-0.991, $P < 0.05$). It should be noted that although there were distinct preferences, each rodent did eat some of each regime. This is not unexpected as the animals sample the seeds to develop preferences.

The trend towards a preference of the 8-day seeds over the 0-day seeds is reasonable, as there are several potential advantages which may result from the ingestion of slightly fermented seeds. The advantages may include increased nutritional value and decreased seed toxicity (Hesseltine and Wang, 1980) or increased moisture content of seeds from fungal absorption of water from the soil. The potential benefit of water imbibition is one feature we plan to pursue in future experiments.

Regardless of the exact reasons, it is clear that rodents ingest moldy seeds and tend to prefer seeds in the early stages of fungal colonization. Heteromyids have maintained a caching economy for over 10 million years (Voorhies, 1974) and it is likely that their evolved behavior maximize the benefits and minimize the liabilities of the inevitable association of their seeds with fungi. We are currently pursuing this investigation with field and laboratory experiments to identify some of the ways the rodents manage their resource.

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PREDATORY BEHAVIOR OF PINE MARTENS

Although the composition of diets of pine marten (*Martes americana*) is well studied (see Zielinski et al., 1983, for review) direct observations of marten predatory behavior are rare. During a 15-month investigation of marten ecology at Sagehen Creek, California (Spencer et al., in press; Zielinski et al., 1983), we sometimes observed marten in acts of predation. Observations involved five marked marten and one or more unmarked marten. Observations typically were made through 7- or 8-power binoculars, from 4 to 20 m away, after a radio-collared marten was located with a hand-held receiver. Marten were remarkably tolerant of observers and often ignored their presence, especially when intent on prey. The following accounts illustrate the repertoire of hunting techniques observed.

Following prey tracks.—At 0950 h, 20 November 1979, WS watched male marten 07 follow tracks of a Douglas squirrel (*Tamiasciurus douglasii*) in snow for 5 m. The marten moved slowly, stopping to sniff each cluster of squirrel tracks. This observation augments data we obtained by tracking marten in snow: along 30.5 km of marten tracks we found 110 intersections with tracks of potential prey. Marten were apparently interested in the prey tracks in 50% of these cases, as indicated by abrupt direction changes,

pauses, and following of the prey tracks. In one instance a marten followed snowshoe hare (*Lepus americanus*) tracks for over 600 m. Many of the track intersections where we detected no reaction by marten undoubtedly involved prey tracks made after a marten had passed; we therefore conclude that marten investigated the majority of tracks they encountered. Hargis (1981) also found marten tracks to follow those of other animals, and Pulliainen (in litt.) noted reactions by European marten (*M. martes*) in three of 50 cases where their tracks crossed those of prey.

Ambush.—At 1037 h on 28 May 1980, WS located female marten 15 stalking an adult golden-mantled ground squirrel (*Spermophilus lateralis*) in mature fir (*Abies magnifica*) forest. At 1047 h the squirrel, frightened by the marten, entered a large pile of logs. The marten approached to within 6 m, lay flat in a depression in the ground, and waited quietly. At 1101 h the squirrel emerged and climbed atop a log; it seemed aware of the marten's presence, but not its precise location. Both animals remained tense but motionless until 1121 h, when the marten finally lunged. After a short chase, the squirrel entered a crevice in the butt of a large log that was too small for the marten to enter. After several vigorous attempts to reach the squirrel, the marten spent 106 min waiting in ambush, mostly atop the log, directly above the crevice. It began to rain at 1220 h, and at 1230 h the marten crawled beneath a slab of bark leaning against the log. She finally gave up at 1307 h and began investigating snow-free areas beneath trees.

Nest robbing.—At 1035 h, 23 June 1980, WS watched female marten 14 locate a Townsend's solitaire (*Myadestes townsendi*) nest beneath a stump while the two adult birds scolded overhead. The marten spent ca. 2 min out of sight at the nest; subsequent investigation indicated that she had eaten the nestlings. The marten then climbed towards the adult birds in a pine (*Pinus jeffreyi*), as if appraising the chance of capturing them, but soon descended and bounded to a nearby snag where she holed up in a woodpecker cavity. On 26 June, WS found the same marten sleeping in the nest of an American robin (*Turdus migratorius*) while adult robins scolded nearby. Other authors have reported evidence of nest-robbing by pine marten (Grinnell et al., 1937; Murie, 1961; Weckwerth and Hawley, 1962; Francis and Stephenson, 1972; Soutiere, 1978), and Swann (1982) observed European marten feeding on clutches and broods of several species of birds in Scotland.

Excavation.—At 1349 h, 13 July 1980, WS located female 14 in mixed pine-fir forest; she was digging with forepaws beneath a manzanita (*Arctostaphylus patula*) shrub, enlarging a tunnel made by a ground squirrel. After 15 min she had excavated a hole 8 cm in diameter and 15 cm deep. However the squirrel's tunnel extended deeper, and the marten left. At 1414 h WS relocated her ca. 100 m away as she stalked three juvenile golden-mantled ground squirrels using rocks and debris for concealment. When within 4–5 m of one squirrel, the marten charged, chasing it beneath a flat rock. The marten dug alongside the rock, alternately on one side and another, until she enlarged an entrance to the space beneath the rock and captured the squirrel at 1421 h. She killed it with a bite to the back of the neck, then carried it 9 m to the base of a large tree where she devoured all but the stomach, large intestine, and one hindquarter; the latter she carried away at 1432 h.

At 1450 h female 14 was relocated, digging beneath a dead manzanita shrub 2 m from the excavation she had abandoned earlier. Within a few minutes she succeeded in pulling a second young ground squirrel from a 4 by 10-cm hole beneath woody debris. She clamped her jaws around the thoracic region for ca 30 s, dropped the squirrel, then repeated the bite for 20–30 s when it resumed moving. She carried the squirrel 39 m to a hollow log, wherein her movements, partially in view of WS, indicated that she fed until 1512 h when she left. Seven times during her meal the marten peered out of the log for 8 to 90 s.

On 28 August 1979 WZ watched female marten 09, from 1205 to 1300 h, as she used her teeth and claws to enlarge the mouth of a cavity 16 m up in an 84-cm dbh red fir. She then entered and remained in the hole until WZ left at 1431 h. Despite lack of direct evidence, we suspect that the marten killed one or more juvenile Douglas squirrels in the hole. One juvenile and one adult squirrel were in the tree. The adult approached to within centimeters of the marten several times and scolded her vehemently throughout the episode, but was ignored by the marten, which was preoccupied with entering the cavity. After the marten entered the hole, the adult squirrel approached and peered inside, then withdrew, vocalizing loudly.

Use of hunting perches.—At 1357 h on 19 July 1980, WS located female marten 14 on the edge of a sedge meadow with abundant *Microtus* signs. She was 85 cm up on branches of a small lodgepole pine (*P. contorta*) from which she scanned the sea of 50-cm-high sedges around the base of the tree for ca. 3 min. She then descended and worked slowly through the sedges in a 2 by 5-m area for ca. 3 min. Climbing to 1 m in a second small lodgepole she again scanned the vegetation below; after ca. 30 s she riveted her gaze to a movement in the sedges and pounced 1.3 m out from the tree. She was momentarily still, then began a careful search of the sedges. She repeated the perch and scan behavior 7–10 times in the next 5 min, working her way slowly along the meadow edge, but did not pounce again.

At 1030 h, 26 July 1980, WS found female marten 14 hunting in the same manner as on 19 July in

lodgepole forest with sedge ground cover. She bounded between trees and elevated logs from which she scanned the herbaceous vegetation below. It took her ca. 3 min to cover a 10 by 30-m area in this manner.

The use of elevated hunting perches is obviously adaptive where vision is limited near the ground. "Snow-jumping"—the repeated climbing and leaping from trees into snow often detected in snow-tracking studies (e.g., Murie, 1961)—is generally interpreted as play. However, our observations indicate these martens may have been hunting.

While the above observations are unique, they are not surprising in light of the marten's catholic food habits (Zielinski et al., 1983). None of them contradict inferences about marten hunting techniques from tracks in snow. Indeed, our snow-tracking results (Spencer, 1981; Zielinski, 1981) largely corroborate other studies, implicating the zigzag search path and investigation of likely prey refugia typical of mustelines (Powell, 1982) as the primary marten hunting technique. Nevertheless, these direct observations illustrate a more diverse behavioral repertoire than could be ascertained from tracks in snow.

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NSF FUNDING TRENDS IN MAMMALIAN RESEARCH

Educational trends and needs of professional mammalogists have been assessed recently (Barrett and Cameron, 1981). Data concerning research funding in mammalogy, however, are lacking. To address this lack, funding trends in the Division of Biotic Systems and Resources (BSR) (formerly Division of Environmental Biology, DEB) of the National Science Foundation (NSF) are summarized for fiscal years 1977–1982 with respect to Program within the Divison, area of research, and taxonomic group. Programs in BSR used for analysis include Ecology (ECOL), Systematic Biology (SYST), Population Biology and Physiological Biology (PBPE), and Biological Research Resources (BRR). The Ecosystem Studies Program was excluded due to the difficulty in ascertaining the mammalian component within individual projects. Related information on funding trends in BSR may be found in Lillegraven and Stuessy (1979), Stuessy and Thomson (1981), Riemer (1981), Dyer and Callahan (1981), Kaufman et al. (1982), and Barrett et al. (1982).

A total of $10.12 million was awarded for 216 award actions that directly involved the study of mammals