

The Ladybird's Ability to Learn and Remember

Hiroe Daichi (Toyota Nishi Senior High School)

1. Introduction

When insects metamorphose, their body tissues are destroyed and reorganized. I started this research because I was curious to know if insects retain their memory after metamorphosis. The purpose of this research is to find out about ladybirds' ability to learn and remember.

2 Experiments

We chose ladybirds because they are easy to raise, they are with complete metamorphosis, and they eat the same food before and after metamorphosis

2.1

We made a maze (Fig.1) in order to confirm that ladybirds tend to turn alternately.

2.2

We set a desk lamp to light Goal B and Goal C (Fig.2) in order to find out which has a higher priority, alternate turning or phototactic movement.

2.3

a) We set food at Goal D and made a ladybird go through the maze 100 times (Fig.3).

b) We removed the food from Goal D and made the ladybird go through the maze 200 times. We checked which goals it reached.

c) After the process a), we let it free for 30 minutes and did the same experiment as b)



Food(aphids)

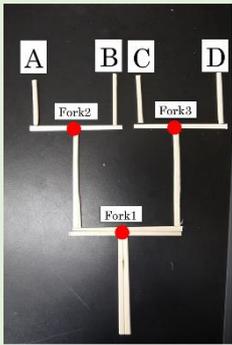


Figure 1

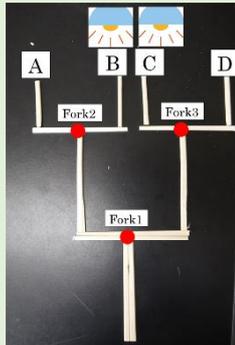


Figure 2

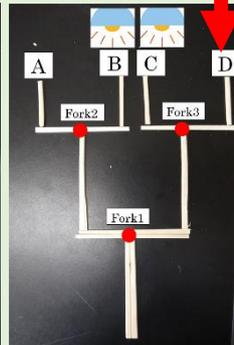


Figure 3

3 Results and Discussion

3.1 Experiment 1

The result was that the ladybird reached Goal A and Goal D more often. (Table 1) So it confirmed the ladybirds' tendency to turn alternately.

	count	rate(%)
A	81	40.5%
B	23	11.5%
C	19	9.5%
D	77	38.5%

3.2 Experiment 2

The ladybird reached Goals B and C. (Table 2) more often. This shows that phototactic movement has a higher priority than alternate turning.

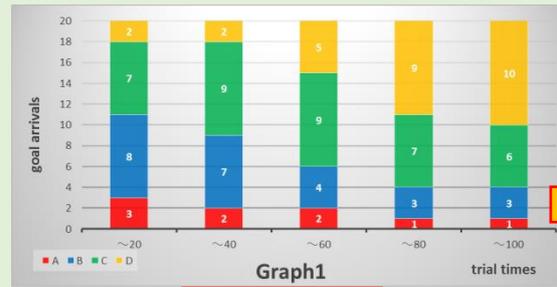
	count	rate(%)
A	24	12.0%
B	73	36.5%
C	69	34.5%
D	34	17.0%

3.3 Experiment 3

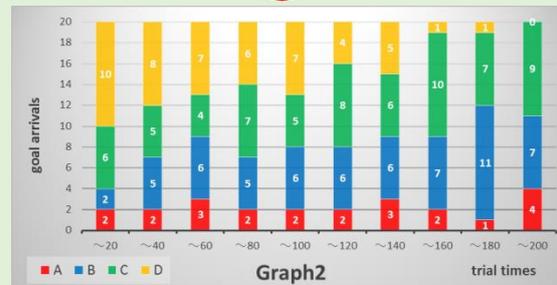
a) The ladybird came to reach Goal D with food more often than other goals around the 70th trial. (Graph 1)

b) The number of arrivals at Goal D was large until around the 60th trial, but it gradually decreased (Graph2).

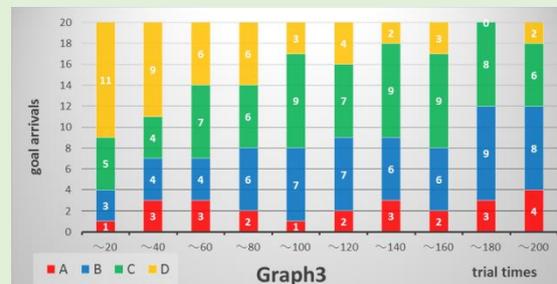
c) The result was almost the same as process b) (Graph3).



soon after



After 30 minutes



Graph 2 and Graph 3 show that the ladybird reached Goal D more often than other goals until around the 60th trial. So we assume that it kept its memory until around that time.

4 Conclusion

- 1) The ladybird's phototactic movement has a higher priority than alternate turning, and the memory of food has a higher priority than phototactic movement.
- 2) The ladybird has the ability to learn and memorize if it repeats an action many times. It retains its memory for a pretty long time. Also, we could say the ladybird is able to learn there isn't food any longer after many trials.

5 Future Plan

In future, we will make a new maze which doesn't have forced turning points and which is easier to light up. Then, we want to do the experiments with larvae first and then with the adults after metamorphosis, in order to find out whether they retain their memory after metamorphosis.

Reference

Yuka Kusano, *Okadangomushi-no Koutaiseitenkou-no Shikumi-o Saguru*, *Kagaku-to Seibutsu*, Vol.53 No.2, pp130-132, Jan.20,2015



Ladybird



Food(aphids)