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Newsletter “おかいこさま”

Special version for overseas researchers

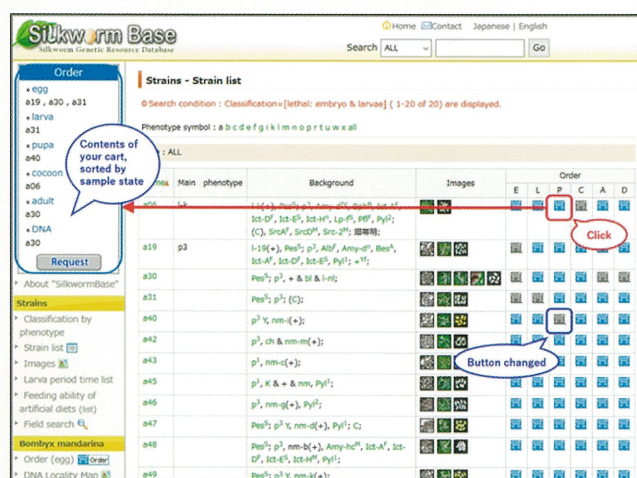
Bio-Resources

April 15, 2019

Project: “Silkworm”

<http://www.nbrp.jp/index.jsp>

1. Visit the website on http://shigen.nig.ac.jp/silkwormbase/request_info2.jsp
2. The page shown below will help you.
3. You can also order silkworm resources by other means (e-mail, telephone, facsimile) as shown on page 4.



The diagram illustrates the transaction process between three entities: International User (top), NBRP silkworm (bottom left), and Kyushu University (bottom right, highlighted in yellow). The process consists of five numbered steps:

- ① Order**: A downward arrow from International User to NBRP silkworm.
- ② MTA**: Two arrows between International User and NBRP silkworm: a white upward arrow and a grey downward arrow.
- ③ Invoice**: A white upward arrow from NBRP silkworm to International User.
- ④ Payment**: A downward arrow from International User to Kyushu University.
- ⑤ Shipping**: A white upward arrow from Kyushu University to International User.

How to rear silkworms

〈Temperature〉 The preferred temperature for silkworm rearing is 25-30°C. Eggs and pupae development can be suppressed by refrigeration (about 4°C). For example, before hatching and emergence, eggs can be stored in the refrigerator for a week. One week of refrigeration does not decrease viability of the eggs/pupae.

〈Mulberry leaves〉 Silkworms (*Bombyx mori*) feed only on mulberry leaves. The amount of mulberry leaves required to rear a larva from the phase of hatching to spinning is 50 g. The weight of a mulberry leaf is about 5 g. Mulberry leaves can be stored in the refrigerator under high humidity conditions for about 2 weeks. However, newly harvested leaves are better for the larvae.

〈Disinfection〉 If several larvae die during development, it could be a result of infection by a silkworm pathogen. To disinfect the rearing room and rearing equipment, "Disinfect Cleaner for Sericulture*" can be used.

*Nozawa et al., 2012 (SANSI-KONCHU BIOTEC).

Sodium hypochlorite (NaClO) (containing 12% more of free chlorine of the undiluted solution)	2 mL
Sodium carbonate (Na_2CO_3)	5 g
Sodium tetrapolyphosphate ($\text{Na}_6\text{P}_4\text{O}_{13}$)	2 g
Water	
Total	1 L

Important

- 1》Pesticides and cigarettes are harmful to the larvae.
- 2》Direct sunlight and strong wind from an air conditioner are also harmful to them.

Egg to the first instar



① Maintain the eggs at room temperature (about 25°C) under high humidity.



② The larvae hatch after about 10 days of incubation at room temperature.



③ Cut the soft mulberry leaves into small pieces. The larvae will gather by the pieces.



④ Gently mix the larvae together using a soft brush.



⑤ Move the larvae into a plastic box.



⑥ Feed them twice per day.



⑦ The larvae climb onto the newly added leaves.



⑧ Bed cleaning.
Discard the feces and older leaves once per day using chopsticks.



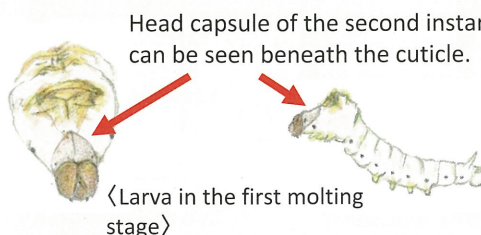
Important

Bed cleaning is important to keep the larvae in good condition.



⑨ Molting.

First instar larvae stop moving after feeding on the leaves for 2-3 days. This developmental stage is called molting.



2~3 instar larvae



- ① Cut the mulberry leaves into small pieces.



- ② Bed cleaning.
Discard the feces and older leaves once per day using chopsticks.

Important



Control the humidity by covering the rearing box with plastic bags.

4~5 instar larvae



- ① Cut the mulberry leaves into larger pieces than those used to feed the 2-3 instar larvae.



- ② Bed cleaning.
Discard the feces and older leaves by hand once per day.



- ③ It is not necessary to cut the leaves for fifth instar larvae. Hard leaves growing at a lower position on the branches are better for fifth instar larvae.



- ④ Bed cleaning.
Discard the feces and older leaves by hand once per day.



Spinning



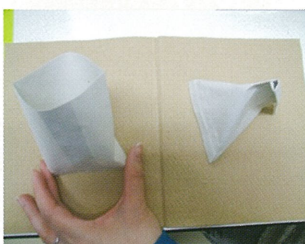
- ① After feeding on the leaves for about 6 days after the fourth ecdysis, the mature larvae will start spinning.



- ② Place the mature larvae in a cocooning frame. They finish spinning in 2-3 days.



Phenotypic features of mature larvae include:
(i) wandering behavior
(ii) translucent integument
(iii) greenish feces



Cocooning frame for several larvae

Paper envelopes can be used for the cocooning frame. Place the larvae in an envelope.

Cocooning frame made of paper for the larvae. Cover the frame with a net.



Cocooning frame for many larvae



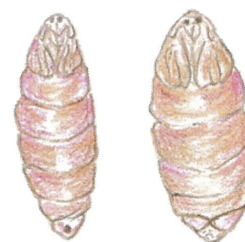
Pupa



① Harvesting of cocoons.
Larvae pupate 3 days after spinning. Harvest the cocoons approximately 6-8 days after mounting. Remove floss from the cocoons. Lay a paper towel beneath them to absorb the meconium.



② In order to observe a pupa, cut the cocoon using a razor.



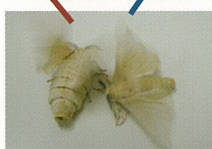
③ Left: male; right: female.
Female pupae are larger and heavier than the male pupae. The tip of the abdomen varies between the sexes.

Moth



① Moths emerge about 10 days after spinning.

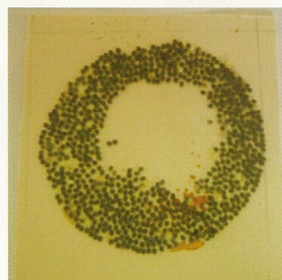
Female Male



② Female moths attract male moths by releasing a sex pheromone.



③ Separate the moths after 2-3 h from the onset of copulation. Cover the female moths with a plastic cup.



④ Newly laid eggs are white. The color of the fertilized eggs changes from white to black 2 days after laying.

Female moths start laying eggs at night. The females lay about 500 eggs. The moths die within 1 week of copulation. Moths do not feed or consume water.

How to maintain the eggs?

① You can preserve the eggs at room temperature (about 25°C) for 2-5 months. Dry conditions and high temperature (more than 30°C) decrease hatchability.



② You can preserve the eggs in a refrigerator (about 4°C) for more than 3 months. Dry conditions decrease the hatchability. To maintain humidity, cover the egg box with plastic bags.

③ After preserving the eggs at room temperature, the eggs will start developing at room temperature. Larvae hatch after 10 days of incubation at room temperature.

How to order silkworms?

There are four ways to order silkworm resources. Do not hesitate to ask us about the silkworm strain.



① E-mail

banno@agr.kyushu-u.ac.jp
fujii.tsuguru.233@m.kyushu-u.ac.jp
nagasaki.kiyomi.778@m.kyushu-u.ac.jp



② Ordering from the website

http://shigen.nig.ac.jp/silkwormbase/request_info2.jsp



③ Telephone

+81-92-802-4820



④ Fax

+81-92-802-4822

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Edited and published by

The National Bio-Resource Project,
in Silkworm Resource Division, Institute of Genetic
Resources, Kyushu University, 744 Motooka, Nishi-ku,
Fukuoka 819-0395, Japan

Project reader: Yutaka Banno

Tel: +81-92-802-4820

E-mail: banno@agr.kyushu-u.ac.jp

