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OBSERVATIONS ON THE DISTRIBUTION AND REPRODUCTION OF THE SALAMANDER *EURYCEA JUNALUSKA* IN TENNESSEE

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ABSTRACT

Recent collecting has revealed a population of the plethodontid salamander *Eurycea junaluska* from the Tellico River drainage in Monroe County, Tennessee. The only other recent record of *E. junaluska* in Tennessee is from Sevier County. Female *E. junaluska* collected in March have enlarged ovarian follicles indicating that oviposition occurs in spring. The larvae of *E. junaluska* metamorphose at larger sizes than larvae of sympatric *Eurycea*.

INTRODUCTION

Eurycea junaluska Sever, Dundee and Sullivan was described from elevations of 365-610 m along the Cheoah River and its tributaries Santeetlah Creek and Tullulah Creek in Graham County, North Carolina (Sever et al., 1976). Subsequently, the species was reported from Fighting Creek, Sevier County, Tennessee, in the Great Smoky Mountains National Park (Sever, 1976, 1979). Sever (1976) examined specimens described as *E. b. bislineata* X *cirrigera* by King (1939) from various localities in Sevier and Blount Counties in the Great Smokies. Sever stated that these specimens, which were in poor condition, were *E. junaluska*. However, despite much personal fieldwork in the Great Smokies over the past decade, I have been unable to find more than a half dozen specimens of *E. junaluska*, and all of these have come from Fighting Creek.

Aside from the localities mentioned above, no other records for *E. junaluska* have been published. The only published data on the larvae or on the female reproductive cycle are by Bruce (1982b) on the Santeetlah Creek population. This paper reports a new locality for the species in southeastern Tennessee and gives some additional observations on the larvae and female reproductive cycle.

MATERIALS AND METHODS

This paper focuses on collections made in southeastern Tennessee and southwestern North Carolina since 1975. All distances reported for localities are straight-line measurements from topographical maps. Snout-vent length (SVL) of specimens was measured to the nearest 0.1 mm from tip of the snout to posterior end of the vent. For data on ovarian follicles, both ovaries were removed, the number of enlarged follicles was counted, and 10 follicles from each female were randomly chosen and measured to the nearest 0.1 mm with an ocular micrometer. Tennessee

specimens have been placed in the herpetological collections of the Carnegie Museum, Pittsburgh.

RESULTS AND DISCUSSION

Most metamorphosed specimens of *E. junaluska* have been collected as they crawl onto U. S. Route 129 along the Cheoah River in Graham County, North Carolina, on rainy nights (Sever et al., 1976). Following a heavy rain on the evening of 21 March, 1979, I collected between 0200-0500 hours along National Forest Road 210 between Bald River Falls and National Forest Road 217, 11-16 km ESE of Tellico Plains, Monroe County, Tennessee. This road borders the Tellico River at elevations of approximately 650-700 m.

Among the species collected were *Notophthalmus viridescens* (2 specimens), *Desmognathus monticola* (6), *Plethodon glutinosus* (2), *Gyrinophilus porphyriticus* (3), *Pseudotriton ruber* (5), *Eurycea bislineata* (1), and five adult female *E. junaluska*. The following morning, two additional *E. junaluska*, and adult male (48.5 mm SVL) and a larva (38.2 mm SVL) were collected from under rocks along the Tellico River, 14.4 km ESE of Tellico Plains. One of the females, the male, and the larva are shown in Fig. 1. This is the first published illustration of the larva of the species. On 20 March 1981, I collected another *E. junaluska* larva (28.6 mm SVL) from the Tellico River at the State Line Campground, 22.5 km SE of Tellico Plains at about 710 m elevation.

The nearest previous record for *E. junaluska* is from Rattler's Ford, Santeetlah Creek, Graham County, North Carolina (Sever et al., 1976). The locality at Santeetlah Creek is approximately 18 km NE of the record for *E. junaluska* at the State Line Campground. The ridge of the Unicoi Mountains separating locales at Santeetlah Creek and the Tellico River is generally 1500-1600 m. Since no specimens have yet been collected from altitudes >710m, the height of the Unicoi Mountains may represent a significant barrier for dispersal of the species between headwaters of the two drainages.

The only published data on the reproduction of *E. junaluska* are by Sever et al. (1976) on the male cycle and by Bruce (1982b) on the timing of oviposition and growth of larvae. Based upon testicular morphology, Sever et al. (1976) stated that the mating season for the species is

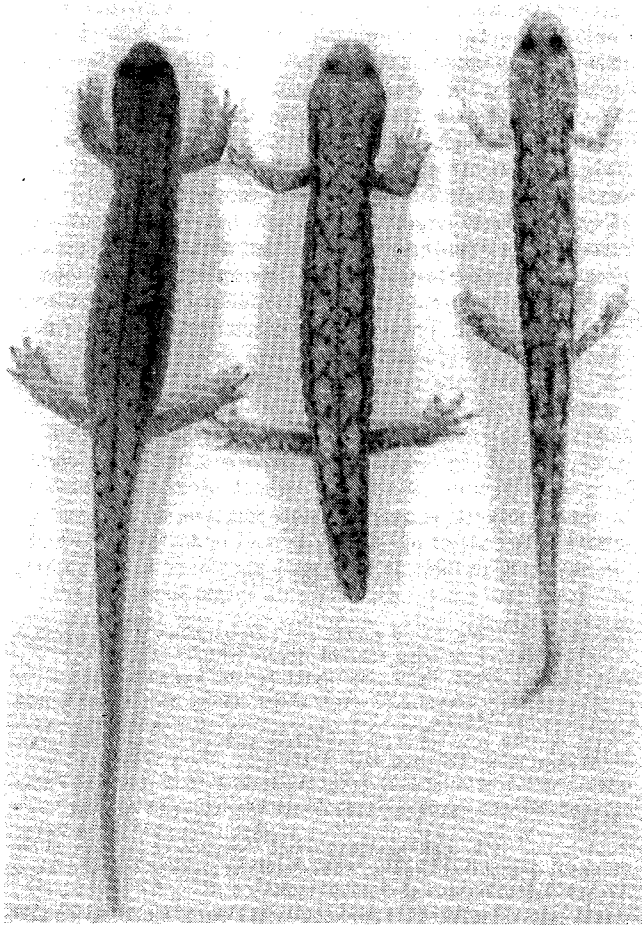


FIG. 1. Tennessee specimens of *Eurycea junaluska*. Specimens are from samples referred to in the text that were collected on 21 March 1979, along the Tellico River, Monroe County. The specimen to the far left is a female, the middle specimen is a male, and the specimen to the right is a larva.

probably fall, winter and early spring. Bruce (1982b) reported finding four clutches of eggs attached to the undersides of rocks in 6-20 cm of water at Santeetlah Creek between 13-15 May, 1980. Females (40-42 mm SVL) were in attendance with each clutch, and the clutches contained 30, 31, 40 and 49 eggs.

I examined the ovaries of the five female *E. junaluska* from the Tellico River and those of five other specimens collected in March at other localities. Despite annual collecting trips in March to this region, this represents nearly the total sample of females personally collected since 1975.

Results are presented in Table 1. All metamorphosed females collected in March possessed large ovarian follicles. The 10 females were 37.0-46.5 mm SVL (mean = 43.0, SD = 2.94) and had 41-68 total ovarian follicles (mean = 51.0, SD = 9.42). The number of enlarged follicles was highly correlated with SVL ($r = .801$). There was no significant difference ($p > .001$) between the number of follicles in the right and left ovaries ($F = 0.57$). However, there was significant variation ($p < .001$) in size of the follicles between individuals ($F = 10.99$).

TABLE 1. Number and size of ovarian follicles in *Eurycea junaluska* from various localities mentioned in the text. All measurements are in mm. R = right ovary, L = left ovary, and T = total count.

Locality	Date	SVL	Number			Size (N = 10)			
			R	L	T	Range	Mean	SD	
Tellico River	21 Mar 79	41.3	20	26	46	1.8-2.2	2.0	.17	
		44.0	30	28	58	2.2-3.0	2.6	.25	
		44.4	26	21	47	1.8-2.5	2.2	.21	
		45.1	23	26	49	2.0-2.6	2.2	.22	
		46.5	30	38	68	2.0-2.9	2.3	.29	
Cheoah River	15 Mar 76	37.0	19	22	41	1.8-2.5	2.2	.23	
		21 Mar 79	40.0	22	20	42	2.0-2.6	2.3	.19
			43.9	22	32	54	2.2-3.0	2.7	.26
Fighting Creek	18 Mar 76	41.8	21	21	42	2.2-2.6	2.4	.11	
Santeetlah Creek	19 Mar 79	45.8	33	30	63	2.4-2.8	2.6	.14	

Despite the significant variation in follicle size, the relatively large size of the follicles overall indicates that oviposition was probably imminent for most individuals. Bruce (1982b) did not report on egg sizes in the clutches he found, but developmental stages led him to believe that the date of oviposition was close to May 1. He also stated that oviposition occurs in *E. bislineata* at Santeetlah Creek at the same time. However, I found a clutch of 20 eggs attended by a female *E. bislineata* at Santeetlah Creek on 17 March, 1982. Thus, the period of oviposition for both species may be more extensive than Bruce (1982b) believed.

Eleven females from the type series that were collected between 17 July-12 September possessed very small ovarian follicles, but counts and sizes are not available. There are also no data on ovarian follicle size in females between October-February and April-June, due to lack of specimens.

Besides the Tellico River specimens, the females from the Cheoah River locale that were collected in March were also found by road hunting. Perhaps the females were on the road because they were migrating from more terrestrial areas to oviposition sites in the streams. The Fighting Creek and Santeetlah Creek specimens indicated in Table 1 were under rocks along the stream border.

The only published data on the larvae of *E. junaluska* are by Bruce (1982b) on Santeetlah Creek specimens. Three of the egg clutches he collected hatched in the laboratory between 30 May-5 June, with the newly hatched larvae averaging 7.1-8.7 mm. Bruce (1982b) reported a two or occasionally three year larval period for *E. junaluska* with metamorphosis in July at 35-42 mm SVL. In contrast, *E. bislineata*, the only other sympatric *Eurycea* whose larvae typically occur in lotic habitats, has a one- or two-year larval period at Santeetlah Creek and metamorphoses between May-July at 24-33 mm SVL (Bruce, 1982b). Size at hatching was similar between the two species, but *E. junaluska* had faster growth rates. In a stream in western North Carolina where *E. junaluska* was absent, Bruce (1982a) reported a one-year larval period for *E. bislineata* with metamorphosis at 17-20 mm.

Besides the large larvae mentioned from the Tellico drainage, I have collected larval *E. junaluska* of 38.7, 40.2 and 40.3 mm SVL from Tullulah Creek in Graham County, North Carolina. Smaller larvae are numerous at this locale.