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# Are rats able to detect stress odours in chicken droppings?

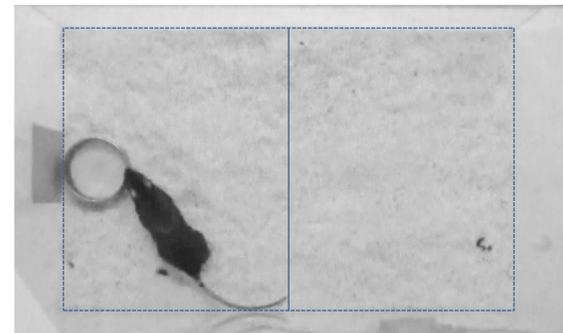


Vincent Bombail<sup>a</sup>, Blandine Barret<sup>a</sup>, Laurence Guilloteau<sup>b</sup>, Christine Leterrier<sup>b</sup>, and Birte L Nielsen<sup>a</sup>

<sup>a</sup> Neurobiologie de l'Olfaction, INRA, Université Paris-Saclay, Jouy-en-Josas, France

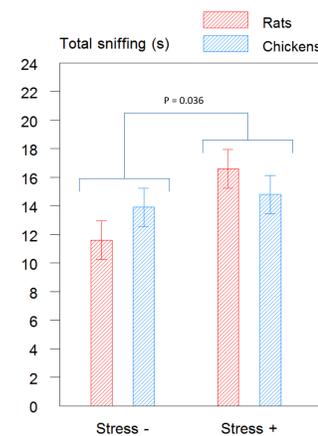
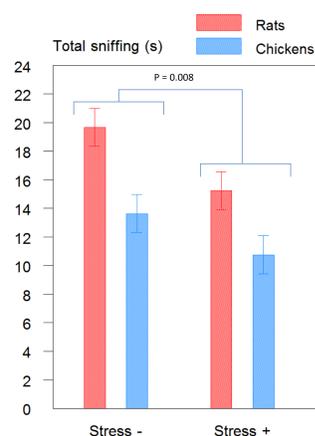
<sup>b</sup> Physiologie de la Reproduction et des Comportements, INRA, Nouzilly, France

- Rats can distinguish between faeces from stressed and non-stressed conspecifics (Valenta & Rigby, 1968; Mackay-Sim & Laing, 1980).
- If they respond in a similar manner to odours emitted by excreta from stressed chickens and rats, this could indicate a specific odorous stress signature, which might be used for non invasive detection of stress levels (e.g. biomarker)
- We used faeces/excreta from stressed rats (chronic variable stress done as part of another experiment) and chickens (24h simulated transport stress), with matched non-stressed control



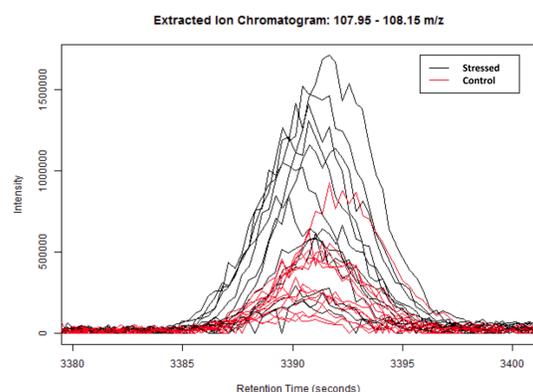
**Test 1.** Male Brown Norway (BN) rats (n=12) were tested for 5 min in a large T-maze (100 x 77 cm<sup>2</sup>) with a perforated metal ball (tea-ball) placed in each arm of the maze. All rats were tested 6 times, with tests 1 and 6 done with empty tea-balls in both arms. In between, each rat was tested twice with rat faeces and twice with chicken excreta. In each test, the two tea-balls contained stressed and control faeces/excreta, always from the same species.

**Test 2.** Male BN rats (n=16) were exposed for 10 min to an odour presented in a container with a perforated lid in a test arena (50 x 25 cm<sup>2</sup>). All rats were tested 6 times, with tests 1 and 6 done with an empty container (no odour). In between, each rat was tested once with each of the four types of excreta/faeces in a Latin square design.



**Results 1.** Rats sniffed the control excreta/faeces longer than they sniffed the stressed excreta/faeces (16.6 vs 13.0 ± 0.92 s; P<0.001). The duration of first sniffing was longer for the rat faeces than the chicken excreta (3.6 vs 2.7 ± 0.31 s; F<sub>1,85</sub>=4.1; P=0.045).

**Results 2.** Rats spent longer in contact with (17.4 vs 13.7 s; P=0.020) and longer sniffing the stressed than the control odours (15.5 vs 12.6 s; P=0.036). The percentage of time spent in the odour half in contact with the odour container was larger for the stressed odours (10.4 vs 7.9%; P=0.028).



**Figure 1.** Zoomed chromatogram from GC-MS analyses of excreta from stressed (black) and control (red) chickens. The area under the peaks indicate the relative abundance of phenylmethanol – a potential candidate for avian stress odour.

## Conclusions

- The two different testing paradigms yielded different responses to stressed excreta/faeces
- However, within each test, the same differences were seen between stressed and non-stressed excreta/faeces independent of species of origin.
- This would indicate that – both in rats and chickens – stress gives rise to specific volatile organic compounds (VOCs).
- A potential candidate molecule is shown in Figure 1

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### References

Valenta JG, Rigby MK (1968). Discrimination of the odor of stressed rats. *Science* 161, 599–601.  
Mackay-Sim A, Laing DG (1980). Discrimination of odors from stressed rats by non-stressed rats. *Physiol Behav* 24, 699–704.