

Nutritional status alters the lipidome of a bethylid wasp incapable of *de novo* lipogenesis

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Physiological status is greatly influenced by the quality of available nutrient uptake. Nutrient acquisition strategies vary across insect parasitoids, including host feeding and the ingestion of environmental sugars⁽¹⁾. Hymenopteran parasitoids do not possess *de novo* lipogenesis⁽²⁾ and are limited to lipids obtained during larval development. However, parasitoid lifespan and fecundity is enhanced by carbohydrate intake⁽³⁾. Using a metabolomics approach and liquid chromatography-mass spectrometry (LC-MS) we aim to assess the effects of dietary treatments on the lipidome of the parasitoid wasp *Goniozus legneri*.

Adult female *G. legneri* were isolated and either starved or provided with a honey diet for 7 days (n = 20 per treatment), then frozen in liquid nitrogen. Individual wasps were extracted using a modified methanol-chloroform-water solvent methodology and concentrated prior to LC-MS analysis. Fragmentation patterns of differential lipids were generated using LC-MS-MS to aid identification. Differentiation between classes was determined by combined PCA/OPLS-DA and validated with a one-way logistic ANOVA.

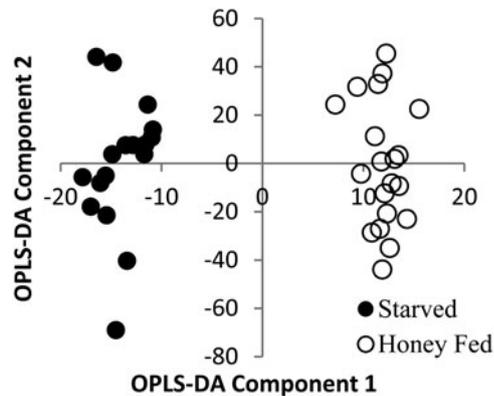


Fig. 1. OPLS-DA analysis of MS samples of honey-fed and starved *G. legneri*.

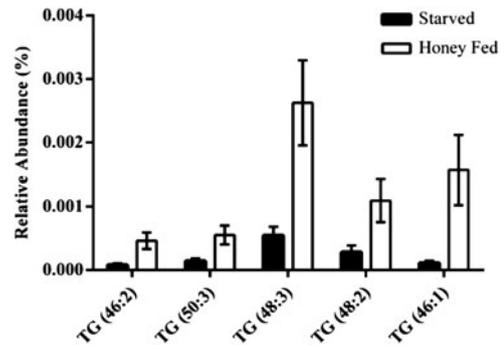


Fig. 2. Differential triglyceride levels between honey-fed and starved *G. legneri*.

A total of 38 differential ions were identified in positive ESI mode (logistic ANOVA with Bonferoni correction: $P < 0.05$, $df = 2,37$), consisting of 37 upregulated amongst honey-fed and 1 in starved *G. legneri*. Differential lipids strongly associated with honey-fed wasps were large storage glycerolipids, including 25 unique triglycerides. Remaining honey-treatment associated differential lipids are comprised of diglycerides and phospholipids. The single upregulated lipid in starved wasp samples was identified as a phosphocholine. In conclusion, adult female *G. legneri* can utilise simple carbohydrates as an energy source, and as a result, may be capable of preserving storage lipids for maintenance and egg allocation.

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