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Diet Impacts the Reproductive System's Maturation in Male Moth *Agrotis ipsilon* (Noctuidae, Lepidoptera)

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1. Introduction

Developmental transitions, such as **sexual maturation**, demand **considerable energy**: this suggests **diet** might be an **important external factor** controlling them. The male *Agrotis ipsilon*, goes through a **sexual maturation** between the **third (D3) and the fifth (D5) day** of adult life [1]. **Morphological and functional shifts** in the **reproductive system** occur during this period [2]. Moreover, moths obtain **nutrients** (water, amino acids and **soluble carbohydrates** like saccharose, fructose and glucose) within the **nectar** [3]. Some of them practice **puddling**, a behavior allowing to **sodium** intake from excrements and puddles of brackish water [4]. All of these nutrients are **essentials** for the **accomplishment of the reproductive function** in butterflies [4, 5]. In this study, we assessed the **impact of diet** on sexual maturation in the **male moth *Agrotis ipsilon***.

2. Materials & Methods

Different *ad libitum* diets from D1:

- water;
- sucrose (S);
- sucrose with glucose (SG);
- sucrose with glucose and fructose (SGF);
- NaCl (Na);
- sucrose and NaCl (SNa);
- sucrose with glucose and NaCl (SGNa);
- sucrose with glucose, fructose and NaCl (SGFNa).



Reproductive system's studies at D3 and D5:

- length of accessory sex gland and amount of proteins
- testicular volume and bundle transfer

4. Discussion

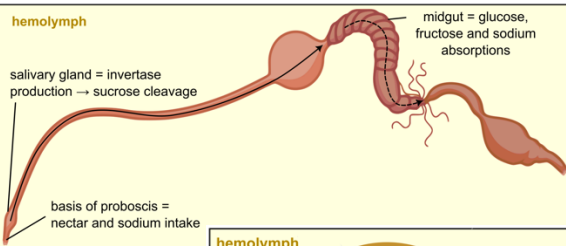
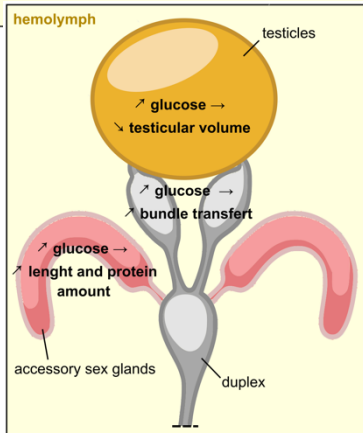


Figure 5. Glucose impacts reproductive system's maturation: it promotes the reproductive organ development, accelerates the bundle transfer from testicles to duplex and increases the protein production in accessory sex glands.



Diet rich in **sucrose, glucose and fructose** along with **sodium** impacts **sexual maturation** by **inducing** the **reproductive system's development** during the **first three days of adult life** in the male moth *Agrotis ipsilon* (Fig. 5).

3. Results

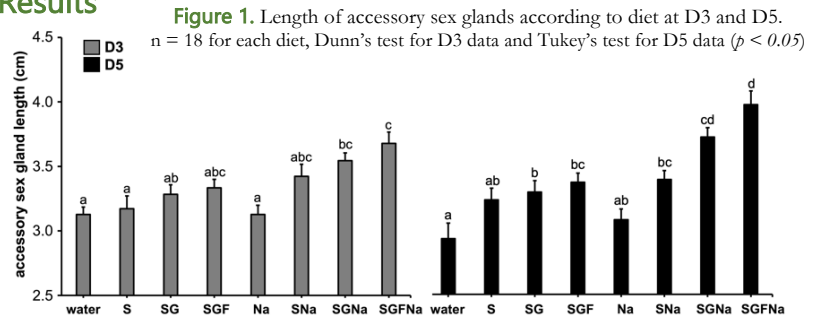
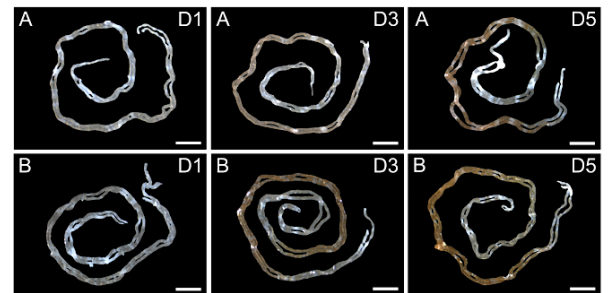
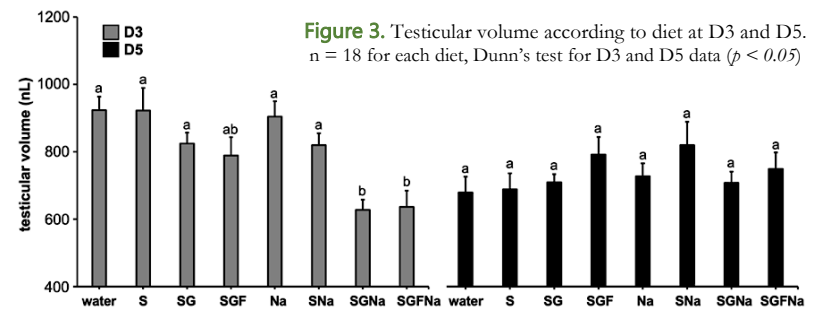


Figure 1. Length of accessory sex glands according to diet at D3 and D5. n = 18 for each diet, Dunn's test for D3 data and Tukey's test for D5 data ($p < 0.05$)

Figure 2. Accessory sex gland morphological change during first five days of adult life for an individual fed with water (A) and fed with sucrose + fructose + glucose + Na (B). Scale bar = 25 mm.



Diet composed of **three sugars with sodium** **increases** protein amount (reddish coloration) inside accessory sex glands (Fig. 2).



Decreased testicular volume and bundle transfer **accelerated** by a diet including diverse sugars supplemented with sodium at D3 (Fig. 3 & 4).

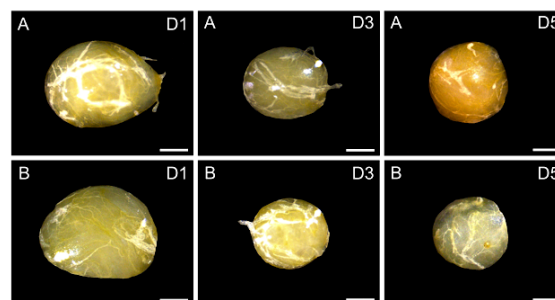


Figure 4. Testicle morphological change during first five days of adult life for an individual fed with water (A) and fed with sucrose + fructose + glucose + Na (B). Scale bar = 500 μm.

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