FEMORAL GLAND BIOLOGY AND POSSIBLE MEDICAL CONCERNS IN THE GREEN IGUANA, *Iguana iguana*

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Abstract: Femoral glands are a common secondary sex characteristic of male lizards. These glands are used in various ways for sexual, individual, and territorial identification. No medical problems have been described previously. Possible impaction of these glands from low humidity is discussed.

Key words: green iguana, *Iguana iguana*, femoral gland, impaction.

Femoral glands are commonly used in the determination of sex in adult green iguanas, *Iguana iguana*, with mature males having enlarged glands, and females having minimally developed glands. These glands are often referred to as pores. They are called femoral when in the femoral area and called preanal/anal/ventral glands when in the cloacal region. In some species, there are even precloacal glands (Antoniazzi, 1993). Anal pores are similar in appearance, but are shallower and less well developed than femoral pores (Frye, 1991). A review of the veterinary and biology literature provides information on the biology and supposed function of the glands, but there has been no discussion of medical problems associated with those glands in any species. The history of studies on these glands, anatomy/microanatomy of normal glands, and function and make up of glandular secretion will be discussed, followed by a discussion on a medical presentation seen by the author involving the femoral glands.

Cole (1966) brings together many of the early studies and hypotheses on the femoral glands of lizards. A list of suggested functions of the secretion included: securely fastening males to females during copulations, mate attraction into the males’ territory during the breeding season by odor, territory marking for males, tactile stimulation by the secretion “tines” to quiet the females during breeding, and finally that they are vestigial. As seen by further research, some are true or true within certain parameters, while in other cases they are outright incorrect. Studies of femoral glands in gekkonid species (Menchel, 1975; Maderson, 1985; Chiu, 1987a, 1987b), *Amphisbaena alba* (Antoniazzi, 1993, 1994; Jared, 1999), and *Amphibolurus ornatus* (Fergusson, 1985) have also been useful in understanding their function.

The femoral glands are a single row of discrete lobular/alveolar holocrine glands that produce a waxy substance. Both sexes have them, but they are better developed in males (Frye, 1991). They are formed by an invagination of the stratum germinativum of the body epidermis, which forms a follicular unit (Fergusson, 1985). Histologically, they extend into the dermal layer. Wide ducts from the glandular lobules are lined by several layers of plump nonkeratinized squamous to low cuboidal epithelial cells with centrally located nuclei. The ducts expand to merge with and become many lobular/alveolar glands. The gland’s acini are composed of cuboidal secretory cells that have cytoplasmic filled with eosinophilic granules. As the gland fills with the secretory products/sloughed cells, the substance is forced outwards (Frye, 1991).
In desert iguanas, *Dipsosaurus dorsalis*, studies indicate the femoral gland secretions are made of about 80% protein and 20% lipid components. This is constant throughout the year. Each individual iguana has a unique protein pattern. Their secretions strongly absorb ultraviolet light (Alberts, 1990). In green iguanas, the protein components are about 80% also, but dropped to 65% during the breeding season. The lipid components include free fatty acids, triglycerides, methyl esters, steryl esters, and sterols. Green iguanas have more unsaturated lipids produced during the breeding season and that increases volatility. They do not absorb ultraviolet light (Albert, 1992b). A phylogenetic study shows that the protein components of the secretions vary as expected. Desert iguanas and green iguanas have enough intraspecific variation to determine sex and identify individuals (Alberts, 1991). A follow-up study in green iguanas found that this information is likely useful for the iguanas in recognition at the species, sex, and kin levels (Alberts, 1993b).

In 1-yr-old and older male green iguanas, femoral gland productivity, pore size, and the percentage of lipids in the secretions correlates positively with plasma testosterone levels in dominant individuals. In subordinates and immature males this does not occur. Peak activity is during the breeding months of November through January. It is surmised that the secretions could function in the ontogeny and maintenance of dominance relationships (Alberts, 1992a). The femoral pore secretion is rubbed onto the environment of the iguana to create a variety of species-specific responses when detected by other iguanas. In a comparison between desert and tropical iguanids, it was found that desert iguanas use ultraviolet light to detect the secretions on the ground, and because of their low volatility, iguanas examine the secretions by direct tongue contact to the secretion. In contrast, tropical iguanids production does not rely on ultraviolet detection, because the higher volatility aerosolizes the secretion. The protein fraction still elicits more tongue-flicking comparing to desert iguanas, but a greater proportion of the tongue-flicks are directed towards the air in the presence of lipids alone. These differences are believed to be due to environmental variation of large open ranges having arid conditions (desert), versus an environment with smaller ranges, foliage obscuring visibility, and humidity (tropics). Male desert iguanas seem to produce the secretion as territory markers, while females have active glands in unmated females, likely to advertise that status. Green iguanas show a hormonal regulation of signal production that is complex and dependent on social conditions. (Alberts, 1993).

Many “assumed male” iguanas presenting clinically (for routine physical exam, for aggression concerns, or for other concerns) have been noted to have several to many abnormal femoral pores. These pores are swollen with palpable enlargement of the gland and its product far larger than the gland opening. Most of these iguanas elicit extreme discomfort when these impacted pores are expressed manually, a less discomfiting experience when performed on normal pores. Often to further work on these pores, the iguana needs to be under general anesthesia (of note is the fact that attempted expression of these pores can be another item to assess the level of anesthesia). Some of the pores were expressed at this time with gentle constant pressure, but others required enlargement of the opening to remove. Pores expressed under anesthesia or that are lanced often bleed copiously, as seen with other abscess lancing and removal. Material within is normal waxy material, though impacted ones are often darker in color. No evidence on cytology reveals infection in the exudate. All pores are cleaned using chlorhexidine gluconate 2% on cotton-tipped applicators.
Complications include the recovery from anesthesia, pain, and excessive bleeding. Bleeding often does not manifest until the iguana goes home and begins basking, likely increasing blood flow that facilitates rupture of formed clots. To address this, the pore region is pressure-wrapped with gauze and vet wrap for 2-3d. In these animals no excessive bleeding has occurred. There is also concern that too aggressive expression may rupture a pore into surrounding tissue, possibly causing infection and abnormal future pore use and growth. Lanced pores are not sutured up, but are allowed to heal, with no apparent complications. Pore lumens often invert out with the exudate, but are easy to replace with the applicators. Rechecks on many of these iguanas reveal normal looking pores with normal wax production within 1mo.

Without performing histopathology on an affected femoral pore, it is impossible to definitively determine the process involved. There has been no evidence at this time on cytology that infection has been the cause, but it does not mean that this should not be considered on a case-by-case basis. Common facts in their clinical histories include living in Utah, where humidity is very low. Though recommended to do so by the author, the owners are usually unable to do warm water soakings of the reptile more often than weekly and in many cases, not at all. This author hypothesizes that the primary cause of these impactions is the lack of humidity in the iguanas’ environment. An iguana housed at the clinic and soaked daily for 30min has no problems with femoral pores at all. This problem should be considered when evaluating sudden aggression in male iguanas. While a more likely scenario is the fact the iguana is becoming sexually aggressive (often to women during their menstruations), several individuals have had rapid behavioral changes after the impactions are relieved. It is not known whether these behavioral changes are coincidental or not.
REFERENCES