Possible link to evolutionary development of the neural crest found in sea squirt tadpole

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(Phys.org)—A team of researchers affiliated with New York and Dalhousie Universities, in the U.S. and Canada respectively, has found a possible intermediate cell type that might help understand the evolutionary process that led to the development of the neural crest. In their paper published in the journal *Nature*, the team describes their study of sea squirt tadpole neural development and the similarities they found with the neural crest. Marianne Bronner, with the California Institute of Technology offers some insight into the work done by the team in a News & Views piece published in the same journal issue.

The neural crest is group of cells that come to exist in the central nervous system of developing vertebrates—they eventually diverge and go on to become different cell types that form different body parts, such as cartilage, bone, and pigment cells in the skin. A lot of study has been conducted on the neural crest because many in the field believe its development led to the dominance of those that have it. Despite such study, no intermediary cells have ever been found in other species, which means there is little evidence of how it came to evolve to its current state. In this new study, the researchers looked at the developing sea squirt because it possesses bipolar tail neurons that they claim have some similar traits to the neural crest.

To be a precursor, or at least a relative of the neural crest, cells would have to demonstrate three distinct traits; differentiating into other cell types, an origin in the central nervous system and migratory behavior. In studying cells found in the invertebrate, *Ciona intestinalis* tadpoles, the

researchers report that they do originate in the central nervous system, they do migrate and they do differentiate into other cell types. In addition, they found that some of the cells differentiate into cells that are similar to sensory neurons in vertebrates. But, does this mean that the neural crest evolved from creatures similar to the modern sea squirt? The researchers do not try to answer that question, instead they note that there are differences too, such as the fact that not all of the bipolar tail neurons express all of the genes that are expressed by the neural crest, though that could indicate they are an intermediary. It is also not clear, Bronner points out, if the networks that regulate genes are similar.