

# THE FORKED TONGUE

THE MONTHLY NEWSLETTER OF THE GREATER CINCINNATI HERPETOLOGICAL SOCIETY

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## The Editor's Den

The December Forked Tongue Features an article on culturing mealworms and silkworms.

Silkworms are much larger than the other larvae typically fed to captive reptiles but are very good nutritionally. If you have a mulberry tree in your backyard you're in luck. If not there is now an artificial diet which can be purchased.

## Calendar of Events

February 7, 2007 – Monthly meeting featuring Phil Peak and Will Bird speaking on Snake Conservation in Kentucky.

March 7, 2007 – Monthly meeting featuring Jim Harrison and Kristen Wiley speaking on venom extraction.

April 4, 2007 – Monthly meeting featuring Jeff Davis Speaking on the Eastern Massasauga.

May 2, 2007 – Monthly Meeting featuring Marc Frevols Speaking on Using Herps for Learning in the Classroom.

## Future Program Ideas?

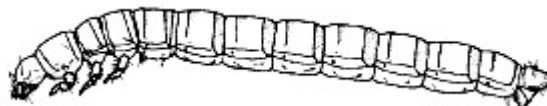
I am sure that everyone can agree that we have never had better run of quality speakers than we have since Dean has taken the position of vice-president. Although we have been able to find what we believe are quality speakers we really want to know what types of programs the members would want to see. If you have any ideas of all regarding a topic or even an individual that you would like see come to the GCHS, please let one of the officers know.

## Rearing Mealworms

Ohio State University Extension Fact Sheet  
*Entomology*

HYG-2135-96

William F. Lyon



### Yellow Mealworm

Common Name	Scientific Name
Yellow Mealworm	<i>Tenebrio molitor</i> Linnaeus
Dark Mealworm	<i>Tenebrio obscurus</i> Fabricius

Mealworms are one of the best baits for bluegills, perch, trout, whitefish and many pan fish. Ice fishermen will catch many kinds of pan fish with mealworms when other baits fail. Bluegills prefer smaller baits after ponds and lakes are frozen. Yellow mealworms are known as "golden grubs" and often last on the hook longer than many other live baits.

## Kinds of Mealworms

Yellow mealworm adult beetles are shiny black, whereas dark mealworm adults are dull black. Eggs are white, bean-shaped and about 1/20 inch long. Young larvae are white and darken with age. Mealworm larvae have a smooth, highly polished, shiny, elongate, hard, wormlike body about 1-1/4 inches long at maturity. Yellow mealworms are honey-yellow, whereas dark mealworms are yellow-brown. Pupae are first white before turning yellow.

## Obtaining Mealworms

Mealworms can be obtained from pet shops where they are used to feed birds, reptiles and animals. Also, live bait stores sometimes sell mealworms.

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They often are found in granaries, feed stores and poultry houses.

### **Cages**

Use a large, galvanized metal washtub, large bucket, crock or wooden box. A wooden box or flat about 8 to 10 inches deep, 2 feet long and 18 inches wide is a satisfactory cage. A suitable lid can be made by perforating small holes in a thin sheet of zinc cut to fit inside the box rim and resting the lid on a narrow wooden batten or strip all around. The cover is easily removed, allowing good ventilation. Some people use a fine- mesh screen cover.

### **Cage Preparation**

Fill the box to within two inches of the top with wheat bran plus a small amount of dry brewer's yeast or graham flour and meat scraps. Alternating layers of chicken mash and burlap with about four layers of each may also be used. The chicken mash layer should be less than 1/4 inch thick. Spray the surface lightly with water and keep it damp with daily sprinkling - do not soak.

### **Biology**

The yellow mealworm is the kind most used for fish bait. A culture can be started by introducing from 500 to 1,000 larvae or beetles in a wooden box 8 to 10 inches deep, 2 feet long and 18 inches wide. Each female can lay some 275 eggs, with larvae completing their growth in six months or less at 80 degrees F. Larvae molt 9 to 20 times before reaching adulthood. Mealworms are easy to raise and multiply quite rapidly with a constant temperature of 80 degrees F. Temperatures can vary from 65 to 100 degrees F.

### **Feeding**

Mealworms are cheap and easy to raise. Feed may consist of wheat or corn bran into which is mixed about 1/4 part of poultry laying mash. Since mealworms prefer moist foodstuffs, their diet should be varied by adding slices of potatoes, carrots, lettuce or other vegetables from time to time. Place these vegetables on a thin board or metal on top of the bran. This tray can be removed at intervals and cleaned. Keep the bran

from becoming too moist or molds and mites can develop, ruining the culture. Apply fresh bran as needed; this alone is a staple diet.

### **Other Factors**

If too little moisture is in the bait, growth will be slowed and size reduced. If too much moisture is in the bait, it can become moldy and poison the larvae. Maintain suitable moisture by placing pieces of cabbage, carrots, lettuce or potatoes near the top of the bait. Use one type vegetable at a time to provide adequate moisture for both adults and larvae. When larvae are nearly mature, place corrugated paper, rough burlap or crumpled paper toweling in the cage. Let adults emerge before disturbing. Avoid too many adults in the cage because they can eat eggs and reduce the population. Harvest the larval fish bait just before pupation begins or as needed. In a short time you will have all the mealworms you can use. Size is largely a matter of feed and temperature. If kept at a temperature of about 38°F, mealworms can be stored almost indefinitely. Care must be taken not to freeze them. Observation is the secret of raising mealworms.

### **Silkworm Rearing**

Printed from University of Arizona Center for Insect Science Needs from <http://insected.arizona.edu/silkrear.htm>

### **Natural Food**

#### **Rearing Habitat**

- Petri dishes or pint size containers
- An aquarium or wide mouthed jar with a lid
- For larv<sup>3</sup>/<sub>4</sub>: A food plant vase made from film can or 1/2 pint container with "x" cut in lid
- Pruning shears or heavy scissors are helpful to gather plant material
- Laundry bleach (sodium hypochlorite)

#### **Food**

The natural food plant of the silkworms is the mulberry tree (*Morus* sp.). Make sure you have a dependable source of pesticide free mulberry leaves before beginning this project. Before feeding the leaves to the larvae, soak the leaves for three minutes in a cleaning solution (three

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tablespoons of laundry bleach and a drop of dish washing detergent in a gallon of water).

Thoroughly rinse the leaves in running water and shake off excess water. Store the leaves in a plastic bag in the refrigerator. The first through third instar larvae require young, tender leaves of mulberry. Offer a leaf in a petri dish and change the leaf daily. After a week you will need to supply more than one leaf. A small piece of damp paper wrapped around the end of the leaf will prolong the freshness. The fourth and fifth instar larvae will need more room and can be set up in the gallon jar with a container to hold mulberry stems and leaves. These older larvae can eat older mulberry leaves. Recut stem ends and quickly insert into water when changing the food plant.

#### **Water**

Larvae do not need water if the natural food plant is used because they can obtain all the water they need from the plant.

**If you cannot obtain the natural food plant, you must use the artificial diet.**

#### **Artificial Food**

##### **Rearing Habitat**

- Disinfected glass petri dishes
- Filter paper or paper toweling
- Spray mister
- Circular sheet of paraffin paper which fits inside the petri dish
- Enough artificial diet for each larva instar
- Alcohol to reduce fungal growth on artificial food.

#### **Food**

Complete instructions should be provided with the purchased artificial food. The following information is gleaned from the Carolina Biological Supply Company informational sheet.

First instar larva: Dip one bar of diet in water and remove when the water is absorbed. Remove excess water with paper towel. Place a moist piece of filter paper or paper towel in the bottom of the petri dish and cover with a sheet of paraffin paper. Place the moistened diet on the paraffin paper and transfer the larvae. Cover the diet and larva with a sheet of

paraffin paper. Check the diet daily and add drops of water to keep it moist.

Second and Third instar larva: After four days, the larva will stop eating and molt. After molting, clean and disinfect the dish or use a new sterile dish. Use the same setup without the moist filter paper. The third instar larva will need at least two petri dishes and will eat at least two bars of diet.

Fourth and Fifth instar larva: Make sure the larva have enough room and provide additional petri dishes as needed. The top sheet of paraffin paper is no longer needed. Continue to check the diet and keep it moist. If mold appears, remove the larvae and add one or two drops of disinfectant alcohol. Allow the alcohol to evaporate and reassemble setup.

#### **Water**

The artificial diet must be moistened with water before the larvae can eat it.

#### **Cleaning**

Frass (droppings) needs to be removed frequently to discourage mold. Gently remove the water container and dump out the frass. Every time you change the food plant, rinse out the container and thoroughly dry it. Periodically wash the water container for the food plant.

Replace the filter paper and paraffin paper every time you give the larvae new artificial diet. Sterile petri dishes are strongly recommended to reduce fungal growth.

#### **Raising Young**

Newly hatched larvae can be transferred by using a small paint brush. Older larvae can be gently picked up with your hands. When the fifth instar larva begins to shrink (after sixth to eighth day), prepare a cocoon nest. Using cellophane paper or paper towels, make a roll of paper by twisting one end and placing two or more larvae in it. Twist the other end closed. Store the rolls in the dark at 25°C (77°F). It takes the larva three days to spin the cocoon and then two to three days to molt into a pupa. By cutting the end of the cocoon, a pupa can be gently removed from the cocoon for examination and returned to the cocoon after

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observation. Although the adults do not fly, the moths have delicate wings that can be damaged by handling.

If you ordered silkworm eggs, the eggs should be placed in a petri dish. After seven days, the eggs will begin to hatch and continue for one to two weeks. Once the first eggs have hatched, check the dish every day for new hatchlings. A day or two before hatching, the egg will darken around the edge. Transfer newly hatched larvae with a fine paint brush to artificial culture or food plant. If adults copulate in captivity, the female will lay eggs within 24 hours. These eggs will not hatch for some time and can be stored.

**Other Concerns**

**Precautions**

If you commit to feeding the caterpillar mulberry leaves, make sure you can obtain plenty of leaves. Once the caterpillars have eaten leaves they will not eat the artificial diet.

Try to maintain the temperature between 68°F to 86°F especially during the first three instars. If you have access to an incubator, keep it at 84°F (29°C). The later instars can be reared with or without an incubator.

Do not place the rearing container where direct sunlight will hit the container. The larvae can easily overheat and die.

**Nutritional Value of Feeder Insects**

I pulled together a couple of tables regarding the nutritional value of some of the more common insects used for feeding herps. It is generally accepted that a calcium to phosphorus ration of between 1:1 and 2:1 is very important. You will see from the information below that most food items need to be supplemented with calcium to reach those ratios. Please note that the measurement units are different in each table.

Percent dry weight		
	Silkworms <sup>1</sup>	Mealworms <sup>1</sup>
Nitrogen	10.35	N/M
Protein	64.7	N/M
Fat	20.83	12
Calcium	.21	.03
Phosphorus	.54	.27
C/P Ratio	.38	.11

<sup>1</sup>Frye, *A Practical Guide for Feeding Captive Reptiles*, 1993

	Fat % kcal	Calcium mg/kcal	Phosphorus mg/kcal	Protein % kcal
Silkworm	43	0.5	0.6	54
Mealworm	60	0.1	1.2	37
Waxworm	73	0.1	0.9	27
Cricket	44	0.2	2.6	50

<http://www.silkwormshop.com/benefits.html>

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### Classified Advertising Policy

GCHS Members may run a free classified ad of 7 lines or less at no charge for an unlimited time; however, the ad will be canceled after one month unless the editor is informed to continue it. Please include scientific names for the animals with your ad as well as your phone number and area code.

Ads of up to 7 lines for non-member are \$2 per issue; ad charges for items more than 7 lines long are as follows:

Business card size	\$3 per issue
1/4 page	\$6 per issue
2 page	\$10 per issue
Full page	\$20 per issue

**The GCHS is not liable for the quality of the merchandise advertised. The Society also reserves the right to refuse any ad considered inappropriate.**

### Requirements for Submitting Articles to the Forked Tongue

Articles can be submitted via 3.5" floppy disk or hard copy to Editor, GCHS 11470 Gatch Hill Road, Aurora, IN 47001.

Articles may be e-mailed to Grady Calhoun at [gradycalhoun@earthlink.net](mailto:gradycalhoun@earthlink.net).

Black and white photographs can be included with articles. Photo submissions should include your name, phone number, and description of photo on the back. Photos can be returned.

All time dependent submissions must be in the editor's possession no later than the meeting previous to the publication.

### Classifieds

Rats and Mice for sale. Reasonable price. Call Jesse or Tom (513) 876-0579.

Discount: A 10% discount is offered to all card-carrying members of the GCHS at *All Creatures Animal Hospital*. Dr. Dan Meakin, All Creatures, 1894 Ohio Pike, Amelia, OH 45102, 513-797-7387.

Discount: A 10% discount is offered to all card carrying members of the GCHS at Dr. Dahlhausen's Veterinary Clinic, 5989 Meijer Dr., Suite 2, Milford, Ohio 513-576-0131

(Number to left of decimal indicates males; number to right of decimal indicates females; number to right of second decimal indicates number of unknown sex. For example, 3.2.1=3 males, 2 females, and 1 unsexed specimen)

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### Currently Held Positions

President	Grady Calhoun	(812) 926-1206	Vice President	Dean Alessandrini	(513) 347-0099
		(513) 564-6041	Editor	Grady Calhoun	(812) 926-1206
Treasurer	Peggy Fille	(513) 528-4452			(513) 564-6041
Sergeant-at-Arms	Bruce Fille	(513) 528-4452	Education Committee Chairman		
Advisor	Vacant		Peggy Fille		(513) 528-4452
Secretary	Kyle Becker	(513) 831-4898			

### About the GCHS

The Greater Cincinnati Herpetological Society holds monthly meetings which typically consist of a short business section, a refreshment intermission, and a program related to herpetology. Both members and nonmembers are invited to attend. Membership is open to anyone with an interest in reptiles and amphibians. New members may sign up by mail or at the monthly meetings. Members receive monthly issues of *The Forked Tongue* and free classified advertising. Annual dues should be directed to the secretary at the society's mailing address, according to the rates below:

Student	\$10.00	Corresponding	
	\$10.00		
Individual	\$15.00	Sustaining	\$25.00
Family	\$20.00	Institutional	\$30.00
Contributing	\$50.00		

### Why Be a Member?

Receive monthly issues of *The Forked Tongue*

§Meet individuals knowledgeable about herpetoculture

§Have access to captive-bred herps and feeder animals

§Participate in society-sponsored field trips, and outings.

§Receive a 10 percent discount on herp-related items and services when you show a valid membership card at the following establishments:

Delhi Pet Center (513) 451-4015

Kentucky Reptile Zoo (606) 663-9160

Harrison Pet Center (513) 367-1115

All Creatures Animal Hospital (513) 797-7387

Dr. Dahlhausen's Veterinary Clinic (513) 576-0131.

P.O. Box 14783  
Cincinnati, OH 45250

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