Abstract of the Dissertation

The Population Ecology of Clonal Growth in the Herb *Potentilla simplex*

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Modular iteration, or clonal growth, is one of the mechanisms by which reproduction occurs in many plant, animal and microbial taxa. This dissertation analyzes the benefits of clonal growth in the capture of space and persistence in heterogeneous habitats, using the perennial stoloniferous herb *Potentilla simplex*. In many modular clonal species the capture of space is aided by the physiological linking of individual modules (ramets) to form an integrated unit. An experimental study in the glasshouse established that ramets of *P. simplex* are indeed physiologically integrated. Ramets growing in favorable microsites shared resources with those growing in poor microsites. However, it was also discovered experimentally, in a field setting, that these ramets do not remain integrated throughout their lifetime, but can attain independence within 3-6 weeks after establishment. *P. simplex* ramets are independent at two levels; those on individual stolons that form integrated units, and interdependent ramets on a single stolon that become autonomous over time. This dynamic process of ramet interdependence and independence may enhance the ability of clones to respond locally to conditions experienced by clone parts without compromising the performance of the entire clone. Another

experimental study in the glasshouse tested the hypothesis that physiological integration was most advantageous in a heterogeneous environment. The results indicate that the benefits of physiological integration increased with increasing patchiness of the habitat. It facilitated capture of space by increasing the lateral spread and mobility of clones. This is of significance in community interactions such as site preemption and interference competition. Increased mobility suggests that physiological integration may allow this species to maximize its foraging ability and resource acquisition in a patchy habitat. A demographic analysis of a natural population of *P. simplex* in a successional old field revealed that the survivorship of a clonal family (ramets known to be from one genet) increased with the addition of independent ramet components, implying that the risk of family extinction was spread among the members. Ramet multiplication also increased the space captured by this plant and the dispersal of clones from the point of origin, potentially enabling clones to move away from locally unfavorable conditions.