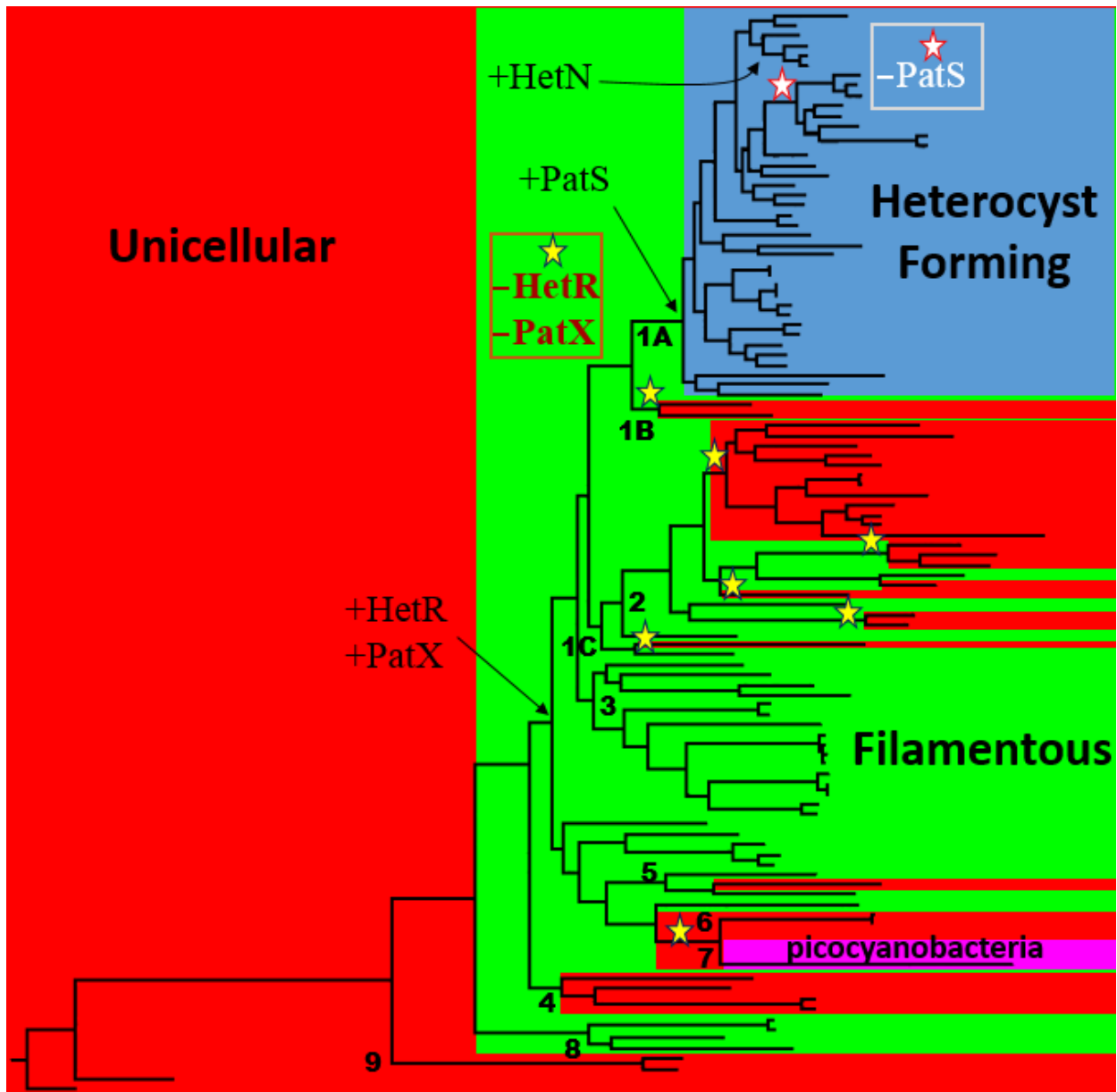


## Graphical Abstract



The development of spaced nitrogen-fixing cells (heterocysts) by multicellular cyanobacteria provides perhaps the simplest system through which to study intercellular signaling and patterned differentiation. We found that a pair of proteins that may interact to regulate heterocyst development and pattern formation evolved long before the invention of these specialized cells, near the advent of multicellularity itself.