

OR303

Genomics of caste determination and social parasitism in harvester ants

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Reproductive division of labor is the core element of eusociality and it evolved via the canalization of two (at least) female developmental pathways, one for queens and one for workers. The genes that regulate the bifurcation of these developmental pathways are key regulators of social organization, and potentially involved in the evolution of eusociality. We use the *Pogonomyrmex* genetic caste determination system to map out the timing of developmental differentiation of queens and workers during larval development. We couple development with comparative genomics on the hybridizing species from which the genetic caste determination system evolved in order to look for developmental genes that associate with caste determination. Lastly, we use comparative genomics to examine the consequences of losing the worker caste, which has occurred in two social parasites that are part of the same species complex. Using the social parasites we are able to ask whether genes involved primarily in worker development are lost as part of the evolution of parasitic specialization and the loss of the worker developmental pathway? In summary, our goal is to find genes that are essential for eusociality, at least in harvester ants, and then see what happens to these genes when social parasitism causes a reversion from eusociality. We suspect our findings will have broad relevance to the study of phenotypic plasticity and social evolution.