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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).



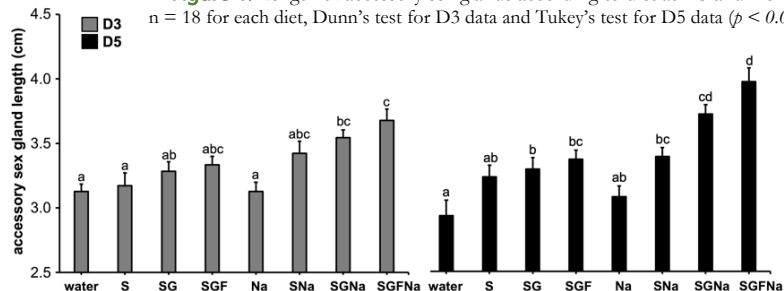
### Reproductive system's studies at D3 and D5:

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

## 3. Results

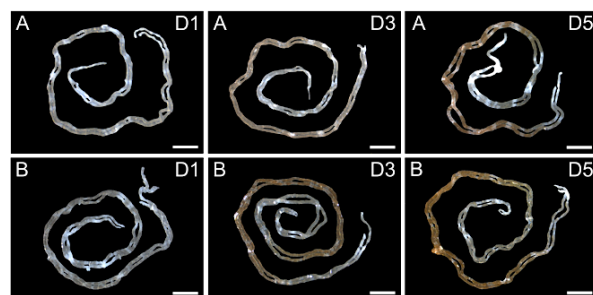
**Figure 1.** Length of accessory sex glands according to diet at D3 and D5.

n = 18 for each diet, Dunn's test for D3 data and Tukey's test for D5 data ( $p < 0.05$ )



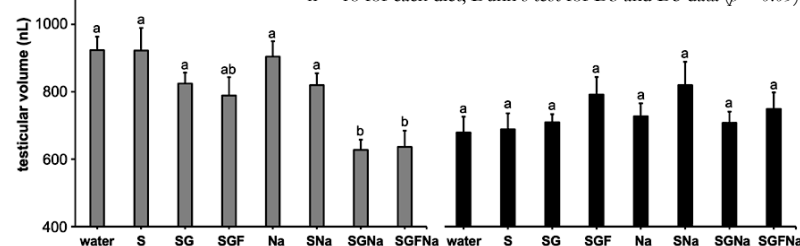
Diet of **three sugars** along with **sodium** increases accessory sex gland length (Fig. 1 & 2).

**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.

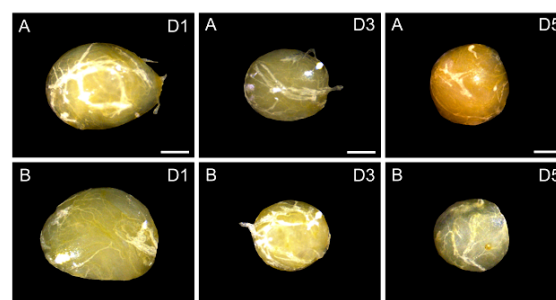


Diet composed of **three sugars** with **sodium** increases protein amount (reddish coloration) inside accessory sex glands (Fig. 2).

**Figure 3.** Testicular volume according to diet at D3 and D5. n = 18 for each diet, Dunn's test for D3 and D5 data ( $p < 0.05$ )

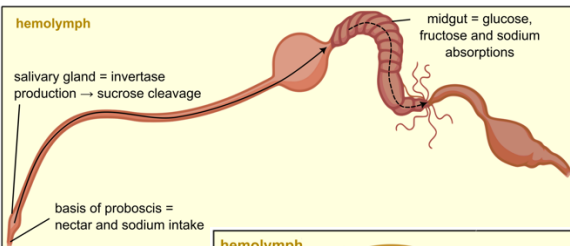


**Decreased testicular volume** and **bundle transfer** accelerated by a diet including diverse sugars supplemented with sodium at D3 (Fig. 3 & 4).

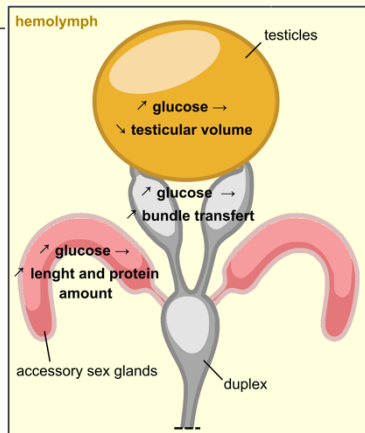


**Figure 4.** Testicle morphological change during first five days of adult life for an individual fed with water (A) and fed with sucrose + fructose + glucose + Na (B). Scale bar = 500  $\mu$ m.

## 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).

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