



INSTITUTIONEN FÖR BIOLOGI
OCH MILJÖVETENSKAP

Masters presentations in biology

January 2021

Schedule & abstracts

Monday January 11

ZOOM

- 8.30 **Billie Julien** (Physiology & cell biology 60 hp)
The effect of benzbromarone on the activity of interstitial cells of Cajal in the fish gut
Opponent: Rasmus Lindblad
- Ca. 9.30 *Break*
- 11.00 **Andrea Albeck** (Conservation biology, 60 hp)
BUZZY IN THE CITY – investigating exploitative competition between managed honeybees and wild bees in the city of Gothenburg
Opponent: Ellinor Delin
- Ca. 12.00 *Lunch break*
- 13.00 **Jeanette Ågren** (Biodiversity & systematics, 45 hp)
A molecular survey of *Ulva* in Scandinavia – Expected and observed diversity and distribution
Opponent: Andrea Albeck
- Ca. 13.50 *Short break*
- 14.00 **Rasmus Lindblad** (Conservation biology, 60 hp)
Does fake grass make an eel pass? Investigating the impact of water flow rate and eel size on the efficiency of three different passage solutions
Opponent: Jeanette Ågren

Welcome!

Abstracts

The effect of benzbromarone on the activity of interstitial cells of Cajal in the fish gut

Billie Julien (Physiology & cell biology 60 hp)

Supervisor: Catharina Olsson, Biological & Environmental sciences, GU

Examiner: Kristina Snuttan Sundell

Contractions and relaxation of gastrointestinal smooth muscle are directly controlled through the enteric nervous system as well as the interstitial cells of Cajal (ICC). At least in mammals, the ICC network generates slow waves which propagate along the gastrointestinal tract, acting as pacemaker while neural activity modifies frequency and amplitude. This study utilised *in vitro* smooth muscle strip preparations to explore the effect of benzbromarone, which acts as a blocker for the Ano1-channel thereby inhibiting the ICC activity, on gastrointestinal contractions in rainbow trout (*Oncorhynchus mykiss*) and shorthorn sculpin (*Myoxocephalus scorpius*). Benzbromarone. In addition, immunohistochemistry with antibodies against Ano1 and the neural markers was used to identify the presence and distribution of ICC. A network of Ano1-immunoreactive fibres and cell bodies were found within the myenteric plexus. Benzbromarone affected both endogenous contractile activity and carbachol-induced contractions, although the results exhibit a bit of ambiguity. The endogenous contractile activity exhibited a mostly biphasic response with a disappearance of regularity in frequency, while cholinergic induced contractions demonstrated a decrease in amplitude. These results corroborate the presence of ICC within the myenteric plexus of the gastrointestinal tract in teleosts, highlighting regional differences and supporting ICC to play a role in both pacemaker activity and mediating neurotransmission.

Does fake grass make an eel pass? Investigating the impact of water flow rate and eel size on the efficiency of three different passage solutions

Rasmus Lindblad (Conservation biology, 60 hp)

Supervisor: Johan Höjesjö, Biological & Environmental sciences, GU

Examiner: Lotta Kvarnemo

Migration is a central part of the lifecycle for many fish species, allowing access to areas necessary for reproduction and/or feeding areas. Modern infrastructure such as dams and hydropower plants pose a great threat to many fish species that need freshwater streams to reproduce. Fish passages are fitted to some dams and hydropower plants to facilitate fish migration, but the effectiveness of these passages vary. The critically endangered European eel spawn in the Sargasso Sea and migrate as juveniles to freshwater lakes where they grow and develop until they transform and migrate back to the sea. The eel is on the verge of extinction partly due to migration barriers in rivers. The aim of this study is therefore to under controlled laboratory conditions, investigate how artificial ramps fitted with three different substrates might facilitate upstream migration in juvenile eels at different flow rates and for different sizes of eels. Overall, 64 % of the eels succeeded to climb any of the substrates. At lower flow rates (0.05 and 0.1 l/s) both sizes of eels preferred the ramp with small studs ("EF-16"), over both the artificial turf and the ramp with large pillar-like studs from Milieu Inc. At a higher flow rate (0.25 l/s) the preference shifted towards artificial turf. Smaller eels were generally less likely to use the passages at higher flow rates, possibly because of physical

limitations. Eels choosing the passage with pillar-like studs were larger in general. However, this might have been due to smaller eels preferring the other solutions. This study highlights the importance of choosing the right type of eel passage and tuning the water flow rate to get the most efficient eel passage depending on the size of the eels present at the migration barrier.

#european eel #passage solutions #fishway #migration barriers #hydropower #elvers

BUZZY IN THE CITY – investigating exploitative competition between managed honeybees and wild bees in the city of Gothenburg

Andrea Albeck (Conservation biology, 60 hp)

Supervisor: Åslög Dahl, Biological and Environmental Sciences, GU

Examiner: Johan Höjesjö

Wild pollinator-habitats decrease due to habitat destruction and agricultural modernization, making urban green areas increasingly interesting in terms of conservation biology. In Sweden, one third of the wild bee species are red-listed, and it is highly important to optimize conservational efforts. Parks and gardens often provide high plant-biodiversity and long flowering periods, making them suitable bee-habitats. However, urban beekeeping has become more and more popular and many European cities have reported high increases of managed honeybees. Researchers are now worried that the managed bees will exert an exploitative competition-pressure under high density beekeeping, as revealed in a number of studies. In this study, I therefore aimed to investigate if increasing numbers of managed honeybee-colonies influenced wild bee occurrence in the city of Gothenburg (the second largest city in Sweden). The study was conducted during the summer, investigating: wild bee visitation rates in relation to honeybee-colony density, seasonal effects on visitation rates and plant-pollinator network structures. Six different sites with honeybee-colony densities ranging from 3 to 23 colonies (within a 500-meter radius) were investigated at twelve occasions. I found a negative correlation ($r_s = -0.42$, $n = 216$) between the visitation rate of wild bees and the density of honeybee-colonies within a 500-meter buffer zone. A seasonal effect was detected ($\chi^2(11) = 22.85$, $p = 0.0186$, $W = 0.346$) on wild bee visitation rate, possibly connected to shifts in pollen-hosts. Further, interaction evenness (IE: 0.65-0.50) and network structures were less balanced on sites with high numbers of honeybee-colonies and low resource-availability. Wild bee-activity seemed to decrease in buffer-zones with high numbers of honeybees and low resource-availability. Thus the study-results agree with previous studies conducted in different countries and environments. Moreover, high resource abundance seems to be an important factor in preventing competition and increasing bee-biodiversity. With this knowledge, one can design guidelines to make future collaborations between beekeeping and conservation biology more feasible.

Keywords: exploitative competition, wild bees, managed honeybees, pollinator-conservation, urban beekeeping

A molecular survey of *Ulva* in Scandinavia – Expected and observed diversity and distribution

Jeanette Ågren (Biodiversity & systematics, 45 hp)

Supervisor: Sophie Steinhagen, Marine Sciences, GU

Examiner: Bengt Oxelman

The species composition and distribution of marine green macroalgae in Scandinavia are poorly understood as historical records are based on morphological characters which are unsuitable to identify many species. This is especially true of the ecologically and economically important genus *Ulva*, the taxonomy and systematics of which have been rewritten with the use of molecular methods. Additionally, the European seaweed industry purports to sell species which are likely misidentified. To investigate the diversity, distribution and systematics of *Ulva* in Scandinavia, ca 500 specimens of green macroalgae were collected along the coasts of Sweden, Norway and Denmark in the summer months of 2020 during the peak of green algae vegetation. Specimens or sequences from biomass sold by three European companies were also obtained. After genomic DNA extraction, the plastid *tufA* gene was amplified and sequenced, followed by Maximum Likelihood phylogenetic analysis. *tufA* barcoding was effective in identification of *Ulva* spp. However, all taxa could not be delimited to species level, and the method is limited both by a lack of reference sequences and misidentification of voucher material. The results were compared with and found to differ from historical species inventories and distribution records. Fewer and different species were detected, including at least three introduced species identified in this study and related field collections. The distribution of *U. fenestrata* (previously known as *U. lactuca*) was different from historical records, in part due to salinity related morphological variation of *U. compressa*, which has led to past misidentifications. *U. laetevirens* is likely a common species sold in Europe, both harvested from the wild and cultivated. More data is needed to confirm and expand upon the results regarding species occurrences and distributions. On a larger scale, the taxonomic information in online repositories needs to be updated and expanded with new and more reliable reference sequences.