End of Life Behavior in the Mountain Brook Lamprey, *Ichthyomyzon greeleyi*

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The Mountain Brook Lamprey, *Ichthyomyzon greeleyi*, is a non-parasitic lamprey found in the upper Ohio River drainage. After 5.2 to 6.2 years as filter-feeding ammocoetes, individuals transition into adults (Potter and Bailey, 1972). During this stage *I. greeleyi* no longer attains sustenance for life. Instead, the species' focus is solely on reproduction (Raney, 1939). This stage is characterized by swimming upstream to higher gradient substrate (e.g., large gravel) to spawn and then to die. Little is known about its end of life behavior. This note documents the life history of *I. greeleyi* from spawning through death while in captivity. Information is presented on behavior, length, weight and post-spawning lifespan.

Materials and Methods

Adult *I. greeleyi* (two males, two females) were collected by seine in Russell Creek, Adair County, Kentucky, in the middle of March. They were maintained in two 10-gallon aquaria filled with water and rocks (ranging from 1-30 cm in circumference) taken from their collection site. The tanks were illuminated with day- and night-time settings with it slowly getting brighter in the morning and then slowly getting darker in the evening. Temperature of the water remained ambient with room temperature (16°-18°C). An air pump provided aeration.

At first appearance of urogential papillae (Fig. 1, top), the specimens were separated into gender-specific tanks. Gamete retrieval commenced when gravid female bodies exhibited a dorsal curve (Fig. 1, bottom) and males began vigorous nest-building behaviors (e.g., digging in the substrate and moving rocks). During the stripping procedure the lampreys were anesthetized in a solution of MS-222 (tricaine methane sulfonate, trade name Fenquil, 75mg/L). Immediately following the stripping procedure, the lampreys were placed in a two-quart specimen bowl containing fresh water to recover. Two hours after recovery they were returned to a communal tank. All specimens were weighed before and after stripping (Fig. 2). Lengths were measured only after stripping (Fig. 3).

Findings

After separation of the genders, lamprey activity included moving rocks with their oral disc and raking finer debris by attaching to a solid object and vigorously shaking their tail. This activity was not gender specific. After nine days, this activity escalated and was followed by short periods of rest. The majority of vigorous physical activity took place in the late morning and early evening. It was at this point when the gametes were stripped.

It took an average of seven minutes to anesthetize the adults, retrieve the gametes, and return them to fresh water. Within five minutes of their return to fresh water, the lampreys resumed spawning in the specimen bowl. Fecundity for these females was an average 1700 eggs.

After all lampreys were back in a communal tank, only two lampreys at any given time were involved in spawning activity. During spawning, females attached themselves to a sturdy surface. Males then attached themselves to the back of the female's head, wrapped their tail around the female's body, and squeezed while shaking her vigorously. Lampreys not engaged in reproductive activity swam above the spawners or moved rocks and debris.

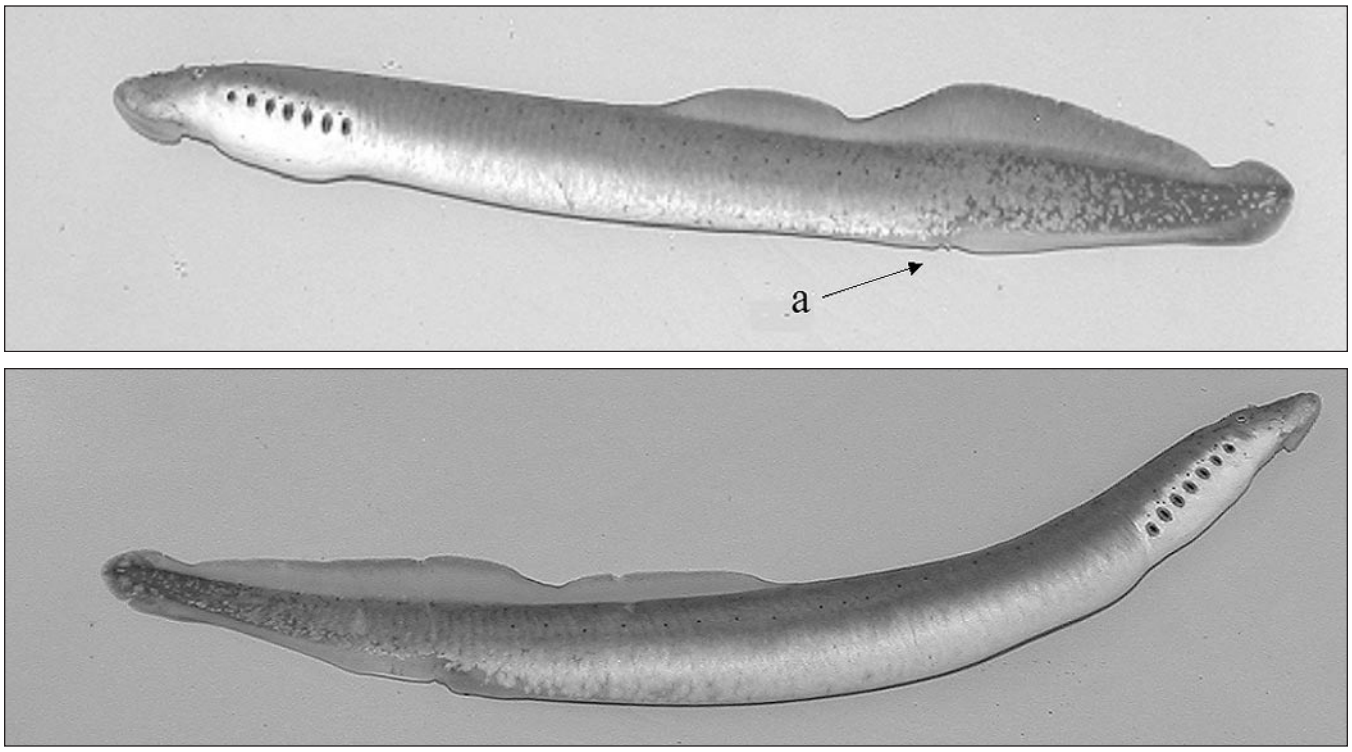

Fig. 1.
Top: Mountain Brook Lamprey, *Ichthyomyzon greeleyi*, pre-stripped fertile male, showing urogential papilla on the ventral side protruding from the cloacal opening. Bottom: Pre-stripped gravid female, showing dorsal curvature of body because of her gametes. Photographs by Gordon Weddle.

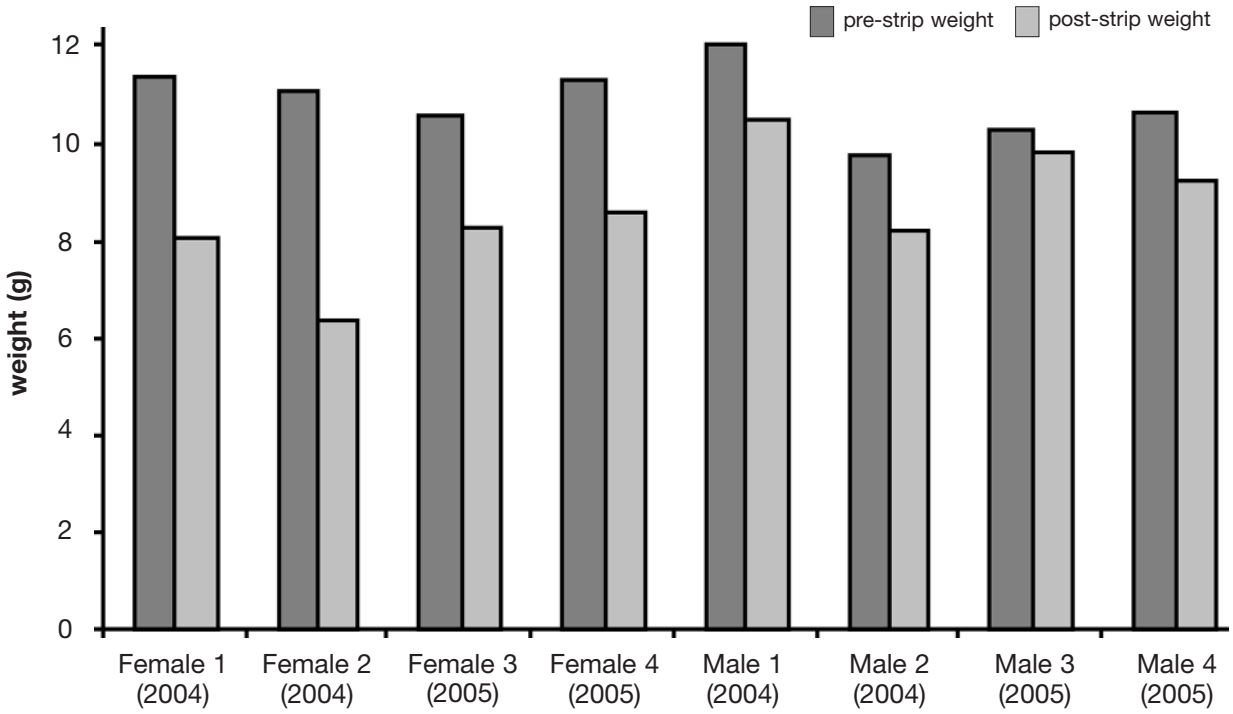

Fig. 2.
Weight changes due to gamete stripping of captive Mountain Brook Lamprey, *Ichthyomyzon greeleyi*. Males on average lost 12% of their total body weight to gametes while females on average lost about 30% of their total body weight.

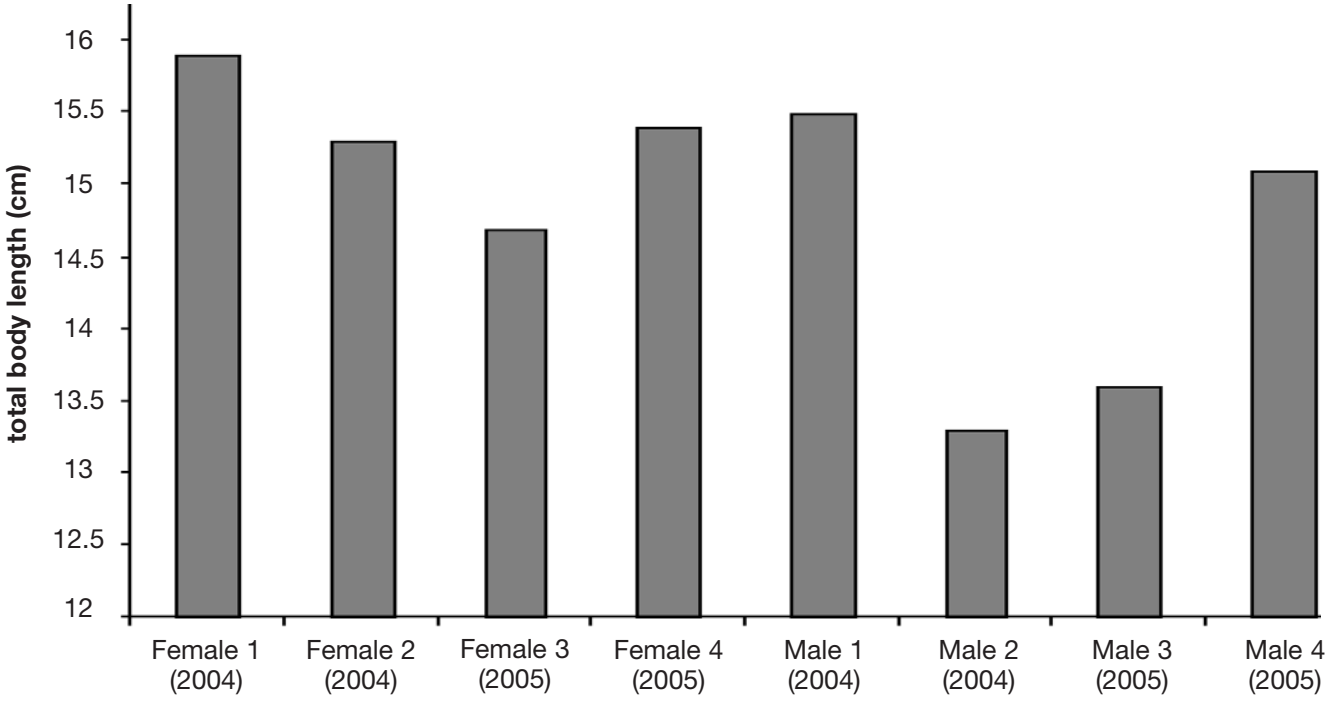

Fig. 3.
Total length of post-stripped adult Mountain Brook Lamprey, *Ichthyomyzon greeleyi*.
Of these specimens, male average length was 14.6 cm. Female average length was 15.3 cm.

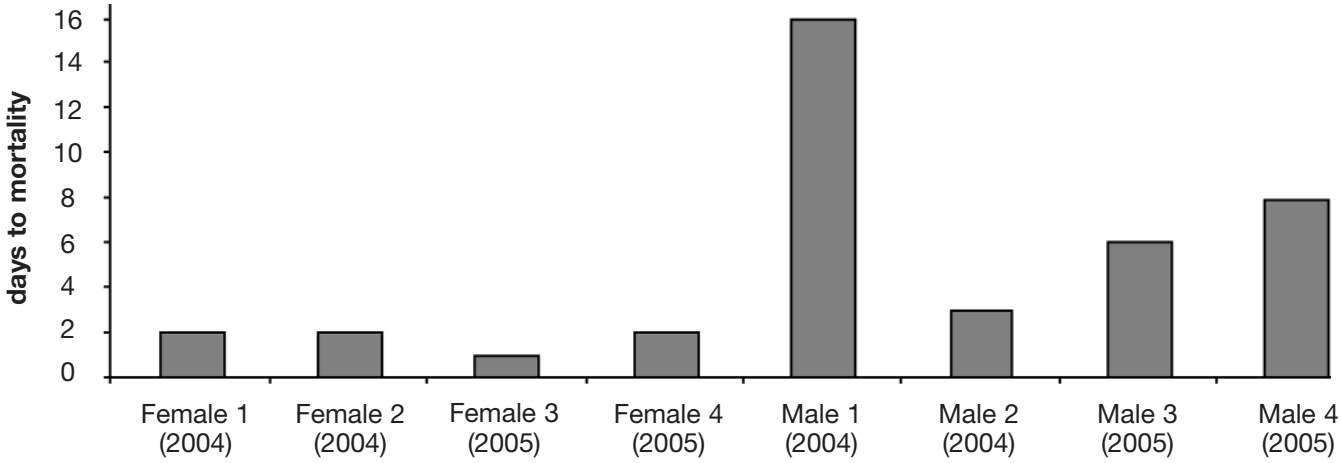

Fig. 4.
Mortality rate of adult Mountain Brook Lamprey, *Ichthyomyzon greeleyi*, in captivity.
Females, on average, died 6.5 days sooner than males.

Each male spawned with each female in the tank regardless of the absence of gametes. This activity continued until the females died. When no females remained, male activity declined to just swimming around the rocks. Additionally, they knocked down the rock pile they had created, covering what few eggs were present.

Female lampreys did not live beyond two days after retrieval of gametes; males lived an average of five days longer (Fig. 4). One male lived for 16 days after his gametes were stripped, but significantly declined in activity after the first 11 days. All specimens were placed in preservative upon their death.

Discussion

There was a communal effort at reproduction and reproduction was the adult's sole purpose during this stage of life. Males lived longer than females, and their total gamete loss represented less of their total body weight than that of the females'. The cause of earlier female mortality is presumed to be due to physical exhaustion, loss of energy in making and expelling large numbers of gametes, and constriction as males continue to spawn with females until death.

Acknowledgments

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Literature Cited

Potter, I. C., and J. R. Bailey. 1972. The life cycle of the Tennessee brook lamprey, *Ichthyomyzon hubbsi* Raney. *Copeia* 1972 (3): 470-476.

Raney, E. C. 1939. The breeding habits of *Ichthyomyzon greeleyi* Hubbs and Trautman. *Copeia* 1939 (2): 111-112.