Kin recognition in Lions, Honey bees and Belding's ground squirrels

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Are animals capable of recognizing their relatives? Furthermore, are they able to discriminate between immediate siblings, half-siblings and non-siblings and display favouritism to siblings? I would like to suggest that animals are very much capable of performing this behaviour and they do so using very simple or very complex mechanisms. William D. Hamilton has explained nepotistic behaviour by the inclusive fitness model in which he claims that natural selection favours animals that help relatives because this behaviour ensures a wider transmission of genes, which includes an organisms own genes that are spread by offspring and copies of the same genes spread by reproductive relatives. Animals may identify relatives based on phenotypic or genetic signals. Phenotypic signals may be coming directly from the individual and may include distinct morphological appearances, chemical signals and audio notes. For example, honeybee workers have multiple fathers and one common queen mother, this results in a population of full and half sisters in a colony. The full sisters are able to build an image of themselves during their early learning which they use to discriminate against half sisters. Wayne M. Getz and Katherine B. Smith apply the inclusive fitness theory to demonstrate that workers are capable of establishing genetic cues of recognition which they later use to selectively raise a queen that is completely related to them and hence by doing so they help to propagate their genes. They conducted an experiment in which they proved the genetic basis of recognition between workers descendant from different drones by raising them in the same environment. Since, behaviours have an underlying genetic as well as environmental component; they were able to isolate the environmental effects by raising them on the same brood comb, thus ensuring that the eggs, larvae and pupae developed in the close proximity of cell to cell contact. Next, they removed the bees twenty-four hours before their expected emergence and separated the full sisters from the half sisters and further split the former into groups consisting of ten bees. Individuals from the full sister groups were introduced into the other groups and consequently were not attacked as significantly higher than the half sisters, thus proving the genetic basis of discrimination. On the other hand, a group of scientists from the University of Minnesota found that male lions cooperate and help each other unconditionally. According their theory, the cooperative behaviour of lions has evolved not by kin selection or reciprocity but through mutual understanding. In the wild, male

lions form small coalitions of unrelated individuals to defend a pride of reproductive female. The scientists tested the behaviour and cooperation of lions within the group by threatening them with audio recorded playbacks of roars from other unknown lions thereby creating a natural inter-coalition confrontation scenario. Demographically speaking, the small coalitions which were observed typically consist of unrelated members. Alternatively, Hamilton's inclusive fitness theory would apply to the larger groups which naturally consist of related individuals, since not all of the members will get a chance to mate during their residence. The researchers hypothesized that the benefits of cooperation between male lions should be higher than defecting and thus expected them to collectively approach the threat in order to minimize injuries and maintain the strength and integrity of their breeding territory. They found that male lions did indeed cooperate and the mutual relationship was independent of kinship or reciprocity. On the other hand, it is widely known that Belding's ground squirrels put themselves at great danger when they make alarm calls pertaining to imminent terrestrial predatory responses in order to warm their relatives. Paul W. Sherman concluded that female squirrels behave in a nepotistic way since he found that they call more often than males and are more eager to call when in the presence of relatives. Sherman also conducted a study to determine the type of calls and behaviour of Belding's squirrels towards aerial predators. He wanted to know whether these calls put the squirrels at great danger of being caught and whether they called to alert relatives or to benefit themselves. If the behaviour was biased towards relatives, then Sherman would have expected social females to give more calls than males. However, his data revealed that the whistling behaviour was independent of age, sex or kinship. He observed that the hawks were rarely successful at capturing as soon as the whistles were sounded. Furthermore, he also observed that the squirrels which were farther away from shelter whistled more frequently and the squirrels continued to call and run for cover simultaneously as though wanting to confuse the bird. Finally, Sherman concluded that squirrels whistle to protect themselves because whistling ensures each individuals success by alerting the others to whistle and run and resultantly cause a sense of chaos so that the hawk either gets confused or aborts the hunt due to discouragement. In conclusion, I would like to say that animals do have complex social interactions just like humans, and they are capable of

recognizing relatives as well as think about their own welfare depending on what is best for their survival and reproductive success. A question to tackle is to what extent do the animals use this recognition? In socially possible situations, it is not enough to just use genetic cues, but they must also use sensory cues to judge behaviour, out of which social behaviour may play a greater role than genetics. However the recognition is not complete since if it was then we would expect no altruism between non relatives.

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