

Food choice in *Drosophila melanogaster*: the role of diet type, sex and social environment

Jelena Trajković¹, Sofija Pavković-Lučić¹, Dragana Miličić¹, Tatjana Savić²

¹University of Belgrade – Faculty of Biology, Belgrade, Serbia

²Institute for Biological Research “Siniša Stanković” - National Institute of the Republic of Serbia, University of Belgrade, Belgrade, Serbia

INTRODUCTION

- Insect nutrition affects many biological processes, which can be monitored from cellular to behavioural level.
- Food quality and balance in the amount of key nutrients, strongly affect fruit fly *Drosophila melanogaster* fitness.
- A number of genes involved in sensory pathways and physiological systems are included in the regulation of feeding behaviour.
- The fruit fly food-related behaviour may be determined by sex and by the presence of other individuals.

OBJECTIVES

- Whether there were differences in food choice between *D. melanogaster* strains reared on two different substrates for more than 20 years?
- Whether sex and social environment influenced food choice in these two strains?

METHOD/DESIGN

- *D. melanogaster* strains were maintained for more than 450 generations on two different substrates, the cornmeal substrate and substrate with apple.
- Flies were offered five diets: cornmeal substrate (St) and substrates with tomato (T), banana (B), carrot (C) and apple (A).
- Virgin females and males were tested for the time they have spent on different diets, individually, and in groups of five individuals.



Fig 1. Plastic boxes used in the experiment, with Petri dishes filled with standard, tomato, banana, carrot, and apple substrates.

RESULTS

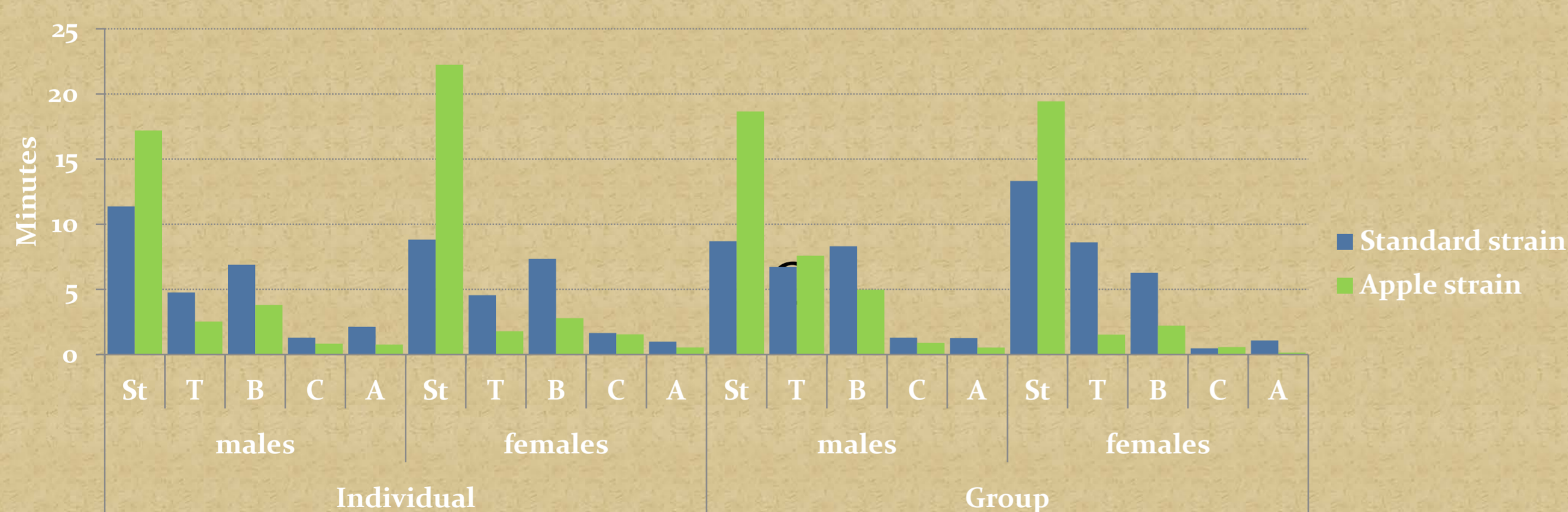
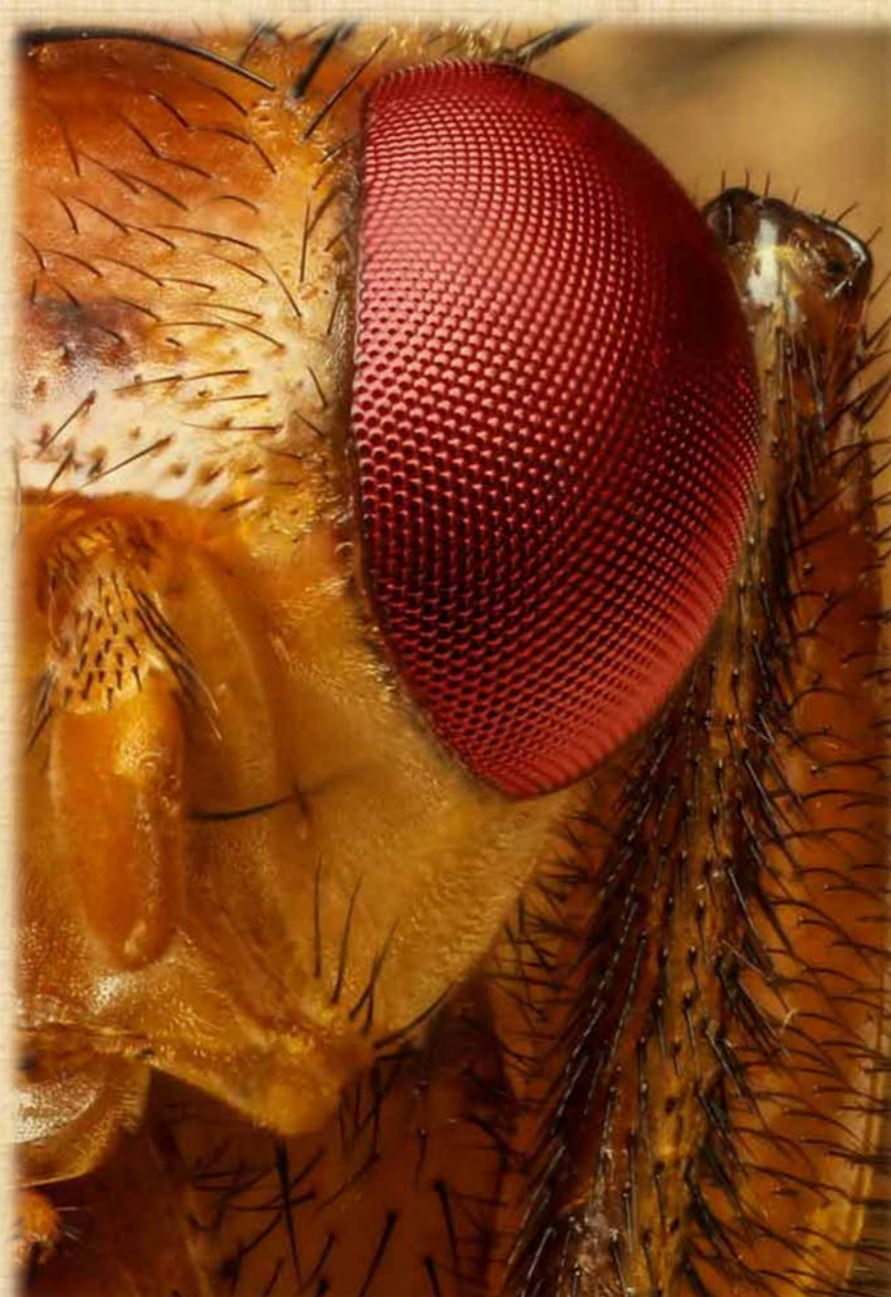


Fig 2. The average time flies spent on different substrates within 1 hour observing period.

Table 1. Four-way ANOVA of *D. melanogaster* food choice.

	SS	df	MS	F	p
Food	34470.2	4	8617.56	99.0038	***
I/G	62.8	1	62.77	0.7211	
Sex	17.2	1	17.23	0.1980	
Strain	18.8	1	18.79	0.2159	
Food × I/G	448.1	4	112.04	1.2871	
Food × Sex	481.1	4	120.27	1.3818	
I/G × Sex	29.6	1	29.56	0.3396	
Food × Strain	6629.1	4	1657.26	19.0397	***
I/G × Strain	11.3	1	11.25	0.1293	
Sex × Strain	23.6	1	23.62	0.2713	
Food × I/G × Sex	145.1	4	36.27	0.4167	
Food × I/G × Strain	36.9	4	9.22	0.1059	
Food × Sex × Strain	355.4	4	88.84	1.0206	
I/G × Sex × Strain	301.6	1	301.62	3.4652	
Food × I/G × Sex × Strain	471.6	4	117.89	1.3544	
Error	195411.0	2245	87.04		



CONCLUSIONS

- All five substrates offered to flies differ in protein content and in the C/N ratio (our previous study).
- Apple substrate contains smaller amount of protein and higher C/N ratio compared to the standard substrate.
- In this study, flies from both strains chose nutritionally richer diet (standard cornmeal substrate).
- Food choice was not influenced by sex or social environment.
- It might suggest that nutritional requirements towards the best available food are the same for both sexes, regardless of whether flies were tested individually or in a group.

This work was supported by The Serbian Ministry of Education, Science and Technological Development, Contract Numbers: 451-03-9/2021-14 200178 and 451-03-9/2021-14/200007.