**Abstract.**—*Mustela frenata* is a mustelid commonly called the long-tailed weasel. As a sexually dimorphic species with an elongate body form, it is one of 17 species in the genus *Mustela*. It is endemic to southern Canada, most of the United States, Mexico, and Central America where it prefers habitats with an abundance of prey, den sites, and proximity to cover. It exhibits delayed implantation, is voracious for a small predator, and is well adapted for taking rodents from confined burrows. It is a species of least concern in relation to conservation status.

**DISTRIBUTION**

*Mustela frenata* occurs in southern Canada, throughout much of the United States, Mexico, and Central America (Fig. 3). It is the only weasel species extant to Mississippi.

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**Long-tailed Weasel**

*Mustela frenata* (Lichtenstein, 1831)

**Context and Content.**—Order Carnivora, family Mustelidae (IUCN 2007).

**GENERAL CHARACTERS**

*Mustela frenata* (Fig. 1) is a dark chocolate-brown mustelid with a white to yellow abdominal and throat region. The tip of the tail is jet black (about one-third of the tail). *Mustela frenata* is sexually dimorphic, with males being larger than females. Males on average weigh 196–267 g, while females typically weigh 71.5–126 g. Males average 405 mm total length with a tail length of 135 mm and hind foot length of 44.5 mm. Females average 325 mm total length with a tail length of 107.5 mm and hind foot length of 37.1 mm (Hamilton 1933). Skull (Fig. 2) length averages 48.98 mm in males and 43.56 mm in females (Ralls and Harvey 1985).

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Fig. 1.—*Mustela frenata* from Rio Grande Nature Center, Albuquerque, NM. Used with permission of the photographer J. N. Stuart.

Fig. 2.—Dorsal, ventral and lateral views of cranium, and lateral view of mandible of an adult *Mustela frenata* from The Mammals of Virginia by D. W. Linzey, 1998. Average length of the male skull is 48.98 mm. Used with permission of the illustrator Donald W. Linzey.
FORM AND FUNCTION

Dental formula is i 3/3, c 1/1, p 3/3, m 1/2, total 34 (Powell 1973). Northern populations of Mustela frenata molt into a white coat for winter, but no literature indicates that this occurs in Mississippi. The northern populations with white winter coats also retain the black tail tip. The black tail tip may function as a deflection mark in which the black tip is more noticeable than the body. When an avian predator attacks a weasel its attention is drawn to the tip of the tail. The predator misses because the tail is such a small target (Powell 1982).

Multiple theories have been proposed to explain why there is such notable sexual dimorphism in weasels. One theory states that polygyny favors intrasexual selection (Ralls and Harvey 1985). Another suggests that the effort required by males to subdue females for copulation has led to increased size in males (Wright 1948).

Weasels, Mustela spp., have sacrificed metabolic efficiency to fill their niche. They have evolved an elongated body to enter restricted spaces where their prey resides (Ralls and Harvey 1985).

ONTOGENY AND REPRODUCTION

Ontogeny.—The average gestation period is 279 days. Young are born in April or May with an average litter size of 6 or 7 (range = 4–10). Mothers have 4 pairs of teats located on the postabdominal and inguinal areas (Hamilton 1933; Wright 1942, 1947, 1948).

In captivity, 1 day old weasels have fine white hair over their body except for the belly, legs, and tail. The hair is sparse, so the flesh-colored skin can be seen beneath. The eyes appear as dark areas under closed eyelids. The pinnae are folded and vibrissal areas of the face look like warts. At 1 week old, the white, fuzzy hair covers the body except for the pink belly. They are able to roll around energetically, but are unable to crawl; average weight is 7.6 g. At 2 weeks old, the white hair hides the skin color. Teeth have not erupted, but the ears have turned light brown. At this point males weigh about 17 g and females 13.5 g. Both sexes can support their own weight; however only males can crawl. At 3 weeks the fur has started changing to gray and the tail tip has began turning black. Canines and carnassial premolars have erupted. They are vocal and can crawl and roll with agility. Males average 27 g and females 21 g. Three and one-half week old young can masticate pieces of meat the size of a house fly; incisors begin erupting. At 4 weeks of age males average 38.7 g and females 30.5 g. By 5 weeks, eyes are beginning to open. Playing and fighting over food is common. Their fur has turned dark and white fur has appeared on the belly. Six-week old weasels have the first appearance of long guard hairs. Males weigh 81 g and females 62 g. They also have the characteristic weasel odor. By 7 weeks, males weigh 101 g and females 72.5 g (Hamilton 1933; Sanderson 1949).

Growth peaks at 3–4 months post parturition. Females enter estrous as early as 9 weeks of age, which allows all females to produce young the following spring; immature males do not become sexually active until the following summer (Sanderson 1949; Wright 1942, 1950).
Reproduction.—*Mustela frenata* has a discontinuous type of embryological development known as delayed implantation. Breeding occurs in July or August. Ovulation, fertilization, and cleavage occur, but implantation is delayed. The embryos remain dormant in the female’s uterus as blastocysts until implantation in early spring, which occurs less than 27 days before parturition (Wright 1942, 1947, 1948).

Males are sexually immature when about 11 months old. The baculum (penis bone) remains small (14–29 mg) during the first year of life. Rapid changes in the male reproductive system begin in early spring. Spermatogenesis begins in March and the testes are full size and descended in the scrotum during April–July. Active testes are 7–8 times the size of regressed testes. Mature baculums weigh 53–101 mg. Therefore, in the winter immature and mature males can be distinguished by baculum weight. Regression of the testes starts in August or September (Wright 1947, 1950). Females in estrous are characterized by a swollen “doughnut-shaped” vulva. It is similar to that seen in ferrets and martens.

The average swollen vulva measures 5 x 5 mm. The period of estrous does not have any evident changes in mammary glands, but several days before birth the nipples are noticeable (Wright 1948).

ECOLOGY

**Population characteristics.**—Population densities of *Mustela frenata* are thought to be limited by food supply and predatory raptors (Powell 1973; Ralls and Harvey 1985).

**Space use.**—*Mustela frenata* prefers habitats abundant with fossorial mammal dens and in proximity to cover. These areas provide prey species and den/nesting sites (Polderboer et al. 1941). One example of a den is a burrow 3 inches in diameter with 2 chambers at a depth of 12 inches. Nesting material inside consisted of chopped grass. Weasels often take residence in a den previously inhabited by one of its prey such as moles or gophers. It should also be noted that a chamber might be set aside solely for deposition of feces (Hamilton 1933; Polderboer et al. 1941; Sanderson 1949).

**Diet.**—*Mustela frenata* has been reported to consume mice, chipmunks, shrews, rats, young rabbits, birds, reptiles, and eggs. The remains of skunks, woodchucks, and other weasels have been found in their dens. Mice of the genus *Microtus* are often noted as the most important food source. Predation of game species rarely occurs; although there have been observations of attacks on ground-nesting birds, but with little success. Cannibalism may occur, and mothers will eat their young if they die before leaving the nest (Hamilton 1933; Muths 1998; Polderboer et al. 1941; Ralls and Harvey 1985; Sanderson 1949; Smith et al. 2003; Simms 1979).

*Mustela frenata* eats 20–40% of its body weight daily. Energy can either be stored as fat or as cached reserves. Since body diameters are important to weasel foraging strategies, they cache food when it is plentiful (Simms 1979). *Mustela frenata* has been seen caching 19 prey items in a 4 hour period (Muths 1998). After eating its fill of eggs from a disturbed nest, *M. frenata* has been observed caching the remaining eggs (Smith et al. 2003).

Confined spaces such as mice dens, mole burrows, and rabbit holes are where *Mustela frenata* often captures its prey (Muths 1998; Ralls and Harvey 1985; Polderboer et al. 1941). After locating prey, *M. frenata* makes a quick dash at the animal and attacks by biting down on the base of the skull. If the prey is large, the weasel may wrap its forelimbs around the prey and scratch violently with its hind feet. Subduing larger prey in this manner reduces the possibility of the prey being able to attack the weasel (Hamilton 1933; Sanderson 1949).

**Diseases and Parasites.**—Ectoparasites include fleas including *Ceratophyllus* spp. Endoparasites include roundworms and flatworms (Hamilton 1933).
**Interspecific interactions.**—Potential predators of *Mustela frenata* are raptors, owls, some snakes, and feral cats and dogs (Hamilton 1933; Powell 1973). Weasels have erratic movement patterns, which are thought to decrease movement predictability, possibly lowering the capture success of raptors (Powel 1982).

**BEHAVIOR**

**Reproduction.**—Behavior of captive *Mustela frenata* during breeding season (July–August) has been recorded. When a male is interested in an estrous female, it often will ‘wrestle’ with her, holding the female at the scruff of the neck until she subdues. Resistance in females seems to differ among individuals. After the struggle, the male holds the female’s belly with his front paws and arches over her posterior region for copulation. They remain locked in this position for 2-3 h. The female is usually uneasy after copulation and will break away from the male. If left together, copulation may occur again. However, it is unknown if pairs in the wild have multiple copulations (Wright 1948).

**Communication.**—*Mustela frenata* has 3 vocalizations: the trill, screech, and squeal. The trill is most common being used when investigating new items, playing, and hunting. It is composed of short, low frequency calls that occur quickly. The calls average 0.024 s in length with 0.037 s breaks between. There are 2 harmonics present: 1 from 200–500 Hz and the other from 750–1000 Hz (Svendson 1976).

The screech is used when suddenly disturbed. An open gape and lunge is usually associated. This results in a defensive or aggressive display. The screech may be emitted 7 or more times with 3s intervals that include the trill. A single screech is usually .15 s long; it begins at 2.2 kHz and goes down to 1 kHz. Part of the screech is white noise resulted from forceful air expulsion (Svendson 1976).

The squeal functions as a distress call. It is 0.35 s long and has a frequency of 1.5 kHz (Svendson 1976). A common vocalization described for *Mustela frenata* is a “took-took-took-took” (Hamilton 1933), which may be the trill described previously.

**CONSERVATION**

The International Union for Conservation of Nature and Natural Resources lists *Mustela frenata* as Lower Risk/ Least Concern (2007).

**REMARKS**

I could not find any published literature concerning the life history of *Mustela frenata* in the southeastern United States, particularly Mississippi.

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Wright, P. L. 1942. Delayed implantation in the long-tailed weasel (Mustela frenata), the short-tailed weasel (Mustela cicognani), and the marten (Martes americana). Anatomical Record 83:341–353.


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