

Article VI.—HABITS OF *APLODONTIA*.

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In July and the early part of August, 1915, the author collected material for a group of *Aplodontia*, the "Showt'l" or so-called Mountain Beaver, for the American Museum of Natural History. This material comprised a series of specimens with accessories (plants, shrubs, soil, etc.), and involved a study of as many of the peculiarities of the animal as could be observed. As the habits of *Aplodontia* are but imperfectly known an account of such facts as were recorded may be worth while.

The only accounts of the animal that I have seen exceeding several lines in length are those of Coues¹ and of Stephens.² Coues wrote in part from data supplied by early observers, men often not very precise in their distinctions between the showt'l and other mammals of the region, and as he himself at times queried the accuracy of the observation some of the habits accredited to *Aplodontia* may well be questioned.³ The life of the species here under consideration may differ from that of kindred relatives of the genus, but the following comments are given for what they may be worth.

Specimens were collected in the vicinity of Tillamook, Oregon, where the animals were found in abundance. This species proves upon examination and comparison to be *Aplodontia pacifica* Merriam.

The showt'l in some of its habits, and also in superficial appearance, greatly resembles some large pocket gophers (*Thomomys*). This resemblance was noted as far back as 1876 when Coues (*l. c.*, p. 559) made mention of this fact. The writer had been struck by the similarity before Coues was read, and found it difficult not to think of *Aplodontia* as a relative of the Geomyidæ rather than a sciurormorph. This resemblance, which has so distorted the external affinities of the animal, points suggestively to a firmly fixed fossorial habit and to a certain extent to a parallelism with the habits of the Geomyidæ.

The showt'l if not strictly nocturnal is at least so much so that the animal can rarely be seen during the day. Although a number of runways were visited and I was daily in places where evidences of activity were manifest,

¹ Elliot Coues, Monographs of North American Rodentia, No. IX, Haplodontidæ. 1876.

² Frank Stephens, California Mammals, 1906, pp. 93-95.

³ Coues (*l. c.*, p. 597).

I saw none of the animals themselves. Those caught in traps were frequently alive when the rounds were made in the morning and one such individual furnished me most of my points on behavior. Because of this difficulty in actually observing the working animals and because of the great labor involved in excavating the underground workings of a "colony," a practical impossibility in most cases about Tillamook, some of the conclusions drawn are conjectures only, but conjectures that appear to be well supported by the data that could be gathered.

The "colonies" of this animal, if the word colony is strictly applicable here, a point I shall discuss later, were found most frequently where vegetation was rankest and where moist loose soil made digging easiest. When such a place is encountered the large holes and piles of earth thrown out from the burrows are generally numerous and indicate the presence of several individuals as well as a marked degree of activity of the individual.

While it has been asserted that *Aplodontia* is a gregarious animal, and lives in colonies of several individuals, it is however more than probable that this number is not very great. A series of runways is inhabited by a single family, and there is no evidence that this animal is as social in its habits as, for example, *Cynomys* or *Microtus*. One might be led to suppose many individuals were present because of the amount of earth thrown out and the numerous runways but this is easily accounted for by the activity of the showt'l. Traps set in the runways were almost always successful the first night, one and possibly two animals being caught. Thereafter traps set in the same immediate vicinity yielded nothing for several days at a stretch, probably until some neighbors wandered over from nearby runways. This lack of success in trapping after the first two or three animals were caught was not due to caution on the part of the animal for *Aplodontia* exhibits no inherent cunning and is easily caught in exposed traps. Furthermore no fresh dirt was thrown out after the first animals were caught, nor were any of the cut leaves and green twigs so commonly lying about the burrows to be seen. All the evidence pointed unmistakably to a depletion of the colony; after two or three had been caught the burrows had a lifeless appearance and debris that had fallen into the runways was undisturbed. By shifting the traps about it was ascertained that the area dominated by these few individuals was rather extensive, for not until traps had been shifted some distance could another set of animals be taken.

The subterranean workings of the showt'l are externally simple. The plan is one or more long main runways opening to the surface by short side burrows at frequent intervals. The diameter of these runways is from six to ten inches, depending on the nature of the soil, and the floor of the tube is kept quite clear of loose dirt. Generally the runway follows any natural

advantage, such as fallen logs, and here often the burrow is so shallow that it is but half its normal diameter into the soil, the log serving to cover it over. In such spots the floor of the runway is seen to be well trodden down and where the runway crosses a short distance from one log to another it becomes a mere path, but a path with vegetation and small obstacles removed. Where exit to the surface is made from a deeper runway the course of the short burrow is direct and often the main runway can be readily seen by looking through its short length. Loose dirt is brought to these burrows and pushed out, being carried just far enough to be out of the way. The main runways, in many cases, may extend for more than 100 feet, but the exact extent is necessarily hard to determine. The average depth below the surface is eight inches to a foot. Nothing could be learned of the nest or home chamber of the animal.

The dirt is handled much in the same fashion as the pocket gopher works. A mass of loose earth is pushed ahead of the body by the chest and shoulders, the broad blunt head also being used to shove aside the dirt. Where large quantities of earth were being excavated nightly these facts could be observed in the morning from the imprints in the loose piles of soft earth. Here could be seen a fan-shaped dump, in miniature like those at the entrance of underground mines, where the dirt was pushed to the edge and allowed to roll down a foot or so to the ground level. It should be here stated that the burrows always open out to utilize the down grade of any little slope at hand. Over the top of the dump could be seen a depression where the showt'l pushed along before him his load of dirt, and often the modeling of the soft earth showed the imprint of his blunt nose where he pushed aside the walls to make more room for his dirt to pass.

Showt'ls when caught in the trap without serious injury are very pugnacious and at such times when two are brought together fight ferociously. They will bite fiercely at sticks or any objects thrust near them and I imagine that under ordinary circumstances this pugnacity would serve to keep the inhabitants of a series of burrows few in number. Their resemblance in behavior to the pocket gopher, under similar conditions, indicates that the showt'l may have the same surly home life.

An animal caught in a steel trap by the leg but with no bones broken was found the morning of July 28, and was kept alive to observe his habits. He was very aggressive while in the trap and when brought near another captive, also uninjured, after the first tussle he created such a respectful attitude in showt'l No. 2 that the latter strained at the chain to keep out of his reach. They were separated before either had been hurt, for the powerful incisors and strong jaw muscles are capable of giving deep wounds.

While in the trap great care in handling the animal had to be exercised. He was placed in a box and kept from escaping by a board laid across the top.

Before he had been in captivity twenty-four hours he was taken out to be photographed. A wire fastened to a hind leg prevented escape and he was put down in a spot resembling his habitat. After several determined efforts at escape, he suddenly stopped his struggles and grabbing a tender young shoot of the "elk-brake" by which he was surrounded proceeded to feed as quietly and as unconcernedly as if he were perfectly free. He was quite touchy however, and any sudden movement brought forth an attempt at freedom. He sat up a great part of the time, and if annoyed while in this attitude sparred like a bear with his fore paws, showing a perfect control of his position.

So rapidly did he become tame that by nightfall of the first day he took young fern shoots from my hand and ate them while seated upon the window sill of my room, completely oblivious of my presence. His appetite was good and he ate a number of fern tips, generally selecting the youngest and softest from the handful offered him. The elk-brake, *Pteris aquilina*, that seems to be one of his main articles of diet, has many branching stems that bear the green foliage. The showt'l clipped off an inch or two of the terminal stems, a single snip of the sharp incisors generally severing the small stem. Then holding this stem in his fore paws the animal passed the tender fronds back between the molars, and with a rather hurried crunching munched them down, mastication though rapid seeming to be quite thorough and audible as well. The lateral stems were clipped off close to the main stem and after the greenest of the terminal stems had been eaten the animal, after sniffing over the rest of that particular fern, passed on to a fresh one, some preference being given to the more succulent portions. If a stem that was fairly hard and brown was trimmed off, after the fronds had been devoured it was discarded. The posture of the animal was squirrel-like, with the back somewhat arched.

He drank large amounts of water when it was given him. He put his nose into the water and drank, and did not lap up water. This showt'l was liberated on the bank of a small clear brook and as an experiment he was put out into a fairly deep pool. He swam ashore showing no fear whatever of the water, but evidently displaying no particular fondness for it. He swam well and rapidly, and his unfrenzied procedure showed he had no dread of the water. He looked very much like a slowly swimming tailless musk rat.

Despite the fact that the showt'l has been described in literature as being a water loving animal, I do not think they ever swim from choice. He spent some time after coming ashore in shaking out his fur and going over his sides and belly before he felt sufficiently comfortable to begin eating.

This captive animal washed his face after the manner of small mammals, reaching back with the fore paws onto his shoulders and hinder neck readily, the movements being short, quick dabs. When irritated he twitched the whiskers energetically and when most angry uttered a husky querulous note somewhat like a cough. He often satisfied his curiosity by sniffing and working his nose, and this member seemed to be very sensitive, for the slightest blowing upon it produced spasmodic starts. When aroused his eyes had a bright alert appearance, but quickly took on a dull listlessness when the animal relaxed at ease.

His body was very hard and firm to the touch. When running loose on the floor and I put my hand upon him, he seemed to brace himself and became rigid at times. He could give sharp scratches when held but did not seem to be able to squirm very effectually because of his short thick neck and the heavy musculature of the fore parts.

By the end of a week he had become so tame that he never offered to bite. He seemed to accept the conditions as inevitable and, not showing any appreciation of caress that some tame animals display, his attitude was one of complete indifference. He soon cut off the toes from the foot that had been pinched in the trap, but evinced no concern over the fact. No attempt was made to gnaw out of the box that kept him prisoner.

A pronounced musky odor is given off by the animal and is noticeable in skins some months old. It is very noticeable in a freshly killed animal, it having a strong penetrating quality, rather pleasant than otherwise. It recalls, most nearly, the scent of the musk-rat, *Ondatra*.

No very young showt'ls were noted or taken. The youngest are about three quarters grown and have the permanent pm⁴ just appearing beneath the milk predecessor. This fact would indicate either that there is a definite period of birth in the spring, and not an indefinite term extending over most of the early summer when young might be taken up to the fall months, or else that the young do not leave the underground nest until nearly adult. This latter hypothesis has little to support it.

A variety of plants were noted as forming the food of *Aplodontia*. All of the more common plants and shrubs seemed to contribute, those noted especially being the thimble-berry (*Rubus* sp.), the large elk-brake (*Pteris aquilina*) and the sword-fern (two species of *Aspidium*) but in general any of the green leaved plants might be eaten. The elk-brake and sword-fern seemed to be the food most preferred and often cut stems and fronds were to be seen in the burrows and runways. Leaves alone are eaten and there was no evidence that bark or roots were consumed.¹ I was told by the

¹ Coues (*l. c.*, p. 587) comments on the capacious alimentary system, which is of a type to deal with bulky food such as the foliage of plants.

farmers that the showt'l not infrequently cut piles of green vegetation and left it outside to 'cure' into hay, taking it into the burrow presumably to store up, a proceeding analogous to a habit of the cony (*Ochotona*). I am unable to vouch for the truth of this as no such 'hay piles' were noted, but other writers (*cf.* Coues and Stephens) mention this habit, so my informants were undoubtedly correct in their statements. As there was an abundance of green food to be had in July, it is not unlikely that foliage is stored up only at the end of the summer when the green leaves are about to disappear.

Much has been made of the semi-aquatic tendencies of this animal, which has been credited with seeking sites where water courses sometimes were in part deflected into their borrows. This is doubtless often the case, for the showt'l seeks abundant green vegetation and this is oftenest found where there is water. However, *Aplodontia* shows no marked predilection for water, since in the humid coast belt, where Tillamook is situated, the rainfall alone is sufficient to induce luxuriant vegetation and here the comparatively dry hillsides harbored many families of the showt'l. From the behavior of my captive animal, I believe that water is tolerated when it is a necessary adjunct, but is avoided when sufficient food can be found otherwise. This may be so, however, only in the case of this species, and other forms may be more truly sub-aquatic.

Much the largest and most flourishing colony was found in the orchard of a deserted farm. Here under 'evergreen' blackberry bushes large quantities of earth were thrown out every night and great activity was evident. It is not improbable that the tall rank grass and such low fleshy leaved plants as the dandelion were the important food items here, for cut grass stems were seen about the burrows, and the absence of any other suitable food went to support this supposition.

It was suggested by the farmers that some of the inroads upon potato fields were made by showt'ls, on account of the presence of burrows on the adjacent uncultivated land. Traps set in the potato fields, if at any distance from the waste lands, did not catch *Aplodontia*, and I collected no very positive evidence to condemn the animal. The large ground squirrel (*Citellus grammurus douglasii*) was quite common in this region and the credit for the damage to farm produce must be given in the greater part to this animal and to the chipmunk (*Eutamias townsendi*). No unquestionable *Aplodontia* burrows were noted running out into the cultivated fields.

The showt'l probably is not very extensively preyed upon by hawks or owls, owing to the dense cover of vegetation beneath which he works and also to his nocturnal habits. However, predaceous animals use his burrows and runways, for two weasels (*Putorius saturatus*) were caught on successive

nights in one runway, and I was told that skunks (*Spilogale*) were not uncommonly caught by the farmers in traps set for *Aplodontia*.

Explanation of Figures.

Figure 1. *Aplodontia* sitting on haunches in characteristic attitude. The fern that is shown in this figure is the elk-brake (*Pteris aquilina*) that appears to be one of the most important articles of diet of this species.

Figure 2. *Aplodontia* in feeding attitude, eating the terminal fronds of the elk brake. Note the squirrel-like pose.

Figure 3. Shows the broad blunt head of the showt'l which bears a strong likeness to that of a pocket gopher (*Thomomys*). The whiskers are prominent and are doubtless important as tactile organs.

Figure 4. Showt'l photographed by means of a flashlight apparatus set where dirt was nightly excavated. Note the great mass of loose dirt and the trail over the top where the animal passed to and fro in pushing out earth from the burrow. This burrow was at the base of a thick clump of "evergreen" blackberry bushes.

Figure 5. Side exits from a main burrow showing how logs are utilized in running a burrow. The main tunnel here runs under the log and parallel with it.

Figure 6. A large burrow in loose soil formed largely of humus from the decaying elk brake. In such spots the tunnels are large and capacious because excavation is so easy. The roof often falls in when the tunnel passes close to the surface.

Figure 7. A well worn side burrow on a fairly open hillside. Note the clean appearance of the floor of this borrow. Burrows that are in nightly use have all loose debris cleared out and thus show unmistakable evidence of occupancy.

Figure 8. An exit in a locality where the ground was rather thickly carpeted with moss and fallen leaves. Under these conditions the showt'l is less apt to disclose his presence as the soft moss shows runways but poorly.



Fig. 1.

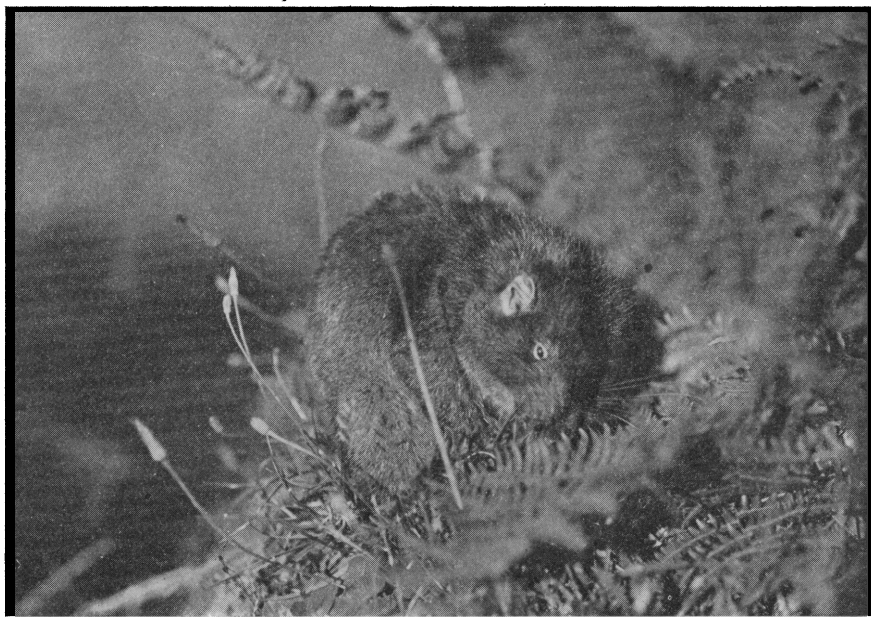


Fig. 2.

Habits of *Aplodontia*.



Fig. 3.



Fig. 4.
Habits of *Aplodontia*.



Fig. 5.



Fig. 6.

Habits of *Aplodontia*.



Fig. 7.



Fig. 8.

Habits of *Aplodontia*.

