

Book of Abstracts



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SESSION II

PHYSIOLOGY, ETHOLOGY AND INTERACTIONS

Personality and behavioural syndromes in dung beetles: evidence from multiple behaviours in *Copris umbilicatus* Abeille de Perrin, 1901 (Coleoptera, Coprini)

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Although personality studies have primarily focused on vertebrates, the evidence showing invertebrates to be capable of displaying personalities (expressed as the repetition of certain behaviours over time) and behavioural syndromes (a set of correlated behaviours) is steadily growing. Dung beetles have never been considered in this framework, despite having been extensively studied in many fields of ethology, ecology and evolution. In this study, to investigate the possibility of personality and behavioural syndromes in *Copris umbilicatus* – an optimal species model thanks to its subsocial complex behaviour – we analysed three multiple behaviours (activity, thanatosis and distress call emission) which may be differentially expressed as distinct behavioural traits.

We found moderate to excellent levels of repeatability in all behavioural traits considered, indicating individuals to have distinct personalities. Repeatability estimates were noticeably higher in the behavioural traits related to sound emission, modest in traits related to locomotory activity and lower in the trait related to thanatosis. Furthermore, we showed that the duration of thanatosis was negatively correlated with two activity traits, namely 'distance moved' and 'locomotory speed'. This suggests the existence of a behavioural syndrome involving thanatosis and activity, with bolder individuals exhibiting shorter thanatosis and higher locomotor activity, in contrast with fearful individuals which display longer thanatosis and poor locomotor activity. No relationships were found between the behavioural traits and body size or sex. Principal component analysis (PCA), performed on each separate behaviour as well as on all behaviours together, showed a well scattered distribution of individuals across the PCA bi-dimensional space, suggesting that each displays a behavioural mix that distinguishes it from the others. This noticeable difference between individuals, which was not due to differences in sex or body size, could be attributable to differences in personality among individuals.

The study of personality in invertebrates could contribute towards a better understanding of the insect dynamics present in other fields, such as population and community ecology. Personality affects individual fitness, which in turn influences the population growth rate, population stability and resource-seeking dynamics. By consequence, personality may also have different implications in terms of invasion biology, conservation and biological control. Dung beetles provide an impressive variety of ecosystem services. Through the manipulation of livestock faeces for their feeding and nesting processes, dung beetles contribute, first and foremost, to dung removal, but also to bioturbation, nutrient cycling, mineralization processes, plant nutrient uptake and plant growth enhancement, all of which may benefit agricultural and pastoral ecosystems. Since the provision of these services may depend on the personalities represented in local populations and communities, future research might reveal bolder or more active individuals to be those able to remove more dung.

KEY WORDS: distress call, locomotor activity, thanatosis, repeatability, behavioural traits, locomotory arena, sex, body size.

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