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Reaction of a male Stone marten (*Martes foina* Erxleben, 1777) to foreign faeces within its territory: a field experiment

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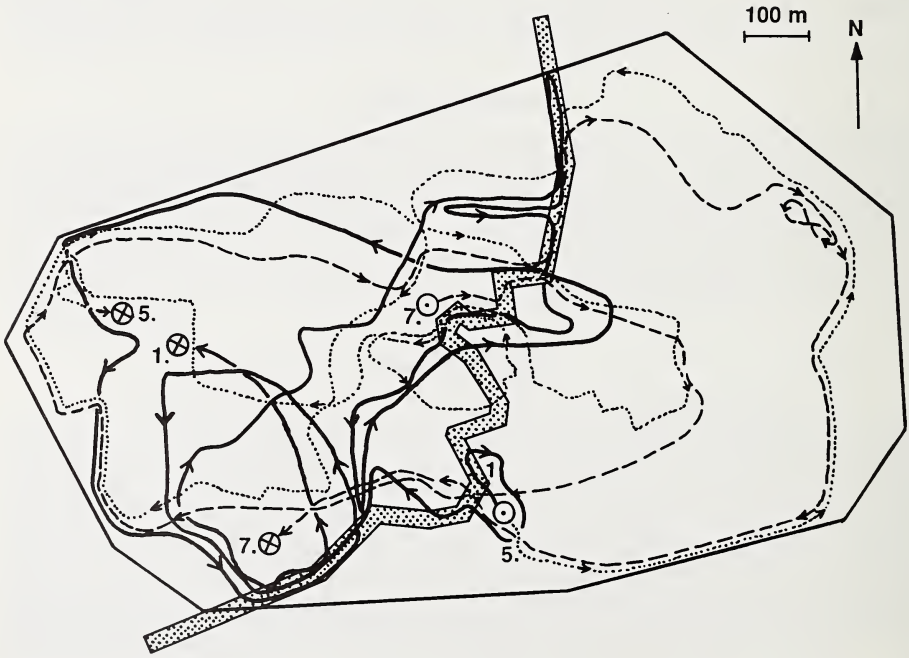
The use of faeces and urine for marking territories, revealing sex and reproductive status, is widespread among carnivores (Gorman and Trowbridge 1989; Macdonald 1980). Stone martens scent mark their territories by exposing special small droppings and urinating on conspicuous locations (Grünwald 1988). They are territorial against conspecifics of the same sex (Krüger 1989) and increase their marking activity during the mating season (Grünwald 1988). Here, we report on an experiment, where we simulated the intrusion of a foreign male stone marten into the territory of a resident male during the mating season.



Examples of ranging movements of the male stone marten within its home range (convex polygon). The dotted lines represent movements during the nights 5. (19 June) and 7. (25 June) before; the thick solid line represents night 1. (26 June) after the exposition of conspecific faeces. The faeces were placed along the "olfactory corridor" (hatched area). ⊙ = start, ⊗ = end of one nightly movement

The resident stone marten was trapped in June 1989 in the village of Hardegsen, near Göttingen, German Federal Republik (51°57′ N, 9°60′ E). It was fitted with a radio collar (Karl Wagener, Colonia) and tracked on foot and by bicycle continuously during its active time for the next five weeks. Tracking data was complimented with direct observations. Faeces of captive male stone martens (from the "Arbeitskreis Wildbiologie, Giessen") were mixed with water and spread out on a line through the home range. The suspension was renewed prior to every tracking night. A 25 m broad stripe along this line was defined as the "olfactory corridor", where the marten was regarded as having direct contact with the faecal scent (Fig.). We compared the marten's locomotoric activity (travel distance and speed) within the corridor before and after placement of the faeces. A total of 14 nights of observation were used for the analysis, 7 nights to document movement pattern and home range size and 7 nights for the experiment.

During the first period, the male ranged over nearly the whole village and moved often along the outer limits of his territory (Fig., convex polygon, minimum area = 65.7 ha). After placement of the faecal suspension, however, he mated with a female and spent a significantly higher proportion of his activity in the olfactory corridor (+75.4 %, one tailed Mann-Whitney U-test: U = 39.5, df = 13, p = 0.027, Tab. 1). This reduced his range to the inner and western part of his territory (Fig.), but did not affect his overall travel rate (Tab.).

During the first night after the placement, 26 June, the male encountered the corridor 10 times, moved within it over about 1.6 km, but 4 times he turned around immediately and ran back. In the second night, 27 June, after leaving his hiding place, he run directly to the corridor, sniffed the faeces and deposed a scent mark himself, showing the typical behaviour that Gründwald (1988) described for marking with urine. During the next 65 minutes he followed the corridor intensively over ca. 900 meters and sniffed several times

Travel distance (TD) and travel rate (TR) of a free living male stone marten throughout its territory and within the olfactory corridor, before and after placement of the foreign conspecific faeces

Date	Observation time (min.)	TD in total (m)	TD in corridor (m)	TR in total (m/min.)	TD in corridor /total TD (%)
Before					
1. 8 June	195	3930	250	20.2	6.4
2. 10 June	270	5470	350	20.3	6.4
3. 12 June	170	4590	1125	27.0	24.5
4. 14 June	180	5560	700	30.9	12.6
5. 19 June	135	2970	550	22.0	18.5
6. 22 June	90	3170	150	35.2	4.7
7. 25 June	250	4580	200	18.3	4.4
Average	184.3	4324.3	475.0	24.8	11.1
After					
1. 26 June	315	6840	1625	21.7	23.8
2. 27 June	120	3780	925	31.5	24.5
3. 28 June	284	8330	2225	29.3	26.7
4. 30 June	120	3730	425	31.1	11.4
5. 2 July	105	2840	425	27.0	15.0
6. 4 July	290	5650	1500	19.5	26.5
7. 5 July	287	4370	350	15.2	8.0
Average	217.3	5077.1	1067.9	25.1	19.4*

* The difference between the periods is significant according to a one tailed Mann-Whitney U-test: U = 39.5, df = 13, p = 0.027.

along the outspread suspension. Then he returned to his hiding place and was observed mating with a female, who probably lived in the western part of his territory. In the third night, 28 June, the marten was especially active, moved over 8 km and investigated the olfactory corridor very intensely (Tab.). In the following nights, the marten concentrated his movements again on the western part of his home range, but encountered the corridor more seldom. No mating was observed during this time.

Oestrus females are considered to be the limiting resource for males of solitary carnivores (Sandell 1989). Hence, prior to copulation, resident males should gain more from keeping close to and defending their receptive females, than from patrolling their territories. In our experiment, however, the male increased his activity along the olfactory corridor, although he was mating in the second night of the experiment.

The stone marten was obviously attracted by the suspension of its conspecifics' faeces. A similar behaviour was described by Grünwald (1988) with captive stone martens. Her animals showed a 11.3-fold increase in their exploratory behaviour and locomotoric activity, when they encountered scent marks of foreign martens. This was interpreted as agonistic and curiosity behaviour induced by the olfactory marks. Especially during the mating season, the scent of a male conspecific within an occupied territory is likely to initiate aggressive behaviour of the territory owner. At other times of the year, when other resources are more prevalent, territorial scent marks might be less important (see Pulliainen 1982).

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