
Blood is thicker than water

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Abstract

According to Hamilton's inclusive fitness hypothesis, kinship is an organizing principle of social behavior. Behavioral evidence supporting this hypothesis includes the ability to recognize kin and the adjustment of behavior based on kin preference with respect to altruism, attachment and care for offspring in insect societies. Despite the fundamental importance of kinship behavior, the underlying neural mechanisms are poorly understood. We repeated behavioral experiments by Hepper on behavioral preference of rats for their kin. Consistent with Hepper's work, we find a developmental time course for kinship behavior, where rats prefer sibling interactions at young ages and express non-sibling preferences at older ages. In probing the brain areas responsible for this behavior, we find that aspiration lesions of the lateral septum but not control lesions of cingulate cortices eliminate the behavioral preference in young animals for their siblings and in older rats for non-siblings. We then presented awake and anaesthetized rats with odors and calls of age- and status-matched kin (siblings and mothers) and non-kin (non-siblings and non-mothers) conspecifics, while performing in vivo juxta-cellular and whole-cell patch-clamp recordings in the lateral septum. We find multisensory (olfactory and auditory) neuronal responses, whereby neurons typically responded preferentially but not exclusively to individual social stimuli. Non-kin-odor responsive neurons were found dorsally, while kin-odor responsive neurons were located in ventrally in the lateral septum. To our knowledge such an ordered representation of response preferences according to kinship has not been previously observed and we refer this organization as nepotopy. Nepotopy could be instrumental in reading out kinship from preferential but not exclusive responses and in the generation of differential behavior according to kinship. Thus, our results are consistent with a role of the lateral septum in organizing mammalian kinship behavior.

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