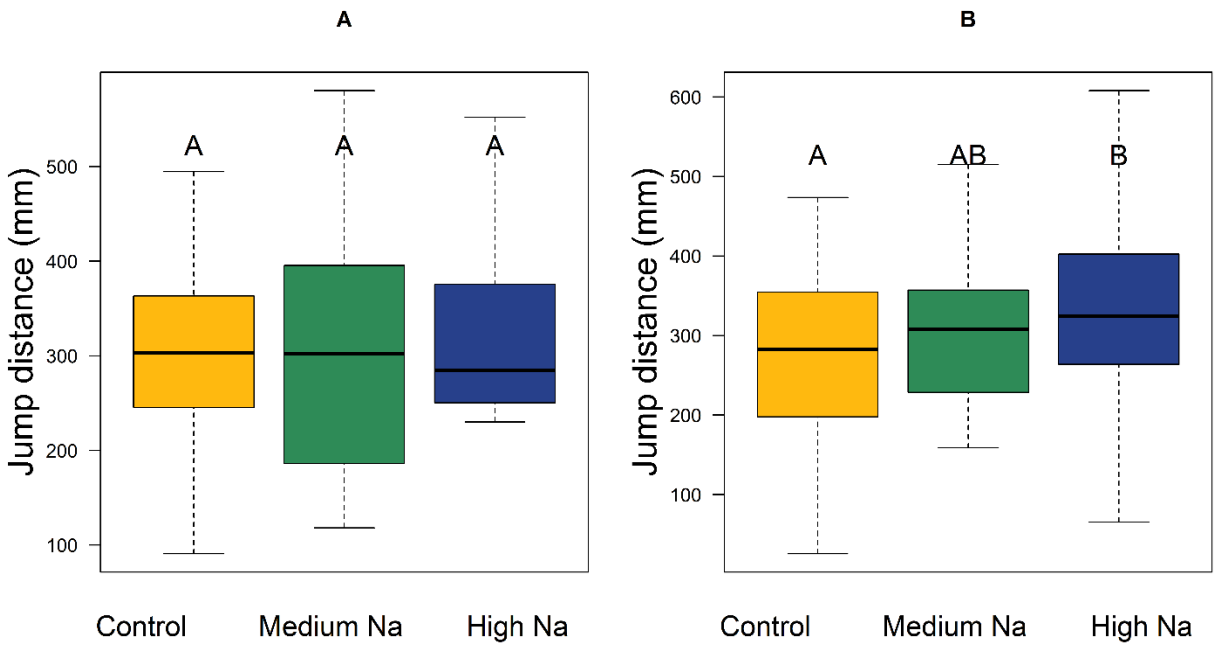

Figure S5. Grasshoppers from the solitary experiment alone did not have differences in jumping distance (A; note smaller sample sizes in Table 1). Grasshoppers in the nymph colony experiment jumped further when on the high sodium diet compared to control (B; Tukey's HSD, $P = 0.01$).