

# The genome sequence of the colonial chordate, *Botryllus schlosseri*

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## Abstract

*Botryllus schlosseri* is a colonial urochordate that follows the chordate plan of development following sexual reproduction, but invokes a stem cell-mediated budding program during subsequent rounds of asexual reproduction. As urochordates are considered to be the closest living invertebrate relatives of vertebrates, they are ideal subjects for whole genome sequence analyses. Using a novel method for high-throughput sequencing of eukaryotic genomes, we sequenced and assembled 580 Mbp of the *B. schlosseri* genome. The genome assembly is comprised of nearly 14,000 intron-containing predicted genes, and 13,500 intron-less predicted genes, 40% of which could be confidently parceled into 13 (of 16 haploid) chromosomes. A comparison of homologous genes between *B. schlosseri* and other diverse taxonomic groups revealed genomic events underlying the evolution of vertebrates and lymphoid-mediated immunity. The *B. schlosseri* genome is a community resource for studying alternative modes of reproduction, natural transplantation reactions, and stem cell-mediated regeneration.

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The tunicates are an evolutionary group that includes species such as sea squirts and sea tulips. Their name comes from the structure known as a ‘tunic’ that surrounds their sac-like bodies. As marine filter feeders, tunicates obtain nutrients by straining food particles from water, and they can live either alone or in colonies depending on the species. Charles Darwin suggested that tunicates may be the key to understanding the evolution of vertebrates, and indeed today they are regarded as the closest living relatives of this group.

Colonial tunicates can reproduce either sexually, or asexually by budding. Compatible colonies have the ability to recognize one another and to fuse their blood vessels to form a single organism, whereas incompatible colonies reject one another and remain separate. This recognition process bears some resemblance to the rejection of foreign organ transplants in mammals.





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