

required in the field was minimal: some small glass tubes; micropipettes; razor blades; alcohol; antibody; saline; and wristwatch. With production of appropriate antibodies, this antibody test should be useful as a field method for distinguishing among other species where external morphology is inadequate.

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ANATOMY AND HISTOLOGY OF THE SCENT GLANDS ASSOCIATED WITH THE ORAL ANGLE IN WOODCHUCKS

Woodchucks (*Marmota monax*) rub their muzzles on objects and gnaw on trees near burrow entrances and along paths between burrows. Woodchucks also engage in a "greeting" behavior (Armitage, 1962) that involves sniffing of the oral region (Meier, 1982). Both scent marking and greeting in ground squirrels (*Spermophilus*) have been associated with the presence of scent-producing glands at the oral angle (Kivett et al., 1976; Kivett, 1978) but such glands have not been reported in *Marmota*. However, Schaffer (1940) described a scent gland located on the cheeks of *M. marmota*, and Koenig (1957) noted that secretions emanating from cheeks of males were rubbed on stones and branches within the home range. Koenig suggested further that "lip" glands existed because individuals were attracted to the muzzle of conspecifics during interactions. Rausch and Rausch (1971) reported that facial glands similar to those described by Schaffer (1940) in *M. marmota* also were present in all species of North American marmots. However, they described neither the location nor structure of these glands.

As part of an ongoing study of the social organization of woodchucks, we examined the head and buccal cavity for presence of scent glands. We also were interested in variation in the activity of scent glands that correlated with either age or sex, or with breeding season.

Eight woodchucks (3 adult males, 3 adult females, and 2 juvenile females) were live-trapped between April and December and brought into the laboratory. Specimens were anaesthetized with an intraperitoneal injection of sodium pentobarbital (50 mg/kg). The heads of three animals were shaved and the skin was inspected for glandular tissue. Any tissue suspected to be glandular was excised and examined histologically. Subsequently, no cutaneous scent glands were found.

A pungent odor was detected emanating from the corners of the mouths of the woodchucks. A bilateral pair of large and easily palpated glands was present in the walls of the buccal cavity near the oral angle (Fig. 1a). Secretions from lobes of this gland drained into ducts which anastomosed to form a primary duct. This main duct opened at the base of a flap formed by the folding of skin lateral to the boundary between the oral and cutaneous epithelia (Fig. 1a). Hence, the openings of the ducts leading from these glands were surrounded by hirsute cutaneous epithelium.

The glands and their ducts were excised completely and frozen immediately in liquid nitrogen. Semi-serial frozen sections (12 μ m with a 48 μ m gap) were stained with toluidine blue. Glands were classified as multilobular apocrine sudoriferous glands based on their structure and histology (Fig. 1b, c). Dark-staining material indicative of actively secreting cells was evident in the ducts of glands from individuals of different