

Graduate Student Project: The molecular basis for ammonia transport in invertebrates

A graduate student (MSc or PhD) position is available to conduct research on ammonia transport and ammonia toxicity in aquatic invertebrates employing a combination of physiological, immunohistochemical and advanced molecular biological techniques including Real-Time quantitative PCR, functional protein expression analysis and gene knock-out by RNA interference (RNAi).

Ammonia is a highly toxic waste product from protein metabolism. Among a variety of other toxic effects ammonia affects the membrane potential of neurons and elevated ammonia levels in mammals have been related to brain swelling (Alzheimer Type II astrocytosis) due to toxic accumulation of glutamine in astrocytes, which leads to cell swelling and cell death. In aquatic invertebrates, where ammonia is not transformed into less toxic molecules but excreted directly, an effective excretion system is *essential* to keep cellular and body fluid ammonia levels within a tolerable range and therefore maintain cellular functions. Although the toxicity of ammonia is well known, only very recently it has been discovered that there are specific proteins (members of the Rhesus protein family) through which molecular ammonia can cross the epithelial layer of an excreting tissue.

One focus of the study will be to investigate the particular role of these Rhesus-related proteins in the ammonia excretion process and its regulation using crustaceans or other aquatic invertebrates as model systems. The importance for gaining knowledge in this subject is given by its direct relevance in the medical field and for economical applications such as aquaculture where ammonia management is crucial.

The study is very intensive with respect to molecular biological methods and experience in some of these techniques is required. Communications skills (English speaking and writing) are essential. Basic stipendiary support is available and the student will be expected to apply for independent scholarship funding. The opportunity will be given to present data of the study on national and international conferences. Selection will be based on academic achievements, reference letters and previous research experience. For additional information, please contact Dr. Dirk Weihrauch via email: Weihrauch@cc.umanitoba.ca