

The scent world of cats: where to place a urine scent mark to increase signal persistence?

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Submitted: April 27, 2020. Final revision received: September 4, 2020. Accepted: September 22, 2020

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Supplementary material

Figure S1. Chosen microsites were marked with a small amount of lasting wood colour 7 cm (i.e. width of the experimenter's palm) above the location where urine was sprayed. Presented below are examples of colour-marked microsites. The finger points at the spray location.

Vertical bare rock:



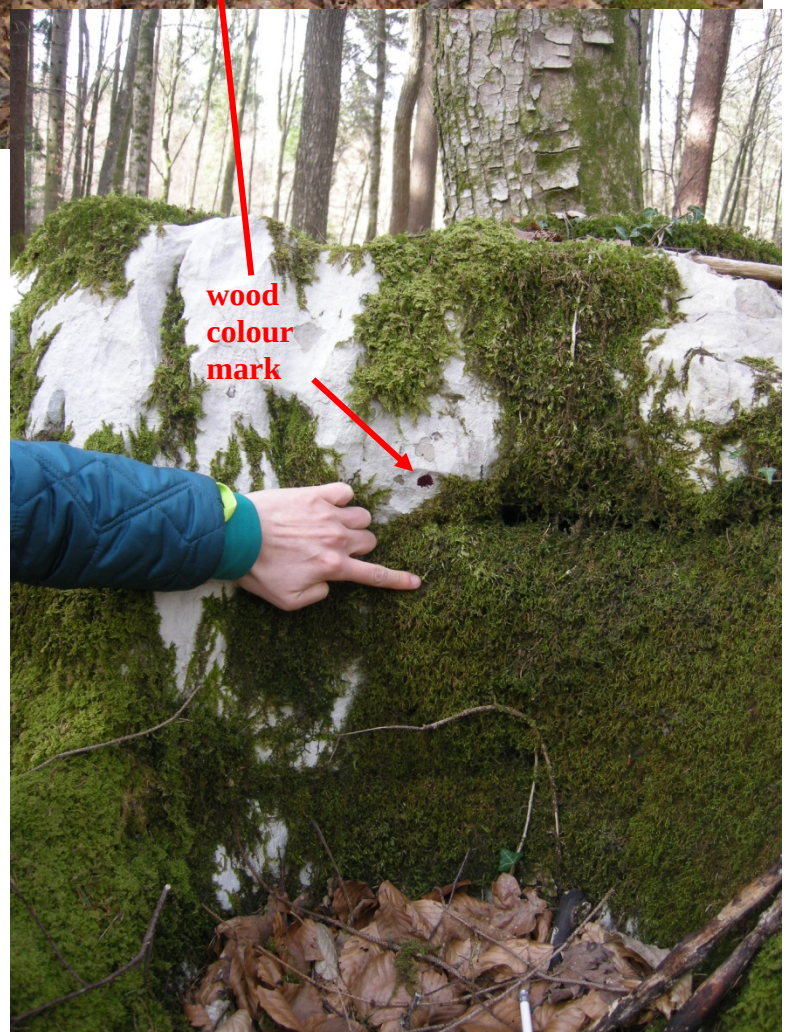
Coniferous tree trunk – rugged bark:



wood
colour
mark



Vertical rock with moss:



Deciduous tree trunk – smooth bark:



Sloping bare rocks:



Overhanging bare rocks:



Table S1.
 Recorded smell intensities and sniffing times. Note: Only 24 out of 28 investigated micro-sites are included in this data table (small conifers were excluded from the analysis – see Methods section – and are excluded from this data table as well).

ID No.	Orientation	Type	Date & Time of urine deposition		SESSION 1 - 02 May 2018 afternoon		SESSION 2 - 03 May 2018 morning		SESSION 3 - 03 May 2018 afternoon		SESSION 4 - 04 May 2018 morning		SESSION 5 - 04 May 2018 afternoon	
			Date	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time
1	south	bare rock - overhanging	02 May 2018	7:06 AM	3	17:43	3	06:27	3	16:26	3	07:22	2	17:41
2	north	bare rock - overhanging	02 May 2018	7:08 AM	3	17:45	3	06:30	3	16:28	3	07:24	2	17:44
3	south	bare rock - vertical	02 May 2018	7:00 AM	3	17:32	3	06:23	3	16:30	2	07:19	0	17:36
4	north	bare rock - vertical	02 May 2018	8:08 AM	3	17:48	3	06:25	3	16:31	2	07:27	1	17:39
5	north	rock with moss - vertical	02 May 2018	8:03 AM	4	18:21	3	06:56	3	16:56	3	07:53	3	18:26
6	south	bare rock - vertical	02 May 2018	7:28 AM	3	18:03	3	06:50	3	16:39	2	07:36	1	18:06
7	south	bare rock - flat	02 May 2018	7:23 AM	3	18:07	3	06:46	2	16:45	2	07:38	1	17:58
8	north	bare rock - flat	02 May 2018	7:24 AM	3	18:09	3	06:49	2	16:47	2	07:44	2	18:08
9	north	bare rock - overhanging	02 May 2018	7:13 AM	3	17:38	3	06:52	3	16:49	3	07:49	3	18:09
10	south	bare rock - overhanging	02 May 2018	7:17 AM	3	17:35	3	07:20	3	17:04	3	08:09	3	18:37
11	north	bare rock - vertical	02 May 2018	7: 59 AM	3	18:18	2	07:02	3	16:59	2	07:58	2	18:28
12	north	bare rock - flat	02 May 2018	8:06 AM	2	18:23	3	06:59	2	16:57	2	07:56	1	18:25
13	south	bare rock - flat	02 May 2018	7:56 AM	3	18:15	3	07:04	2	17:00	2	08:00	2	18:29
14	north	rock with moss - vertical	02 May 2018	7:50 AM	4	17:57	3	07:12	3	16:51	3	08:06	3	18:32
15	south	rock with moss - vertical	02 May 2018	7:50 AM	3	17:58	3	07:14	3	16:52	3	08:07	2	18:34
16	south	rock with moss - vertical	02 May 2018	7:47 AM	4	18:10	3	07:10	3	16:53	3	08:01	3	18:31
17	south	deciduous tree trunk - smooth bark	02 May 2018	7:43 AM	2	18:12	2	06:40	2	16:54	2	08:02	0	18:16
18	north	deciduous tree trunk - smooth bark	02 May 2018	7:43 AM	2	18:13	3	06:42	2	16:55	2	08:04	0	18:20
19	south	deciduous tree trunk - smooth bark	02 May 2018	7:40 AM	2	17:59	3	06:37	3	16:36	0	07:32	0	17:49
20	north	deciduous tree trunk - smooth bark	02 May 2018	7:40 AM	3	18:01	3	06:39	3	16:37	2	07:34	1	17:55
21	south	coniferous tree trunk - rugged bark	02 May 2018	7:35 AM	2	17:50	3	06:33	2	16:33	2	07:29	2	17:46
22	north	coniferous tree trunk - rugged bark	02 May 2018	7:35 AM	3	17:52	3	06:35	2	16:35	2	07:30	3	17:48
23	south	coniferous tree trunk - rugged bark	02 May 2018	7:33 AM	2	18:05	3	06:44	3	16:41	2	07:46	2	18:12
24	north	coniferous tree trunk - rugged bark	02 May 2018	7:33 AM	3	18:06	3	06:45	2	16:43	3	07:48	3	18:14

Smell intensity categories:

- 0 -- urine smell cannot be confirmed
- 1 -- urine is smelled slightly, but is certainly detectable
- 2 -- urine smell well detectable but only at close range (i.e. up to 5 cm)
- 3 -- urine smell detected at a distance 5-15 cm
- 4 -- urine smell detected at a distance 15 cm or more

All times in this table are absolute sniffing times (see Methods section).

ID No.	SESSION 6 - 05 May 2018 morning		SESSION 7 - 05 May 2018 afternoon		SESSION 8 - 06 May 2018 morning		SESSION 9 - 06 May 2018 afternoon		SESSION 10 - 07 May 2018 morning		SESSION 11 - 07 May 2018 afternoon		SESSION 12 - 08 May 2018 morning		SESSION 13 - 08 May 2018 afternoon	
	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time
1	2	07:11	3	18:45	2	08:12	2	18:42	3	06:11	2	17:31	2	05:45	2	17:11
2	2	07:13	3	18:48	2	08:13	2	18:46	0	06:14	1	17:28	1	05:30	1	17:02
3	0	07:06	0	17:32	0	07:03	/	/	/	/	/	/	/	/	/	/
4	0	07:09	0	17:23	0	07:10	0	17:12	/	/	/	/	/	/	/	/
5	3	08:03	3	18:39	3	08:17	3	18:50	3	06:19	3	17:02	3	06:06	3	17:37
6	0	07:25	0	17:37	0	07:06	/	/	/	/	/	/	/	/	/	/
7	0	07:30	0	17:51	0	06:58	/	/	/	/	/	/	/	/	/	/
8	0	07:33	0	18:04	0	07:29	0	17:07	/	/	/	/	/	/	/	/
9	3	07:41	3	18:23	3	08:09	3	18:49	3	06:17	3	17:43	2	05:49	2	17:31
10	3	08:07	2	18:19	3	08:07	2	18:37	2	06:08	2	17:38	1	05:37	2	17:07
11	1	07:58	0	17:58	0	07:32	0	17:48	0	05:28	0	17:07	/	/	/	/
12	0	08:01	0	17:44	0	07:24	0	17:28	0	05:32	/	/	/	/	/	/
13	1	07:56	0	17:26	0	07:17	0	17:20	/	/	/	/	/	/	/	/
14	3	07:53	3	18:41	3	08:23	3	18:53	3	06:27	3	17:49	3	06:12	3	17:50
15	3	07:54	2	18:42	3	08:22	3	18:44	3	06:22	3	17:48	3	06:08	3	17:40
16	3	07:51	3	17:20	3	08:20	3	18:40	3	06:24	3	17:45	3	06:10	3	17:48
17	0	07:42	0	17:15	/	/	/	/	/	/	/	/	/	/	/	/
18	0	07:47	0	17:18	0	07:45	/	/	/	/	/	/	/	/	/	/
19	0	07:20	/	/	/	/	/	/	/	/	/	/	/	/	/	/
20	1	07:22	1	17:02	0	07:39	0	18:14	0	05:53	0	17:24	0	05:20	0	16:57
21	2	07:17	2	18:26	3	08:01	2	18:28	2	05:58	2	17:11	2	05:53	2	17:15
22	3	07:18	3	18:28	3	08:03	2	18:34	2	06:04	2	17:18	2	05:56	2	17:19
23	2	07:36	2	18:31	2	08:04	3	18:30	2	06:01	3	17:33	3	05:59	2	17:23
24	3	07:37	2	18:34	3	08:05	2	18:35	3	06:06	3	17:35	3	06:02	2	17:27

Smell intensity categories:

0 -- urine smell cannot be confirmed

1 -- urine is smelled slightly, but is certainly detectable

2 -- urine smell well detectable but only at close range (i.e. up to 5 cm)

3 -- urine smell detected at a distance 5-15 cm

4 -- urine smell detected at a distance 15 cm or more

All times in this table are absolute sniffing times (see Methods section).

ID No.	SESSION 14 - 09 May 2018 morning		SESSION 15 - 09 May 2018 afternoon		SESSION 16 - 10 May 2018 morning		SESSION 17 - 10 May 2018 afternoon		SESSION 18 - 11 May 2018 morning		SESSION 19 - 11 May 2018 afternoon		SESSION 20 - 12 May 2018 morning		SESSION 21 - 12 May 2018 afternoon	
	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time
1	2	05:31	2	16:51	2	05:31	2	16:44	2	05:18	2	16:54	1	06:33	1	16:22
2	1	05:21	1	16:42	1	05:23	1	16:36	0	05:14	1	16:46	1	06:24	0	16:16
3	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
4	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
5	2	05:53	3	17:16	3	06:06	2	17:15	3	05:57	3	17:29	2	07:18	3	16:36
6	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
7	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
8	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
9	2	05:35	2	16:55	2	05:34	2	16:48	2	05:26	3	16:57	2	06:39	2	16:26
10	2	05:27	2	16:47	2	05:28	2	16:40	1	05:22	2	16:50	1	06:29	1	16:20
11	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
12	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
13	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
14	2	05:59	3	17:19	2	06:02	2	17:08	2	05:53	3	17:26	3	07:10	2	16:37
15	3	05:49	2	17:22	3	05:53	2	17:19	2	06:01	2	17:18	3	07:06	2	16:37
16	3	05:56	2	17:25	2	05:57	2	17:04	2	05:48	3	17:22	3	07:14	3	16:36
17	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
18	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
19	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
20	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
21	2	05:38	2	17:00	2	05:38	2	16:52	2	05:30	1	17:06	1	06:47	2	16:29
22	2	05:43	2	17:08	2	05:46	2	17:01	2	05:43	2	17:14	2	06:57	2	16:33
23	2	05:41	2	17:04	2	05:42	2	16:55	2	05:35	2	17:02	2	06:53	2	16:31
24	2	05:46	2	17:12	2	05:49	2	16:58	2	05:39	2	17:11	2	07:01	2	16:35

Smell intensity categories:

- 0 -- urine smell cannot be confirmed
- 1 -- urine is smelled slightly, but is certainly detectable
- 2 -- urine smell well detectable but only at close range (i.e. up to 5 cm)
- 3 -- urine smell detected at a distance 5-15 cm
- 4 -- urine smell detected at a distance 15 cm or more

All times in this table are absolute sniffing times (see Methods section).

ID No.	SESSION 22 - 13 May 2018 morning		SESSION 23 - 13 May 2018 afternoon		SESSION 24 - 14 May 2018 morning		SESSION 25 - 14 May 2018 afternoon		SESSION 26 - 15 May 2018 morning		SESSION 27 - 15 May 2018 afternoon		SESSION 28 - 16 May 2018 morning		SESSION 29 - 16 May 2018 afternoon	
	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time
1	0	06:27	0	17:05	0	05:43	0	12:20	0	06:00	/	/	/	/	/	/
2	0	06:17	0	17:03	0	05:30	/	/	/	/	/	/	/	/	/	/
3	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
4	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
5	2	07:08	1	16:52	2	06:23	2	13:02	1	06:18	2	17:27	1	06:22	2	16:03
6	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
7	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
8	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
9	0	06:32	0	17:07	0	05:48	0	12:24	0	06:06	0	16:43	0	05:19	/	/
10	0	06:22	0	17:01	0	05:37	0	12:16	/	/	/	/	/	/	/	/
11	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
12	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
13	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
14	2	07:01	1	16:58	1	06:38	2	12:45	1	06:30	2	17:14	1	06:17	1	16:09
15	2	06:55	1	16:54	2	06:27	1	12:51	1	06:12	2	17:20	1	06:05	1	15:56
16	2	07:05	1	16:56	2	06:32	2	12:57	1	06:24	2	17:38	2	06:11	2	15:50
17	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
18	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
19	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
20	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
21	1	06:38	1	16:43	0	05:54	1	12:28	0	05:24	0	16:49	0	05:44	0	16:15
22	2	06:47	2	16:48	2	06:10	2	12:36	1	05:38	2	17:04	1	05:54	1	16:38
23	2	06:43	2	16:46	1	06:02	1	12:32	0	05:31	1	16:57	0	05:49	0	16:25
24	2	06:51	2	16:50	2	06:18	2	12:40	2	05:44	2	17:09	2	05:59	1	16:45

Smell intensity categories:

- 0 -- urine smell cannot be confirmed
- 1 -- urine is smelled slightly, but is certainly detectable
- 2 -- urine smell well detectable but only at close range (i.e. up to 5 cm)
- 3 -- urine smell detected at a distance 5-15 cm
- 4 -- urine smell detected at a distance 15 cm or more

All times in this table are absolute sniffing times (see Methods section).

ID No.	SESSION 30 - 17 May 2018 morning		SESSION 31 - 17 May 2018 afternoon		SESSION 32 - 18 May 2018 morning		SESSION 33 - 18 May 2018 afternoon		SESSION 34 - 19 May 2018 morning		SESSION 35 - 19 May 2018 afternoon		SESSION 36 - 20 May 2018 morning		SESSION 37 - 20 May 2018 afternoon	
	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time
1	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
2	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
3	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
4	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
5	2	06:09	2	17:20	1	06:50	1	17:07	1	06:45	0	17:43	0	06:33	0	16:17
6	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
7	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
8	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
9	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
10	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
11	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
12	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
13	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
14	2	05:55	1	17:12	1	06:41	1	17:14	1	06:52	1	17:57	0	06:46	0	16:28
15	1	05:48	0	17:03	0	06:34	1	16:59	0	06:37	0	17:33	0	06:25	0	16:06
16	2	06:03	2	17:30	2	07:02	2	17:20	1	06:59	1	18:07	1	06:54	1	16:38
17	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
18	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
19	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
20	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
21	0	05:16	/	/	/	/	/	/	/	/	/	/	/	/	/	/
22	1	05:35	1	16:48	1	06:22	1	16:46	1	06:22	1	17:20	0	06:09	0	15:43
23	0	05:25	0	16:34	0	06:16	0	16:37	0	06:15	/	/	/	/	/	/
24	2	05:42	2	16:56	1	06:28	1	16:52	1	06:30	1	17:26	0	06:17	1	15:53

Smell intensity categories:

- 0 -- urine smell cannot be confirmed
- 1 -- urine is smelled slightly, but is certainly detectable
- 2 -- urine smell well detectable but only at close range (i.e. up to 5 cm)
- 3 -- urine smell detected at a distance 5-15 cm
- 4 -- urine smell detected at a distance 15 cm or more

All times in this table are absolute sniffing times (see Methods section).

ID No.	SESSION 38 - 21 May 2018 morning		SESSION 39 - 21 May 2018 afternoon		SESSION 40 - 22 May 2018 morning		SESSION 41 - 22 May 2018 afternoon	
	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time	Smell Intensity	Time
1	/	/	/	/	/	/	/	/
2	/	/	/	/	/	/	/	/
3	/	/	/	/	/	/	/	/
4	/	/	/	/	/	/	/	/
5	0	05:34	0	16:50	0	05:26	/	/
6	/	/	/	/	/	/	/	/
7	/	/	/	/	/	/	/	/
8	/	/	/	/	/	/	/	/
9	/	/	/	/	/	/	/	/
10	/	/	/	/	/	/	/	/
11	/	/	/	/	/	/	/	/
12	/	/	/	/	/	/	/	/
13	/	/	/	/	/	/	/	/
14	0	05:41	0	16:56	0	05:36	/	/
15	0	05:27	0	16:41	/	/	/	/
16	1	05:49	1	17:02	0	05:45	0	16:47
17	/	/	/	/	/	/	/	/
18	/	/	/	/	/	/	/	/
19	/	/	/	/	/	/	/	/
20	/	/	/	/	/	/	/	/
21	/	/	/	/	/	/	/	/
22	0	05:09	0	16:26	/	/	/	/
23	/	/	/	/	/	/	/	/
24	0	05:17	0	16:32	0	05:12	0	16:12

Smell intensity categories:

- 0 -- urine smell cannot be confirmed
- 1 -- urine is smelled slightly, but is certainly detectable
- 2 -- urine smell well detectable but only at close range (i.e. up to 5 cm)
- 3 -- urine smell detected at a distance 5-15 cm
- 4 -- urine smell detected at a distance 15 cm or more

All times in this table are absolute sniffing times (see Methods section).

Figure S2. Discoloration of moss (from green to yellowish or brownish) was observed five days after the deposition of urine. The presented photos were taken in the evening of 8 May 2018 (i.e. 6.5 days after urine deposition).



