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Changing Dominance Hierarchies: Competition between Dictyostelium discoideum in the Vegetative State

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Dictyostelium discoideum is an excellent model for studying cooperation and conflict. When these amoebae starve, they aggregate to form a multicellular slug then a fruiting body. *D. discoideum* genotypes compete for space in the fruiting body, which contains reproductive cells, and avoid forming the stalk cells, which will die. Most studies have focused on competition when these amoebae aggregate and become multicellular, however, they spend most of their life in the unicellular stage. Therefore, it is necessary to develop techniques to study interactions during the relatively understudied unicellular, vegetative state.

The sex locus for *D. discoideum* provides a stable genetic marker to identify a clone. By taking advantage of distinct regions within the sex locus, I have developed quantitative PCR assays to track and quantify *D. discoideum* clones in mixed genotype interactions. Previous studies found a linear dominance hierarchy among *D. discoideum* clones during their multicellular phase. Clones at a disadvantage in the multicellular stage may have advantages at other stages, which could explain how this linear dominance hierarchy is stable. Therefore, competition experiments are underway to determine whether the same dominance rankings are evident earlier in the lifecycle. Preliminary results suggest that there is competition between clones in the vegetative stage and dominance rankings differ from those previously found. In a 50:50 mix during the vegetative state, a clone previously ranked last outcompeted a clone previously ranked fourth. We calculated relative fitness and found a range of 0.54 to 1.04 meaning that all clones except for one were negatively impacted by the presence of a competitor. Additional competition experiments are being conducted for a complete comparison to the previously constructed multicellular dominance hierarchy. These shifting competitive advantages provide insights into how competition changes across different lifecycle stages and could explain how the diversity observed among *D. discoideum* is maintained.