

Brood size of the stygobiotic asellid isopod *Caecidotea bicrenata bicrenata* from Franklin County, Tennessee, USA

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Caecidotea bicrenata bicrenata is a stygobiotic asellid isopod that ranges from northern Alabama through central Tennessee¹. To determine brood size in this species we made four collections of *C. b. bicrenata* from Buckets of Blood Cave in Franklin County, Tennessee over an eight-month period. Ovigerous females were present in three of the four collections. For each female carrying eggs or embryos we measured body length and brood number.

A shallow stream that is approximately 0.5 m wide runs through Buckets of Blood Cave, although it is not accessible in all parts of the cave due to overlying rock. *C. b. bicrenata* is present throughout the stream. We did not quantify *C. b. bicrenata* density, but roughly estimated it to be 100/m². No other macroscopic animals are common in the stream. On each visit we collected an average of 60 individuals by picking up rocks from the stream bed and then removing animals from the rocks by hand or with forceps. We transported live animals to the lab before preserving them in 70% ethanol. Ovigerous females were identified under the microscope. We removed and counted eggs, embryos or immatures from ovigerous females and measured female body length, from the front of the head to the end of the pleotelson.

We collected 47 individuals including five ovigerous females on 2/26/2010, 57 individuals including five ovigerous females on 4/10/2010, 80 individuals including zero ovigerous females on 7/16/2010, and 56 individuals including two ovigerous females on 10/28/2010. For the twelve ovigerous females, brood size ranged from 16 to 49 with a mean of 28.9 and a standard error of 2.5 (Table 1). The body length of ovigerous females ranged from 5 mm to 11 mm (Table 1). There was no linear relationship between body length and brood size ($R^2 =$

0.31, $F = 0.06$). Ovigerous females collected in February had either eggs or early stage embryos, whereas those from April had developed embryos. One ovigerous female from October carried embryos and the other carried immatures around 1 mm in length. The ovigerous females from October were among the smallest collected and carried the smallest observed broods (Table 1).

Table 1. Collection date, body length, and brood size for *Caecidotea bicrenata bicrenata* ovigerous females from Buckets of Blood Cave.

ID	Collection Date	Body Length (mm)	Brood Size
1	2/26/2010	11	32
2	2/26/2010	9	26
3	2/26/2010	8	25
4	2/26/2010	9	37
5	2/26/2010	8	32
6	4/10/2010	6	24
7	4/10/2010	9	32
8	4/10/2010	7	29
9	4/10/2010	6	27
10	4/10/2010	8	49
11	10/28/2010	6	18
12	10/28/2010	5	16

Brood sizes have been reported for a handful of stygobiotic *Caecidotea* species. *C. kendeighi* individuals from Illinois ranging from 6.2 mm to 8.8 mm in length carried a maximum of 21 eggs². *C. stygia* from Kentucky ranging from 3.5 to 7.5 mm in length carried 13 to 34 eggs or embryos, with a mean of 20³. *C. pricei* from West Virginia ranging from 10 to 17 mm in length had a brood size ranging from 9 and 100, with a mean of 41⁴. *C. tridentata* from Kansas ranging from 9.3 to 13.4 mm in length had a brood size ranging from 6 to 70, with a mean of 45⁵. A *C. recurvata* individual kept in the lab produced five broods of around 50 individuals each over a two-year period⁶. Consistent with our observations of *C. b. bicrenata*, Lewis and Bowman reported brood sizes of 20, 26 and 50 for three *C. b. whitei* individuals from Illinois⁷. They also reported a brood size of 17 for one *C. beattyi* individual⁷. The small brood sizes of stygobiotic *Caecidotea* contrast with those of epigeal *Caecidotea*, which can carry more than 300 eggs⁸.

Little is known about the reproductive period of stygobiotic *Caecidotea* species. Our observation of around 10% ovigerous *C. b. bicrenata* females in samples from February and April is similar to Fong's observation of 15% ovigerous *C. pricei* females in March⁴. Ovigerous *C. kendeighi* females were collected in June and July^{2,9}. Ovigerous *C. tridentata* females were present every month of

the year at a mean of 10% per sample at one site¹⁰, whereas Hoffmann found ovigerous females only during June at another site⁵. Banta, studying *C. stygia* in Indiana, reported finding young in the brood pouch year round¹¹. Ovigerous females, when present, are found at low frequencies. Epigean *Caecidotea* species generally have their peak reproductive period in the late winter and early spring³; whether that pattern is present in stygobiotic species is not clear.

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