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Getting to the Bottom of the Scrape

"There are more things in heaven and earth
than are dreamt of in your philosophy."

William Shakespeare

This dreamy-eyed buck is both scent-marking and sniff checking his scrape's limb. This handsome deer has much to say!

He stretched his massive neck, closed his eyes, and rubbed his forehead, eyes, and antlers back and forth across the spruce's overhanging branch tips. Periodically, he would stop, open his eyes, and sniff his handiwork. He chewed the tip of one of the branches, sniffed it, and then rubbed the length of the branch across the top of his head again – pressing the limb against the base of his antlers. The long hair on his forehead covers an underlying network of secretory glands that are most active during the rut and in dominant, mature males. At one point, the buck seemed to deliberately push the twig tip into a nostril. Next, he more assertively rubbed his face and antlers all over the limb, this time rearing up onto his hind legs in order to reach higher into the spruce's twigs and needles. More than 50 percent of his time was spent in dreamy-eyed preoccupation with the scents and secretions he had deposited just seconds before.

Hidden in a nearby ground blind, I watched in fascination. It was mid-October, just weeks before the breeding season would peak. Thick vegetation prevented me from seeing what happened next, but his tracks and sign told all. The buck had pawed the ground directly beneath the limb and had removed leaves and duff, exposing the ground to bare soil. Next, he stepped into his 3 ½- to 4 ½-foot oval-shaped scrape and performed "rub urination." He squeezed his hind leg hock joints together and rubbed the pronounced hair tufts of his tarsal glands against one another while urinating upon them. So far as we know, the tarsal gland is a kind of chemical command center – simultaneously revealing a deer's personal ID, physical condition, and social and sexual status. The three step scent-marking behavior – overhead limb-marking, pawing the scrape area, and rub urination – creates what biologists call a "full sequence scrape."

This buck is fully mature. He will make numerous rubs and "full-sequence scrapes" throughout the habitats frequented by does and other bucks. His unique scent, posted throughout the forest, will powerfully influence the behaviors of the does, and subordinate bucks alike

This buck is performing frequent sniff-checking along with rubbing his nose and mouth on an overhead limb. He occasionally nibbled one of the branches. The chewed limb tip increases the absorbency of the marked branch, and enhances its function in delivering the buck's scent messages. Notice the long-haired pelage between the antlers. This thick hair covers his forehead glands.

The buck's urine transmitted to the scrape beneath him a potent elixir of specific compounds. Big Guy has the right stuff! The smells impart olfactory news about the buck's physical condition – even the quality or shortcomings of his diet. The full sequence scrape also serves as a repository for his unique scent identity. He is indeed a mature dominant buck – one that his fraternal cohorts and prospective breeding partners know well.

But that's not all. The mere process of pawing with his hooves leaves still more information. Interdigital glands between the primary toes of each foot leave signals that reveal the surging testosterone levels of Big Guy. Chemical ecologists have analyzed interdigital gland volatiles with gas chromatography-mass spectrometry and discovered 46 compounds that are found in higher concentrations in dominant males, including akanes, arcenes, aldehydes, keptones, aliphatic acids, esters, pyrroles, furans, and sulphur compounds.

Many whitetail deer enthusiasts, myself included, were taught that a scrape was a place where a buck prepared a kind of scrape-date liaison center, where he would leave a message and return later to find an answer from a potential mate. If her urine left in or near the scrape affirmed her sexual readiness, then he would simply trail her and find her. However, to conclude that the scrape merely functions as a buck-finds-doe nightspot grossly oversimplifies a scrape's function. Simply put, a scrape serves as a multi-purpose communications system, through which many messages may be delivered that can influence the behavior of many deer, bucks and does alike. Different messages are posted and interpreted by different deer, with different results over time and space. To be sure, bucks do sometimes trail does away from scrapes, but most scrape making occurs *before* the does are sexually receptive. In fact, biologists now suspect that the mature does' so-called "silent ovulation," with elevated pre-estrus progesterone levels, is what stimulates bucks and triggers their inclination to make scrapes roughly 10 to 20 days before the actual breeding season begins. The olfactory allure of a doe's approaching estrus biostimulates a buck and encourages his libido, aggressiveness, and determination to maintain his dominant rank in the deer social hierarchy.

This alert doe is in a habitat recently frequented by bucks. Notice the antler-rubbed saplings around her.

This skinny old buck did not look well, not for the early October pre-rut period when I took this photo! Though he never pawed out a scrape, his tarsal glands at the hock joints are being pressed together and he will soon urinate over them. He is preoccupied with rubbing his face and the corners of his eyes on the overhead limb and is very likely scent-marking with secretions from his preorbital glands.

Social order in the whitetail world is made and maintained by challenge and dominance. From early on, fawns seek to be dominant. They rise on hind legs and kick and flail at one another with sharp hooves. Matriarchal does assert their authority over subordinate herd members, with good reason. With uncanny savvy, a wise doe's leadership assures the herd foraging success, comfort, and safety. Although dominant bucks will inevitably be challenged by other bucks, their size, maturity, and "boss attitude" reward them with breeding and territorial privileges.

Younger bucks are understandably intimidated by their dominant elders. Scrapes help announce the presence of mature bucks.

What does all this have to do with the scrape? Remember, a full sequence scrape not only biostimulates does and synchronizes the breeding season, but the scrape also posts multiple messages regarding the mature buck that created the signpost. When Big Guy initiates a scrape, he first focuses his attention on the overhead limb. Subsequent buck and doe visitors to his scrape do likewise. A doe will sniff and lick the branches that Big Guy has scented. In addition, she will discover more information in his urine and tarsal and interdigital gland chemicals, and will thereby become intrigued by our buck's special qualities. Subordinate bucks will do the same – with a very different outcome. These younger bucks are intimidated by a mature buck's various scent messages, and their competitive and reproductive urges are subdued. Here again, whitetail social order and herd well-being are served. The suppression of younger bucks' participation in the rut reduces costly energy expenditures and risks associated with debilitating injuries, as well as increased vulnerability to predators. With winter's severe climate and food shortages just a month away, this leaves more energy to be invested in growth and survival. In this way, young bucks do a better job of growing into the mature, dominant bucks of the future.

A “full sequence scrape” reveals:

1) slightly damaged, or even broken overhead limb(s);

2) a pawed out oval-shaped depression in which leaves, duff and snow have been scraped away;

3) a fresh scrape will be marked with musky urine and will show tracks of a mature buck. Maine’s big woods buck hunter, Hal Blood, believes that a high percentage of scrapes are found under conifer trees. I agree! I am convinced that the overhead limb marking surface itself is key. An evergreen’s multi-surfaced, variously angled twigs and needles absorb and release scent more effectively. In addition, when warmed by the sun, the dark-colored needle surfaces better activate and release scent molecules. Of hundreds of scrapes I have seen, the following tree species in our region are also popular choices: red oak, beech, speckled alder and apple at the “old field” or farm field edge.

A longer neck hair was jammed into a broken branch when a buck reared up on his hind legs and vigorously rubbed the overhead limb above his scrape. Note that this hair is hollow at the base, characteristic of the superb insulating properties of the hairs that keep a deer’s upper torso warm in winter.

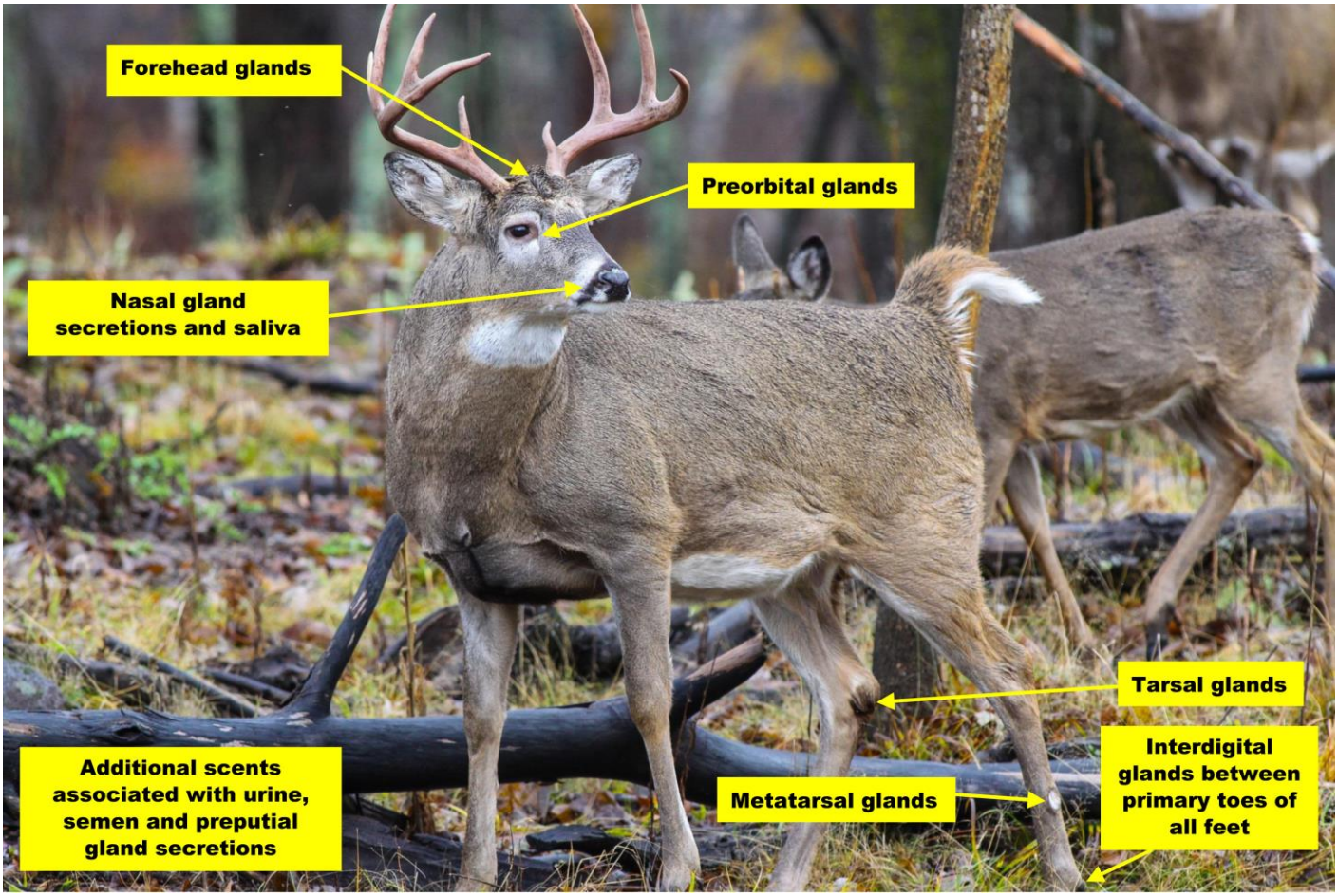
Between the hoof cleaves is a sparsely haired glandular pocket that produces a waxy, cheesy substance called sebum. The interdigital gland’s rancid scent is caused by the accumulated dead skin cells mixed with sebaceous gland secretions. Deposits of interdigital gland scent on the ground enable deer to track one another. Even the Black-legged tick, vector for the organism that causes Lyme disease, is known to track the interdigital scent of a whitetail deer in order to better locate and ambush its cervid host.

With his head tilted upward and his nostrils pinched closed, this mid-western buck is performing “flehmen” or “lip curl”. He has just licked a doe’s urine and is drawing non-volatile scent molecules up into the Vomeronasal organ that is located on the roof of his mouth. Here, chemical signals are pumped to the hypothalamus, a specialized part of the brain that regulates hormones and influences reproductive readiness. Bucks and does alike are “bio-stimulated” in this way—glandular secretions and urine chemistry provide powerful scent signals that both encourage and synchronize the activities of the breeding season.

Notice the fine short white hair at the tip of this much-used overhead limb. This hair is probably from around the nose, or possibly from under the chin or along the lower jaw. I have found it useful to create a hair key, with representative samples taken from various parts of a buck's head and neck so that I could more accurately identify what I am seeing on rubs and scrapes.

- Short white hairs come from the pelage around the nose, chin and lower jaw. Short, grayish brown hairs come from the bridge of the nose and face. Look closely for a banded arrangement of two or more colors.
- Longer, coarser brown or even auburn-colored hairs come from the buck's distinctive forehead pelage. These hairs often show the multi-colored agouti pattern of different colors.
- Very rarely one can find a short black hair. This is possibly from the stripe of black hairs that extends from the mouth to the nose of most deer. Some deer have dark hairs that encircle and accent the edges of their ears; a short black hair could come from here as well.

Once an estrus doe has been discovered by a buck they will form a "tending bond". Unless he is displaced by a more dominant buck they will remain together, feeding and bedding near one another and copulating multiple times. When she is no longer receptive, he will leave her in search of another doe.



Many fine biologists and chemical ecologists have certainly helped us appreciate the remarkable functions and versatility of the whitetail scrape. For those wishing to get their nose into this subject, consult the following: David Hirth, Larry Marchinton, Karl Miller, Karen Alexy, John Ozoga, Jonathan Gassett, Glenn DelGiudice, Gerald Moore, Terry Kile, Thomas Atkeson, Timothy Sawyer, and Leonard Lee Rue III.