

**Bill P. Lovejoy<sup>1</sup>**

Department of Zoology  
Oregon State University  
Corvallis, Oregon 97331

**Hugh C. Black**

and

**Edward F. Hooven**

Department of Forest Science  
Oregon State University  
Corvallis, Oregon 97331

## **Reproduction, Growth, and Development of the Mountain Beaver (*Aplodontia rufa pacifica*)<sup>2</sup>**

### **Abstract**

This paper presents a summary of observations of the growth, development, and behavior of two mountain beavers born in captivity and raised for 68 days. Initial growth was rapid, and the mean weight of the young increased from 19.8 g at two days to 364 g at 60 days, or 43 percent of adult mean weight. The most rapid growth was during weeks seven and eight, coincident with weaning. Death was attributed to a bacterial infection.

### **Introduction**

A search of the literature revealed few references to the young of *Aplodontia*. Cramblet and Ridenhour (1956) observed the birth of three young to a captive female and reported briefly on the first five days of their development. Our information is based on examination of Pacific mountain beaver (*Aplodontia rufa pacifica*) periodically live-trapped in the field and on daily observation of a litter raised in captivity.

Two female mountain beavers gave birth to litters of four and two young in captivity. Both pregnant females were live-trapped about one week before parturition, in the Coast Range of western Oregon. The litter of four, born on 31 March 1966, survived for five weeks. They were not handled for fear of rejection by the female. The litter of two, born on 3 April 1966, were observed and weighed daily on a Mettler balance. The female tolerated the handling of the young.

### **Breeding Habits, Males**

The testes of mountain beaver are abdominal, except during the breeding season when they become semiscrotal. Pfeiffer (1956) found the testes reached maximum size in January and February. Hubbard (1922), in Washington, noted that the testes began to enlarge about 15 December, attained full size by 15 January, began to decline early in April, and regained nonbreeding size by mid-April. We first observed wild males with

<sup>1</sup>Present address: Department of Biology, Georgia Southern College, Stateboro, Georgia, 30458.

<sup>2</sup>Paper No. 816, Forest Research Laboratory, School of Forestry, Oregon State University, Corvallis, Oregon 97331.

semiscrotal testes in late December, when both males and females began discharging a cloudy yellowish-milky urine while confined in a handling cage. By mid-January, most mature males had descended testes that remained semiscrotal until near the end of March, when they again became abdominal.

#### **Breeding Habits, Females**

The breeding season of *Aplodontia* is short and fairly well defined. Pfeiffer (1958) determined that estrus occurs within a period of five to seven weeks in winter, and all of the breeding females in a population ovulate about the same time each year. Female mountain beavers do not bear young before their second season.

Females in estrus have hypertrophied nipples and a swollen vulva (Pfeiffer, 1958). A circle of black mammary hairs around the nipples also becomes prominent in pregnant and lactating females (Pfeiffer, 1955). The earliest sign of estrus we observed was in early February when the urinary papillae of two captured mature females appeared red and swollen.

Hubbard (1922) reported taking a pregnant female in late February near Seattle, Washington. Early stages of pregnancy were observed by Scheffer (1929) in late March, and 11 of 26 females that he examined in early April were pregnant. Mountain beaver examined by Pfeiffer (1958) in western Washington had early embryos during late February and gave birth by mid-March. Parturition was reported by Cramblet and Ridenhour (1956) to occur about the same time in northwestern California as the birth of the two litters reported here.

#### **Litter Size**

Scheffer (1929) examined 16 pregnant females and reported seven with litters of two young and nine with litters of three. Dalquest (1948) reported the litter size of mountain beavers in Washington to be from two to three and, rarely, four. Pfeiffer (1958) examined 12 pregnant females and found an average of 2.4 embryos.

#### **Lactation**

Pfeiffer (1958) believed that lactation in *Aplodontia* probably does not continue beyond two months. Hubbard (1922) reported taking lactating females in May. Voth (1968) reported females lactating from late April to late June. Our field records show females lactating from early April through late May. One of our captive females was still lactating at the end of May.

#### **Physical Development and Behavior**

Newborn *Aplodontia* were helpless and appeared embryonic or premature (Fig. 1). The skin was pink, slightly wrinkled, and naked except for the presence of vibrissae. Eyes and auricular openings were tightly sealed, with the eyes recognizable only as dark spots beneath the skin. The front toes were well developed and equipped with long claws. The hind toes were less developed, and the tail (which remains vestigial) was a mere stub. Sex could be determined by examination of the genitalia.

Only the litter of two was handled. At two days, the weights were 18.0 g and 21.6 g (mean 19.8) with an average body length of 66 mm. These animals were smaller than a litter of three reported by Cramblet and Ridenhour (1956), which averaged 27 g and 87 mm when only one day old. The weight difference between the two remained insigni-

ficant (mean 3.70 g, range 1.8 g to 8.6 g), until day 45 when the eyes of the heavier one opened. The weight difference then increased sharply (mean 21.2 g, range 7.0 to 38.0 g), until day 60, which was four days after the second one had both eyes open. The increased difference in weight was attributed to the increased foraging ability of the one with its eyes open.

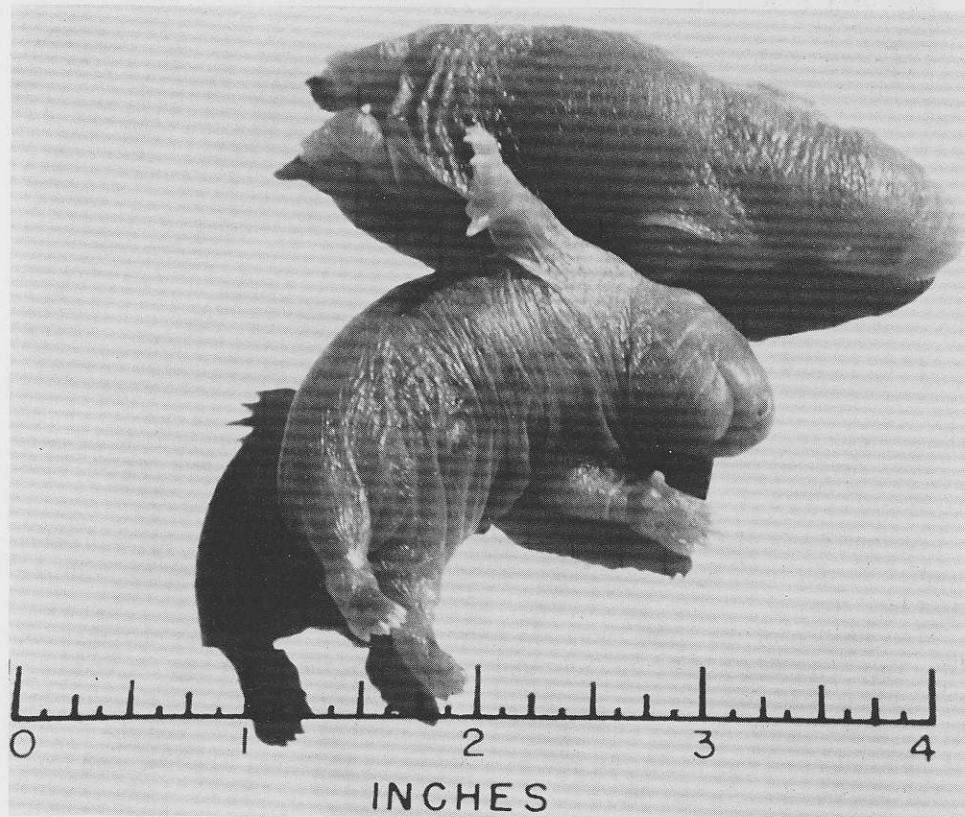


Figure 1. A litter of two *Aplodontia rufa pacifica*, two days old, that were born in captivity on April 3.

At three days, the mountain beavers made squeaking sounds. By day five, dark pigmentation appeared along their backs and the tops of their heads. At seven days, the mean body weight was 27.9 g. Black pigmentation appeared over most of the dorsal surface, and the skin became increasingly wrinkled and baggy over the hindquarters. A sparse growth of fine hairs covered most of the body at nine days. The ear pinnae unfolded and became erect, and the eye slits formed at day ten, but both eyes and ears remained closed.

At 14 days, the body was completely covered with hair. The hair on the dorsal surface was dark and sleek, and that on the ventral side was white. At 15 days, the mountain beavers began to crawl with only the more developed front legs (Fig. 2). At 21 days, the mean body weight was 73.8 g, and the length was 125 mm. The ears were now opened. Hair on the dorsal surface became darker and more glossy; a brownish color appeared on the neck and shoulders and along both flanks.

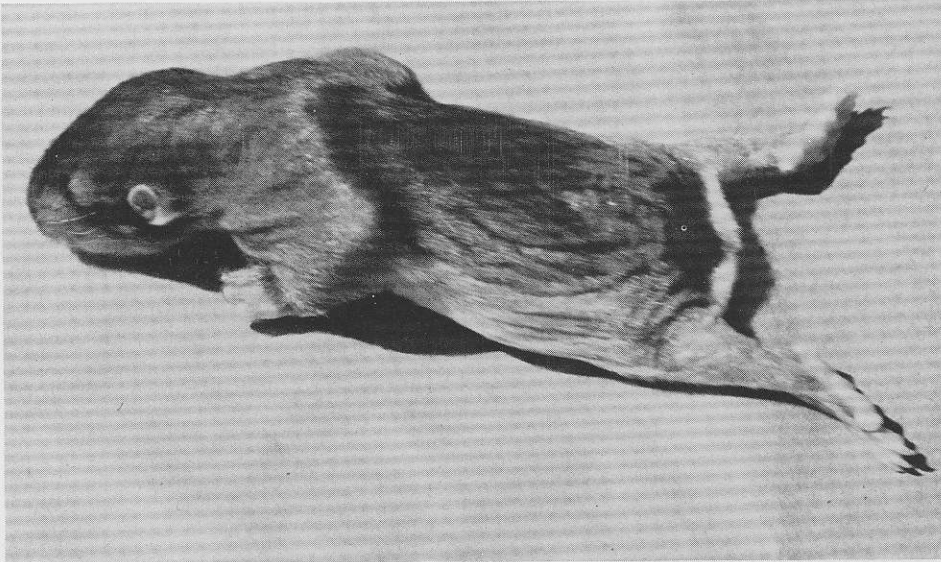


Figure 2. One of a litter of two young *Aplodontia rufa pacifica* at 15 days of age. Only the more developed front legs are used in crawling at this age. Note thick dark hair on dorsal surface.

At four weeks, the lower incisors erupted and, five days later, the upper incisors erupted. At this time, one of the young was observed scratching its lower jaw with the right hind foot.

Coordination of the young mountain beavers improved considerably during week five. They were able to hold up their heads and also use their hind legs for crawling. Balance was poor, and they still had difficulty in righting themselves. Investigative behavior was exhibited through sniffing, licking, and nibbling themselves and the fingers of the handler, and they made their first attempts at face grooming. The first solid food, rolled oats, was eaten on day 38.

On day 45, when the larger animal weighed 190 g, the eyes opened. The smaller animal weighed 184 g, and the eyes remained closed. The mean total length of the beavers was 210 mm. The eyes of the second animal did not open until day 54, when the animal weighed 280 g. In comparison, the young of *Spermophilus lateralis* open their eyes at 27-31 days (McKeever, 1964), and *Spermophilus beecheyi* opens its eyes at days 34-37 (Tomich, 1962). Our mountain beavers roamed freely about their cage. When both were placed on a table, the one with its eyes opened avoided falling off the edge, but the one with eyes closed did not. They played with each other, biting and pushing with their forepaws.

By week seven, the young readily accepted natural food, such as foliage of red huckleberry (*Vaccinium parvifolium* J. E. Sm.), sword fern (*Polystichum munitum* (Kaulf.) Presl.), and Douglas fir (*Pseudotsuga menziesii* (Mirb.) Franco). At eight weeks, both young were still nursing. Their mean body weight was 347 g (337 and 357), a gain of 110 g over the past week. At day 60, they reached a maximum mean weight of 364.5 g (349 and 380). From this point, the young gradually lost weight until their death at 68 days.

Necropsies performed by the Veterinary Diagnostic Clinic at Oregon State University revealed both young *Aplodontia* had intestinal ulcers and a bacterial infection of *Pasteurella* sp. Death was attributed to the infection.

#### Growth Rate

Mean growth rate of the two young *Aplodontia* raised in captivity from birth to nine weeks is shown in Figure 3. The captive young grew rapidly after their first week. Mean weight was 110 g at four weeks and 347 g at eight weeks. These juveniles experienced their most rapid weight gain during weeks seven and eight. During this two-week period, their weight increased 126 percent over what they had weighed at the end of six weeks. By eight weeks, they had attained about 43 percent of the adult mean weight. Adult mean weight of *A. r. pacifica* is 806 g, based on weights of 75 males and 34 females retrapped and weighed repeatedly during a two-year study in western Oregon (Lovejoy, 1972).

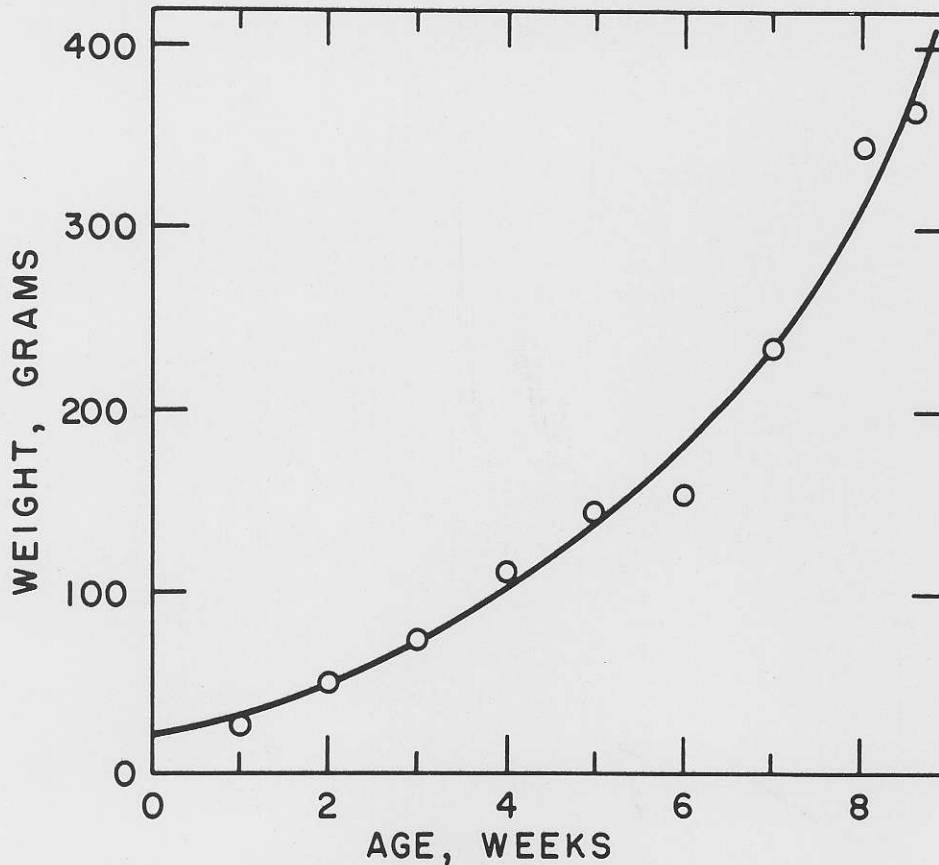


Figure 3. Mean growth rate of two young *Aplodontia rufa pacifica* that were raised in captivity from birth to about 63 days of age.

#### Literature Cited

- Cramblet, H. M., and R. L. Ridenhour. 1956. Parturition in *Aplodontia*. *J. Mammal.* 37: 87-90.  
Dalquest, W. W. 1948. Mammals of Washington. *Univ. Kansas Publ., Mus. Natur. Hist.* 2: 1-444.  
Hubbard, C. A. 1922. Some data upon the rodent *Aplodontia*. *Murrelet* 3: 14-18.

Lovejoy, B. P. 1972. A Capture-Recapture Analysis of a Mountain Beaver Population in Western Oregon. Oregon State Univ., Corvallis, Ph.D. thesis. 105 pp.

McKeever, S. 1964. Biology of the golden-mantled ground squirrel. Ecol. Monogr. 34: 383-401.

Pfeiffer, E. W. 1955. Hormonally induced "mammary hairs" of a primitive rodent, *Aplodontia rufa*. Anatomical Record 122: 241-256.

———. 1956. The male reproductive tract of a primitive rodent, *Aplodontia rufa*. Anatomical Record 124: 629-635.

———. 1958. The reproductive cycle of the female mountain beaver. J. Mammal. 39: 223-235.

Scheffer, T. H. 1929. Mountain beavers in the Pacific Northwest: their habits, economic status and control. U.S. Dept. of Agric., Farmers' Bull. 1958: 1-18.

Tomich, P. Q. 1962. The annual cycle of the California ground squirrel, *Citellus beecheyi*. Univ. California Publ., Zool. 65: 213-282.

Voth, E. M. 1968. Food Habits of the Pacific Mountain Beaver, *Aplodontia rufa pacifica* Merriam. Oregon State Univ., Corvallis, Ph.D. thesis. 263 pp.

Received March 9, 1977

Accepted for publication September 13, 1977

