Different paralogs may control somatic cell development in *Volvox powersii* and *Volvox carteri*

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Abstract:

The evolution of somatic cell differentiation represents a critical step in the major evolutionary transition from unicellular to multicellular life. The volvocine green algae provide an excellent model system for studying the evolution of cellular differentiation because member species span a range of complexity from single-celled, to multicellular with two specialized cell types. Previous research[1] revealed that the *regA* gene, which encodes a putative transcription factor, controls somatic cell differentiation in the multicellular volvocine alga *Volvox carteri*. A mutation leading to loss of a functional *regA* gene product results in *V. carteri* colonies developing a characteristic regenerator phenotype where somatic cells become de-differentiated. The *regA* gene is a member of a tandem duplication of paralogs known as the *regA* cluster which arose early in the evolution of multicellularity in the volvocine green algae and is present in all Volvocacean species which differ in cell number, complexity, and developmental program[2]. However, the functional role of the *regA* gene and related *regA* cluster genes in species other than *V. carteri* is not known. I will describe the identification of a putatively causal mutation in the *regA* cluster gene, *rlsB*, of a regenerator-like mutant of *Volvox powersii*[3]. The developmental program of *V. powersii* is thought to be more ancestral than *V. carteri*. In *V. carteri*, germ cells and somatic cells are specified by an asymmetric division during embryogenesis that creates large germ-progenitor cells and small soma-progenitor cells. This asymmetric division is a derived developmental character only seen in *V. carteri* and its closest relatives, but is absent in *V. powersii* and most other volvocine species. Thus, understanding the genetic basis of somatic cell development in *V. powersii* will improve our understanding of the evolution of somatic cell development in the volvocine green algae. Furthermore, the finding that *rlsB* may control soma in *V. powersii* indicates a possible history of subfunctionalization or independent co-options for *regA* cluster genes during the evolution of soma.

References:

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