



Välkomna till redovisningar av Kandidatarbeten 25 augusti 2022

Welcome to oral presentations of Bachelor projects 25 August 2022

Lokal/Venue: Föreläsningssalen, Zoologen, Medicinaregatan 18A, Göteborg.

Alla är välkomna att delta på plats/Everyone is welcome to attend!

Zoom-länk för handledare, studenter, familj & vänner, som vill lyssna men inte kan närvara på plats/Zoom-link for supervisors, students, family & friends that want to listen, but are unable to attend in person: <https://gu-se.zoom.us/j/68327883904>

	namn	hp	titel	examinator	handledare	biträdande/extern	opponent
8.15-8.45	EDITH ASPELIN	30	The influence of tundra vegetation on soil temperature	Johan Uddling	Anne Bjorkman		Niklas Aglad
8.45-9.15	LISA CARLSSON	30	Black and round gobies: An experimental study of habitat choice and resource competition	Johan Höjesjö	Lotta Kvarnemo	Ola Svensson, Leon Green	Violetta Chernoray
9.15-9.45	MAJA LAGERVALL	30	Vem vinner räkan? - En beteendestudie mellan den invasiva svartmunnade smörbulten och den inhemska svarta smörbulten	Johan Höjesjö	Leon Green		Ida Vartia
Fika							
10.15-10.45	SIMON ISAKSSON	30	Potentialen för säl-fies - En utvärdering av foto-identifiering som metod för att estimerar sälpopulationer	Johan Höjesjö	Karin Hårding		Edith Aspelin
10.45-11.15	KIM ALMBRATT	30	TBA	Staffan Andersson	Johan Höjesjö		Lisa Carlsson
11.15-11.40	ANDERS BACKESTEDT	15	Tillväxt hos naturvärda ekar i Gunnebo	Håkan Pleijel	Frank Götmark		Maja Lagervall
Lunchrast							
13.00-13.30	VIOLETTA CHERNORAY	30	On the road again – Homogenization of plant species and their traits	Åslög Dahl	Anne Bjorkman	Jonas Lembrechts, Jan Clavel	Simon Isaksson
13.30-14.00	NIKLAS AGBLAD	30	Evaluation of heat treatment as a method to remove biofouling in oyster aquaculture	Sam Dupont	Åsa Strand	Anna-Lisa Wrangle	Kim Almbratt
14.00-14.30	IDA VARTIA	30	Investigating the toxic and acidifying effect of scrubber effluent on green sea urchin larvae	Lisa Jönsson	Sam Dupont	Kerstin Magnusson	Anders Backstedt
14.40-15.10	Lotta Kvarnemo		Information om slutfasen för redovisande studenter				

Notera att språk i titel och sammanfattning anger redovisningsspråk.

Please note that the language in title and abstract reflects the language it will be presented in.

Sammanfattningar i bokstavsordning/Abstracts in alphabetical order

Evaluation of heat treatment as a method to remove biofouling in oyster aquaculture

Niklas Agblad

Aquaculture is a growing business in various parts of the world, Sweden included. As the commercial use of oysters increases, so does its demand. Farmers will need to produce a high quality product that is appealing to the customer and cost-effective for the farmer. One major issue for farmers is biofouling, as unwanted organisms settle and grow on the oysters, lowering their value and quality. This thesis explored a method for reducing population growth in a group of biofouling organisms, the calcifying tubeworms. The method included using a heated sea water treatment, in which the oysters are dipped into heated water for a short time period. Included in the experiment is the Swedish native oyster *Ostrea edulis* and the invasive species *Magallana gigas*. Due to its invasive status, *M. gigas* is prohibited to culture in Swedish water. The demand from the market has farmers wanting a legislation change, therefore its inclusion in this thesis was relevant. Using a range of temperatures based on previous successful studies on blue mussels, tests were conducted to see if the method can be applied to oysters too and if so, how the two different species differ in tolerance to stress from the heat treatment. Tubeworm mortality was also tested separately. The results indicate that *M. gigas* has a higher tolerance towards the stress from heat treatment while the mortality of *O. edulis* significantly increased with temperature. Alongside a surprisingly low threshold for high mortality in tubeworms, a conclusion was made that the method is applicable to Swedish aquaculture, but the method must be optimized further to suit our native species to yield an effective result with low oyster mortality.

The influence of tundra vegetation on soil temperature

Edith Aspelin

The arctic has experienced more rapid climate warming and is more sensitive to temperature changes compared with the rest of the world. We can already see how vegetation distributed across the arctic tundra has changed in composition, height, and abundance. It's not only that climate can change the vegetation; it has also been shown that the vegetation can have an impact on the climate and global warming through buffering effects on soil temperatures. This study aimed to investigate what influence alpine vegetation has on tundra soil temperatures by comparing the temperature difference between the vegetation canopy (representing the air temperature) and the soil and ground in places with different amounts and types of vegetation, during the summer and winter season separately. 64 stations (plots) were installed on the tundra around Latnjajaure field

station in northern Sweden with equipment to measure temperatures. A vegetation survey was performed at every plot to document vegetation cover and the types of species present. It was hypothesized that plots with more vegetation cover would have higher soil temperatures. The coverage of shrubs in the plot showed a significant effect on the soil temperature in the summer, a higher coverage correlated with lower soil temperatures, but the same effect was not seen in surface temperatures. The abundance of moss in the plot had a significant effect in the winter season; more moss correlated with higher soil and ground temperature compared to air temperatures. The amount of bare soil also showed significance where more bare soil correlated with lower soil temperatures. This study supports the claim that alpine vegetation significantly influences the soil temperatures on the tundra and the suggestion that vegetation change could influence the speed of permafrost thaw and thereby greenhouse gas emissions.

Tillväxt hos naturvärda ekar i Gunnebo

Anders Backestedt

Gamla ekar (*Quercus sp*) har närmare 2000 arter knutna till sig varav ca en tredjedel är rödlistade och några unika till just ek. Detta till följd av ekens speciella barkstruktur, håligheter och förmåga att bilda mulm. Detta gör gamla ekar till väldigt värdefulla individer för den svenska mångfalden, men trots det så visar pollenanalyser att eken minskar i dom svenska landskapen till följd av skogsbruk och förändrad markanvändning inom jordbruket. Naturvårdsverkets åtgärdsplan för särskilt skyddsvärda träd innefattar dom flesta äldre ekarna i Sverige, i Gunnebos kulturreservat som ligger i västra Götalandsregionen finns ett stort antal ekar som faller under åtgärdsplanen. Detta projekt har åter inventerat 45st naturvärda ekar i Gunnebo som inventerades 2010 i syfte att ta reda på vilka parametrar som påverkar gamla ekars tillväxt och kondition. Ekarnas diameter mätes, andelen döda grenar räknades, kronkonkurrens och rotkonkurrens mätes, detta var dom parametrarna som användes 2010 och som kunna påverka ekarnas tillväxt, dessutom gjordes en enklare inventering för att kolla eventuell nyrekrytering i området alla ekar mellan 1–3 m noterades som rekryter och mindre ekar som skott. En multipel regressionsanalys genomfördes för att försöka förklara parametrarnas effekt på ekarnas tillväxt vilket gav resultatet att varken kron eller rotkonkurrens hade någon signifikant effekt på tillväxten, men att det finns en stark trend att mängden döda grenar hos ekarna hade en negativ effekt på tillväxten. Förklaringsvariablerna kunde bara beskriva 14,2 % av tillväxtens varians vilket innebär att andra parametrar än dom som testades i detta försök också påverkar ekarnas tillväxt.

Black and round gobies: An experimental study of habitat choice and resource competition

Lisa Carlsson

The introduction of new species is a forever fascinating subject in the interest of the wellbeing of our ecosystems. When a new species is established it could lead to

consequences for the already existing species, both negative and positive. Black goby, a native species to the Swedish west coast, has for the past decade shared their waters with an invasive species, round goby and the repercussions are not yet known. The aim of this study was to investigate the interspecific and intraspecific interactions of black goby and round goby. Is there a preference for a specific habitat and do their behaviour change when there is a resource present? Two individuals were put together in an aquarium, either in company with their own species or the other. The experiment was divided into three steps based on what was to be investigated; 1. Habitat choice 2. Food competition, 3. Shelter competition. The number of interactions in each step did not change between the treatments, however there were more interactions when there was food present in the intraspecific treatments, compared to when there was not. Moreover, black gobies were on average faster on interacting with the food than round gobies. Furthermore, round gobies preferred eelgrass when housed with a round goby and the pipe when housed with a black goby. In conclusion, the behaviour of round gobies changed in the presence of a black gobies when it comes to habitat preference, but not in willingness to interact with another individual. Black gobies displayed the same behaviour in the presence of a round goby as a black goby. They did demonstrate other behaviours in the storage tanks, like laying eggs and acting defensive towards other black gobies in the same shared tank.

On the road again – homogenization of plant species and their traits

Violetta Chernoray

Habitat conversion and anthropogenic disturbances greatly affect biodiversity and species distribution. A very common anthropogenic disturbance, that can be seen almost everywhere, is roads. Roads fragment landscapes, modify the environmental conditions and serve as dispersal corridors for plants. Furthermore, they have been shown to have a homogenizing effect on plant species communities, meaning that they make the plant communities more similar to each other through time. However, although there have been studies on how roads and elevational gradients in the mountains affect species composition, little is known about their effect on plant trait assemblage and functional diversity. Do roads and elevation homogenize the functional diversity of plant communities? By using plant abundance data along different elevational gradients, and three different road proximities (which include roadside plots and natural plots), together with plant trait data for three different traits, this project aimed to answer two hypotheses: "the road proximity has a homogenizing effect on plant species and their traits" and "the elevation has a homogenizing effect on plant species and their traits". This was done in R (v. 4.2.0) with the help of the `vegan` package, which made it possible to make dissimilarity plots, NMDS ordinations, and an ANOSIM analysis of the data. The results showed that the plant communities closest to the road were slightly different from the communities in the natural vegetation, and that elevation didn't have a significant effect on the sampled plant communities. In other words, there was no statistical evidence that neither the road proximity nor the elevation had a homogenizing effect on plant species or their traits. Why that is can have various

explanations. Perhaps the roadsides have some well adapted species that thrive in the roadside environment, and therefore can't, or won't, yet spread into the natural vegetation.

Potentialen för säl-fies - En utvärdering av fotoidentifiering som metod för att estimerar sälpopulationer

Simon Isacson

För att kunna bevara naturområden på ett varsamt sätt krävs en god förståelse för de liv som lever där. Knubbsälen är en toppredator som påverkar hela födokedjan och som spelar en avgörande roll i ekosystemet. Vissa sälar migrerar långa sträckor medan andra är relativt stationära, det är därför väldigt viktigt att vi lär oss förstå populationerna på en individuell nivå. Tidigare har man identifierat individer genom att fysiskt märka dem, i denna artikel utforskades möjligheten att markera och identifiera knubbsälsindivider genom fotoidentifiering och användandet av programmet Wild-ID, såväl som att försöka uppskatta populationsstorlekarna på två olika lokaler i Gullmarsfjorden, Sverige. Identifikationsprogrammet fungerade bra och under projektets gång lyckades vi identifiera 59 unika individer varav 22 av dessa identifierades med både dess högra och vänstra sida av ansiktet. Likhetspoängen som programmet gav de matchade bilderna var till 99% under 0.3 vilket är en relativt låg poäng men trots detta lyckades programmet ranka 75% av matchningarna som dess topp 1 förslag och 95% som en av dess topp 10 förslag vilket visar att även om likhetspoängen var väldigt låg kunde programmet ändå vanligtvis hitta den korrekta matchen. Med den insamlade informationen kunde vi även uppskatta populationsstorlekarna av ön Ärten till 26 (12 – 60) individer och ön Hågarntskären till 73 (47 – 129) individer. Detta är första gången som identifiering av knubbsälsindivider görs i Sverige med hjälp av foto-ID och är ett väldigt viktigt steg i skapandet av fler och bättre alternativ till att förvara våra vatten. Nu är grundarbetet gjort och nästa steg är att utöka databasen.

Vem vinner rakan? - En beteendestudie mellan den invasiva svartmunnade smörbulten och den inhemska svarta smörbulten

Maja Lagervall

Den antropogena och naturliga spridningen av den invasiva svartmunnade smörbulten (*Neogobius melanostomus*) ökar stadigt för var dag. Flera studier har gjorts angående artens biologi och inverkan på dess nya livsmiljöer. Få av dessa projekt har utforskat artens interspecifica konkurrensbeteende gentemot inhemska arter på de platser där den har introducerats. Denna studie använde betesförsedda kamerariggar (baited remote underwater video, BRUV) kring Sveriges västkust för att filma antagonistiska resursinteraktioner mellan den svarta smörbulten (*Gobius niger*) som är inhemska i detta område, och den introducerade svartmunnade smörbulten. Både interspecifict och intraspecifict konkurrensbeteende hos de två arterna dokumenterades. Mot förväntningarna utförde den svarta smörbulten mer antagonistiska interaktioner, detta

resultat var signifikant. Svarta smörbultar som närmade sig andra svarta smörbultar var dessutom den vanligaste typen av interaktion, även denna signifikant. Resultaten visade att BRUV systemet är en bra metod att använda för både abundansmått och beteendemönster eftersom båda arterna tillbringade lika mycket tid på BRUV systemen och eftersom antalet interaktioner ökade med antalet individer. Få av platserna som filmades hade en högre täthet av svartmunnade smörbultar medan alla platser hade abundans av svarta smörbultar. Ytterligare analys av befintlig data skulle därför vara till nytta för att öka noggrannheten i resultaten.

Investigating the toxic and acidifying effect of scrubber effluent on green sea urchin larvae

Ida Vartia

To meet the new environmental requirements of reduced sulfur emissions from ships, many shipowners have installed the open-loop scrubber to "clean" the exhaust. In this scrubbing process, seawater is pumped from the ocean and combined with the emission gas, creating an acidic and toxic effluent that is directly discharged into the ocean damaging the marine environment. This study aims to understand the effect different concentrations of scrubber effluent (toxicant mixtures, pH and alkalinity decrease) have on green sea urchin larvae (*Strongylocentrotus droebachiensis*). In the highest concentrations, pH and alkalinity were corrected to the same level as filtered seawater to focus only on the effect of the mixture of toxicants. The central hypothesis was that the combination of toxins and low pH/alkalinity in scrubber effluent would negatively impact survival, body length and morphology of sea urchin larvae. Moreover, it was hypothesized that part of the negative effect driven by low pH and alkalinity could be minimized using a strong base. However, some negative effects would still be observed due to the toxins present in the scrubber effluent. The experiment was conducted at the Kristineberg Marine Research Station. Larvae were cultured for 14 days in different concentrations of scrubber effluent in filtered seawater. We found severe effects on body length growth rate and development caused by the scrubber effluent in the highest concentration (10% ~ pH 7.3). The exact concentration with corrected pH and alkalinity (10%AT ~ pH 8) decreased the harmful effects enabling the larvae to develop and grow. However, toxins hindered the larvae from reaching the same growth as the control size. In conclusion, the scrubber effluent harms the green sea urchin larvae development and growth. While this impact can be reduced by treating the effluent for its acidity, sea urchin larvae still suffer from toxicity.