

Maternal and nourishment factors interact to influence offspring developmental trajectories in social wasps

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Electronic Supplementary Material-5: Descriptive Statistics. Mean \pm standard error (sample size) for all results reported in the text. Raw data files related to colony size, lipid stores, and gene expression are available from the Dryad Digital Repository: <http://dx.doi.org/10.5061/dryad.m82qm>

A. Biomarkers of worker-gyne caste phenotype in *Polistes fuscatus*: To identify relevant biomarkers, we compared foundress-reared (FR) pre-pupae with worker-reared (WR) pre-pupae from unmanipulated field nests (no drumming + unrestricted foraging). Data are presented in two ways: years combined (as they are presented in the figures in the main text) and years separated. To account for potential lipids lost while identifying the sex of the pre-pupae, proportion lipid was calculated from total lipid (mg) divided by the post-sexing weight (not shown). In 2013, FR pre-pupae were not weighed before they were sexed; those data are not available (n/a).

			Years combined	2013 data	2014 data
$\Delta\Delta Cq$ Gene Expression	<i>heat-shock protein 90a</i>	FR	0.40 \pm 0.03 (21)	0.37 \pm 0.07 (5)	0.41 \pm 0.04 (16)
		WR	0.56 \pm 0.09 (9)	0.53 \pm 0.11 (5)	0.60 \pm 0.17 (4)
	<i>hexamerin 70b</i>	FR	0.11 \pm 0.03 (21)	0.03 \pm 0.02 (5)	0.14 \pm 0.04 (16)
		WR	0.25 \pm 0.09 (9)	0.19 \pm 0.06 (5)	0.32 \pm 0.19 (4)
	<i>inositol oxygenase</i>	FR	0.54 \pm 0.05 (21)	0.62 \pm 0.08 (5)	0.51 \pm 0.06 (16)
		WR	0.75 \pm 0.07 (9)	0.69 \pm 0.08 (5)	0.81 \pm 0.14 (4)
	<i>rhodopsin</i>	FR	0.52 \pm 0.06 (21)	0.70 \pm 0.14 (5)	0.46 \pm 0.06 (16)
		WR	0.65 \pm 0.12 (9)	0.65 \pm 0.18 (5)	0.66 \pm 0.17 (4)
Physiology	Total lipid (mg)	FR	8.03 \pm 0.69 (25)	6.15 \pm 1.22 (9)	9.09 \pm 0.72 (16)
		WR	10.87 \pm 1.08 (10)	13.32 \pm 1.11 (5)	8.41 \pm 0.98 (5)
	Proportion lipid	FR	0.05 \pm 0.004 (25)	0.04 \pm 0.007 (9)	0.05 \pm 0.004 (16)
		WR	0.06 \pm 0.007 (10)	0.08 \pm 0.004 (5)	0.04 \pm 0.004 (5)
	Weight (mg)	FR	192.9 \pm 7 (16)	n/a	192.9 \pm 7 (16)
		WR	202.3 \pm 12.8 (10)	195.8 \pm 20.4 (5)	208.7 \pm 17.4 (5)

B. Colony growth: Values represent average change in number of 1st-5th instar larvae on the nest from the previous week (while accounting for larvae that went ‘missing’ due to pupation) \pm standard error (n = number of colonies) over time for each treatment. Artificial drumming began on 18 July 2014. Foraging restriction began on 12 August.

2014

	15 July	22 July	29 July	5 Aug	12 Aug	19 Aug	26 Aug	2 Sep
No drum / Unrestricted	1 \pm 1.8 (6)	4.3 \pm 2.1 (6)	4.5 \pm 0.6 (6)	11.3 \pm 6.7 (6)	7.5 \pm 3.0 (6)	3 \pm 3.2 (6)	-1.7 \pm 2.0 (6)	-1.2 \pm 1.2 (6)
No drum / Restricted	0.6 \pm 0.7 (7)	7.9 \pm 2.1 (7)	10.6 \pm 2.2 (7)	14 \pm 5.2 (7)	14.3 \pm 6.0 (7)	-1 \pm 2.3 (7)	-2.7 \pm 1.1 (7)	-5.7 \pm 1.6 (6)
Drumming / Unrestricted	2.3 \pm 2.7 (3)	8 \pm 4.9 (3)	9.3 \pm 5.0 (3)	12 \pm 1.5 (3)	1 \pm 2.6 (3)	7 \pm 7.0 (3)	3 \pm 6.1 (3)	-2.7 \pm 2.2 (3)
Drumming / Restricted	2.3 \pm 1.5 (4)	4.3 \pm 2.0 (4)	0.8 \pm 3.2 (4)	13 \pm 2.7 (4)	-1.5 \pm 2.5 (4)	0.8 \pm 1.3 (4)	-3.8 \pm 2.2 (4)	-2.8 \pm 1.8 (4)

C. Effects of simulated drumming and/or restricted foraging on normalized brain gene expression. In our analyses, we used a 2x2 statistical design, where data from both years were included for analyses, and year was included in the model as a factor. Note that treatment ‘No drumming, unrestricted foraging’ values are the same as those used to calculate unmanipulated WR data in A. Foraging was only restricted on colonies in 2014. Values denote $\Delta\Delta Cq$ gene expression.

	Treatment	Years Combined	2013 data	2014 data
<i>heat-shock protein 90a</i>	No drumming, unrestricted foraging	0.56 ± 0.09 (9)	0.53 ± 0.11 (5)	0.60 ± 0.17 (4)
	Drumming, unrestricted foraging	0.43 ± 0.04 (7)	0.38 ± 0.05 (4)	0.49 ± 0.04 (3)
	No drumming, restricted foraging	0.59 ± 0.07 (7)		0.59 ± 0.07 (7)
	Drumming, restricted foraging	0.40 ± 0.03 (3)		0.40 ± 0.03 (3)
<i>hexamerin 70b</i>	No drumming, unrestricted foraging	0.25 ± 0.09 (9)	0.19 ± 0.06 (5)	0.32 ± 0.19 (4)
	Drumming, unrestricted foraging	0.34 ± 0.10 (7)	0.21 ± 0.08 (4)	0.52 ± 0.16 (3)
	No drumming, restricted foraging	0.18 ± 0.06 (7)		0.18 ± 0.06 (7)
	Drumming, restricted foraging	0.23 ± 0.17 (3)		0.23 ± 0.17 (3)
<i>inositol oxygenase</i>	No drumming, unrestricted foraging	0.75 ± 0.07 (9)	0.69 ± 0.08 (5)	0.81 ± 0.14 (4)
	Drumming, unrestricted foraging	0.85 ± 0.12 (7)	0.74 ± 0.20 (4)	1.01 ± 0.06 (3)
	No drumming, restricted foraging	0.83 ± 0.08 (7)		0.83 ± 0.08 (7)
	Drumming, restricted foraging	0.42 ± 0.06 (3)		0.42 ± 0.06 (3)
<i>rhodopsin</i>	No drumming, unrestricted foraging	0.65 ± 0.12 (9)	0.65 ± 0.18 (5)	0.66 ± 0.17 (4)
	Drumming, unrestricted foraging	0.51 ± 0.10 (7)	0.36 ± 0.12 (4)	0.72 ± 0.05 (3)
	No drumming, restricted foraging	0.80 ± 0.09 (7)		0.80 ± 0.09 (7)
	Drumming, restricted foraging	0.38 ± 0.004 (3)		0.38 ± 0.004 (3)

D. Effects of simulated drumming and/or restricted foraging on physiology. In our analyses, we used a 2x2 statistical design, where data from both years were included for analyses, and year was included in the model as a factor. Note that treatment ‘No drumming, unrestricted foraging’ values are the same as those used to calculate unmanipulated WR data in A. Foraging was only restricted on colonies in 2014.

Treatment	Years Combined	2013 data	2014 data	
Total Lipid (mg)	No drumming, unrestricted foraging	10.87 ± 1.08 (10)	13.32 ± 1.11 (5)	8.41 ± 0.98 (5)
	Drumming, unrestricted foraging	10.22 ± 1.92 (7)	11.70 ± 2.07 (4)	8.24 ± 3.74
	No drumming, restricted foraging	7.91 ± 0.65 (7)		7.91 ± 0.65 (7)
	Drumming, restricted foraging	6.12 ± 0.80 (4)		6.12 ± 0.80 (4)
Proportion Lipid	No drumming, unrestricted foraging	0.06 ± 0.007 (10)	0.08 ± 0.004 (5)	0.04 ± 0.004 (5)
	Drumming, unrestricted foraging	0.06 ± 0.009 (7)	0.08 ± 0.007 (4)	0.04 ± 0.009 (3)
	No drumming, restricted foraging	0.04 ± 0.004 (7)		0.04 ± 0.004 (7)
	Drumming, restricted foraging	0.04 ± 0.004 (4)		0.04 ± 0.004 (4)
Weight (mg)	No drumming, unrestricted foraging	202.3 ± 12.8 (10)	195.8 ± 20.4 (5)	208.7 ± 17.4 (5)
	Drumming, unrestricted foraging	190.1 ± 18.2 (7)	176.4 ± 2.07 (4)	208.4 ± 36.4 (3)
	No drumming, restricted foraging	213.2 ± 8.4 (7)		213.2 ± 8.4 (7)
	Drumming, restricted foraging	182.2 ± 22.0 (4)		182.2 ± 22.0 (4)