

*Salpa thompsoni* life cycle: new insights and implications for the Southern Ocean biological pump

Evgeny A. Pakhomov<sup>1,2</sup>, Brian P.V. Hunt<sup>1,3</sup> and Volker Siegel<sup>4</sup>

1. Department of Earth, Ocean and Atmospheric Sciences, University of British Columbia, Vancouver, BC, Canada

2. Institute for the Oceans and Fisheries, University of British Columbia, Vancouver, BC, Canada

3. Hakai Institute, Heriot Bay, BC, Canada

4. Sea Fisheries Institute, Hamburg, Germany

Abstract

The accepted life cycle of the pelagic tunicate *Salpa thompsoni* is largely based on the samples collected during the Discovery Expeditions in the beginning of the last century. Analyses of historic and current data have suggested a long-term southward shift in the salp distribution with a subsequent decline of the Antarctic krill population. Previous works have shown that the reproduction of salps may be inhibited at low temperatures (high Antarctic), and there is a question as to how the life cycle of *S. thompsoni* may have been altered during this southward shift. Samples of *S. thompsoni* were collected using RMT-8 trawls onboard the RV *Polarstern* mainly during two 2013 voyages: ANT XXIX/3 conducted in February-March and ANT XXIX/7 carried out in August-October. This sampling provided a unique opportunity to study the life-cycle of salps in the same area across different seasons. Although *S. thompsoni* was largely absent in the coldest waters during summer and fall, it was sampled at > 90% stations during winter. Salp densities were on the lower side of those recorded north of the ice edge zone. An unusually early spawning of *S. thompsoni* was observed in the northern Weddell Sea during winter leading to a population consisting of specimens at a very advanced maturity stages. It appears that relationships of salp development to temperature and Chl-*a* concentrations require re-evaluation. An alternative life strategy is proposed for *S. thompsoni* in the ice covered and marginal ice zones and implications to the Southern Ocean biological pump are discussed.

Key words: *Salpa thompsoni*, pelagic tunicates, biology, life-cycle, Southern Ocean

Contact author: Evgeny Pakhomov, [epakhomov@eos.ubc.ca](mailto:epakhomov@eos.ubc.ca), Department of Earth, Ocean and Atmospheric Sciences, University of British Columbia, Vancouver, BC, Canada