

## LABORATORY REARING OF *MESOVELIA CRYPTOPHILA* (HETEROPTERA: MESOVELIIDAE)<sup>1</sup>

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ABSTRACT: *Mesovelia cryptophila* was reared from egg to adult at  $26.7 \pm 0.6^\circ \text{C}$  under a 14L:10D photoperiod. The incubation period averaged 14.93 days; and the four nymphal stadia, 3.24, 2.51, 3.15, and 4.85 days, respectively.

*Mesovelia cryptophila* Hungerford occurs from New Jersey south to Florida and west to Michigan, Iowa, Oklahoma, and Mississippi (Smith 1988); it also has been reported from Minnesota (Bennett and Cook 1981) and Texas (Polhemus 1997).

Little is known about the biology of this infrequently collected species. It has been collected from a shaded pool in Mississippi (Wilson 1958); a cypress swamp in South Carolina (Sanderson 1982); bog, lake, and impoundment habitats in New Jersey (Chapman 1959); a small pond and shaded, stagnant backwaters of a stream in Iowa (Harris 1943); and the margin of a bog lake in Michigan, similar to the habitat of *Mesovelia amoena* Uhler (reported as *Mesovelia douglasensis* Hungerford) (Hoffmann 1932, Hungerford 1924).

Hoffmann (1932) reported only apterous adults in Michigan, and Sanderson (1982) stated that macropterous adults were unknown. Chapman (1959) reported specimens (stages not given) collected in May and August through October in New Jersey; Sanderson (1982) collected specimens (stages not given) in July in South Carolina; and Hungerford (1924) and Hoffmann (1932) collected adults in June and July, and in July, respectively, in Michigan.

Hoffmann (1932) reared this species in the laboratory under unspecified conditions with limited success (i.e., five individuals reached adult) and briefly described the immature stages. He reported only four nymphal instars.

On 9 July 1991, one of us (SJT) discovered a small population of *M. cryptophila* in Gallatin County, Illinois. Because so little is known about this insect, and because Hoffmann's (1932) rearing data were limited and collected under unspecified conditions, we decided to rear the insect in our laboratory under controlled conditions.

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## MATERIALS AND METHODS

The Gallatin County site was a small, shaded bay of Crab Lake (= Hulda Lake) located 6 mi NE of Shawneetown. The water was covered with a light (approximately 10 plants per m<sup>2</sup>) covering of duckweed (Lemnaceae). Thirty apterous adults (15♂♂, 15♀♀) were collected with an aquatic D-net up to 2 m from shore, brought to the laboratory, and placed in glass creamers (1♂, 1♀/container). The creamers (4.5 cm deep x 3.0 cm diam.) were filled with 1 cm of deionized water and 3 floating plastic disks (0.6 cm in diam.) were added. The curved sides of the containers were sufficient to prevent the insects from escaping. Two paper strips of cardstock (approximately 1.25 x 2.5 cm) were angled against opposite sides of each container with the tops above the water. The disks and strips served as oviposition sites and allowed individuals to leave the water.

Containers were checked daily for eggs, all of which were laid beneath the water surface. Plastic disks and paper strips, with attached eggs, were transferred to new containers. If eggs were deposited on the walls of the container, adults were transferred to a new container. As eggs hatched, the newly emerged first instars were transferred to new containers prepared similarly to those for adults, but without paper strips. Nymphs of the same instar molting into the subsequent instar on the same day were transferred to new containers if other nymphs in the container had not molted. The water level was maintained just above (0.1 - 0.3 cm) the eggs. Maximum numbers of individuals reared per container were: 6 first instars, 4 second instars, 3 third instars, and 1 fourth instar. Adults reared from these eggs were preserved in 70% ethanol.

Each adult was fed 1, and each nymph 1/2, frozen adult fruit fly (*Drosophila melanogaster* Meigen) per day. Flies were crushed or torn slightly for nymphs to facilitate feeding and were replaced daily.

All individuals were maintained in incubators at 26.7 ± 0.6° C under a 14L:10D photoperiod. All containers were changed at least once per week but more frequently when water became cloudy.

Data were analyzed with the SAS (SAS Institute 1988) TTEST procedure. Level of significance was set at 0.05.

## RESULTS AND DISCUSSION

Eggs (n = 96) were deposited singly on the paper strips, sides of the plastic disks, and walls of the containers. The incubation period averaged 14.93 days (Table 1). There were four nymphal instars, thus confirming Hoffmann's (1932) results. The first through fourth stadia averaged 3.24, 2.51, 3.15, and 4.85 days, respectively. Duration of total developmental time from egg to adult averaged 28.56 days. No sexual difference was detected for either the fourth

stadium ( $T = -0.9685$ ,  $df = 45$ ,  $p = 0.3304$ ) or for total length of development ( $T = -0.8387$ ,  $df = 45$ ,  $p = 0.4061$ ). Of the 30 field-collected adults, five females and four males were still alive after one month.

Hoffmann (1932) collected adults in Michigan but reared their offspring in Kansas. Females laid up to 75 eggs (mean = 55,  $n = 4$ ), which were inserted into plant tissue. He reported an egg laid on 27 July hatched on 14 March (229 days), and two eggs laid on 24 and 25 July hatched between 21 and 25 September (58-63 days). The large discrepancy in incubation period between Hoffmann's study (58-229 days) and ours (12-19 days) (Table 1) suggests his eggs were in diapause. Hoffmann's (1932) five specimens reared from first instar to adult averaged 17.6 days (range = 16-21, no rearing temperature given), approximately four days longer than ours.

Although the occurrence of only four instars is rare in Gerromorpha (Štys and Davidová-Vilímová 1989), it is not unprecedented in the Mesoveliidae; *Mesovelia furcata* Mulsant and Rey, a European species, has only four nymphal instars (Zimmerman 1984).

Table 1. Durations (in days) of immature stages of laboratory-reared *Mesovelia cryptophila*.

Stage	Sex	Number completing stadium	Mean $\pm$ Std. Err.	Range
Egg <sup>a</sup>		94	14.93 $\pm$ 0.16	12-19
First instar		80	3.24 $\pm$ 0.07	2-5
Second instar		67	2.51 $\pm$ 0.07	2-4
Third instar		71	3.15 $\pm$ 0.07	2-4
Fourth instar	Males + Females <sup>b</sup>	48	4.85 $\pm$ 0.11	3-7
	Males	27	4.74 $\pm$ 0.15	3-7
	Females	20	4.95 $\pm$ 0.15	3-6
Egg through fourth instar	Males + Females <sup>b</sup>	48	28.56 $\pm$ 0.20	25-31
	Males	27	28.41 $\pm$ 0.26	25-31
	Females	20	28.75 $\pm$ 0.32	26-31

<sup>a</sup> 96 eggs were laid.

<sup>b</sup> One individual died during molting and could not be sexed.

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