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Sex ratio biases in termites provide evidence for kin selection

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Inclusive fitness theory, also known as kin selection theory, is the most general expansion of Darwin's natural selection theory. The idea that relatedness among individuals can drive the evolution of altruism has been the subject of much debate in evolutionary biology. One of the strongest lines of support for this theory comes from female biased investment by female workers in eusocial Hymenopterans where relatedness from the worker to sisters is higher than to brothers. These evidences of kin selection obtained from the studies of eusocial Hymenoptera are attributed to their special genetic system 'haplodiploidy'. Therefore, such a strong test of the theory has proven difficult in diploid social insects because they lack such relatedness asymmetry. Here we show that kin selection can result in sex ratio bias in eusocial diploids. Our model predicts that allocation will be biased toward the sex that contributes more of its genes to the next generation because of sex-asymmetric inbreeding over generations such as mother-son mating. Prediction of the model matches well with the empirical sex allocation of *Reticulitermes* termites. In *R. speratus*, *R. virginicus* and *R. lucifugus*, queens produce replacement queens asexually but use normal sexual reproduction to produce the other castes including replacement king, which results in mother-son inbreeding. Thus, the genes of primary queens were more transmitted to the next generation than that of primary king. In these three species, the sex allocations were significantly female biased while other non-parthenogenetic species (*R. flavipes*, *R. okinawanus* and *R. yaeyamanus*) showed equal allocations. These results suggest that kin selection is an important force in both diplodiploid and haplodiploid organisms. Previously, the validity of inclusive fitness theory has relied merely on the empirical studies of haplodiploid organisms. Our findings open broad new avenues to test inclusive fitness theory beyond the well-studied eusocial Hymenoptera.