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## SCENT MARKING BY YELLOW-BELLIED MARMOTS

The use of cheek glands for scent marking has been reported for *Marmota flaviventris* (Armitage, 1974), *M. marmota* (Koenig, 1957; Münch, 1958), *M. olympus* (Barash, 1973), and *M. broweri* (Rausch and Rausch, 1971). Yellow-bellied marmots also have anal glands, but the use of anal glands for marking has not been observed. Anal glands are used in agonistic displays (Armitage, 1974). Münch and Rausch and Rausch state that the cheek secretion functions as a territorial marker, but neither report contains any behavioral data showing the context in which rubbing the sides of the face on rocks or other objects occurs. Barash (1973:184) reported that cheek rubbing by Olympic marmots "generally correlated with high social excitement." Scent marking frequently occurs when a mammal is both intolerant of and dominant to conspecifics and may not imply territoriality (Ralls, 1971). The glands occur in both sexes, but female *M. marmota* mark less often than males (Koenig, 1957). Both the absence of territoriality in female marmots (Armitage, 1974) and the following observations of scent marking by both sexes of yellow-bellied marmots suggest that territorial marking is not the fundamental function of the cheek glands.

In 689 hours of observation spread over four years, 89 chases occurred among a mean population of 11 resident adult females in a colony in Yellowstone National Park. The following observation illustrates the context in which three instances of cheek rubbing occurred: female BBT lying under a rock near burrow 14, female #524 approaches and chases female BBT into the burrow; female 524 gives a cry and acts excited, runs back and forth rubbing side of head and shoulders against the boulder over the burrow entrance, kicks some stones with digging motion and then departs.

Five other chases were associated with high excitement in which the dominant animal grabbed sticks and stuffed them into the burrow to which the submissive animal retreated (Armitage and Downhower, 1970), but cheek rubbing was not observed.

Agonistic behavior was not observed among adult males in the Yellowstone National Park colony, but was observed 32 times in 10 years in five marmot colonies in Colorado (Armitage, 1974). In those chases in which a strange male entered a burrow within the territory of the resident male, the resident male displayed intense excitement and vigorously rubbed his cheeks on rocks above the burrow entrance. Territorial males also scent mark unobtrusively. Most of the above-ground activity is lying and sunning (Travis and Armitage, 1972). While lying on a rock, a male may rub his cheeks on that part of the rock where he rests his head. I have not determined how often a male scent marks, but the same sunning posts are used daily and presumably scent marked frequently, if not daily.

Yearling males are non-territorial; however, scent marking has been observed as illustrated by the following example. In mid-July a strange yearling male appeared in the Yellowstone National Park colony and was chased by female 645, the second most aggressive adult female. A few minutes later the yearling male greeted and attempted to mount female 2, a highly submissive animal. She entered a burrow. The yearling became highly excited and rubbed the side of his head on the rock above the burrow entrance.

The most complex instance of cheek rubbing occurred in North Picnic Colony (locality 7; Armitage, 1974) in the East River Valley, Colorado. Yearling male 303 was trapped at locality 6 in late June. In mid-July he appeared at locality 7 and at 0830 (MST) went to a rocky area in the meadow where he rubbed his chin and cheeks on a rock commonly used for sunning by resident adults. Ten minutes later he went upslope to a burrow area. Resident adult male 98 appeared and went to the same area; both animals ran downslope, male 303 entering a burrow, and male 98 going to the rocky area. At 0857 he sniffed the rock that male 303 had cheek rubbed, then rubbed his cheeks on the same ridge of rock. Ten minutes later male 98 moved to another rock where male 303 had been but had not marked, sniffed the rock, but did not mark it, and moved away upslope. At 0940, male 303 returned to the rocky area, sniffed the rock marked by male 98, moved away, returned

and again sniffed the rock and proceeded to rub his cheeks over the same area. Cheek rubbing was repeated five minutes later. The yearling male eventually emigrated.

All instances of cheek rubbing by yellow-bellied marmots except the unobtrusive marking by males occurred in conflict situations. High excitability characterized these behaviors and all but two were associated with agonistic behavior in which the dominant animal cheek rubbed. The yearling-male:adult-female interaction was associated with sexual dominance. These observations are consistent with the interpretation that scent marking is not territorial but is an expression of dominance.

The use of scent marking to express dominance may be associated with self-reassurance (Ewer, 1968:116). The bout of scent marking by the yearling and adult male may contain elements of dominance and of self-reassurance. Ewer stresses that these functions are complementary and that the same mark can function both ways. Probably the unobtrusive scent marking by males not only assists in his maintaining dominance, but reassures him of his social role. This self-reassuring role of scent marking may be a major reason why resident males are nearly always dominant to and able to exclude intruder males (Armitage, 1974). This work was supported in part by grants GB 8526 and GB 32494 from the National Science Foundation.

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