

VOCALIZATION IN *MARMOTA MONAX*

Woodchucks (*Marmota monax*) and other marmots produce short, simple whistles, but the woodchuck also emits a longer two-part whistle consisting of a single high-intensity shriek followed by a less intense warble.

There are several descriptions of this sound in the literature. Seton (1928) cited two: "a short, sharp whistle, following with a chuckling sort of warble," and "an extremely shrill, short whistle, followed by one of lower pitch, given with sort of chuckling sound and a diminuendo ending." Hamilton (1934) noted a three-part emission, a "sharp short note, which is preceded by a muffled 'phew.' This latter note is very low. . . . The whistle is frequently followed by a rapid warble, which sounds like 'tchuck, tchuck, tchuck' and grows fainter at the end." Merriam (1886) noted that "the Woodchuck utters a loud, shrill and tremulous whistle . . .," and Grizzell (1955) stated that the whistle is a short, sharp piercing note followed by a series of hiss-like noises that are emitted while the animal trembles all over. The woodchuck also has been said ". . . to sing like a canary bird, but in a softer, sweeter note . . ." (Kellogg, 1872), and to emit ". . . a low, abrupt note, often followed by a tremulous, wavering call that dies slowly away" (Cahalane, 1954). Schoonmaker's (1966) observations were similar: ". . . a short, sharp, shrill whistle that sounds very much like that produced by a person when the fingers are placed between the teeth. . . . The shrill whistle is usually followed by a sustained, tremulous whistle in a much lower key . . . heard only when close to the animal . . . might be similar to scolding of a red or grey squirrel . . . a short, loud whistle which is followed by a chattering, barking sound. This melts into a series of low notes that suggest the distant beating of the wings of a grouse."

I have heard the two-part whistle in the field on two occasions, and recorded and analyzed spectrographically the whistle of a caged, pet woodchuck (captured when 4 to 6 weeks old in the spring of 1959 at Fredonia, Chautauqua Co., New York). The whistles were musical throughout and contained none of the "hisses," "phews," or "tchucks" mentioned above. I heard the captive first whistle when she was 2 years old. Initially she apparently whistled only when asleep, but in subsequent years she whistled while awake, most commonly in spring. I could stimulate her to whistle by entering the room in which she was caged and then abruptly leaving, or by walking past her cage when it was out-of-doors. I recorded her whistle in March 1967 with a Uher 4000 Report-L tape recorder (analysis was made with a Sono-Graph; analyzing filter band width = 300 Hertz). After the microphone was placed just outside her room, I jarred the cage to awaken her, and then left the room quickly. Eight seconds later she emitted the two-part whistle. About 1 minute later I again entered the room, spoke a brief salutation and left; within 7 seconds she again whistled.

Audiospectrograms reveal that the signal is complex. Seven elements were noted (Fig. 1). (1) The initial shriek is the most intense portion of the emission and is a single pulse that is slurred upward from 2.7 to 4.8 Hertz (cps). (2) The second pulse, less intense, also is slurred upward and starts from a lower frequency than the first; in one recording the third pulse was also a complete slur. (3) Subsequent predominant pulses are composed of two dominant frequencies, each of which is slurred upward through a range of about 1.7 Hertz. As the warble progresses, the range through which these are slurred decreases. Eventually, after 10 or so pulses, slurring ceases: then the frequencies of consecutive pulses may not be exactly the same. The dominant frequency of the upper tones gradually increases after the seventh slurred pulse for the next four consecutive pulses. (4) Shortly after a whistle begins (after the sixth pulse in Fig. 1) secondary notes are introduced in the low frequency range, and these notes alternate with the repeating two-tone pulses. The carrier frequency of these alternating tones is about the same as the dominant frequency in the slurred lower one. (5) There is an overall decrease in intensity as the warble progresses. (6) Pulse repetition rate increases during the emission, although not in a regular manner. (7) Warble duration is not constant; one was 3.8 seconds and the other 6.0.

Grizzell (1955) noted that the woodchuck "trembles" when emitting the signal, although he heard a hiss-like rather than musical warble. I noticed a slight vibration of the body