

BIO-info 31/2010, 24. sept. 2010 [BIO: saksliker og møtereferater](#) [BIO-info arkiv](#)
submission deadline to bio.info@bio.uib.no is Wednesday 16:00

Fra toppen!

Marin biobank til Bergen?

I utlysningen av NFR-midler til [Marin bioprospektering](#) som det nå jobbes med er det bl.a. avsatt 8 mill. til forvaltning av marine samlinger. Midlene skal brukes til kvalitetssikring og sporbarhet i innsamlet materiale, god og oversiktlig brukertilgang, hensiktsmessig nasjonal arbeidsdeling og koordinering, profesjonalitet i organisering og forretningspolicy og internasjonalt samarbeid som styrker norsk kompetanse og tilgang til komplementære internasjonale samlinger.

Under kartleggingen av aktiviteter i Bergen er det identifisert flere marine samlinger som det kan være ønskelig å få koordinert under en marin biobank-hatt: Bergen Marine Biobank. I tillegg til eksisterende mikrobe- og algesamlinger, foregår det dessuten utstrakt toktvirksomhet ut fra Bergen hvert eneste år i regi av HI og UiB. Hvis noe ressurser på hvert av disse toktene settes av til innsamling av dedikert biobank-materiale, vil vi raskt kunne bygge opp samlinger med et unikt og kompletterende materiale til det som finnes hos Marbank i Tromsø.

Dette krever videre at det avsettes ressurser i form av arealer og infrastruktur, men slike samlinger, bygget opp og vedlikeholdt på en systematisk og profesjonell måte og med et nasjonalt register over hvor innsamlet materiale befinner seg, vil raskt kunne betale seg ut igjen i form av spennende prosjekter rettet mot marin bioprospektering, biodiversitetsforskning og bioteknologi.

Hilsen Anders



Ukens bilde



Research school in systematics

Photographer: **courtesy of Christiane Todt**

Group photo from the first marine course of the Norwegian-Swedish Research School in Biosystematics. Course is a joint initiative with Swedish partners the University of Gothenburg and the Swedish Taxonomy Initiative's research school. The course was held at the marine biological station at Tjärnö.

[Read more.](#)

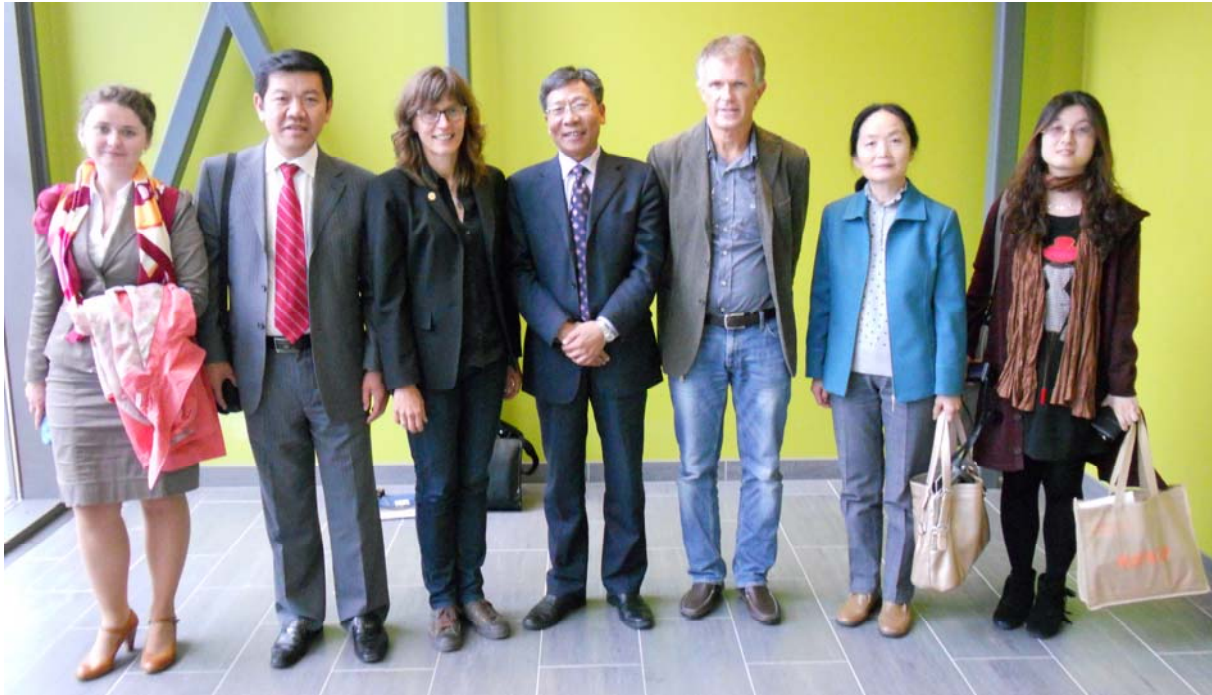
You are invited to submit photos (electronically!) for "Ukens bilde". Please include a very short description and credit information. Send your pictures to [Elinor Bartle](#)

Innhold:

Marin biobank til Bergen?	1
Ukens bilde	1
Siste nytt fra BIO	3
Kina-samarbeid; BIO-seminar; Dekorasjoner; BIO PhD-seminar; Gratis helseerklæring for tokt deltakere; Meld byggetekniske feil	3
Gratis helseattest for tokt deltakere fra UiB Bedriftslegene ved UiB kan nå tilby sjømannsattest gratis for alle ved UiB, men undersøkelsene blir ikke utført der. Ta kontakt med Arsana og si at dere er fra UiB. Eventuelle spørsmål vedrørende avtalen kan rettes til HMS avdelingen ved UiB: Telefon: (47) 55 58 20 54 E-post: post@hms.uib.no	4
Siste nytt fra verden rundt oss	5
Rekrutteringsrapport; Coastal and Marine Ecological Classification Standard; HMS-nyheter; ...	5
Forskning: utlysninger, nye satsinger og prosjekter	5
Meltzer; Fond og legater;	6
Kurs, møter, seminar og arrangement	6
CalMaro Workshop; Soil Metagenomics 2010; Ecosystem Modelling for Fishery Management...	6
Nye artikler	7
Skjæraasen, Meager, Mayer, Fernö, Sjøtun, Kirkendall, Nejtgaard	7

Siste nytt fra BIO

Kina-samarbeid; BIO-seminar; Dekorasjoner; BIO PhD-seminar; Gratis helseerklæring for tokttdeltakere; Meld byggetekniske feil



Kinesisk delegasjon besøker BIO

En delegasjon fra North East Normal University i Changchun, Kina, besøkte BIO i forrige uke for å diskutere forskningssamarbeid og utveksling av forskere og studenter. En sommerskole for BIO-studenter var et av forslagene som kom opp. Interessert? NENU rangeres som nr. 23 blant Kinas mer enn 1000 universiteter, og økologi og molekylærbiologi er blant de viktigste fagene det satses på. Både med tanke på vitenskapelig kvalitet og ressurser vil et samarbeid med NENU være interessant for BIO.

BIO-seminar i oktober – Per Jakobsen: Er mennesket et resultat av arv eller oppvekst?

Tid: torsdag 7. oktober kl. 13.00-14.00

Sted: Stort auditorium, 2. etasje, Datablokken

Hvor mye av oss selv kommer fra genene våre? Er kroppsform, kjemiske reaksjoner, egenskaper som motstandsdyktighet mot sykdommer, vår personlighet og følelser, vår språkevne, bare produkter av kulturen rundt oss, eller våre genetiske predisposisjoner.

Trolig er vi verken produkter av arvelige predisposisjoner eller oppvekstbetingelser, men snarere en kombinasjon av begge. Noen trekk ved oss selv er imidlertid mindre disponible for kulturell endring enn andre, mens andre trekk er mer plastiske. Plastisiteten er avgrenset for hvert trekk som følge av at vi har en genetisk predisponert reaksjonsnorm som avgrenser kapasiteten for endring. Disse aspektene er viktige for vårt velvære, for hvis genene betyr noe, må vi i høyere grad enn i dag stille spørsmål om hva som er det mest biologisk korrekte samfunnet å leve i.

Dekorasjoner - up for grabs

Instituttet har en samling på 86 bilder, kart, foto, reproduksjoner etc tatt ned fra veggene på HIB i forbindelse med ombygging. Vi vil ta vare på noen få; de andre bildene kan ansatte få forsyne seg fritt av - innen fredag 1. oktober. Det som ikke er tatt til da, blir kassert. Bildene kan brukes inne på kontorer, hjemme, på hytte, etc, men ikke i gangene.

BIO-info

Nyheter fra Institutt for biologi

Bildene står på rom nr. 335 B3, 'garderobe', ganske langt mot syd i 3. etasje i Bioblokken på HIB.

Harald Kryvi

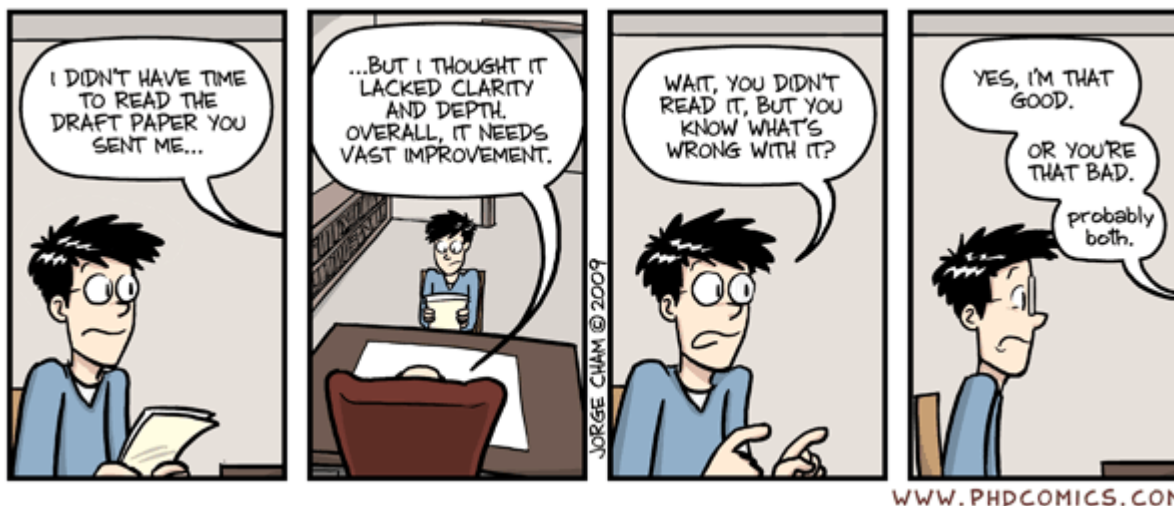
Annual PhD Seminar at BIO for candidates and supervisors

Department of Biology invites all PhD candidates, supervisors and research group leaders to a one day seminar on PhD education. The seminar will take place at Stort Auditorium, High Technology Centre on October 19th 08:30-15:30. This seminar is a part of your responsibilities whether you are a PhD candidate, a supervisor or a research group leader!

Program highlights:

- New Procedures for follow-up of the PhD candidates
- Research supervision, Professor Gunnar Handal, UiO
- Supervision, reflections from supervisors and candidates including group work
- Ethical and formal guidelines for publishing
- Publish or perish. Reflections on the process of scientific publishing
- Being both a PhD student and an employee
- Presentation of Molecular and Computational Research School
- Presentation of the candidates PhD committee at Mat.Nat.Fak

Please register on <http://biologi.uib.no/phd/>. Registration deadline is October 1st. Full program details will be updated on this website.



Gratis helseattest for toktdeltakere fra UiB

Bedriftslegene ved UiB kan nå tilby sjømannsattest gratis for alle ved UiB, men undersøkelsene blir ikke utført der. Ta kontakt med [Arsana](#) og si at dere er fra UiB. Eventuelle spørsmål vedrørende avtalen kan rettes til HMS avdelingen ved UiB:

Telefon: (47) 55 58 20 54

E-post: post@hms.uib.no

Årsbefaring i nybygget – meld inn byggtekniske feil

Det er snart ett år siden bygget ble overtatt og tid for årsbefaring. Byggherren trenger derfor hjelp til å finne alle feil og mangler som må rettes. Vi har fått inn en god del meldinger, men det er fortsatt mulig å melde inn for årsbefaringen blir ikke så tidlig som vi annonserte i BIO-INFO nr. 29!

Det vi trenger informasjon om er alle typer feil og mangler med bygget, for eksempel:

Skader/feil på gulvbelegg og vegger.

Dører og vinduer som går tregt, beslag, lister og håndtak etc som er løse.

Feil på det elektriske anlegget, ventilasjon, vann og avløp.

Slurvet utført arbeid og dårlig håndverk.

BIO-info

Nyheter fra Institutt for biologi

Vi trenger også en mangelliste for den faste innredningen som kom med bygget dvs laboratorieinnredningen og minikjøkken (dårlige låser, skuffer, dører etc.)

Vi har opprettet en [nettside](#) der du kan melde inn feil og mangler. Beskriv skaden / mangelen kort og presist og angi stedet så nøyaktig du kan. Ny FRIST: Onsdag 13. oktober.

Takk for hjelpen!

Siste nytt fra verden rundt oss

Rekrutteringsrapport; Coastal and Marine Ecological Classification Standard; HMS-nyheter; ...

Rapport om helhetlig rekruttering til UiB lagt fram

(**Sigrunn Eliassen** og **Anne Gro Vea Salvanes**) Betre personal- og prosjektadministrative rutiner, langsiktige forskningsstrategiske planar og meir openheit i rekrutteringsprosessen er blant tiltaka som skal sikre midlertidig tilsette betre arbeidstilhøve. Les mer fra [På Høyden](#).

FGDC invites comment on Coastal and Marine Ecological Classification Standard

The Federal Geographic Data Committee (FGDC) is conducting a public review of the draft Coastal and Marine Ecological Classification Standard (CMECS). CMECS provides a means of classifying ecological and habitat units using a common terminology. It provides a uniform protocol for identifying, characterizing and naming ecological units in support of monitoring, protection, and restoration of unique biotic assemblages, protected species, critical habitat, and important ecosystem components.

The draft Coastal and Marine Ecological Classification Standard may be downloaded at http://www.csc.noaa.gov/benthic/cmecs/CMECS_doc.pdf. Comments shall be submitted online at <http://www.surveymonkey.com/s/22G2S67> Comments on the draft Coastal and Marine Ecological Classification Standard must be submitted no later than Monday, December 13, 2010.

Nyheter fra Helse-, miljø- og sikkerhetsseksjonen ved Personal- og organisasjonsavdelingen, Universitetet i Bergen

- HMS-kurs høsten 2010
- Glassavfall skal leveres som restavfall
- Hvorfor og hvordan bytte ut helse- og miljøskadelige stoffer med alternativ som utgjør mindre risiko?
- Graviditet og arbeidsmiljø
- Prosjektstilling ved HMS-seksjonen
- Gå, sykle eller reis kollektivt til jobben

Last ned nyhetsbrevet [her](#) for mer informasjon

HiT fikk ja til doktorgrad nr. 2

(**Peter Emil Kaland**) Akkrediteringsorganet NOKUT sa på sitt styremøte torsdag ja til Høgskolen i Telemarks søknad om doktorgrad i økologi. NOKUTs fagkomité gir mye skryt til fagmiljøet bak doktorgraden. Les mer fra [Høgskolen i Telemark](#).

Indicators report 2010: In-depth information on Norwegian R&D

The extensive presentation of statistics and indicators found in the 2010 Report on Science and Technology Indicators for Norway offers a valuable framework for viewing Norwegian research and innovation, complete with commentary and analysis. [Read more](#).

Ledige stillinger for biologer

Mer info finner du [her](#).

Forskning: utlysninger, nye satsinger og prosjekter

BIO-info

Nyheter fra Institutt for biologi

Meltzer; Fond og legater;

Mer info om utlysninger inkl. løpende, dvs. uten frister, finner du [her](#)

Husk å sende søknadsutkastet til post@bio.uib.no 1 uke i forveien (gjelder ikke mindre bevilgninger som legater og fonds)

Meltzer-fondets priser

Fondet deler årlig ut priser for yngre forskere og for fremragende forskningsformidling. Hvert femte år deler fondet ut ærespris for fremragende forskning (neste utdeling er i 2013). Alle professorer og instituttstyrere ved Universitetet i Bergen har rett til å nominere kandidater til fondets priser. Søknadsfristen er 1. november. [Les mer.](#)

MatNats fond og legater, 2011

Informasjon om fakultetets fond og legater for 2011 er nå lagt ut på [fakultetets hjemmesider](#). **Fristen for søknader er 1. desember 2010.** Merk at søknader som ikke er sendt elektronisk kan risikere å ikke bli vurdert.

Kurs, møter, seminar og arrangement

CalMaro Workshop; Soil Metagenomics 2010; Ecosystem Modelling for Fishery Management...



CalMarO Workshop: "Understanding Science in Policy, Industry, and the Media"

Oct 4 – 6, 2010: 9:00 - 16:00+, Room K1 - ground floor BIO building A

This workshop is offered to help participants consider and develop transferable and professional skills needed by future research leaders in issues related to marine systems and climate change. To register for the workshop [follow the link](#)

and use the sign-in form at the bottom of the page. [More info.](#)

Soil Metagenomics 2010 Symposium

Due to a high number of requests the abstract deadline has been extended to October 4, 2010. Learn more about the Symposium from [our website](#).

Invitation to the 9th BBB Junior Mini-symposium Microscopy 1st October

We would like to invite you and the employees at your institution, especially PhD-candidates, post-docs and Master students, to the 9th BBB Junior Mini-Symposium "Microscopy" on Friday, October 1st 2010, in Conference room 3 of BBB building, 13:00. [Learn more](#)

"Ecosystem Modelling for Fishery Management"

To be held 7-11 March 2011 at the ICES Secretariat in Copenhagen. [Learn more.](#)

Velferd, slakting, oksidasjon og kvalitet av kjøtt og fisk

7.-9. oktober Highland Hotell Geilo. Velferdvedslakting bidrar til bedre kvalitet av både kjøtt og fisk. [Les mer.](#)

Mer info om kurs, møter, seminar og arrangement etc finner du [her](#).

Nye artikler

Skjæraasen, Meager, Mayer, Fernö, Sjøtun, Kirkendall, Nejtgaard

***A full listing of BIO's ISI publications can be found on BIO's internal web pages. Click here for an [alphabetic listing for 2010](#). Click here for a [listing sorted by date](#) in ISI (most recent at the top).

Skjæraasen, J.E., Meager, J.J., Karlsen, Ø., **Mayer, I.,** Dahle, G., Rudolfson, G. and **Fernö, A.** 2010. Mating competition between farmed and wild cod *Gadus morhua*. Marine Ecology Progress Series 412, 247-258.

ABSTRACT: Increasing numbers of hatchery-produced fish entering marine environments has caused concern over potential fitness depressions in wild populations, yet no study has addressed the likelihood of hybridisation between farmed and wild marine fish. Escape rates of Atlantic cod *Gadus morhua* L. from commercial net pens have been substantial and there is a risk of interbreeding between depleted local coastal populations and escapees. We studied mating competition between farmed and wild cod in 2 mixed spawning groups. In addition to detailed behavioural analysis, we examined a suite of individual male characteristics thought to be associated with male reproductive success, including, for the first time in any naturally spawning teleost, sperm motility traits. We found that the expression of reproductive behaviours was similar for both male types (farmed and wild). Males courted both sexes, but courtships lasted longer with a female recipient. Both farmed and wild males also directed most female courtships towards farmed females. The frequency of male displays was linked to their steroid levels. Wild males sired 75% of eggs spawned by wild females, but only 48 to 67% of eggs spawned by farmed females. It is likely that wild females rejected farmed males and chose among the wild males based primarily on behavioural cues. Female choice thus appears to be an integral part of the cod mating system. Sperm traits were not associated with overall reproductive success. Our results suggest that hybridisation between farmed escapees and wild cod is likely and that farmed cod may interfere with the natural spawning behaviour of cod.

Heldal HE & **Sjøtun K.** Technetium-99 (99Tc) in annual growth segments of knotted wrack (*Ascophyllum nodosum*). Science of the Total Environment 408: 5575-5582 (2010).

Abstract: The distribution of technetium-99 (99Tc) in annual growth segments of the brown seaweed *Ascophyllum nodosum* (Fucales, Phaeophyceae) from the southwestern coast of Norway is examined in samples collected from January to November 2006. A twenty-fold increase in the 99Tc-concentration from the youngest to the oldest growth segments was found. The concentrations ranged from 42 to 98 Bq/kg dry weight (d.w.) and from 964 to 1000 Bq/kg d.w. in growth segments formed in 2006 and 1996, respectively. In addition, a seasonal variation in the 99Tc concentration was observed in the actively growing 2006-segments: concentrations decreased from 98 Bq/kg d.w. in April to 54 Bq/kg d.w. in June; there was a further reduction from June to August (42 Bq/kg d.w.); and, finally there was an increase from August to November (93 Bq/kg d.w.). In most of the segments formed between 2000 and 2005, there was a tendency of slightly decreasing 99Tc-concentrations between June and November but this pattern was not observed for the older growth segments. In order to find an explanation for the non-homogenous distribution of 99Tc within thalli of *A. nodosum*, different hypotheses are discussed. Uptake and elimination of 99Tc appears to be most pronounced in the actively growing segments. To date, such non-homogenous distribution of 99Tc within thalli of *A. nodosum* has not been taken into consideration, neither in connection with sample collection nor analysis. This paper shows that special protocols must be followed if *A. nodosum* is going to be used as a bioindicator for 99Tc in the marine environment. A sampling strategy is proposed.

Kolarik, M., and **L. R. Kirkendall.** 2010. Evidence for a new lineage of primary ambrosia fungi in *Geosmithia Pitt* (Ascomycota: Hypocreales). Fungal Biology 114: 676-689.

Abstract: *Geosmithia* is a genus of mitosporic filamentous fungi typically associated with phloeophagous bark beetles world-wide. During this study, the fungal associates of ambrosia beetles

Cnesinus lecontei, Eupagiocerus dentipes, and Microcorthylyus sp. from Costa Rica, were studied using morphology and DNA sequences. Fungal associates belonged to four undescribed Geosmithia species. Geosmithia eupagioceri sp. nov. and G. microcorthyli sp. nov. are evidently primary ambrosia fungi of their respective vectors E. dentipes and Microcorthylyus species. They both have convergently evolved distinct morphological adaptations including the production of large, solitary and globose conidia, and yeast-like cells. Tunnels of C. lecontei contained an undescribed Geosmithia species, but its nutritional importance for its vector is unclear. An auxiliary ambrosia fungus, Geosmithia rufescens sp. nov., was found associated with both G. eupagioceri and the Geosmithia species associated with C. lecontei. G. microcorthyli is genetically quite similar to the phloem-associated Geosmithia sp. 8 from Europe. Large differences in morphology between these two species suggest the rapid co-evolution resulting from the close symbiosis of the former with its beetle host. The ITS rDNA sequences of G. microcorthyli and Geosmithia sp. 8 were not diagnostic, suggesting that alternative markers such as EF-1a, IGS rDNA or b-tubulin should be used, together with morphological and ecological data, for species delimitation in this genus. The primary ambrosia fungi described here are derived from phloem-associated ancestors, and represent two independent lineages of ambrosia fungi in the Hypocreales and a new ecological strategy within Geosmithia.

Kirkendall, L. R., and M. Faccoli. 2010. Bark beetles and pinhole borers (Curculionidae, Scolytinae, Platypodinae) alien to Europe. In: Cognato AI, Knížek M (Eds) Sixty years of discovering scolytine and platypodine diversity: A tribute to Stephen L. Wood. ZooKeys 56: 227-251.

Abstract: Invasive bark beetles are posing a major threat to forest resources around the world. DAISIE's web based and printed databases of invasive species in Europe provide an incomplete and misleading picture of the alien scolytines and platypodines. We present a review of the alien bark beetle fauna of Europe based on primary literature through 2009. We find that there are 18 Scolytinae and one Platypodinae species apparently established in Europe, from 14 different genera. Seventeen species are naturalized. We argue that Trypodendron laeve, commonly considered alien in Europe, is a native species; conversely, we hypothesize that Xyleborus pfeilii, which has always been treated as indigenous, is an alien species from Asia. We also point out the possibility that the Asian larch bark beetle Ips subelongatus is established in European Russia. We show that there has been a marked acceleration in the rate of new introductions to Europe, as is also happening in North America: seven alien species were first recorded in the last decade. We present information on the biology, origins, and distributions of the alien species. All but four are polyphagous, and 11 are inbreeders: two traits which increase invasiveness. Eleven species are native to Asia, six to the Americas, and one is from the Canary Islands. The Mediterranean is especially favorable for invasives, hosting a large proportion of the aliens (9/19). Italy, France and Spain have the largest numbers of alien species (14, 10 and 7, respectively). We point out that the low numbers for at least some countries is likely due to under-reporting. Finally, we discuss the difficulties associated with identifying newly invasive species. Lack of good illustrations and keys hinder identification, particularly for species coming from Asia and Oceania.

Sauvard, D., M. Branco, M. Faccoli, F. Lakatos, and **L. R. Kirkendall**. 2010. Weevils and bark beetles (Coleoptera: Curculionoidea). Chapter 8.2, In A. Roques, M. Kenis, D. Lees, C. Lopez-Vaamonde, W. Rabitsch, J.-Y. Rasplus and D. B. Roy [eds.], Alien Terrestrial Arthropods of Europe. BioRisk 4(1): 219-266.

Abstract: We record 201 alien curculionoids established in Europe, of which 72 originate from outside Europe. Aliens to Europe belong to five families, but four-fifths of them are from the Curculionidae. Many families and subfamilies, including some species-rich ones, have few representatives among alien curculionoids, whereas some others are over-represented; these latter, Dryophthoridae, Cossoninae and specially Scolytinae, all contain many xylophagous species. The number of new records of alien species increases continuously, with an acceleration during the last decades. Aliens to Europe originate from all parts of the world, but mainly Asia; few alien curculionoids originate from Africa. Italy and France host the largest number of alien to Europe. The number of aliens per country decreases eastwards, but is mainly correlated with importations frequency and, secondarily, with climate. All alien curculionoids have been introduced accidentally via international shipping. Wood and seed borers are specially liable to human-mediated dispersal due to their protected habitat. Alien

curculionoids mainly attack stems, and half of them are xylophagous. The majority of alien curculionoids live in human-modified habitats, but many species live in forests and other natural or semi-natural habitats. Several species are pests, among which grain feeders as *Sitophilus* spp. are the most damaging.

Bradley PB, Bronk DA, Sanderson MP, **Nejstgaard JC**, Frischer ME, Sazhin AF, Killberg-Thoreson LM, Verity PG, Campbell L (2010) Nitrogen uptake by phytoplankton and bacteria during an induced *Phaeocystis pouchetii* bloom, measured using size fractionation and flow cytometric sorting approaches. *Aquat Microb Ecol* 61:89-104

ABSTRACT: Uptake of inorganic and organic nitrogen (N) by phytoplankton and bacteria was investigated during a mesocosm study conducted in Raunefjord, Norway in April 2005. One mesocosm was fertilized with nitrate and phosphate at a ratio of 16:1 and maintained in the light, while one unamended light mesocosm served as a control. Dissolved nutrients, phytoplankton and bacterial biomass, and phytoplankton community composition were monitored throughout the 26 d experiment. Uptake of ¹⁵N-labeled ammonium and nitrate, and dual-labeled (¹⁵N and ¹³C) urea and dissolved free amino acids (DFAA) was measured for phytoplankton and bacteria using 2 methods: size fractionation into 0.2–0.8 and >0.8 µm size classes, and flow cytometric sorting based on chlorophyll autofluorescence. Prior to fertilization, dissolved inorganic N concentrations were low and comprised ~5% of total dissolved N. Added nitrate was completely utilized in the amended mesocosm within 10 d, stimulating a large bloom of colonial *Phaeocystis pouchetii*. Ammonium contributed over half of total measured N uptake by phytoplankton and bacteria in both enclosures, while nitrate and urea each supplied roughly 10 to 25%. Overall, DFAA were a negligible N source to phytoplankton but contributed 11% to total bacterial N uptake. Bacterial uptake represented a significant portion of total uptake of all N forms, especially urea and DFAA. Comparison of the 2 methods for measuring phytoplankton versus bacterial uptake demonstrates how the use of 0.8 µm filters can lead to significant overestimation of phytoplankton N uptake due to the retention of bacterial biomass.

Riebesell U, Lee K, **Nejstgaard JC** (2010) Pelagic mesocosms. In: Riebesell U, Fabry V, Hansson L, Gattuso J-P (eds) Guide to best practices for ocean acidification research and data reporting. Publications Office of the European Union, Luxembourg, p 260

From the **Introduction:** One of the greatest challenges in understanding and forecasting the consequences of ocean acidification is the scaling of biotic responses at the cellular and organism level to the community and ecosystem level, and their parameterisation in ecosystem and biogeochemical models of the global ocean. Here mesocosms, experimental enclosures designed to approximate natural conditions, and in which environmental factors can be manipulated, provide a powerful tool to link between small-scale single species laboratory experiments and observational and correlative approaches applied in field surveys. A mesocosm study has the advantage over standard laboratory tests in that it maintains a natural community under close to natural, self-sustaining conditions, taking into account relevant aspects from “the real world” such as indirect effects, biological compensation and recovery, and ecosystem resilience. The mesocosm approach is therefore often considered the experimental ecosystem closest to the real world, without losing the advantage of reliable reference conditions and replication. By integrating over multiple species sensitivities and indirect effects up or down the food web, the responses obtained from mesocosm studies can be used to parameterise ocean acidification sensitivities in ecosystem and biogeochemical models.

Durbin EG, Bucklin A, **Nejstgaard JC**, Frischer ME (2010) Box 6.1 Molecular techniques to establish trophic links. In: Barange M, Field JG, Harris RP, Hofmann EE, Perry RI, Werner F (eds) Marine Ecosystems and Global Change. Oxford University Press, Oxford, UK, p 131-133

Box 6.1: A promising new strategy for assessing feeding in small invertebrates is the use of molecular methods to detect prey-specific nucleic acid molecules as biomarkers of trophic interactions (Sheppard and Harwood 2005). Various different assays have been developed, but the general strategy of these methods is to purify DNA from stomach contents followed by detection and possible

quantification using Polymerase Chain Reaction (PCR) amplification-based methods targeting gene fragments associated with prey organisms.