



Scent rubbing in carnivore species at Gavier Lake, Gujarat, India

Scents are one of the most common means of animal communication. Some animals use scent communication for many purposes including determining age and sex, marking their territories, and finding mates. Scent rubbing is a poorly understood way of marking in which animals rub their bodies against a variety of surfaces, many of which have intense odours. Individuals collapse their forelegs then push forward with their hind legs, rubbing their face, neck, and back onto the destination of the scent in the most well-known occurrences among carnivores (Kleimann 1966, Rieger 1979). Most commonly, they put their own scent on the object while infusing the object's scents onto their bodies. Faeces of other animals, meat, intestinal contents and insecticide are among the substances that elicit scent-rubbing (Heimburger 1959, Ewer & wemmer 1974, Ryon *et al.* 1986). As a result, the subject's pelages are infused with the odour of these substances. Odours produced by sweat glands, urine, faeces and vaginal secretions often induce this behaviour, which is prominent in carnivore species (Goslin & Mckay 1990, Feldman 1994). They scent rub as an olfactory communication method, releasing chemical odours to increase the chances of being recognised by conspecifics (Bothma & le Richet 1995). Canids and other carnivores are well known for rubbing themselves on various scents (Johnson 1973, Gosling & McKay 1990) while smaller carnivores have been shown to increase caution and alter their feeding behaviour when exposed to the scent of larger carnivores (Garvey *et al.* 2016).

Some animals mask their scent by rubbing on a substance with a strong odour so that their own scent will not alert other animals to their presence. This helps them in hunting or preventing other animals from preying on them. Gray foxes have been observed cheek rubbing new puma scrapes to acquire the scent and mask

their own. This demonstrates that smell rubbing serves as an interspecific scent marking mechanism (Maximilian *et al.* 2017).

Mustelids are well-known scent-markers and their anal sac secretions have been studied for 140 years, likely because of “the aggressively malodorous nature of these secretions” (Burger 2005). Smooth-coated otters are local migrant visitors at Gavier Lake, Surat. Over the course of four years (2018–2022), we documented golden jackal (*Canis aureus*), jungle cat (*Felis chaus*), small Indian civet (*Viverricula indica*), and feral dog (*Canis lupus familiaris*) visiting smooth-coated otter (*Lutrogale perspicillata*) defecation and grooming sites at Gavier Lake, rubbing their various body parts on the otter spraints. Otters use these sites (called “latrines” in North America) for defecation, territorial marking, mate selection, grooming etc. Based on the observations, we identified this behaviour as scent rubbing. Here we present our observations on scent rubbing behaviour by frequency, seasonality and scent-rubbed body parts (SRBP).

Gavier (21°07'38.5"N, 72°44'02.3"E) is a freshwater lake around 7 km from Surat City. The lake is rich in flora and fauna. Surat city is surrounded by the river Tapi and lies in the west part of Gujarat. The lake is connected to Tapi River through a canal system. Surat elevation ranges from sea level to 13 m. The climate is tropical savanna, with most rainfall occurring from July to September. The district is marked with canal networks, lakes, ponds, wetlands, and the Tapi River estuarine system which, along with the adjacent coast of the Gulf of Khambhat, provides sufficient variety for a diverse flora and fauna to survive and prosper.

Direct observation & indirect signs. Indirect signs of body rubbing were observed at various locations in the study area. Indirect signs such as scat, wet body marks and body rolling evidence were noticed and this helped in setting up the camera traps at certain locations. Direct observation of body rubbing in animals such as dogs and jungle cats were also noticed at several locations.

Camera trapping. Four Cuddeback X-change model camera traps with infrared flash were used at the study site for behavioural observations. The cameras were programmed to record 30 seconds of video with 3 second delays between them before becoming live and active again. We monitored sites where otters visited and placed our cameras at those locations. Every 2-3 days, camera traps were checked, and data were collected.

Camera traps documented otters defecating and grooming at various locations. Defecating and grooming together is a form of communication. Otters were observed grooming at these sites by rubbing their entire body on the ground, pre- and post-swimming. These grooming and defecating sites were usually close to the water. These sites are used as territory markers and to discover the gender of other otters, dominance status, etc. by smelling the scent of the spraint. The otter spraint has a very strong scent and the camera traps recorded some other carnivores investigating and marking these scent stations. Camera trap videos revealed small Indian civets, jungle cats, golden jackals and feral dogs rubbing their bodies on the fresh otter spraints. The rubbing behaviour and scent-rubbed body parts (SRBP) are different for each of these animals. Most rubbed their bodies on spraints that were less than 12–24 hours old.

Of all the carnivore species in Gavier found rubbing otter scent over their body parts, small Indian civets ($n=12$, 54.6 %) did this most often, followed by feral dogs ($n=7$, 31.9 %). Jungle cats showed this behaviour the least number of times ($n=1$, 4.5 %) (Table 1).

Table 1. Number of images by carnivore species found rubbing scent of otter on their body

Carnivore species	Frequency	Percentage
Small Indian civet	12	54.6%
Feral dog	7	31.9%
Golden jackal	2	9.0%
Jungle cat	1	4.5%
Total	22	100%

Animal body part. Smooth-coated otters rubbed their scat scent over all their body parts except cheeks. Feral dogs were found rubbing otter scat scent over their neck, shoulder, flank and back. Golden jackals rubbed otter scat scent over their throat, neck and shoulder. Jungle cats rubbed otter scat scent all over their body except for throat and chest. Small Indian civets rubbed otter scat scent over their whole body (Table 2).

Table 2. Scent rubbed body parts (SRBP) for different carnivore species

Species	Cheeks	Throat	Neck	Shoulder	Chest	Flank	Back
Smooth-coated otter		×	×	×	×	×	×
Feral dog			×	×		×	×
Golden jackal		×	×	×			
Jungle cat	×		×	×		×	×
Small India civet	×	×	×	×	×	×	×

Seasonality. The majority of SRBP was observed in winter ($n=15$); it was seen the least during the monsoon ($n=2$; Table 3).

Table 3. Seasonal distribution of images of carnivores found SRBP

Season	Frequency	Percentage
Winter (November–February)	15	68.1%
Summer (March–June)	5	22.8%
Monsoon (July–October)	2	9.0%
Total	22	100%

In the existing literature, the methods and importance of scent marking for interspecific interactions are both underrepresented. Scent marking is an important aspect of the behavioural ecology of many animals (Mellen 1993, Rostain *et al.* 2004, Allen *et al.* 2016), yet little is known about how interspecific scent marking works. Animals may investigate the fragrance of other species to gather information (Rostain *et al.* 2004; Li *et al.* 2013) or to escape predation (Apfelbach *et al.* 2005, Bytheway *et al.* 2013). Based on our findings, we generated two hypotheses concerning interspecific communication using this behaviour: (1) all four species may be depositing their own scent onto the substrate in order to compete with conspecifics; (2) all four species may be transferring otter scent onto themselves to hide their own scent either for hunting or for avoiding predators. Our findings suggest that interspecific scent rubbing could be a valuable research topic. To draw conclusions about either of these two hypotheses, further research is needed.

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