were less than one year of age (Bishop 1941, *op. cit.;* Nickerson and Mays 1973, *op. cit.*), which supports this hypothesis. Another possibility is that shelter rocks had separate cavities or compartments within that provided the larvae refuge from being in direct contact with the adults and were thus able to avoid being cannibalized. A third alternative that must be considered is that the larvae observed in the latter two observations may have entered the rocks of the adult males opportunistically immediately prior to our surveys. The hellbender populations at our three localities are robust and appear to be stable which could increase the chance of larval/adult associations.

We thank Shem Unger for encouraging us to report these observations.

JOHN D. GROVES, North Carolina Zoological Park, 4401 Zoo Parkway, Asheboro, North Carolina 27205, USA (e-mail: johngroves2005@yahoo.com); **LORI A. WILLIAMS**, North Carolina Wildlife Resources Commission, 177 Mountain Laurel Lane, Fletcher, North Carolina 28732, USA (e-mail: lori.williams@ncwildlife.org); **SEAN P. GRAHAM**, Sul Ross State University, Department of Biology, Geology, and Physical Sciences, Alpine, Texas 79832, USA (e-mail: sean.graham@sulross.edu).

***PLETHODON CINEREUS* (Eastern Red-backed Salamander). MOVEMENT.** Lungless salamanders (family Plethodontidae) are relatively sedentary and are presumed to have limited dispersal ability (Marsh et al. 2004. Ecology 85:3396–3405). Site fidelity in Plethodontidae is high, and individuals displaced 90 m return to home territories (Kleeberger and Werner 1982. Copeia 1982:409–415). Individuals defend territories (Jaeger et al. 1982. Anim. Behav. 30:490–496) and female home ranges have been estimated to be 24.34 m^2 (Kleeberger and Werner 1982, *op. cit.*). Females may seek out suitable subsurface habitat to oviposit eggs, yet little is known about their maximum movement distances (Petranka 1998. Salamanders of the United States and Canada. Smithsonian Institution Press, Washington. 587 pp.).

On 18 September 2014, a female *P. cinereus* (lead back morphotype; SVL = 44.68 mm; 0.89 g) was found under a coverboard during a standard sampling event and uniquely marked using visual implant elastomer at the S.O. Conte Anadromous Fish Research Center, Massachusetts, USA (42.59280°N, 72.58070°W, datum WGS84; elev. 74 m). This individual was subsequently recaptured at ~1500 h on 8 October 2014 under a coverboard within 3 m of the original capture location and then again ~1430 h on 16 October 2014 under a log, within the same forest patch, though in a 50 x 150 m area adjacent to the original study area. Because we found the marked salamander while collecting multiple individuals for a laboratory study, the exact recapture location of the marked individual is not known. However, the distance between the 8 October capture location and the nearest edge of the 16 October search area (i.e. 50 x 150 m) was 143 m, indicating a minimum movement distance. As far as we are aware, this is the longest recorded movement for *P. cinereus* by more than 53 m (Kleeberger and Werner 1982, *op. cit.*). This finding followed a rain event of 1.63 cm within 24 h and the second largest sustained rain event during October. The movement we observed may have been due to disturbance from handling and marking, although this was minimized in the field.

SEAN C. STERRETT (e-mail: seansterrett@gmail.com), **ADRIANNE B. BRAND, WILLIAM R. FIELDS, RACHEL A. KATZ, EVAN H. CAMPBELL GRANT,** United States Geological Survey, Northeast Amphibian Research and Monitoring Initiative, Patuxent Wildlife Research Center, SO Conte Anadromous Fish Research Laboratory, One Migratory Way, Turners Falls, Massachusetts 01376, USA.

***PLETHODON HUBRICHTI* (Peaks of Otter Salamander). BEHAVIOR.** On 13 September 2014, while examining a site located near Onion Mountain, Bedford Co., Virginia, USA, where *Plethodon hubrichti* and *P. cinereus* are sympatric, we discovered a *P. hubrichti* (SVL ca. 48 mm) biting a *P. cinereus* (SVL ca. 30 mm) beneath a rock on the forest floor (Fig. 1). The *P. cinereus* visibly struggled during our observation with no noticeable effect on the *P. hubrichti*. The *P. hubrichti* appeared to have complete physical dominance over the *P. cinereus*. After a couple of minutes of observation, the *P. hubrichti* released its grasp and both salamanders retreated to the leaf litter. Both salamanders appeared to be unharmed.

Interference competition with *P. cinereus*, including agonistic behavior and territoriality, is thought to be a factor influencing the range boundaries of several Plethodontid species, including *P. hubrichti* (Arif et al. 2007. Evol. Ecol. Res. 9:843–854). The range of *P. hubrichti* is limited to a 19-km length of the Blue Ridge Mountains in Virginia and it is sympatric with the wide-ranging *P. cinereus* along the edge of its range (Petranka 1998. Salamanders of the United States and Canada. Smithsonian Institution Press, Washington, DC. 587 pp.). Aggressive behaviors, such as lunging and biting, have been documented between *P. hubrichti* and *P. cinereus*; however, most behavior studies take place in the laboratory and these behaviors are rarely observed in the field. Although there is no dietary evidence that suggests *P. hubrichti* regularly consumes other salamanders (Arif et al. 2007, *op. cit.*) the size difference between the observed individuals suggests that the *P. hubrichti* was capable of swallowing the *P. cinereus*.

FIG. 1. *Plethodon hubrichti* biting a smaller *P. cinereus*.

ANDREW KNIOWSKI, Department of Fish and Wildlife Conservation, Virginia Tech, Blacksburg, Virginia 24061, USA (e-mail: kniowski@vt.edu); **RENÉE PIETSCH,** Department of Biological Sciences, Virginia Tech, Blacksburg, Virginia 24061, USA.

***TRITURUS MACEDONICUS* (Macedonian Crested Newt). TAIL AUTOTOMY.** Tail autotomy is one of many anti-predator adaptations and is particularly common in lizards (e.g., Arnold 1988. *In* Gans and Huey [eds.], Biology of the Reptilia, Vol. 16, pp. 253–273 Alan R. Liss, New York; Bateman and Fleming 2009. J. Zool. 277:1–14). The tail plays an important role in defensive behavior in salamanders: it may be elevated, undulated, and wagged or convoluted, and autotomized (Brodie 1977. Copeia 1977:523–535; Jablonski and Balej 2014. Herpetol. Rev. 45:302–303). However, tail loss can result in loss of fitness as many animals, including

salamanders, use the tail to store energy as fat (Arnold 1988, *op. cit.*; Maginnis 2006. Behav. Ecol. 17:857–872; Bateman and Fleming 2009, *op. cit.*). Regeneration of the tail may require an increase in feeding rate and diversion of energy from growth or other life processes (Maginnis 2006, *op. cit.*; Marvin 2013. J. Herpetol. 47:174–178). Tail loss may also affect behavior, reproduction, and movement (e.g., swimming, running, and diving; Fox and McCoy 2000. Oecologia 122:327–334; Maginnis 2006, *op. cit.*; Marvin 2010. Copeia 2010:468–474; Marvin 2013, *op. cit.*). Cases of caudal autotomy in caudate amphibians are not usual; it is well established in salamanders of the family Plethodontidae, which occasionally can shed the end of their tails (e.g., Brodie 1977, *op. cit.*; Ducey et al. 1993. Biotropica 25:244–349; Romano et al. 2010. Acta Herpetol. 5:199–205).

Triturus macedonicus is an endemic and widespread species in western parts of the Balkans (Wielstra et al. 2014. Amphibia-Reptilia 35:376–381). On 4 October 2013, during fieldwork carried out in Albania, we discovered a population (approx. 20 individuals) of this species inhabiting a mountain waterhole in the Korab Mountains (41.6823°N, 20.5210°E, datum WGS84; elev. 1776 m). Several specimens were caught for photography and other documentation. Tail loss was recorded in one adult male during handling. The newt, after twisting movements of the tail, lost approximately 30 mm of the distal portion of its tail, accompanied with a small volume of blood. The discarded part of the tail then undulated approximately for 120 seconds. In other specimens of the same population regenerated tails were not observed. Several specimens (including the adult male) had old injuries on their tails. This observation was photographed and filmed (video available at: http://www.balcanica.info/video/Triturus_macedonicus_Albania_autotomy_131004.avi).

To our knowledge, this is the first observation of voluntary tail loss in the genus *Triturus*. However, we suggest that future research on skeletal morphology in crested newts is necessary.

ZDENĚK MAČÁT, Department of Ecology and Environmental Sciences, Palacký University, Šlechtitelů 11, 78371, Olomouc, Czech Republic (e-mail: zdenek.macat@gmail.com); **EDVÁRD MIZSEI**, Department of Evolutionary Zoology and Human Biology, University of Debrecen, H-4010 Debrecen, P.O. Box 3, Hungary (e-mail: edvardmizsei@gmail.com); **DANIEL JABLONSKI**, Department of Zoology, Comenius University in Bratislava, Mlynská dolina B-1, 842 15, Bratislava, Slovakia (e-mail: daniel.jablonski@balcanica.cz).

ANURA — FROGS

***AMEEREGA TRIVITTATA* (Three-striped Poison-dart Frog). MALE SIZE AND REPRODUCTIVE SUCCESS.** Male *Ameerega trivittata* exhibit parental care by transporting tadpoles on their dorsum (Fig. 1) from their initial oviposition sites under leaves or palm sheaths to larger sources of standing water where they complete their development (Roithmair 1994. Copeia 1994:107–115). Males generally transport the entire brood in a single trip when tadpoles reach approximately 18 days of age (Roithmair 1994, *op. cit.*). Male body size has been used as a measure of mate quality in anurans. For example, larger males may be able to mate with larger and more fecund females (Bowcock et al. 2013. Current Zool. 59:747–753) or transport more tadpoles (Ringler et al. 2013. Front. Zool. 10:67). In dendrobatid species, where males transport their young, one measure of reproductive success is the number of tadpoles a male carries. Here we test the hypothesis that the number of tadpoles transported is positively correlated with male size.

This study was conducted 28 May 2013–03 June 2013 in Brownsberg Nature Park in the Republic of Suriname (4.94799°N, 55.18271°W; datum WGS 84). Twenty-three male *A. trivittata* carrying tadpoles were captured by hand or handheld net as they approached tadpole deposition sites. Deposition sites were water-filled puddles ranging from 3–15 m in the middle of a dirt road surrounded by forest vegetation. We measured SUL of each male to the nearest 0.01 mm using calipers, counted the number of tadpoles present using a 10x magnifying lens, and then released the male with his tadpoles at their point of capture. To statistically assess the relationship between the number of tadpoles transported and male SUL, we used Pearson product movement correlation (Minitab 16 statistical software, Minitab Inc., State College, Pennsylvania). Male SUL ranged from 33.1 to 38.9 mm (mean = 35.7 mm, SD = 1.61). The number of tadpoles transported ranged from 3–28 (mean = 17.6, SD = 7.15). We found a significant positive correlation between the number of tadpoles transported and male SUL ($N = 23$; $p < 0.003$; $r = 0.60$; Fig. 2). In contrast, the number of tadpoles transported was not correlated with male size in male *A. trivittata* in Peru (Roithmair 1994, *op. cit.*). This lack of relationship may simply be due to limited

FIG. 1. Male *Ameerega trivittata* transporting tadpoles to a large puddle in Brownsberg Nature Park, Republic of Suriname.

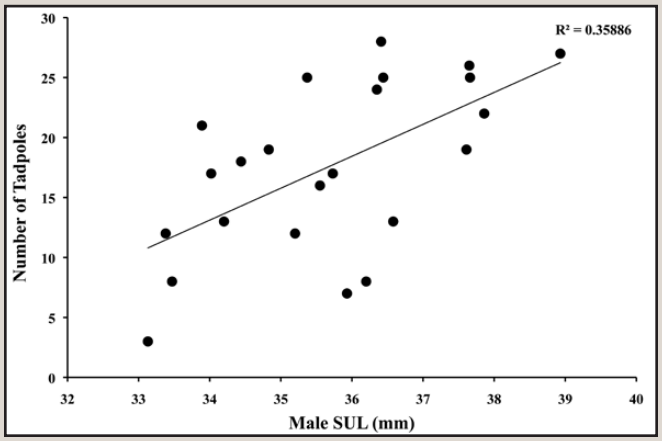

FIG. 2. Correlation between the number of tadpoles transported and male snout–urostyle length in *Ameerega trivittata* at Brownsberg Nature Park, Republic of Suriname.