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The behavioural and neuroendocrinological mechanisms affecting group formation in the African striped mouse, Rhabdomys

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ABSTRACT

Social systems vary within and between species, resulting in some populations living in complex social groups while others adopt a solitary lifestyle. Social systems are ultimately emergent properties of the interactions and relationships between individuals within a population. Social flexibility (a form of phenotypic plasticity) describes hormonally mediated reversible switches in social tactic in response to prevailing environmental conditions. I investigated the mechanisms underlying social interactions, and ultimately social structure in the striped mouse genus, *Rhabdomys*. It is widespread in southern Africa, occurring along an aridity gradient, which influences the social structure of constituent species. A desert species, *R. pumilio*, switches from group to solitary-living, and I asked whether a solitary-living grassland species, *R. dilectus*, could form stable groups. Four experiments were undertaken. 1) To examine the behaviours underlying group formation initiation, age-matched triads of unrelated, sub-adult conspecific female grassland and desert striped mice were formed in captivity. Nest-cohabitation occurred in all desert and 90% of grassland triads, yet desert triads were more aggressive than grassland triads on initial meeting. Both species spent more time interacting amicably as time in triads progressed. 2) Measurements were taken of circulating corticosterone and testosterone concentrations, and 3) neuropeptide arginine vasopressin (AVP) and oxytocin concentrations in the brain of triads and singly-housed controls. Grassland females in triads had greater corticosterone and AVP concentrations than desert female triads, but levels did not differ between triads and solitary-housed controls of both species; testosterone and oxytocin were unaffected. 4) I experimentally injected females of both species sequentially with a saline control, a low and a high dose of AVP, and measured their social motivation (i.e. propensity to spend time with a conspecific) and recognition of familiar unrelated conspecific females. Exogenously administered AVP enhanced the motivation to be social, by increasing the approaches toward the conspecific by focal females in the high AVP treatment in grassland mice and the low AVP treatment in desert mice. Neither species displayed a preference for an unfamiliar conspecific, but amicability toward familiar females was greater in grassland mice, but decreased in desert mice, under high AVP. Solitary grassland striped mice displayed tolerance of conspecifics, underpinned by different inherent hormonal control. My study has demonstrated that the naturally solitary *R. dilectus* can form similar social groupings to that of the facultatively social *R. pumilio*. Switching between social tactics

might have potential survival benefits in unpredictably changing environments predicted for southern Africa.