

Svärdh, L. Histological and parasitological studies of the blue mussel *Mytilus edulis* L.. Department of Marine Ecology, Tjärnö Marine Biological Laboratory, SE 452 96 Strömstad.

Abstract: In environmental monitoring programs chemical analysis of marine organisms, water and sediment indicate the concentrations of identified pollutants. However, chemical concentrations do just indirectly reveal health of various organisms. A more direct assessment of organism health is to use histopathology to unveil sublethal effects of contamination on particular organisms. Histopathological studies of the blue mussel, *Mytilus edulis*, may be used to assess biological effects of human contamination of coastal waters. However, to fully reach this goal, better knowledge of the mechanisms that could affect the tissues of mussels must be gained. Moreover, histological studies add complementary information to ecological studies of mussel populations.

Histological changes of mussel tissue occur owing both to internal processes, such as the reproductive cycle, and to external factors, such as, anthropogenic contamination, salinity and parasites. In this thesis I show that interactions between several factors (external and internal) affect the variation in tissue structure during the life of mussels. A focus is also to test whether it is possible to relate the level of the immune defence (i.e. the production of hemocytes) or the prevalence of parasites to variation in external biotic and abiotic factors.

I found that, when using histological methods to assess effects of contaminants, variation in several natural factors may interact with effects of anthropogenic factors, which limits the usefulness of histological changes as a direct indicator of environmental pollution. However, my result indicates that so called granulocytoma (clusters of granular hemocytes) found in mussels from impacted sites, could be a possible indicator of industrial impact.

The larval stage of a bird parasite, the trematode *Renicola roscovita*, has a complicated life cycle and the first intermediate host is a snail. Larvae are released from snails and inhaled into mussels where they encapsulate in the tissue. I found labial palps of mussels to be filled with the metacercariae of this parasite and such a heavy parasite load is likely to interfere with food uptake. The degree of parasite infection decreases rapidly, however, with distance to rocky shore populations of the snail (*Littorina* spp.), and mussel populations (e.g. rope cultured mussels at >50 m from rocky shores) are not likely to be affected seriously by this parasite.

The flesh weight of the mussels varies with the phase of the reproductive cycle. Therefore, it is important for mussel farmers to know the timing of this cycle. When food is available, glycogen is synthesized in special storage cells in the mussel mantle. The glycogen is later used in the build up of gametes (the gametogenesis). I found a strong correlation between glycogen content and different stages in the reproductive cycle of mussels from Swedish populations of *Mytilus edulis* and from a Spanish population of *Mytilus galloprovincialis*. Thus, the glycogen content of mussels might be used as an indicator of the reproductive cycle and indicate optimal time of harvest. Moreover, the glycogen content also indicates spatial and temporal variation in food availability. To study this relationship in more detail requires probing of individual mussels repeatedly over time. I explored different techniques for tissue sampling without killing the mussels and found some that were possible to use for this purpose. These techniques might also be valuable for sampling endangered species of mussels.

Keywords: anthropogenic, aquaculture, blue mussel, cercaria, contamination, disease, drilling, environment, glycogen, granulocytoma, health condition, hemocyte, histopathology, life cycle, *Littorina* spp., metacercaria, monitoring, *M. edulis*, *M. galloprovincialis*, parasite, *Renicola roscovita*, reproduction, salinity, season, sporocyst, tissue, toxin, trematode.

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