2013 | ANNUAL REPORT

CEES

Centre for Ecological and Evolutionary Synthesis

UiO : University of Oslo

The Centre for Ecological and Evolutionary Synthesis (CEES) combines a broad spectrum of disciplines (such as population biology, statistical and mathematical modelling and genomics) to foster the concept of ecology as a driving force of evolution via selective processes, with a corresponding influence of evolutionary changes on ecology.

Stickleback. © Halvor Knutsen

Cover picture: Fishing boat in rough seas © Arnulf Husmo

CEES IN BRIEF

In 2013, CEES consisted of 171 members (including Core staff, Postdocs and researchers, PhDs, research assistants, technical and administrative staff, and Masters students). In addition, 29 guests stayed for more than one month, and 36 guests for less than one month. The members and guests represented 29 nationalities. The Centre has a core group of 17 employees (two are employed by the Department of Mathematics, one by the Department of Economy and one by the Institute of Marine Research). One employee is a visiting scientist at the University of Alberta, Canada. CEES is chaired by Professor Nils Chr. Stenseth.

CEES supervised 35 Master and 27 PhD students in 2013, and was also involved in the teaching of 9 PhD/Master courses and 3 Bachelor courses. 4 new PhD students were employed, and 7 PhD students and 8 Master students completed their degrees. The CEES graduate school held its annual conference at Holmen Fjordhotell with 110 delegates.

Approximately 74 MNOK of the total budget of 141 MNOK came from the 50 externally funded research projects conducted by CEES in 2013. Most of these were funded through the Research Council of Norway. CEES is also involved in various EU-funded projects. 18 new projects were started.

CEES members published 146 articles in peer-reviewed journals and 6 books/book chapters/reports in 2013. The majority of these results lie within the core scope of CEES. 191 talks at conferences and participations in poster sessions were conducted. The Centre hosted 80 guest speakers, primarily from abroad.

The work of CEES is structured into *Colloquia* and *Themes*, the former being focused projects each lasting for three years and the latter consisting of on-going, long-term work that is accommodated within the Centre. The *Themes* are *Theme 1*: The role of population structuring in adaptive evolution. *Theme 2*: The potential for adaptation. *Theme 3*: The evolution of reproductive isolation. The topics of the *Colloquia* are as follows: *Colloquium 1*: Selection and evolvability: Concepts, measurements and statistics. *Colloquium 2*: Bridging the gap between genomics and evolutionary biology. *Colloquium 3*: The ecology and evolution of infectious diseases with an environmental reservoir (refocused relative to the original proposal to create a greater scientific impact using the expertise at CEES). *Colloquium 4*: Integration of ecology and evolution: A synthesis.

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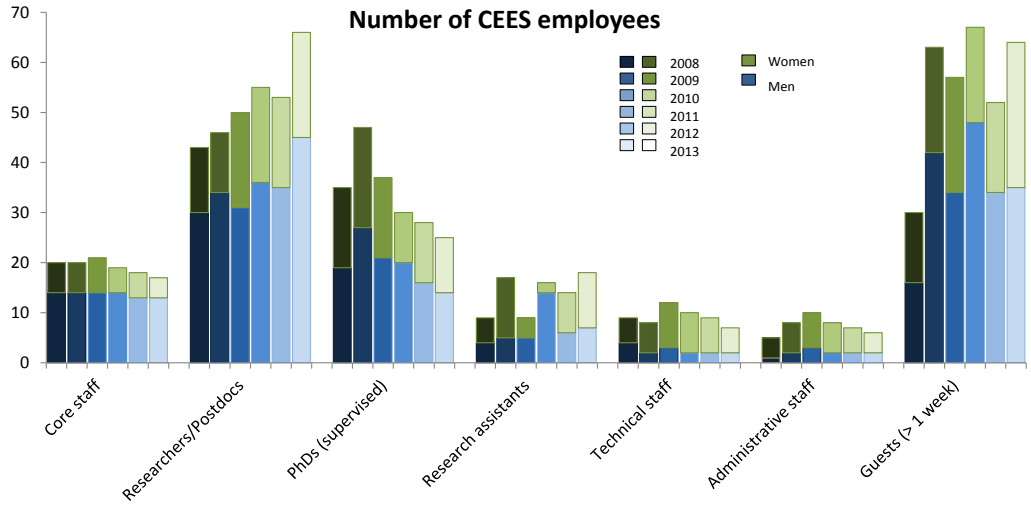
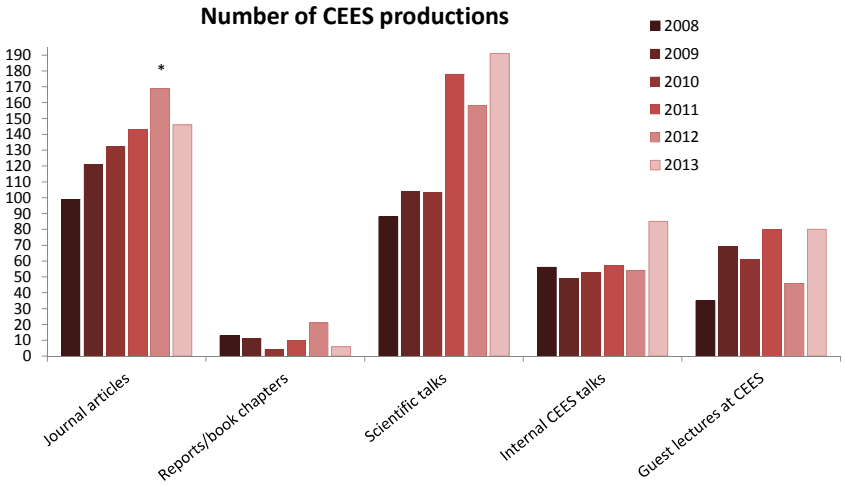
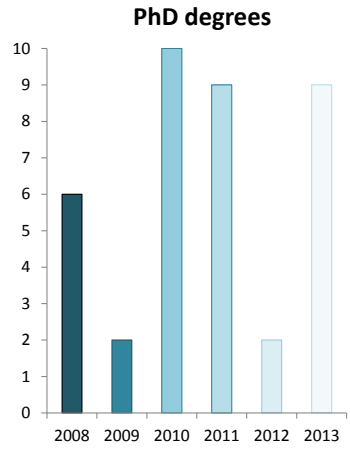
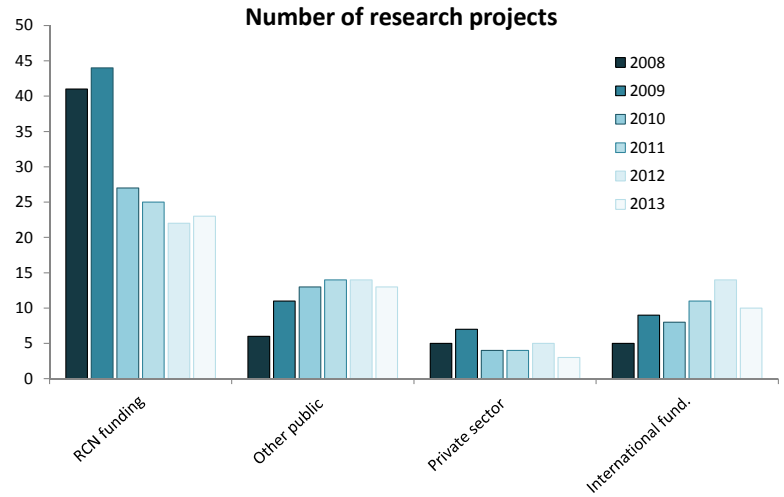
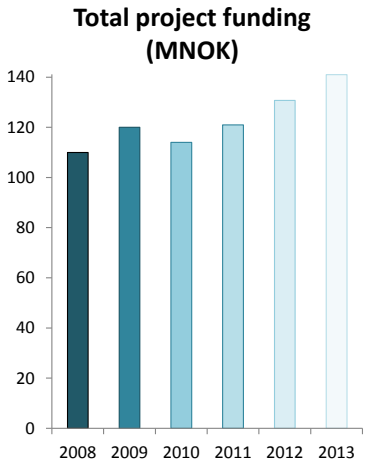






*A change in the national routines for registering publications (inclusion of online first) skews the numbers in favor of 2012.





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1 THE CHAIR'S COMMENTS

We are now in the second half of the Centre of Excellence (CoE) period of CEES (2007–2017). All indicators show promise for what we might expect during the latter part of this 10-year period – and beyond. We continue to keep up our good publication record and to obtain good external financial support for our work: in short, we keep delivering high-quality and internationally highly visible scientific work. It seems clear to me that we will complete the full 10-year period very successfully. The integration of the many disciplines and foci within the Centre continues, all of which provides the basis for the continued existence of CEES beyond 2017. The planning for such a continued existence as an excellent research and training centre is well under way. Besides aiming at a new CoE period, we are also working towards funding through the European Research Council (ERC) – be it Starting Grants, Consolidator Grants or Advanced Grants.

Excellence starts with people – without great people a great vision (as we have) is irrelevant. At CEES we have an extraordinarily good group of people – highly talented and very social – sharing ideas in the pursuit of excellence in science. In 2013, CEES had 171 members (including core staff, postdocs and researchers, PhD students, research assistants, technical and administrative staff, and Master students). The members and guests represented 29 nationalities.

The number of people working at CEES keeps increasing annually, though at any given time the number of people on staff remains rather stable. This implies that we have an increasing number of visitors working with us for a period of a few weeks to several months.

Projects and funding: Approximately 74 MNOK of the total budget of 141 MNOK came from the 49 externally funded research projects conducted by CEES in 2013. Most of these were funded through the Research Council of Norway (RCN). CEES is also involved in various EU-funded projects. In total, 18 new projects were started. We keep securing increasingly more external funding – all of which is coming through fewer (hence larger) grants. I would like to thank Kari B. Rygg for managing the CEES project portfolio and economy.

Promoting young researchers: CEES continues to be a group of rather young and very ambitious scientists – the median age is 38 years (not including Master students and guests). The CEES members are, as I see it, highly ambitious, but very cooperative and sharing – both of which are key elements for a successful research and training centre. I would like to thank the young and highly talented people working at CEES for carrying out all your good work: you are the key to the success of the Centre.

The success of CEES depends to a large degree upon the work and success of our young talented members. Not only do they do excellent science – they also contribute a lot to the very good intellectual and social environment of CEES, be it the Late Lunch Talks, the Morning Coffee or the Happy Hours. I am very grateful to them for organising both seminars, journal clubs and social events – all of which contribute to gluing the members of CEES increasingly better together.

In 2013, RCN launched a basic research call, "Young Research Talent", for young scientists. Our young members were very successful in that call – two of them got their proposals funded. I am pleased to report that Sanne Boessenkool ("Tracking Viking-assisted dispersal of biodiversity using ancient DNA") and Pål Trosvik ("Modeling microbial dynamics of the human infant gut") were awarded funding. In addition, the proposal of Melissah Rowe ("Sperm-pathogen interactions and the evolution of ejaculate antimicrobial defences in passerine birds"), submitted through the Natural History Museum of the University of Oslo, was funded – I am happy to say that she will spend about 60 % of her time at CEES over the next few years.

Chair Nils Chr. Stenseth © Eva C. Simensen

In order to help our young scientists to be as skilled as possible – and as part of that to write as good proposals as possible – we educate them in proposal-writing. A hands-on course was organised, where proposals were developed under good supervision by Yellow Research, a Dutch company. The course was targeted at the ERC calls for Starting Grants and Consolidator Grants, but in addition provided insight as to how to submit to other calls, be it national or international ones. I would like to thank Gry Gundersen for having taken this initiative, and having organised the course.

The Scientific Advisory Board (SAB) continues to provide encouraging feedback through critical and constructive advice. During their annual meeting in September 2013, we were encouraged to link up more closely with other national research centres, specifically the new *Centre for Dynamics of Biological Diversity* (CBD) at the Norwegian University of Science and Technology (NTNU) in Trondheim. I am pleased to say that we currently are doing so, and I am sure that the results will be visible in later annual reports.

We were also encouraged to take an initiative towards the development of a Centre of Excellence for women in our fields: this might, e.g., be accomplished by the collaboration of CEES with the *Centre for Geobiology* (CGB) at the University of Bergen and the Trondheim-based *Centre for Dynamics of Biological Diversity* (CBD) – three CoEs with much in common. This is indeed an attractive – but challenging – suggestion. I do like this idea very much, particularly as it emphasises one of our overriding ambitions, namely to provide good intellectual and practical working conditions (including funding) for our young talented members, many of whom are women. I am trying to develop this suggestion further, in my various capacities.

1 THE CHAIR'S COMMENTS

The Board serves a very good function, not the least with helping us further develop a good relationship with our host institution (the Department of Biosciences and the Faculty of Mathematics and Natural Sciences). The Board is also good at helping us work out plans for how to develop CEES further after its 10-year period as CoE.

I'd like to thank both the SAB and the Board for helping us to develop CEES as a good working place – a good place to carry out excellent work in an excellent intellectual and social atmosphere.

Two colloquia are currently running – *Colloquium 3* (Ecology and evolution of infectious diseases) and *Colloquium 4* (Integration of ecology and evolution). Within the umbrella of *Colloquium 3* we carry out field-, lab- and theoretical work. An ERC Advanced Grant (awarded to Barbara Bramanti (see page 21)) focusing on the analysis of ancient DNA to detect *Yersinia pestis* in historic human samples extends our work on plague profoundly. Thanks, Barbara, for wanting CEES to be the host of your ERC project (MedPlag: "The medieval plagues: ecology, transmission modalities and routes of the infections").

Together with the theoretical work carried out by Boris Schmid and others at CEES, and international collaborators focusing on the analysis of historical records of major plague outbreaks (such as the Black Death and subsequent waves of plague epidemics in Europe), the work on ancient samples is very promising (see pages 21 and 35). Within the same colloquium we are also working on anthrax and Lyme disease – the former project headed by Wendy Turner, Ryan Easterday and Kyrre Kausrud, and the latter headed by Atle Mysterud and Hildegunn Viljugrein. The fieldwork linked to our anthrax work is carried out in Namibia, whereas the fieldwork for Lyme disease is carried out in Norway. We hope to extend this work to also cover tularaemia, not the least because such work could profit highly from our long experience on rodent dynamics.

I do think that we have positioned ourselves very nicely within the inferential landscape of epidemiology of bacterial diseases with an environmental reservoir. This is due to the fact that we combine ecological work in the field (where we aim to understand the dynamics of the disease agent in the environmental reservoir) with genomics work (where we can address evolutionary questions both relating to virulence and phylogeography), a combination which is rarely seen in any other research group. As part of this colloquium we are also carrying out theoretical work with the aim to understand the changing appearance of the disease agent during the ecological dynamics it experiences within the environmental reservoir. The various components of the *Colloquium 3* work will be covered later in this Annual Report (see pages 21 and 22). I am confident that I will return to the work carried out with *Colloquium 3* in future annual reports. Our plan is that this work will continue far beyond 2017: indeed, we aim at establishing a larger continued project covering the topic of *Colloquium 3* – be it a new CoE or some other similar construction. Ruifu Yang from the Beijing Institute of Microbiology and Epidemiology, Wayne Getz from University of California at Berkeley and Elisabeth Carniel from Institut Pasteur, Paris, are now appointed as Kristine Bonnevie Professors, and will be working part-time on *Colloquium 3*.

Our work on plague has been a cornerstone in much of the work within this *Colloquium*. We have always had a strong link with China in our work on plague, most importantly with the team of Professor Zhibin Zhang at the Chinese Academy of Sciences (CAS). Together with his team we have analysed many historical records on human plague in China. Our Chinese link has now been extended to also include the team of Professor Ruifu; thanks to this link we will now be in a unique position to carry out exciting fieldwork in the quest to improve our understanding of the eco-evolutionary dynamics of plague within its natural reservoir. It should also be mentioned that in 2013 we have extended our international network related to plague (and other bacterial diseases)

to the Caucasus region, most importantly (though not exclusively) to Tbilisi in Georgia. The Richard G. Lugar Center for Public Health Research in Tbilisi represents a valuable resource for ecological and evolutionary work on these bacterial systems.

The work within *Colloquium 4* also continues to progress very well – work focusing on the Red Queen type of co-evolution and macroevolution and well-funded through external funding from the Research Council of Norway. This work is headed by Barbara Fischer, Pål Trosvik and Lee Hsiang Liow. This colloquium should be considered the most high profile work of the Centre – linking ecological and evolutionary thinking conceptually closer together than is typically seen in the literature of today. Within this colloquium we are combining theoretical work, including much of the theoretical competence within the Centre, with laboratory work on bacterial communities and paleontological fieldwork (in New Zealand). Again, few groups in the world cover such a broad spectrum of competence in the quest to understand how evolution and ecology are mutually interwoven. Work within this colloquium is well under way, though not yet published – in later annual reports we will, I am sure, provide updates. The success of CEES will, I hope, be judged by how well we have been able to better integrate ecological and evolutionary thinking – and the work within *Colloquium 4* will play a key role. Eörs Szathmáry from Collegium Budapest and Eötvös Loránd University, Budapest, is now appointed as a Kristine Bonnevie Professor, and will work part-time on *Colloquium 4*.

The Centre for Computational Inference in Evolutionary Life Sciences (CELS) – building upon work at CEES and led by Kjetill S. Jakobsen – was launched as an "Endringsmiljø" ("Changing environment") in 2013, and is a multidisciplinary centre within life sciences combining genome and biology research with statistical and computational methods. Besides scientists from CEES and the rest of the Department of Biosciences, CELS involves scientists from the Department of Mathematics and the Department of Informatics. In several respects this development is a direct result of the work carried out within *Colloquium 2* ("Genomic and evolutionary biology synthesis"). CELS addresses fundamental biological questions related to the genotype-phenotype paradigm, how the environment affects genome evolution, and the development of methods for integrated analysis of genomic and other biotic and abiotic data. A main goal is to develop interdisciplinary research activities within statistics, bioinformatics and biology. The strategic aim is to develop a leading interdisciplinary research environment and thus be able to establish a future Centre of Excellence – beyond 2017. A significant contribution to this interdisciplinary research development is that we have secured funding (40 MNOK) for the Aqua Genome Project (see page 37). I congratulate Kjetill S. Jakobsen, Sissel Jentoft and Asbjørn Vøllestad on this achievement.

Theoretical work is an integral part of the work at CEES. I'd like to highlight the work by Thomas F. Hansen and Barbara Fischer (see pages 24 and 26). Theoretical work is in particular an integral part of *Colloquia 3* and *4*. I am convinced that the broad spectrum of ecological systems being studied – from a variety of perspectives – at CEES provides a good platform for doing theoretical work, and for helping us bring together ecological and evolutionary thinking.

The marine work at CEES continues to result in good publications and exciting new developments. Joël Durant, together with other colleagues at CEES and our collaborating institutions, produced a special feature collection of papers published by *MEPS* (vol. 480, pp. 199–287) on the effect of climate variation and harvesting on the marine system (see page 18). I am sure that this will be highly recognised internationally in the years to come. The broader perspective of our marine work, involving managing the marine resources under external forces such as changing climate and increased harvesting pressure, is illustrated in the papers by Anne Maria Eikeset et al. in *Marine Policy* (vol. 39, pp. 172–181) and *PNAS* (vol. 110, pp. 12259–12264).

1 THE CHAIR'S COMMENTS

The Nordic CoE, *NorMER*, is moving along very successfully (see page 28). In 2013 we secured additional funding from NordForsk (which also funds *NorMER*) for another Nordic marine project, *GreenMAR*. *GreenMAR* is a project that aims to provide the scientific knowledge needed for achieving Green Growth – i.e., exploiting our marine resources today in such a way that future generations will have the opportunity to use the same living resources in a similar way. Although many people at CEES have contributed towards *GreenMAR*, I would like to single out three persons who have played key roles in this development: Joël M. Durant, Anne Maria Eikeset and Jason D. Whittington – Thanks.

As I see it, future marine work within CEES could ideally continue under a Nordic umbrella with Nordic funding. Indeed, we are working towards such a construction, possibly with a focus on Skagerrak (though without excluding work on other marine systems). During 2013 we have experienced a very positive development aimed towards joining other Scandinavian marine research groups and institutions focused on the study of Skagerrak. Planning is well under way towards developing a CoE on marine systems, with the University of Agder (in Kristiansand and Grimstad), and the Institute of Marine Research (at Flødevigen outside Arendal) as the host. Marine biologists at CEES will certainly play a key role in that development. Two of our adjunct staff members, Halvor Knutsen and Esben Moland Olsen, have thus far played key roles in this development – and continue to do so.

Our focus on ecology, genomics and evolution of gut adapted bacteria has been a very productive one. Taking an ecological perspective on the dynamics of the gut bacteria – using time series analysis and similar statistical techniques – has been met with great enthusiasm from international colleagues. Thanks to new funding from the Research Council of Norway, this work is now secured for several years to come (see page 22 for a further exposition of this work).

When it comes to African wildlife, we entertain a long collaborative history with Addis Ababa University in Ethiopia. Anagaw Atickem successfully defended his PhD, entitled "Landscape genetics and behavioural ecology of mountain nyala (*Tragelaphus buxtoni*) in the Southern highlands of Ethiopia" on 19 April. As a CoE we should therefore foster excellence in all aspects of our work: Anagaw's work is in that category. He will go back to Ethiopia in the near future and will foster excellent work there. To me, this is one of our extended achievements of excellence.

At the end of 2013 we had four PhD students from Ethiopia working on various wildlife issues – spanning from the African wolf to monkeys, with the latter project also linking to work in Tanzania, where we have one PhD student. I myself have a long history of collaborative work with Tanzanian and Ethiopian scientists.

The Norwegian Sequencing Centre (NSC), with CEES as one of two equal partners (the other being the Oslo University Hospital, Ullevål), continues to provide national and international users with services within deep sequencing technology. In 2013 we secured additional funding (41 MNOK) through the National Financing Initiative for Research Infrastructure programme (INFRASTRUKTUR).

We have started the process of establishing a modern ancient DNA lab (see page 35), prompted by Barbara Bramanti receiving an ERC Advanced Grant for her work on plague using ancient DNA techniques. I expect, and indeed hope, that I can report on work in this lab in the next annual report. However, I want already now to highlight this exciting development. Together with our sequencing facilities, this lab will make us highly competitive with regards to securing funding – and indeed attracting people to work with CEES.

Visibility is important – whether it be in scientific literature or in the broader media. Publishing good papers

in reputable journals, and delivering good lectures at meetings and at other science institutes, is important. I am happy to observe that we do both (see tables later in this Annual Report). However, it is an added value to be featured through special commentaries and on the front covers of journals. In 2013, we should particularly draw attention to the African wolf (*Canis lupus lupaster*) story that was featured in both *African Natural History* and *Natural History*.

Our visibility beyond the science community is also steadily increasing. I am pleased to report that Darwin Day and the Kristine Bonnevie Lecture in Evolutionary Biology were both very successful. Both appear to have become established events that people are attracted to. We also organised a series of more general seminars – both at the Science Library and at the House of Literature (Litteraturhuset) (see page 30 for a further exposition of these events). I would like to thank Tore Wallem for his excellent work in selecting good speakers for these events, as well as for ensuring that the events continue to run smoothly.

It is also very nice to observe that the CEES home page is frequently visited – including the pages on Darwin Day and the Kristine Bonnevie lectures. The fact that each of these sites has drawn almost 2000 visits, in addition to the number of people physically attending the events, demonstrates the public's interest.

CEES as an institution is becoming increasingly active on various social media. CEES is on both Twitter and Facebook – as are many of our members. On page 32 a summary of this activity is provided.

Concerns (1-3): Both the SAB and the Board are concerned about what will happen after the CEES CoE period ends – as are we. We want CEES to develop beyond 2017 – both as a centre for excellent research as well as an institution communicating evolutionary biology to a broad spectrum of people, far beyond academic circles. If we are to be successful in this respect beyond 2017, we need leadership, we need funding, and we need to secure the future for our young talented scientists within the organisation.

1 **Scientific leadership**: It is our intention that when the CEES CoE period ends in October 2017, CEES will continue as one of five sections within the Department of Biosciences. If I'm asked – and am still available – I would be pleased to continue as Chair for a few years of such a section at the Department of Biosciences. However, most importantly, new CoE concepts need to be developed within the broad framework of CEES – bringing ecology and evolution closer together. Who would take the lead in developing and subsequently chairing these potential CoEs is not yet settled, but I have already mentioned above two initiatives that we are working on: (1) The first involves following up on the work within *Colloquium 2* (Genomic and evolutionary biology synthesis) – an initiative that is helped with financial support from the Faculty of Mathematics and Natural Sciences. Two of our Core members, Geir Storvik and Kjetill S. Jakobsen, and our Deputy Chair Sissel Jentoft, are in the leader team of this initiative. (2) The other follows up on the work within *Colloquium 3* (Ecology and evolution of infectious diseases) – an initiative helped in part by the fact that we have an ERC Advanced Grant grantee working with us on plague (Barbara Bramanti), but also because of the very good work being carried out on Lyme disease (under the leadership of Atle Mysterud) and other bacterial diseases with an environmental reservoir.

In addition, we have great opportunities emerging from the work within *Colloquium 4* (Integration of ecology and evolution), in particular with focus on macroevolution within an ecological conceptual platform. As mentioned, the marine work might seek funding through the Nordic Centre of Excellence and similar programmes under the umbrella of The Nordic Council of Ministers/NordForsk. The groups mentioned in this annual report are examples; other groups with great potential will be emphasised in future reports.

1 THE CHAIR'S COMMENTS

As should be evident from the excellence of these groups, CEES has several very strong scientific leader candidates, and I'll do whatever I can to help them grow.

2 **Funding**: Good scientific leaders must be able to develop and maintain good teams – and provide funding for such team work. Until now, CEES has been very successful in securing increasingly greater funding from steadily fewer projects – i.e., larger projects. This is crucial, as such larger projects form the basis for the continued existence of CEES beyond 2017. It is promising to notice that funding is brought into CEES by several of our members, not least by the younger ones. With the core funding provided by the university (which will continue for several years beyond 2017), I believe that the necessary additional funds will come – either through national calls, Nordic calls, or European calls.

3 **Young non-tenured scientists**: Our quest is to secure the future of our many talented scientists (at CEES and elsewhere). ERC is a great opportunity – though with keen competition. We do our best to help our young members secure such funds – and last year we were very happy with our success. We help our young members by assisting them in developing good competitive proposals, but also by helping them to develop strong CVs that demonstrate their excellent scientific performances, including demonstrating the ability to be good team leaders independent of their past supervisors.

It is also good to notice that we have the support – and help – of the Department of Biosciences and the Faculty of Mathematics and Natural Sciences in our effort to provide openings for tenured positions within the disciplines covered by CEES.

Centre for Advanced Study. I'm pleased to observe that our Core member Atle Mysterud, together with Jon E. Swenson from the Norwegian University of Life Sciences, has been granted a year at the Centre for Advanced Study at the Norwegian Academy of Science and Letters, Oslo. Together they will work on the project "Climate effects on harvested large mammal populations". The grant awarded is 3.3 MNOK, for the year 2015/16. Please accept my sincere congratulations.

Awards and honours. During the year, several of our members received awards and appointments to prestigious positions (see page 34). Congratulations to all.

People come and go. CEES is a very dynamic unit. Some researchers come because they are appointed positions at CEES, others because they want to use their own funds for working here. Some leave because they receive other positions – often more permanent. I would like to highlight some of these people.

Dag Hjermann and **Leif Christian Stige** left us as they received permanent positions outside of CEES. Good for them – to some extent this is unfortunate for us; however, they will represent new nodes in our extensive network. Dag left for a position at the Norwegian Institute for Water Research (NIVA) and Leif left for a position in the Norwegian Ministry of Fishery. Both Dag and Leif have played very important roles in the development of our marine platform – a platform which is well recognised both nationally and internationally. Thanks to both Dag and Leif.

Others have come. I have already mentioned Barbara Bramanti and her ancient DNA work on plague and other diseases. Torbjørn Ergon, a statistical ecologist, joined CEES at the beginning of 2013. By so doing he has strengthened our statistical modelling competence – a field which has historically been of great importance for the development of CEES. Welcome, Torbjørn. Your efforts in securing funding for work within the field of ecological and evolutionary statistics are greatly appreciated.

In the middle of the year Geir Hestmark, a plant ecologist and a scholar of the history of science, joined us. I find

his work on the history of science to be of great interest to us. Recognising that we build our research upon the research of scientists who have come before us is indeed very important – having a historian on our team makes this easier to remember. Welcome, Geir.

On a part-time basis, Michael Koomey joined us in the middle of 2013. He is a microbial biologist and will be able to help us with much of our bacterial work – be it the environmentally based bacterial systems we are focusing on within *Colloquium 3*, or the gut microbial systems we also are working on (see pages 21 and 22). Welcome, Mike.

Reidun Sirevåg has served as the Chair of our Board since the very start of CEES in 2007. At the end of 2013 she stepped down as Chair and left the Board. I'd like to thank you, Reidun, for your highly dedicated work within the Board and far beyond. You have paid attention to the bigger picture of CEES – making sure we have all been on the same track – as well as to the minor but nevertheless many details of the Centre. Thanks, Reidun: I hope we can also ask for your assistance and advice in the future.

Sven-Axel Bengtson has served on the Board since the very start of CEES. You have provided us throughout with very good guidance and advice. Indeed, you have been with us since the time we developed the initial proposal which brought us the CoE status, back in 2007. Your help during that initial period was very important – you helped us highlight several crucial details regarding our past performance. Thanks, Sven-Axel.

Tyge Greibrokk, serving as the representative of the faculty on our Board, also left the Board as he reached retirement. It has been very good having you on the Board – you paid attention to the many important details in our budget and accounting, while at the same time you had a good eye for the bigger picture. Thanks, Tyge.

New to the Board are Knut Liestøl and Hanne C. Winther-Larsen. Knut is from the Department of Informatics, and Hanne is from the School of Pharmacy at the University of Oslo. They bring with them scientific competence (informatics and microbiology, respectively) which we otherwise would not have within the Board, and which are of key importance to our Centre. We all look forward to working with you in the years to come.

Our host institution is the Department of Biosciences. Finn-Eirik Johansen represents the department on the Board and as such is our formal link to the Faculty of Mathematics and Natural Sciences. I'd like to express our appreciation for the good support that the Centre has received from both the department and the faculty. Thanks.

Additional thanks: I would like to thank Sissel Jentoft for being an excellent Deputy Chair, helping me chair CEES, and making CEES a better place to work towards bringing ecology, classical evolutionary biology and genomics together. I'd like to thank all members of CEES: the scientific staff for doing great science and the administrative and technical staff for making it possible for the scientific staff to do so. Thanks. Last, but not least, I would like to welcome Camilla Signe Thomsen to the CEES administrative team – a fantastic team that all of us at the Centre benefit from.

2 MANAGEMENT AND ADMINISTRATION

CEES is established as a Centre of Excellence (CoE) by the Research Council of Norway (RCN). It is hosted by the Department of Biosciences under the Faculty of Mathematics and Natural Sciences at the University of Oslo (UiO). RCN and UiO are the main financial contributors and constitute the final reporting entities that define the guidelines under which the Centre operates.

Administrative structure

Chair	Prof. Nils Chr. Stenseth
Deputy Chair	Dr. Sissel Jentoft (Senior Adviser)
Administrative team	Dr. Gry Gundersen (Adviser), Kari B. Rygg (Adviser), Tore Wallem (Adviser), and Camilla S. Thomsen (Executive Officer).
Lab Board	Ass. Prof. Anne Brysting (Leader), Prof. Kjetill S. Jakobsen, Dr. Kathrine Schou, Nanna Winger and Dr. Ave Tooming-Klunderud.
Administrative Leader of Fieldwork Resources	Prof. Atle Mysterud

The Centre is run on a daily basis by the Chair, the Deputy Chair and the CEES administrative team. Running and strategic issues are dealt with at weekly meetings. The Chair and Deputy Chair communicate on a daily basis regarding scientific progress within the Centre. In order to facilitate the running of CEES, and to provide a good cooperative relationship with its host (the Department of Biosciences), weekly meetings are conducted where the Head of Department, the Head of Administration at the Department, the CEES Chair and a representative from the CEES administrative team are all present. In addition to these weekly meetings, the administration at CEES meets with the administration at the department twice a month. These meetings are led by the Head of Administration at the department.

The CEES administrative team is responsible for the daily running of the Centre, which includes: employment, the CEES budget and accounting, budgeting and coordinating funding proposals (RCN, EU and other), annual reporting (RCN, EU and other), media and external communication, facilitating a good reception and stay for the CEES guest researchers, maintenance of the CEES website, and implementing the different CEES arrangements like weekly seminars, conferences, workshops and public lectures. The administrative team also organises and takes minutes at all CEES meetings; i.e. Core meetings every other month, biannual Board meetings, and annual SAB meetings. Most of the general correspondence with the university, the department, the RCN and the media goes through the CEES administration.

The CEES Chair has from September 2011, in accordance with the Deputy Chair and the administrative staff, chosen a so-called "flat organisational structure" where the responsibilities formerly associated with the Head of CEES Administration are now divided among different persons in the administrative team. For instance, Human Resources is Gry Gundersen's responsibility, while finances and budgeting are Kari B. Rygg's responsibility. Thus, each member of the administrative team has the primary responsibility for selected tasks, and all members of the administrative team contribute towards tasks associated with the daily running of the Centre. This organisational model functions very well, due to the high level of competence among the administrative staff and their frequent interaction with the Chair and Deputy Chair at CEES.

The CEES Core consists of the faculty members that have committed to allocating their research time to the Centre. The Core serves as an advisory group for the Chair. Several Core members are *Theme* and *Colloquia* leaders, and are responsible for the scientific progress within their respective *Themes*/*Colloquia*.

The formal administrative support required for students (from the Bachelor to the PhD level) and the general IT support is provided by the Department of Biosciences.

From 1 January 2013 the two departments, Department of Biology and Department of Molecular Biosciences, were formally merged. The research at the Department of Biosciences was then divided into five sections, of which CEES is the largest.

The Deputy Chair, Sissel Jentoft, and the cod team on fieldwork in Møre. © Helle T. Baalsrud

The Board and the Scientific Advisory Board

The CEES Board is an administrative body that meets approximately twice a year (12 March and 10 October in 2013) to focus on strategic and control functions as well as approving budgets, accounts and annual reports. There were some changes in the Board in 2013, as indicated below.

The CEES Scientific Advisory Board (SAB) has been appointed by the CEES Board. The SAB has an annual meeting (29–30 August in 2013), and gives invaluable feedback on the research carried out at CEES.

The Board	Specialisation and home institution	Change in 2013
Chair: Reidun Sirevåg	Microbiologist, University of Oslo, Norway	End: Oct. 2013
Chair: Knut Liestøl	Bioinformatician, University of Oslo, Norway	Start: Oct. 2013
Sven-Axel Bengtson	Ecologist, Lund University, Sweden	End: Oct. 2013
Tyge Greibrokk	Professor at the Department of Chemistry and member of the Board of the Faculty of Mathematics and Natural Sciences, University of Oslo, Norway	End: Oct. 2013
Rolf A. Ims	Ecologist, University of Tromsø, Norway	
Finn-Eirik Johansen	Chair of the Department of Biosciences, University of Oslo, Norway	Start: Jan. 2013
Trond Schumacher	Chair of the Department of Biology, University of Oslo, Norway	Start: Jan. 2013
Bernt Øksendal	Mathematician, CoE Centre of Mathematics for Applications, University of Oslo, Norway	
Hanne C. Winther-Larsen	Molecular microbiologist, University of Oslo, Norway	Start: Oct. 2013

Reidun Sirevåg © Painting by Svein Bolling, photo by Eirik Furu Baardsen

Comments by the Board Chair: Reidun Sirevåg

The Board met twice in 2013, on 12 March and on 10 October. As in previous meetings, the following items were presented and discussed: the economy report, the budget for the present year, and the long-term budget for the years to come. The sources of income are diverse, as are the various projects, but the Board's impression is that the economy is very well taken care of by administration.

A position has been established within CEES with the responsibility for dealing with international grant applications, especially towards the EU system. Throughout the year, considerable work and effort have been put into applications for resources. In 2013, a total of 36 grant applications, representing most of the scientific fields within CEES, were sent to The Research Council of Norway (RCN), the European Research Council (ERC), and other funding agencies. Of these approximately 1/3 were funded.

The now well established pattern of seminars, conferences etc. has been continued. An impressive list of foreign visitors and guest lecturers is presented. Also the annual Darwin Day event and Kristine Bonnevie lectures have been organised, and as usual with well known international scientists as speakers. These arrangements are popular and attended by faculty as well as students, also from outside the Department of Biosciences.

After discussing the 2013 report from the Scientific Advisory Board (SAB), it was agreed that in the future this Board would like a report written and composed by the SAB. In previous years the SAB report has been presented more or less as minutes from their meeting, composed by the CEES administration and approved by the SAB.

At the meeting in October I chose to resign as Chairperson from the Board, after having followed the very interesting and challenging evolution of CEES from its beginning. It has been a great pleasure and a great learning experience.

The Scientific Advisory Board	Specialisation and home institution
Chair: Rita R. Colwell	Microbiologist, University of Maryland, USA
Tim Coulson	Population biologist, Imperial College, London, UK
Olivier Gimenez	Biostatistician, Center for Functional and Evolutionary Ecology (CEFE), France
Edward J. Feil	Microbiologist, University of Bath, UK
Barbara Mable	Evolutionary Biologist, University of Glasgow, UK
Anne Magurran	Behavioural Ecologist, University of St. Andrews, UK
Gordon H. Orians (Corresponding member)	Evolutionary Biologist, University of Washington, Seattle, USA

Comments by the Scientific Advisory Board Chair: Rita R. Colwell

The conclusion of the SAB after reviewing the progress of CEES over the past year is that there is no doubt that CEES is performing extremely well. Evidence in support of this judgment is the excellent grading received by CEES at the most recent funding council review, coupled with the large number of excellent peer-reviewed publications coming from the research of the CEES faculty, staff, and students. There is also measurable added value from CEES being very well integrated into the Department of Biosciences and the University of Oslo. There is good reason to believe that the Research Council is pleased with their investment. Based on performance and the reports provided to the SAB, CEES has responded positively to recommendations of the SAB, particularly in making a serious effort to integrate evolution and ecology, the major theme of CEES. The concern now is that, with the consistent overall excellent performance, CEES must make major decisions as the decade of its funding draws to a close.

Because the most significant component of its legacy is the training of the next generation of excellent young scientists in the fields of ecology and evolution under the umbrella of population biology, these young scientists must begin to take their place in the future of science. The SAB recommends that CEES makes a greater effort to ensure that the young scientists obtain a broad understanding of the synthesis of ecology and evolution, perhaps by an even tighter integration of the research teams of CEES. Many excellent seminars are presented during the year by CEES scientists and visitors, and students should be required to spend time attending seminars and participating in discussions outside of their immediate area of research. With today's abundant interdisciplinary offerings, those working in genomics should be participating in the ecology and other disciplinary activities, and vice versa. Greater focus on mathematics would be highly beneficial since mathematics is the "Esperanto language" of science.

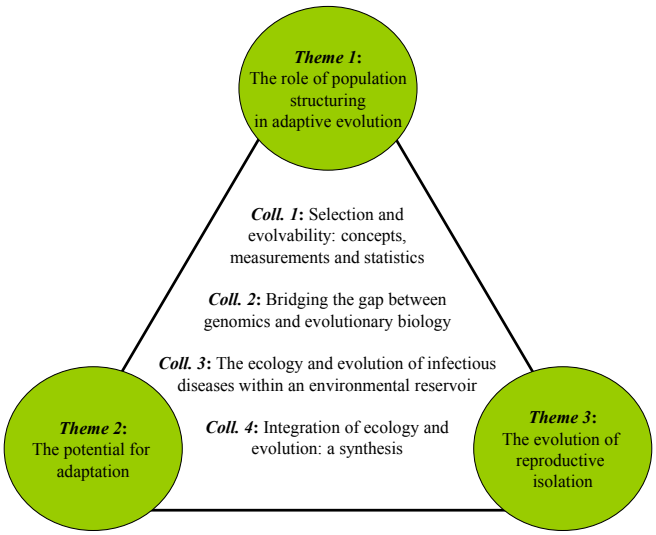
CEES has developed into a large centre, comprising more than 160 staff, students, and faculty, with a momentum that is positive. However, the remaining colloquia need to be completed, and the appointment of visiting professors is an urgent matter. Previous recommendations of SAB, although addressed to some degree, remain urgent. Important tasks that remain and require attention include: allowing talented young researchers to publish their own work and build their career dossiers, strengthening the opportunities for the advancement of female faculty, staff, and students, and continuing to foster the creative thinking and independence of young scientists. The necessity for younger scientists to publish independently remains critical and it would be beneficial, also, for CEES to provide assistance in their search for long term employment after time spent productively with CEES.

Returning to the issue of legacy, the future of CEES beyond 2017 must be deliberated. CEES has become a positive force for ecological and evolutionary synthesis. Has sufficient momentum been achieved? If not yet, then those missing pieces must be defined, addressed, and fitted into the overall programmatic theme of CEES. There are fundamental questions of predicting ecological effects of mutations and societally important applications, such as the ability to predict epidemiological events of massive proportion. CEES and its leadership and management must look to the immediate future and plan for leadership succession and transition to the next phase. A proposal for the transition of CEES into its next phase should be prepared now, as the current phase of CEES comes to an end. CEES must consider how it will characterise and describe the key contributions it has made to the integration of ecology and evolution, and which of the most important issues should receive greatest attention, not only by CEES but by all scientists interested in furthering the vital synthesis to which CEES has significantly contributed and which represents its legacy. The accomplishments of CEES, as well as what still remains to be done, must be communicated to the rest of the world.

3 SCIENTIFIC ACTIVITY

Organisation of the research

CEES takes on numerous research objectives with an ecological and evolutionary synthesis using old and new data from the field and the lab. The research is organised around three intertwined Themes. *Theme 1: The role of population structuring in adaptive evolution.* In 2013 CEES focused on the effects of habitat fragmentation on early stages of genetic diversification and the ecology of microbial communities. *Theme 2: The potential for adaptation.* Research in 2013 dealt with human-induced evolution, e.g. effects of size-selective hunting and fishing. *Theme 3: The evolution of reproductive isolation.* CEES' efforts addressed genetic aspects of reproductive isolation. Within each research Theme, there is integration of ecological and evolutionary thinking. In order to avoid the pitfalls associated with integrative work, such as conceptual and semantic confusion, and to promote communication across the various research fields (that each have their own limiting assumptions), the *Themes* are addressed through four multidisciplinary *Colloquia*, each of three-year duration. Each *Colloquium* constitutes an excellent setting for highly qualified staff and visiting scientists, with experience from a wide range of biological and methodological systems, to collaborate and thus contribute to the overall objectives of the Centre. The topics of the colloquia are as follows: *Colloquium 1: Selection and evolvability: Concepts, measurements and statistics. Colloquium 2: Bridging the gap between genomics and evolutionary biology. Colloquium 3: The ecology and evolution of infectious diseases with an environmental reservoir* (refocused relative to the original proposal to create a greater scientific impact using the expertise at CEES). *Colloquium 4: Integration of ecology and evolution: A synthesis.*



Scientific highlights in 2013

Response of trophic relationships to climate change in sub-Arctic seas

Understanding the drivers that determine the productivity of marine ecosystems is an important issue. Climate and exploitation interact in their effects, such that climate alterations may cause failure in a fishery management scheme while fisheries may disrupt the ability of a population to withstand, or adjust to, climate changes. For example, removal of large (and thus implicitly old and experienced) individuals, resulting in a juvenated, age-truncated spawning population, has been described by numerous authors as resulting from modern day fisheries patterns. Similarly, non-uniform fishing pressure on population sub-units may also lead to a reduction in the capacity of populations to withstand climate variability and change.

It follows that ecosystem-based management of the world's oceans requires a better understanding of how these changes affect food-web relationships. To explore this topic, a series of international workshops funded by the Research Council of Norway on fish population structure in marine ecosystems was held by CEES. These workshops brought together academic and applied scientists from five countries (Norway, Canada, USA, France and Russia) with special expertise in theoretical ecology, animal behaviour, fish and seabird ecology, fisheries oceanography, and ecosystem modelling. This resulted in the publication of a Theme Section of five papers, all coauthored by members of CEES and edited by Joël Durant and Nils Chr. Stenseth, in *Marine Ecology Progress Series.*

During these workshops, we have investigated the effect of fishing and climate on population structure across sub-Arctic ecosystems, using a comparative approach. We particularly focussed on how temperature- and fishing-induced changes in spatial and demographic population structure affect recruitment and population growth rate.

For instance, we studied the effects of variation in spawning stock and sea temperature on long-term temporal patterns related to the recruitment dynamics of 38 commercially harvested stocks in the northern North Atlantic, and found that abrupt changes (and maybe even regime shifts) may be common. In another study, we examined for 5 fish stocks (4 species in 3 ecosystems) the usefulness of indices of juvenile abundance relative to larval abundance for predicting recruitment. Prediction

People who attended the workshops, from back to front and left to right: Ken Drinkwater, Ken Frank, Manuel Hidalgo, Leif Chr. Stige, Dag Ø. Hjermann, Kevin Bailey, Natalia Yaragina, Anne Maria Eikeset, Nils Chr. Stenseth, Geir Ottersen, Mette Skern-Mauritzen, George Hunt, Lorenzo Ciannelli, Tristan Rouyer, Joël M. Durant, Mary Hunsicker, Jon Fisher

of year-class strength is a critical challenge for fisheries managers and is classically based on larval abundance. We found that juvenile abundance could give a better estimate of stock abundance, but that the result was too dependent on data quality to be practical. Our results also showed that forecasts of future recruitment were either improved or qualitatively unchanged by including environmental correlates. In a third study, we compared for 7 gadoid fish stocks (3 species in 7 ecosystems) the effects of fisheries on population growth rate, and the sensitivity of population growth to climate, as well as the role of changed population structure in mediating these effects. We found that there was a general tendency for an increase of the population growth with the increase of the contribution of recruitment.

The results reported in the collection of papers suggest common patterns, but also highlight differences in the relative importance of fishing and climate among the populations and ecosystems. The key message of this Theme Section is the importance of the interplay between environment and stock (size and structure) in shaping recruitment of sub-Arctic marine fish stocks. The 5 papers highlight different aspects of this theme and draw attention to the value of monitoring temporal and spatial patterns, as well as environmental forcing. Amongst other findings, we have demonstrated that recruitment estimates may be improved by taking into account environmental information and nonstationarity. We have shown that age-structure may be important for understanding the dynamics of harvested populations. Finally, we have shown that spatial ecology is important to understand the underlying mechanisms that drive fish population dynamics.

Summarised by Joël Durant

Further reading:

Durant, J. M., **Ottersen, G.**, **Stenseth, N. C.** (2013) Impact of climate and fisheries on sub-Arctic stocks. *Marine Ecology Progress Series*, 480, 199–203.

Durant, J. M., **Hidalgo, M.**, **Rouyer, T.**, **Hjermann, D. Ø.**, Ciannelli, L., **Eikeset, A. M.**, Yaragina, N., **Stenseth, N. C.** (2013) Population growth across heterogeneous environments: effects of harvesting and age structure. *Marine Ecology Progress Series*, 480, 277–287.

Ottersen, G., **Stige, L. C.**, **Durant, J. M.**, Chan, K. S., **Rouyer, T. A.**, Drinkwater, K. F., **Stenseth, N. C.** (2013) Temporal shifts in recruitment dynamics of North Atlantic fish stocks: effects of spawning stock and temperature. *Marine Ecology Progress Series*, 480, 205–225.

Stige, L. C., Hunsicker, M. E., Bailey, K. M., Yaragina, N. A., and Hunt Jr, G. L. (2013) Predicting fish recruitment from juvenile abundance and environmental indices. *Marine Ecology Progress Series*, 480, 245–261.

Fisheries-induced evolution adds a bonus to good management

In a new study, published by the *Proceedings of the National Academy of Sciences of the United States of America* (*PNAS*), we have been the first to determine whether genetic changes resulting from fishing pressure have any significant economic effects for Atlantic cod (*Gadus morhua*) (Eikeset et al. 2013). The study shows that evolutionary changes allow individual fish to grow faster and mature earlier, which increases stock productivity and revenue for fishermen. However, if harvesting pressure is particularly high, genetic changes have negative consequences and cause economic costs.

The overexploitation of our oceans is worrisome for several reasons. One of the latest concerns is that fishing pressure can be so high that it causes a fish stock to alter its genetic composition. In the academic community, it is widely debated whether historical harvesting pressure has been high enough to cause these genetic changes to occur. And if so, have these genetic changes had a positive or a negative effect on the fate of the fisheries and fishermen's revenues? We carried out this study at CEES, in collaboration with several international partners, in order to look at these questions in detail. It was already known that harvesting could cause genetic changes, but what was not known was whether fishermen and managers should be concerned about this. The major challenge in answering this question is the fact that growth and reproduction schedules of individual fish do not only depend on their genetic code, but also on the state of the environment. Since marine systems are constantly in flux, it is notoriously difficult to disentangle genetic and environmental effects. To overcome this obstacle, our team developed a detailed model that closely resembles the population of Northeast Arctic cod, currently the largest cod stock in the world. The trick was to create two versions of the model – one in which genetic changes could occur and the other where the fish only responded to environmental changes.

What we found was that genetic changes occur even if fishing pressure is very small. Surprisingly, genetic changes can have positive or negative consequences, depending on how high the harvest pressure is. In general, evolution allows fish to adapt by growing faster and maturing earlier, which is a good thing, because it allows the stock to produce more offspring. But if harvesting pressure is high, genetic changes have negative consequences and cause economic costs. This happens because evolution facilitates higher growth, which implies that fish can be caught at younger ages, often before they have reproduced. Furthermore, the study found that the key to successful management is a low harvesting rate – irrespective of whether genetic changes occur or not. However, this does not mean that managers can safely ignore evolutionary changes: the economic costs may appear very small, but they are highest for the mesh size that is currently being utilised.

Our paper has been highlighted several places and has attracted great attention, for example in *Science Perspectives*, and the PNAS First Look Blog (written by the *Science News* journalist Robert Frederick). In addition, our research has been featured by such media outlets as Science Daily, The Fish Site, the International Institute for Applied Systems Analysis, Science 2.0, and Fish Information & Services.

Summarised by Anne Maria Eikeset

Further reading:

Eikeset, A. M., **Richter, A.**, Dunlop, E. S., Dieckmann, U., **Stenseth, N. C.** (2013) Economic repercussions of fisheries-induced evolution. *Proceedings of the National Academy of Sciences of the United States of America*, 110 (30), 12259–12264.

Colloquium 3: The ecology and evolution of infectious diseases with an environmental reservoir

Among bacterial pathogens, *Yersinia pestis* (causing plague) is an interdisciplinary treasure trove. Plague comes with a rich body of historic documentation, and its aetological agents have been studied and monitored in their natural reservoirs in Asia for more than 50 years. Distinct bacterial strains have been genetically typed and sequenced from both current and ancient samples, resulting in an incredibly detailed description of genetic relatedness across time and across the globe (i.e. a phylogeography), that can be interpreted in its natural ecological context.

However, despite over 300 years of study, the disease is still poorly understood (which might reflect poorly on us scientists). Basic yet highly relevant questions are still unanswered: where did the three major plague pandemics originate from? What triggered the three pandemic phases of this infective disease? Why did plague disappear from Europe twice? How does plague persist, when it reappears again in a region after long periods of absence? At CEES, we are trying to answer these still open questions for *Yersinia pestis*, as well as similar questions for *Bacillus anthracis* (anthrax). Studying both organisms in their full biological range - from molecular interactions with host species and the abiotic environment, their evolution, routes of transmission, and sensitivity to climate fluctuations - is generating fundamentally new insights into disease ecology and evolution that are broadly applicable.

The **ERC Advanced Grant MedPlag** *The medieval plagues: ecology, transmission modalities and routes of the infections* aims to answer many of the open questions on medieval plague by joining the fields of anthropology, ancient genomics and epidemiology within a biological framework. A new ancient DNA laboratory at CEES, under the supervision of **Barbara Bramanti**, will soon be ready. After disclosing the genetics of ancient *Y. pestis* strains from the first (in 2013) and second (in 2010) pandemics, she and **Stephanie Hänsch** will continue the delicate process of extracting and analysing DNA fragments from old tooth samples of plague victims from the 6th to the 18th century throughout Europe, as well as from Georgia, Kyrgyzstan and South Korea. Some of the same questions on medieval plague are approached from a theoretical epidemiological point of view, by **Boris Schmid** and **Katie Dean**. We now have evidence that plague was continuously being imported into Europe during the second pandemic (rather than only at the start of it), following climatic fluctuations in plague reservoirs in Western Central Asia. These results were presented by Boris in an award-winning poster at the *Yersinia 11* conference in China last year. **Katie Dean** is modelling the spread of plague within medieval European cities, trying to elucidate which of the modes of transmission (pneumonic, classical rat-mediated bubonic, or human-to-human through an arthropod vector) fits historic records of the epidemiology best. The reservoirs of plague form a central theme in our work, and PhD student **Pernille Nilsson** is in an exciting collaboration with Chinese colleagues, *de novo* sequencing and analysing the immunological response of the great gerbil (*Rhombomys opimus*), one of the main hosts of plague in Asia. Besides plague, work on anthrax continues in its natural ecosystem in Namibia, where various observations on the behaviour of the hosts at anthrax carcass sites, and the life of anthrax in the soil are undertaken by **Wendy Turner**, **Ryan Easterday**, and **Kyrre Kausrud**, as well as PhD students **Anders Aas** and **Karoline Vaseth**.

The work on plague and related *Yersinia* species is rapidly expanding. Besides an additional PhD in the MedPlag programme, two new PhD students, funded by the departmental focus grant "COMPI", and under the supervision of **Dirk Linke**, **Gareth Griffiths**, and several CEES members, will look at the infection mechanisms of various *Yersinia* species and strains. Last, but not least, **Thomas Owens Svennungsen** & **Thomas Haverkamp** are supporting the plague group with their expertise. Svennungsen focuses on the constraints that are placed on the evolution of plague virulence by the lifestyle of its hosts, while Haverkamp brings valuable expertise to the group on the behaviour of soil bacteria.

Summarised by Barbara Bramanti and Boris V. Schmid

Further reading:

Harbeck, M., Seifert, L., **Hänsch, S.**, Wagner, D. M., Birdsell, D., Parise, K. L., Wiechmann, I., Grupe, G., Thomas, A., Keim, P., Zöller, L., **Bramanti, B.**, Riehm, J. M., Scholz, H. C. (2013) *Yersinia pestis* DNA from skeletal remains from the 6th century AD reveals insights into Justinianic Plague. *PLoS Pathogens*, 9 (5), 1–8.

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Havarua, Z., **Turner, W. C.**, Mfune, J. K. (2014) Seasonal variation in zebra foraging behaviour may alter contact with the anthrax bacterium. *Canadian Journal of Zoology*, doi:10.1139/cjz-2013-0186.

Genomics and ecology of gut adapted bacteria

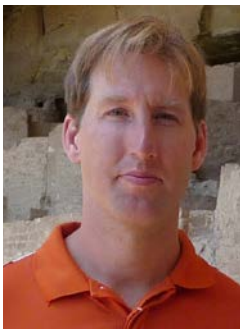
Awareness is growing of the importance of gut microbial colonisation for human health, as numerous links with a multitude of diseases are discovered. The total microbial content of the gut is often referred to as the gastrointestinal (GI) microbiota. Recent advances in sequencing technology have generated massive amounts of data, but much remains to be understood about the processes important for maintaining a healthy bacterial community structure in the gut. *Escherichia coli*, as well as being a much studied model organism, is an important and ubiquitous member of the human GI microbiota. Although *E. coli* constitutes only a small fraction of the total GI microbiota, it has a wide spectrum of potential interactions with the human host, ranging from probiotic to commensal and on to pathogenic. In addition to being a globally dominant cause of acute infections, certain *E. coli* strains have been consistently linked to chronic conditions such as inflammatory bowel disease (IBD). This highlights the importance of understanding colonisation on the strain level and linking this to the dynamics of other species of bacteria that normally colonise the gut.

We compared the genome sequences of 16 commensal and pathogenic *E. coli* strains isolated from infants in the Trondheim area of Western Norway, during a limited time frame, in order to look for gene content signatures distinguishing various phenotypes. In general we found that differences in gene content reflected differences in the core genome phylogeny. We further found gene content signatures distinguishing pathogens from commensals, early and late colonising strains, and strains with high or low maximal growth rates. We also observed ongoing adaptation *in vivo*, toward a maturing gut environment, in a strain that was isolated from a 10 days old infant and then re-isolated 4 months later. Comparison of our 16 strains with the genome sequences of 25 global isolates representing the broad species diversity demonstrated that, with a single exception, the Trondheim strains separated into two clades that were clearly distinct from the global isolates. This result emphasises the importance of geography in shaping gene content profiles on the strain level.

In a related study we investigated the colonisation dynamics of three *E. coli* strains isolated in succession from a single infant by conducting a series of *in vitro* serial transfer competition experiments, including a model background microbiota with representatives of the predominant GI phyla. We found that the latest isolate consistently outcompeted the early and mid isolates in two– and three-way competitions. However, addition of the background microbiota reversed the competitive outcome of two-way competitions between the late and early strains, and this effect was attributed to the rapid growth of *Clostridium perfringens*. Growth rate assays of the *E. coli* strains, under various conditions of nutrient availability, demonstrated that the strains conformed to two distinct ecological profiles known as ‘exploiters’ (high growth rate at high nutrient concentrations) and ‘gleaners’ (high substrate affinity at low nutrient concentrations). Further experiments showed that *C. perfringens* rapidly depleted the main energy source in the growth medium, amino acids, thus providing an environment

favoring the gleaner. Genome sequences of the isolates provided some clues to the adaptations underlying the two ecological strategies. Modulation of a two-way competition by a distantly related third species is termed context-dependent interaction, and has not previously been described among species on a single trophic level.

Continuation of this research was awarded with funding through the FRIPRO programme of the Research Council of Norway. The new project, starting summer 2014, will be a high resolution time series study of microbial GI colonisation in a cohort of healthy infants born in Oslo, Norway. The study will allow us to observe colonisation dynamics in unprecedented detail, with a focus on development of predictive dynamic models for establishment of the infant GI microbiota.



Summarised by Pål Trosvik and Eric de Muinck

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de Muinck, E. J., **Stenseth, N. C.**, Sachse, D., **vander Roost, J.**, Rønningen, K. S., Rudi, K., **Trosvik, P.** (2013) Context-dependent competition in a model gut bacterial community. *PLoS One*, 8 (6), 1–17.

Grazing, climate warming and vegetation in alpine ecosystems

Shifts in ecological systems following recent rapid climatic change are of particular concern in arctic and alpine regions. Climatic warming has increased the altitudinal and latitudinal distribution of many species from a wide range of taxa. Warming effects of high altitude plant communities are well documented in terms of increasing tree-lines and upward shifts of overall vegetation communities, leading to a homogenisation and loss of alpine biodiversity. However, we know very little about how climate change may interact with other aspects of global change such as land use. Despite the importance of livestock grazing in mountain regions of Europe, knowledge regarding how warming and grazing interact to determine changes in vegetation is generally lacking.

We have empirically investigated plant community responses to differing densities of domestic sheep (*Ovis aries*) (0, 25, and 80 sheep per km^2) along an elevational gradient, using a landscape-scale and fully replicated long-term (10 year) field experiment in the mountains of Norway. During the experiment, summer temperatures were never below the average of the previous 30 years, thus a push from climate on the plant communities was present.

In the controls without grazing, the recruitment of birch rose by ca. 200 m in elevation (the maximum possible given the scale of the enclosures). In contrast, no such elevational increase in birch recruitment was seen where grazing was continued or increased relative to pre-experimental levels. We thus provide direct experimental evidence that herbivores can limit the treeline below its potential at the landscape scale in this climatic zone. The effect of sheep grazing on recruitment of *Salix* spp., being important for many game species, was negative at high elevation, but tended towards being positive at low elevation due to reduced competition from other plants. The whole community of vascular plants moved 3 m upslope in 8 years, within the range reported many places in the world under climate warming. However, the vegetation community was stable at low sheep density and tended to move downslope at high sheep density. This impacted species richness and temporal stability between treatments differently along the elevational gradient. Where grazing was ceased, species richness declined by up to 3.7 species at low elevations and increased by up to 3.5

species at high elevations, whilst changes were less extreme where grazing was maintained or increased. Our series of studies highlight how land use may be used to potentially buffer the impact of global warming on the plant communities and tree-lines in alpine ecosystems.

Summarised by Atle Mysterud

Further reading:

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Speed, J. D. M., Austrheim, G., Hester, A. J., **Mysterud, A.** (2013) The response of alpine *Salix* shrubs to long-term browsing varies with elevation and herbivore density. *Arctic, Antarctic, and Alpine Research*, 45 (4), 584–593.

Speed, J. D. M., Austrheim, G., **Mysterud, A.** (2013) The response of plant diversity to grazing varies along an elevational gradient. *Journal of Ecology*, 101 (5), 1225–1236.

Epistasis and evolutionary dynamics

Most biologists share the intuition that interactions between genes, or epistases, are fundamental to the evolution of complex organisms. This intuition contrasts with the single-gene focus that emerged in the modern synthesis. The vast majority of evolutionary theory is based on models that either study genes in isolation or postulate additive interactions, where the effects of individual genes can just be summed up. This is not just grounded in convenience, but is also supported by a class of models that show that epistasis does not have any permanent effects on the response to selection. In a new study, I have taken a new look at these models and shown that they have been misinterpreted (Hansen 2013). They do not show that gene interactions do not have permanent effects. Rather, they assume this. In reality, epistasis can have a dramatic influence on evolutionary dynamics, but this influence depends on the patterns of interaction among genes. It has largely gone undetected because the field has worked with a "patternless" and evolutionary inert statistical conceptualisation of gene interactions.

In Figure 1 we can see the response that different genetic architectures have to the same strength of selection. In the additive architecture, allele substitutions have constant effects that are added together to make the phenotype under selection. In the positive directional epistatic architecture, allele substitutions with positive effects also tend to increase the effects of other allele substitutions with positive effects. In the negative directional epistatic architecture, allele substitutions with positive effects tend to decrease the effects of other allele substitutions with positive effects. Finally, in the non-directional epistatic architecture, allele substitutions will change the effects of other allele substitutions, but in a nonsystematic manner. In this case, the response is virtually identical to the additive architecture. Most studies of epistasis have implicitly assumed a non-directional architecture, and therefore missed the potentially strong effects of epistasis on evolutionary dynamics.

We can think of (systematic) epistasis as curvature in the genotype-phenotype map. Positive directional epistasis is positive curvature (convexity) and negative directional epistasis is negative curvature (concavity). Figure 2 shows how the same amount of underlying genetic variation is amplified by moving along positive curvature to steeper regions of the map, and canalised by moving along negative curvature to flatter regions of the map.

In a related new study, we have shown how patterns of epistasis and additivity are expected to evolve under stabilising and fluctuating selection (Le Rouzic et al. 2013). In that study it is shown that a degree of canalisation (reduction of effects) is expected for both additive and epistatic effects, and under both stabilising and fluctuating selection. However, complete canalisation is hard to evolve, and systems under fluctuating selection are not canalised as far as those under stabilising selection. This is related to the maintenance of genetic variation and evolutionary potential. Figure 3 shows how standing genetic variance and the sizes of mutational effects depend on the period and amplitude of fluctuations in a fitness optimum.

Summarised by Thomas F. Hansen

Further reading:

Carter, A. J. R., Hermisson, J., **Hansen, T. F.** (2005) The role of epistatic gene interactions in the response to selection and the evolution of evolvability. *Theoretical Population Biology*, 68 (3), 179–196.

Hansen, T. F. (2013) Why epistasis is important for selection and adaptation. *Evolution*, 67 (12), 3501–3511.

Hansen, T. F. (2014) Measuring gene interaction. *In: Epistasis: Methods and Protocols. Methods in Molecular Biology.* Springer Verlag. In press.

Le Rouzic, A., Álvarez-Castro, J. M., **Hansen, T. F.** (2013) The evolution of canalization and evolvability in stable and fluctuating environments. *Evolutionary Biology*, 40 (3), 317–340.

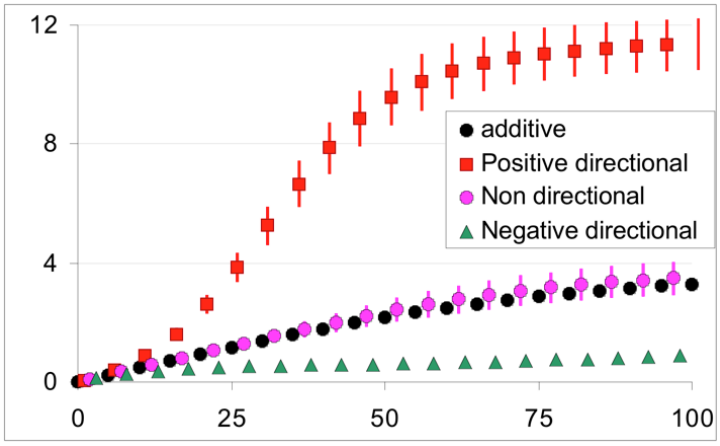


Figure 1: How different patterns of epistasis influence a response to directional selection. The bars give one standard deviation over replicate simulations. (Modified from Carter et al. 2005).

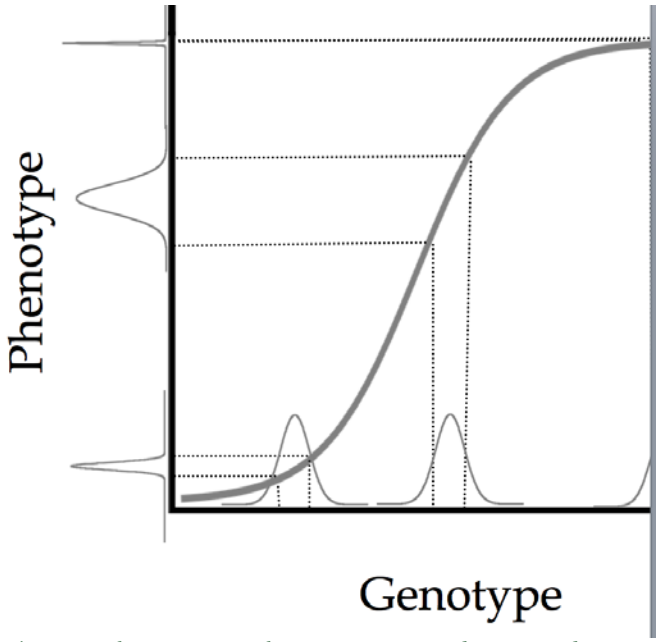


Figure 2: The genotype-phenotype map, and expressed variation (Hansen 2014).

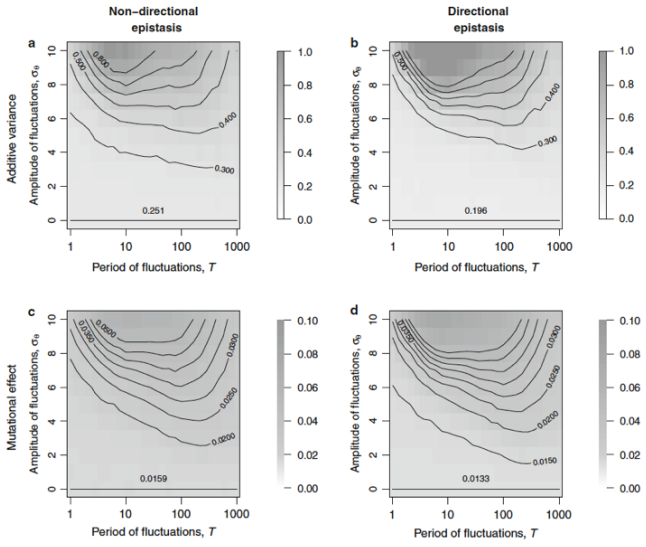


Figure 3: Effects of fluctuations in a fitness optimum on the amount of additive genetic variance and size of mutational effects under non-directional and directional epistasis (Le Rouzic et al. 2013). The effect of pure stabilising selection is shown by the line at the bottom. Note how the highest levels of variance and the largest mutational effects evolve for fluctuations of intermediate lengths (T = tens to hundreds of generations). Note also how complete canalisation (mutational effects = 0) never evolves.

The evolution of age-dependent phenotypic plasticity

Phenotypic plasticity, the ability of a genotype to develop different phenotypes in different environments, is a universal property of organismal life: All living organisms are plastic in at least some of their traits. For example, water flea (*Daphnia* spp.) grow a 'helmet' when exposed to predators in the water, and the spider *Parawixia bistriata* can adapt the type of cobweb it produces to the type of prey it expects to catch. Another illustrative example is the plasticity of marine iguanas (*Amblyrhynchus cristatus*) in body size. These iguanas shrink in El Nino years, when food is scarce, which increases their overall survival chances.

The plasticity of a trait is not generally a quality that is maintained through life, but rather one that is limited to certain periods of an organism's life. The central question, which we asked in this study, was why plasticity evolves to be age-dependent, or why windows of plasticity (where organisms are plastic only during a particular time window of their life) exist in the first place. The hypothesis which we evaluated was if and how limited information about environmental conditions could potentially limit the evolution of plasticity and cause age-dependent plasticity patterns. Previous studies have analysed conditions under which plasticity would evolve in general, but, to our knowledge, this is the first study to investigate the evolution of plasticity from a life-history perspective.

We developed a mathematical model where we described a stochastic environment that is partially predictable for the organism. We also took into account adjustment costs for the plastic traits and different example life-histories for the model organisms. Then we modeled the developmental trajectory of an organism in this environment and derived plasticity patterns that were optimal in terms of fitness for the organism. Our results show that plasticity will often be expected to vary with age: Plasticity will usually vary in a non-monotonic fashion. Early in life it is generally optimal to delay phenotypic adjustments until enough information has been collected about the state of the environment. Towards the end of life, phenotypic adjustments are disfavored as well because the organism cannot sufficiently benefit anymore before its death from a highly adjusted phenotype. A combination of these effects can produce a diversity of non-monotonic plasticity patterns.

Summarised by Barbara Fischer

Further reading:

Fischer, B., van Doorn, G. S., Dieckmann, U., Taborsky, B. (2014) The evolution of age-dependent plasticity. *American Naturalist*, 183 (1), 108–125.

Sea stickleback (Spinachia spinachia). © Halvor Knutsen

4 EDUCATION AND RESEARCH TRAINING

CEES aspires to provide excellent education and training facilities for our students, to supply outstanding candidates for future positions. Our host department, as well as other units of the university, delivers the basic education to our Bachelor and Master/PhD programmes. In 2013, CEES's permanent scientific staff contributed to the teaching of 3 Bachelor courses and 9 Master/PhD courses. 35 Master students were supervised by CEES members, and 8 completed their degrees in 2013. We provide a stimulating research environment for our students by organising workshops, regular seminars and journal clubs, and by frequently inviting prominent scientists as speakers.

The student conference at Holmen Fjordhotell

The CEES Annual Student Conference is a compulsory event that provides a good forum for students to hone their communication and presentation skills in a professional setting. This year the conference was held 14–16 October at Holmen Fjordhotell with 110 delegates. Including a few talks by senior scientists, 60 talks were given at the conference.

Members of the 2013 CEES team for the annual Holmenkollen relay. © CEES

Journal clubs and discussion groups

CEES arranges several different journal clubs, e.g. the Discussions on Epigenetics and Transgenerational inheritance (3 sessions in 2013), MaEcovo (35 sessions in 2013), the Genomic Analyses Club (12 sessions in 2013), and the Speciation Journal Club (11 sessions in 2013). Participating students select relevant papers that focus on scientific challenges within the field of ecology and evolution. The journal clubs encourage critical reading of scientific papers and provide an opportunity for students to keep updated in their field of study, as well as in related scientific fields, thereby also promoting synthesis within the Centre.

Late Lunch Talks (LLT)

The Late Lunch Talk seminar series is a forum where employees, visiting scientists and students at CEES present and discuss their work and ideas. The format is informal, with the objective being the facilitation of stimulating, topical discussions. There are three types of LLT: Regular (most common), PUB talks (a monthly collection of recent CEES publications – with the first event held in October) and Concept Battle (an occasional exercise where basic concepts and buzz words in biology are scrutinised). 16 sessions were held in 2013.

Delegates at the Annual CEES Student Conference, Holmen Fjordhotell © CEES

NorMER

Nordic Centre for Research on Marine Ecosystems and Resources under Climate Change
A Nordic Centre of Excellence administered by CEES.

NorMER is a Nordic Centre of Excellence that brings together the expertise of leading research groups from all Nordic countries, and several North American institutions, to implement a collective and multidisciplinary research strategy to explore the biological, economic, and management consequences of global climate change on fisheries resources. It will achieve this through a unique program of primary research, implemented by PhDs and Postdocs in a system of collaborative projects, with a focus on the Atlantic cod (*Gadus morhua*). Though our Nordic focus is on cod, this research is intended to be a platform to extend this knowledge to other marine systems.

The aims and corresponding actions of *NorMER* are:

1 Perform effect studies to: 1) evaluate climate effects on Nordic marine ecosystems, 2) Build new tools for predicting biological consequences of climate change, and 3) quantify impacts on profit, employment, and harvesting.

Actions: PhDs are co-supervised internationally. PostDocs collaborate internationally. Leading senior scientists and climate researchers provide expert input.

2 Create an effective training environment for young researchers.

Actions: Annual meetings, graduate courses, and special workshops focus on transferable and interdisciplinary skills. Regular interaction between students and international experts in climate- and marine ecosystem-related fields further strengthen the training programme in *NorMER*.

3 Develop a team of outstanding global quality.

Actions: Research institutions from every Nordic country are partners. International researchers and industry representatives are invited to annual meetings. A 7-member Centre Advisory Panel (CAP), consisting of an interdisciplinary mix of globally leading researchers, participates at all annual meetings. Annually, one internationally distinguished researcher is selected as the honored Johan Hjort Chair to participate at the annual meeting to share expertise with *NorMER* partners and students.

4 Link to industry and policy managers.

Actions: Industry and Policy representatives from each of the Nordic countries are encouraged to attend annual meetings for discussing societal/economic effects of climate change, and to learn more about *NorMER* work. PhD students will be encouraged to visit marine industries or participate in commercial fishing. A strong bio-economic focus within *NorMER* will facilitate transference of results to fisheries managers.

5 Update marine ecosystem management policies to sustain healthy fisheries.

Actions: *NorMER* is a research-based programme to evaluate the effects of climate variability on marine ecosystems and how fisheries management can be adapted to maintain sustainable harvest levels. We hope to produce strong results, built on solid fundamental science, that will be applied to real systems in the Nordic region.

NorMER is primarily supported with funding from Nordforsk, on behalf of the Top-level Research Initiative (TRI), and from each of the main partners.

Comments from the Chair of *NorMER*, Nils Chr. Stenseth (excerpt)

We have been through yet another full year as a 'Nordic Centre for Research on Marine Ecosystems and Resources under Climate Change' (*NorMER*): a Nordic Centre of Excellence focusing on training Young Researchers (PhDs and Postdocs) within the topic of how climate change is affecting marine systems – from ecology and evolution, to economics and management, and including how society ought to adapt to the environmental changes resulting from climate change. Although our perspective is general, we have focused on cod (*Gadus morhua*) as our model organism because we believe this will make it easier to integrate the different disciplines involved within *NorMER*: all *NorMER* members will have one common marine system over which they can combine and apply their diverse expertise. It is clear that we are on the right track with regards to our ambition to be a true Nordic Centre of Excellence, not the least thanks to our excellent team of Young Researchers (YR) – both PhDs and Postdocs.

Communicating our perspectives and results to a broad spectrum of people, particularly politicians, is an important part of *NorMER*. In order to facilitate dialogue with politicians and managers about the science we are doing, we organised – just as we did the year before – a public session at the University of Iceland in connection with our third *NorMER* annual meeting. This session featured presentations from the President of Iceland, the CEO of the largest seafood company in Iceland, the Dean of the School of Social Sciences, and the Director of the Icelandic Marine Research Institute, and several internationally recognised scientists. Our 2013 *NorMER* Annual Meeting, and this public session, were both highly successful.

We will extend the work of *NorMER* to also address the question of how we humans *should* adapt to the Anthropocene in order to sustainably co-evolve with the biosphere, as well as addressing which social transformations are needed to facilitate a sustainable co-evolution. The Stockholm node will play a key role in this endeavour – together with the rest of the *NorMER* team. Specifically, we will combine these with the rest of our work into a new *NorMER* theme, which specifically focuses on adaptation and transformation in Nordic marine social-ecological systems, from an interdisciplinary perspective. This will be facilitated by linking up with collaborating Nordforsk-funded project, *GreenMAR (greenmar.org)*.

NorMER report 2013 facsimile. The 90 page report can be found at normer.org, or you can order it from normer-post@ibv.uio.no

5 SCIENTIFIC OUTREACH

An important goal of CEES is to communicate its research and findings, as well as to increase the appreciation and understanding of science. Our aim is to reach both Norwegian and international audiences.

PUBLIC EVENTS

A central part of our scientific outreach is the open seminars with high-profile researchers and communicators of science, held both on the university's campus and at public venues such as Oslo's House of Literature (Litteraturhuset).

For the eighth year in a row, the annual events of Darwin Day and the Kristine Bonnevie Lectures on Evolutionary Biology were held, the latter constituting a regular part of the university's annual anniversary day. In 2013, the topic for **Darwin Day (12 February)** was Darwin and genetics through one and a half centuries, and featured lectures by **Adam Rutherford**, **Christina Richards**, **Tatum Simonson** and **Richard Myers**. As a prelude to Darwin Day, an event we called the Darwin Day Vorspiel combining art and science was held at the House of Literature. **Henkjan Honing** from the Amsterdam Brain and Cognition centre at the University of Amsterdam, and **Jon Roar Bjørkvold** from the University of Oslo lectured on human musicality and "What makes us musical animals". This event was co-organised with the Norwegian Humanist Association and supported by the Freedom of Expression Foundation. **The Kristine Bonnevie Lecture (2 September)** by **Steve Jones** from University College London was titled "What sex really means". It was preceded by the lecture "Defending evolution – and some other sciences" by **Eugenie C. Scott**, Executive Director at the National Center for Science Education (NCSE, Elsewhere USA).

Several other public lectures were organised or co-organised by CEES in 2013:

Anne Glover, the European Commission's first Chief Scientific Adviser: "Does Norway need a Chief Scientific Adviser?" (22 April)

Speakers at the Darwin Day Vorspiel and Darwin Day (left to right): Henkjan Honing, Nils Chr. Stenseth, Tatum Simonson, Christina Richards, Richard Myers, Adam Rutherford. © Tore Wallem

Anthony Barnosky, from the University of California, Berkeley: "Maintaining Humanity's Life Support Systems in the 21st Century: messages for policy Makers" (7 May)

David M. Buss, University of Texas, and Vibeke Ottesen, CEES: "Strategies of Human Mating" (13 May)

Steve Jones and **Eugenie C. Scott**: "Why evolution is right and creationism is wrong" (3 September)

Dorte Gleie, Den Blå Planet, National Aquarium Denmark and others (as part of the Norwegian Science Week): "Oceans and aquariums" (19 September)

David Sloan Wilson and others: "The quality of life and evolution" (12 October)

Bill McKibben, Sophie Prize Winner of 2013: "Why 350 is the Most Important Number in the World & Notes from the Front Lines of the Climate Fight – how to push for change" (29 October)

OPEN SCIENTIFIC EVENTS

Our Friday and Extra seminars are also open to the public, although they are more technical and aimed at researchers and students. In 2013, 39 such seminars were held.

MEDIA

The members of CEES are accessible to the media, and are encouraged to contribute their comments on issues of public concern when their expertise is applicable. The press coverage of research conducted at CEES is conveyed through a broad array of both national and international media, including newspapers, magazines, radio, television, and web-based information channels. Several CEES members, though not mentioned here by name, contribute extensively towards communicating their research.

Field vole (Microtus agrestis). © Torbjørn Ergon

The use of social media for advancing one's science career

The advent of social media has changed the way we share and collect information. Also scientists increasingly use these media. One application area is science outreach, where blogs are the usual place for explaining one's research to a wider audience. For example, CEES leader Nils Chr. Stenseth maintains a blog at the Norwegian science news website 'forskning.no'. On this blog he discusses science issues, as well as research politics. Several other CEES researchers maintain, or contribute to, one or more blogs, including Vibeke Ottesen, Glenn-Petter Sætre, and Atle Mysterud. In addition, two Master students are currently blogging about life as a student at CEES: Annie Evankow and Anna Blix. For an overview of some of the blogs associated with CEES, see the table below.

I maintain a science blog of my own at flxlexblog.wordpress.com, with a slightly different perspective. My intended audience is fellow scientists, and my posts may be more technical than what is usual for science outreach. I blog about the field I am working in (analysis of High Throughput Sequencing data), sharing my opinions, snippets of results that are too small to turn into a full article, or interesting papers I come across. I know of one CEES colleague, postdoctor Thomas Haverkamp, who uses blogging in a similar way. I find blogging an excellent way to share knowledge, and it has helped me enormously to build an online, international reputation. Blogging this way is also a good way to practice one's writing skills.

Twitter is a social medium that is becoming more popular among scientists. I like to describe Twitter as a permanent, online conference. New science findings are often first reported on Twitter. For me, Twitter replaces scanning a journal's table of contents, as by following the right scientist, most important papers in my field appear in my Twitter stream (rarely do I miss one!). In return, when I come across an interesting new publication, I post a link to it on Twitter.

Many scientists on Twitter link to relevant news items or opinion pieces, making Twitter a great place to pick up the latest scientific news. Bloggers, myself included, actively use Twitter to notify their followers of new posts. Due to the restriction on the length of posts (140 characters), Twitter is not the best place for discussions among peers, but it does happen and can result in interesting exchanges. Finally, conference goers often share the best parts of presentations through Twitter. This allows other scientists to 'virtually' attend a conference and at least get an impression of what was presented. Not all presenters are comfortable with this, and often conferences will ask speakers to declare whether the presentation can be shared on Twitter.

Academic organisations and research groups also increasingly use social media to broadcast their work, and CEES is no exception. CEES is active on Facebook (https://www.facebook.com/pages/CEES-Centre-for-Ecological-and-Evolutionary-Synthesis/295891987141021) and Twitter (username @CEESUiO).

I find social media, and in particular Twitter and blogging, to be an excellent tool for networking. I have 'met' several scientists through social media first, and in person afterwards. Some of these I have successfully invited to give presentations at CEES, or help me teach courses. At the end of 2013, I was invited back by one of these researchers in my 'online' network to co-teach a Master class at the University of California, Davis (USA) in genome assembly, my 'specialty'. For me, this invitation confirmed that my online activities are worth the time I spend on them.

Yes, establishing and maintaining an active online presence through social media is time consuming. I fully understand why researchers would rather not use their valuable time on it, preferring instead to finish their next article. Personally, I can recommend the investment, as it only has brought me benefits.

Summarised by Lex Nederbragt
(twitter.com/lexnederbragt)

Blogs and blog posts by members of CEES

Nils Chr. Stenseth	forskning.no/blog/stenseth
Vibeke Ottesen	forskning.no/blog/vibeke.ottesen, biososial.org, darwinist.no
Lene Martinsen	forskning.no/blog/lenemartinsen
Glenn-Petter Sætre	guest blogger at: darwinist.no
Atle Mysterud	masterbloggen.no/veileder/master-i-okologi-hva-venter-deg
Kristina Kvile	blog.marinbiologene.no
Annie Evankow	www.mn.uio.no/ibv/livet-rundt-studiene/studentblogger/annie-s-blog
Anna Blix	masterbloggen.no/blog/author/annablix
The CEES-administered Nordic Centre of Excellence 'NorMER'	normer.uio.no/blog
	microsizedmind.wordpress.com
Lex Nederbragt	flxlexblog.wordpress.com

6 GENDER EQUALISING STRATEGY

Gender balance in high-rank academic positions is a priority for both the Research Council of Norway (RCN) and the University of Oslo. CEES has implemented several guidelines to counter the attrition of women at all levels, from Masters students to tenured scientific staff, and all stages in between. Our strategy to attract and keep female scientists is based on optimising the conditions for our female students, and emphasising female role models.

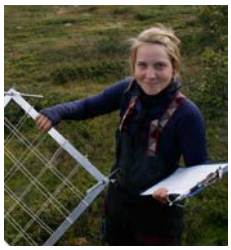
We have continued our dedication to awarding scholarships for transitional engagements, enabling female candidates to further their scientific careers. In 2013, 6 women received such support from CEES, for periods ranging from 1–6 months. One female with a Master's degree was granted a stipend to qualify for a PhD position (Ane Mari Bjørnæs), two females were granted a stipend in order to finish their PhD degrees (Anna Mazzarella, and Inger Maren Rivrud), and three females (Eli Rueness, Inger Maren Rivrud, and Yngvild Vindenes) received transitional funding while working on obtaining a researcher or postdoc position. Of the latter group, two have now obtained a postdoc or researcher position at CEES, and one will soon submit a researcher application to the RCN.

Both the CEES Board and the Scientific Advisory Board are chaired by female scientists. The Deputy Chair is female, two of the three *Themes* are co-chaired by female scientists, and one of the four *Colloquia* will be chaired by a female scientist. CEES had three female Associate Professor IIs employed in 20% positions (Hege Gundersen, Jorijntje Henderiks, and Hildegunn Viljugrein). These researchers have also been involved in supervising students and have participated in both international and internal scientific meetings and conferences. Through their many activities at CEES, these female scientists are good motivators and role models for our female (and male) students.

Also in 2013, the CEES arranged "Women only - session". The session was organised for the female CEES researchers and was led by Reidun Sirevåg (the CEES Board leader) and Rita R. Colwell (the CEES Scientific Advisory Board leader). Other female members of the Scientific Advisory Board (Barbara Mable, and Anne Magurran) were also present. The session is an opportunity to discuss and learn from experienced women about gender-based challenges in academia. More than 20 females participated in the meeting.

Wendy Turner's current research focuses on anthrax transmission in Namibia. © Ryan Easterday

7 AWARDS AND HONOURS



Anna Blix

Anna Blix was in May awarded a writer scholarship of 30 000 NOK and a book contract for her Master's thesis: "Feedback processes in grazing ecosystems: Are sheep grazing in alpine habitats affecting long-term use and productivity?" *Masterstipendet* ("the Master's scholarship") is a national contest arranged by the bookstore and publisher Akademika. The award goes to an outstanding Master student who deserves to reach a broad audience.

Dag O. Hessen

Core member Dag O. Hessen was awarded the Humanist Award from The Norwegian Humanist Association for his excellence in research and dissemination of science. The jury emphasised how Hessen manages to connect biology with philosophy and ethics, and to bridge the gap between the natural sciences and the humanities. He received the award of 100 000 NOK on 31 May.

Atle Mysterud

Core member Atle Mysterud, together with Jon E. Swenson from the Norwegian University of Life Sciences, was in June granted a year at the Centre for Advanced Study at the Norwegian Academy of Science and Letters, Oslo. Together they will work on the project "Climate effects on harvested large mammal populations". The grant awarded is 3.3 MNOK, for the year 2015/16.

Boris Schmid

Postdoc Boris Schmid was awarded second prize for his poster at the 11th international symposium on *Yersinia*. The symposium was held in June at Suzhou, near Shanghai, in China. The prize consisted of a poster fellowship of 250 US dollars, awarded by Cold Spring Harbor Asia. Boris' work centres around the reintroduction of plague into Europe.

Nils Chr. Stenseth

Chair Nils Chr. Stenseth was appointed to the governing body of the European Research Council (ERC): the Scientific Council. During his 4-year term, he and his fellow members of the Scientific Council will define the scientific funding strategy and methodologies of the Agency. Stenseth was informed about the award at the end of 2013, and the announcement was made official in January 2014.

In June 2013, Stenseth also received an honorary adjunct professorship at Addis Ababa University, Ethiopia.

Kjetil L. Voje

Kjetil L. Voje was awarded H. M. the King's Gold Medal for his doctoral dissertation. The King's Gold Medal is awarded annually to an excellent, young researcher for scientific work evaluated at the University of Oslo. Voje defended his PhD thesis: "The relative effects of adaptation and constraint on phenotypic evolution" in March, to exceptional reviews from the assessment committee. The award was announced in June, and the formal handover coincided with the annual anniversary celebration at the University of Oslo in September.

8 EXPERIMENTAL FACILITIES

CEES manages dedicated labs for DNA/RNA isolation, separate PCR facilities, and post PCR and Sanger DNA sequencing laboratories (such as the ABI lab).

The CEES DNA lab is a molecular research core facility and is fully equipped for DNA and RNA extraction from various types of bacteria, protists, algae, fungi, and animal and plant tissues (including blood, faeces, and ancient DNA). It contains all the basic instrumentation of a modern molecular biology laboratory, including equipment for gene cloning, genomic libraries, real-time PCR, DNA/RNA quantification, and chip-based analysis of DNA, RNA, and protein. The annual turnover of the CEES DNA lab was 373 000 NOK in 2013, and 50 researchers used the lab. The CEES DNA lab is open to users from the Department of Biosciences, and is at present actively used by CEES and the Microbial Evolution Research Group (MERG).

The ABI lab is a Sanger sequencing DNA sequencing core facility at the Department of Biosciences. The lab is situated at CEES and functions as a sequencing service lab for all research groups at the Department of Biosciences, as well as other institutes at UiO, within Norway, and abroad. The ABI-service lab has operated since July 2005.

The ABI lab is a fully equipped laboratory with two ABI PRISM® 3730 Genetic Analysers, each with 48 capillaries and providing DNA sequencing and fragment analysis. The ABI lab implemented automated dye-terminator removal protocol in 2009, based on paramagnetic beads and a Biomek® 3000 Laboratory Automation Workstation. We also have ten different PCR-machines, shared by the CEES lab, including three Eppendorf Master Cycler ep gradient S and a MJ Research Tetrad PTC-225 Thermo Cycler. This year the turnover from ABI lab activities has financed two qPCR machines (Roche Light Cycler 96) that will be placed in a new and specialised qPCR lab serving the entire department. The annual turnover of the ABI-service lab exceeded 900 000 NOK in 2013, and approximately 23 000 samples were sequenced.

A new CEES lab under construction – the ancient DNA lab for serving interdisciplinary life science research at UiO

The fast development within high throughput sequencing has made it possible to analyse historic and ancient DNA (aDNA) in a far more reliable way than before. Such approaches are increasingly being used in the various fields of biology (including evolutionary biology), biomedicine and forensic sciences, historical and archaeological research, and physical anthropology. Old DNA is usually damaged and broken down into short fragments and is often present in minute amounts. The degraded nature and minute quantities of aDNA require that experiments involving such DNA need to be carried out in a dedicated and specially designed laboratory.

Currently no state-of-the-art laboratories capable of handling both human and non-human aDNA exist at UiO. CEES has therefore taken the initiative to establish a new aDNA lab located at the Department of Biosciences. The aDNA lab is now in the planning and early building phase, and the project is coordinated by Cecilie Mathiesen and Nanna W. Steen. A fully equipped lab is expected to be ready in the fall of 2014. This lab has been made possible through a tight and successful collaboration with IBV/CEES, the Museum of Cultural History (KHM) and the Natural History Museum (NHM), as well as by strong support from the Faculty of Mathematics and Natural Sciences, the Medical Faculty and the Estate Department. We have in addition received 2 million NOK in funding from the UiO programme for research infrastructure, in order to equip the aDNA lab with state-of-the-art instrumentation.

When operative, the aDNA lab will be run by CEES, in collaboration with our partners from NHM and KHM, and so the project as a whole is a prime example of interdisciplinary collaboration across faculties at UiO. The tight coupling to the competence and services of the Norwegian Sequencing Centre (NSC) at CEES is an ideal situation for the aDNA lab activities, and will add international competitiveness to this interdisciplinary core facility project. The demand for the aDNA lab is driven by ongoing and newly funded projects at CEES. Most importantly, the ERC funded project of Barbara Bramanti on medieval *Yersinia pestis* outbreaks has been a driving force for establishing the aDNA lab. In addition, there are several projects at CEES that will strongly benefit from access to the new aDNA lab. Examples include an RCN funded project investigating evolutionary effects of fishery pressure on Atlantic cod using historic samples (led by Bastiaan Star and Sissel Jentoft), and the recently funded "Young Research Talent" project of Sanne Boessenkol involving collaborations between CEES, NHM and KHM.

In fall 2014, when the aDNA lab is expected to be available to researchers, UiO will have gained infrastructure at the international forefront of aDNA research. This will attract scientists not only from UiO, but also from other Norwegian universities as well as internationally.

8 EXPERIMENTAL FACILITIES

NORWEGIAN SEQUENCING CENTRE

The Norwegian Sequencing Centre (NSC) has two equal nodes hosted by the Centre for Ecological and Evolutionary Synthesis (CEES) at the Department of Biosciences at the University of Oslo, and the Department of Medical Genetics (DMG) at Oslo University Hospital and the University of Oslo. NSC has recently been awarded a large grant (41 million NOK for the period 2014–2017) from the INFRAstructure programme of RCN for Phase II of the Sequencing Centre. This grant will allow us to keep up with technological developments, increase the number of staff, and enhance our services. Due to this large funding, NSC is from 2014 on the National Roadmap for research infrastructures and large national projects – a major achievement for NSC and UiO.

Offered sequencing applications: NSC offers the Norwegian research community access to a broad range of high-throughput sequencing technologies (HTS) and applications. We possess state-of-the-art facilities and provide services covering most applications within the deep sequencing field, e.g. *de novo* sequencing, exome sequencing, sequencing of ancient DNA and other degraded DNA samples, as well as transcriptome-, miRNA-, amplicon-, bisulphite- and chromatin immunoprecipitation (ChIP)-sequencing., and base modification detection for smaller genomes. In 2013, we implemented exome sequencing on our Ion Proton instrument as an addition to exomes on the Illumina HiSeq platform. This method allows sequencing of key exonic regions in up to three samples within just a few days, and is suitable for smaller projects.

New instrumentation: The new INFRAstructure funding for Phase II will make it possible to keep up with the very rapid development within the HTS field and has enabled the purchase of two additional Illumina HiSeqs in 2013/2014. The Illumina technology is now established at both nodes and NSC has provided higher sequencing throughput and more flexibility in handling different projects. Further, this implies that we have the capacity to take on more large sequencing projects. At present, we have the following instruments available: 2 x Illumina HiSeq 2000, 2 x Illumina HiSeq 2500, 2 x Illumina MiSeq, 1 x Pacific Biosciences RS, 1 x Ion Torrent PGM, 1 x Ion Proton and 1 x Roche 454 (GS-FLX). This is by far the largest instrument park for HTS in Norway. In addition, NSC has a multitude of automation equipment (such as Hamilton, Beckmann Biomek FXs, Beckmann SpriWorks and BluePippin).

Instrument upgrades: HTS technology is developing fast, and NSC has implemented important upgrades on our current instruments in order to continuously provide "state-of-the art" service. This year, the PacBio RS instrument was upgraded to RSII resulting in a 50 % increase in number of reads. Mean read length has increased to 5-6 kb as a result of launching a new polymerase and chemistry. New chips/kits have also been launched for Ion Torrent instruments providing increased number of reads and read lengths.

Offered services: Services include project consultation, sample preparation, and running the sequencing reactions on the DNA sequencers, together with quality assessment of the data. For projects sequenced on Illumina and Ion Torrent instruments, mapping of the data to a reference is performed. For bacterial PacBio projects, an assembly pipeline was set up this year and fully assembled genomes are now delivered to our users. This represents an expanded bioinformatics service and is of great help to researchers who do not have vast experience with genome assemblies. In addition to *de novo* genomes, base modification analyses can be provided for bacterial and fungal genomes sequenced on PacBio RSII. NSC may also offer advice on analysis software tools. For more advanced projects, users are referred to bioinformatics services/help desks (such as ELIXIR), or to research collaborations when appropriate. The submission of projects is handled through our website (www.sequencing.uio.no) where there is a single contact point for both nodes (CEES and DMG), to help ensure that the optimal technology is applied for each project.

Sequencing activity: In 2013, the total number of samples sequenced increased with more than 40 %, compared to 2012. In total, about 3300 different samples were sequenced at NSC, representing samples from more than 200 research groups – mostly from Norway, but also from several other European countries. The largest fraction of the samples was run on the Illumina platform (HiSeq/MiSeq). However, the number of samples sequenced on PacBio is steadily growing. There is still some demand for 454-sequencing, mostly for amplicon sequencing of PCR products longer than 500 bp.

Large projects: This year NSC carried out sequencing of the Atlantic salmon (*Salmo salar*) genome using the PacBio long read technology. The salmon sequencing project was a collaboration between CEES/NSC, the J Craig Venter Centre Institute (JCVI) and the International Collaboration to Sequence the Atlantic Salmon Genome. The PacBio data generated at NSC will be an integral part of the salmon genome assembly to be launched in 2014. Currently, the largest project that NSC is performing sequencing for is the Aqua Genome (AG) Project – led by CEES. In the AG project, 1000 individuals of Atlantic cod (*Gadus morhua*) will be sequenced with Illumina technology. The AG project is still in its initial phase and the bulk of sequencing will be performed in 2014 (the AG project is described in the 2012 CEES Annual Report). We anticipate that large projects will be increasingly important for NSC in the future, and for the next year we have several such projects in the pipeline – both within biomedical and biological research.

Outreach: We have been involved in organising a two-week, hands on course on "High Throughput Sequencing technologies and Bioinformatics Analysis", held at UiO in collaboration with the Computational Life Science initiative (CLSi), the FUGE/ELIXIR Bioinformatics platform, and the Norwegian Genomics Core Facility.

Summarised by Ave Tooming-Klunderud and Kjetill S. Jakobsen

The Norwegian Sequencing Centre. © Lex Nederbragt

9 COMPUTATIONAL AND BIOINFORMATIC RESOURCES

2013 saw an increase in the bioinformatics activities at CEES. This was largely driven by new projects that need analysis of high-throughput sequencing data, although other types of analyses have contributed to the growth as well.

Infrastructure

At CEES, we use a combination of self-owned servers, and CPU hours we have applied for on the UiO supercomputer 'Abel'. This maximises flexibility for CEES researchers in choosing the right resource for their project. Memory-intensive applications can be run on our own servers, while CPU-intensive applications can be submitted to Abel and therefore do not take up valuable time on the servers. The servers CEES owns (see below) are attached to the Abel system. This means users can seamlessly access the same programmes and disks on the self-owned servers, as well as on Abel. For storage ('project disk space') we rent space from the University Center for Information Technology (USIT) (attached to Abel) at UiO, rather than buy and administer our own.

Hardware

Starting with the project to sequence and assemble the genome of Atlantic cod in 2009, CEES has invested in its own hardware for computation. These servers are hosted and maintained by the High Performance Computing (HPC) group of USIT. The following computational infrastructure is available to CEES: (i) two servers with 24 CPUs and 128 GB of RAM, and around 1 TB disk space; (ii) two high-memory servers with 64 CPUs and 512 GB of RAM, and around 24 TB disk space each. On the university computer cluster Abel, we have allocations through the national HPC infrastructure through Notur (notur.no), for CPU-intensive computations. In 2013, a large new Notur application was granted, enabling CEES researchers to use 1.3 million CPU hours per half year. CEES bioinformaticians use 30 TB of project disk space with another 10 TB disk space for long-term archival of data at Norstore (norstore.no), the national Norwegian infrastructure for the archiving of digital scientific data.

Organisation

The bioinformaticians are organised through a mailing list and occasionally meet to discuss common interests or papers. In 2013, a group of researchers started 'the Genome Analysis Club' (TGAC) to discuss papers and programmes focusing on analytical methods for whole genome data (including whole genome sequencing, SNPs, RADtags, etc). There is a wiki containing a growing number of articles dealing with the practicalities of using the resources at CEES, tips and tricks, etc. (https://wiki.uio.no/mn/bio/cees-bioinf/). Although the day-to-day administration of the servers and disk space is the responsibility of USIT, there is still a considerable amount of overhead for CEES staff. Aspects of this include applying for, and reporting on the use of, CPU hours on Abel; correspondence with USIT on required software and interruptions of the servers; feedback to CEES users; administration of the user base, mailing lists, and wiki; instructing new users.

Help desk

In the spring of 2011, a CEES help desk on molecular methods and bioinformatic data analysis was initiated, and during 2013 this consisted of two people with backgrounds in bioinformatics, as well as one person specialising in molecular wet-lab issues.

Projects

Examples of projects requiring large computational resources and large amounts of disk space are: (i) eukaryote genome sequencing projects (fish, birds); (ii) the RAD-seq platform at CEES (SNP detection and genotyping by sequencing); resequencing projects for SNP detection and typing (fish, birds); (iii) *de novo* genome assembly of bacterial genome using Illumina and Pacific Biosciences data; (iv) transcriptomics analysis pipelines for differential gene expression studies; (v) ecological modeling.

Courses

Continuing on the success of previous courses (Unix, python and perl), an internal course was organised in 2013 modeled upon the Software Carpentry (software-carpentry. org) Bootcamp curriculum. Furthermore, two CEES bio-informaticians held a Software Carpentry Bootcamp for all researchers at UiO (July 2013).

Summarised by Lex Nederbragt

Data collection by the cod group at Møre (Farstad). © Julia M. I. Barth

10 FINANCES

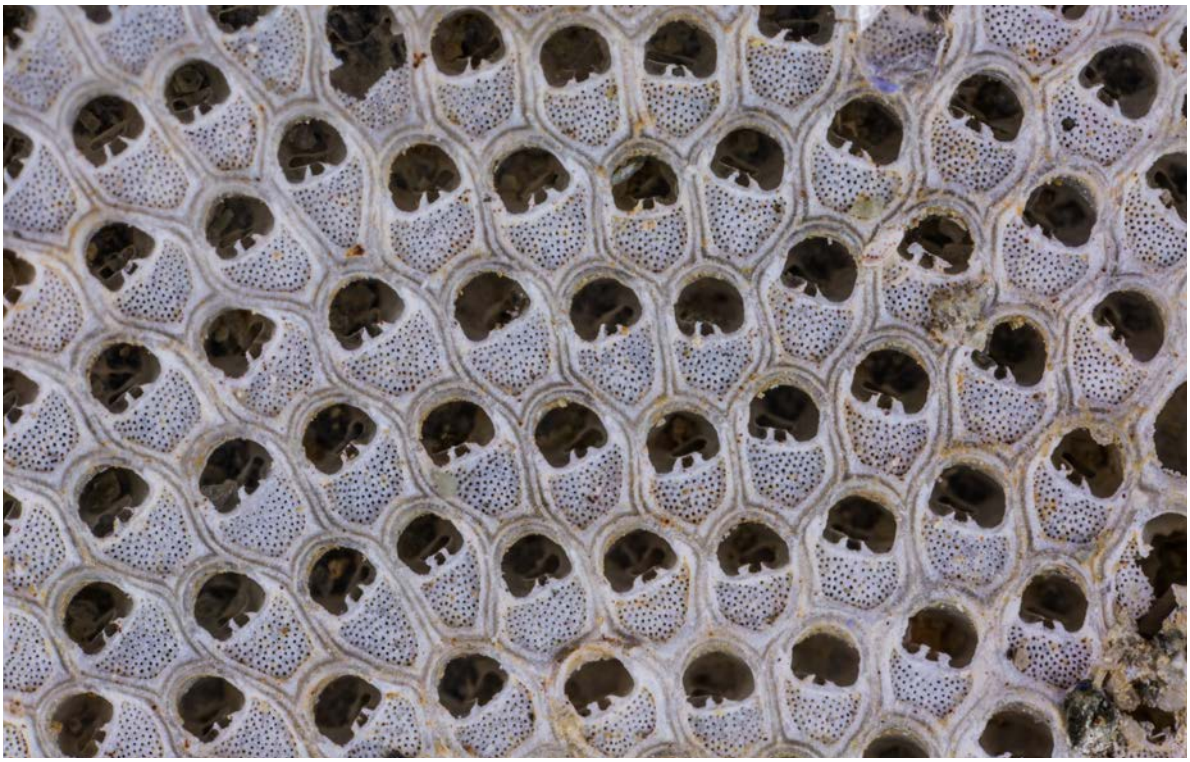
Accounting principles

CEES funding is derived primarily from RCN sources (approximately 11 MNOK in core funding per year), supplemented by funds from UiO (2 MNOK per year plus funding for several positions), and other sources defined as own funding. Our own funding can be divided into the sub-categories: funding from RCN projects; funding from other public sector based projects; funding from international projects and private sector based projects.

Expenditures are sub-categorised into salary expenses, indirect costs, R&D services, equipment, running costs (composed mainly of operational expenses for laboratory and fieldwork) and travel and representation.

In addition to revenues and expenditures that are accounted for, we also have those that are not accounted for. These are mainly defined as the expenditures of those personnel that work within CEES, but receive their salaries from other parties. The value of these services is calculated using official UiO budgeting procedures.

In this report we present the accounting figures for 2013, and the budget for 2014.



The moss animal Steginoporella magnifica. © Kjetil Voje

Revenues and expenditures 2013/Budgeted revenues and expenditures 2014

Total funding			Accounted revenues		Revenues not in account
	2013	Budget 2014	Figures 2013	Budgeted figures 2013	Revenues not in account 2013[1]
RCN-CoE	11 100	10 500	11 100	10 500	
UiO	35 546	9 194	8 784	9 194	26 762
RCN – CEES related projects	35 843	51 744	35 843	51 744	
Other public sector based projects	5 921	6 653	5 921	6 653	
International funding	41 414	15 332	20 810	15 332	20 604
Private sector based projects	894	474	894	474	
Transferred revenues	10 660	19 836	10 660	19 836	
Total funding	***141 378***	***113 733***	***94 012***	***113 733***	***47 366***

Accounted expenses 2013 (Acc 13)/Budgeted expenses 2014 (Bud 14)

	Total		RCN-CoE		UiO		RCN projects		Other public sector based pro.		International funding		Private sector based projects	
	Acc 13	Bud 14	Acc 13	Bud 14	Acc 13	Bud 14	Acc 13	Bud 14	Acc 13	Bud 14	Acc 13	Bud 14	Acc 13	Bud 14
Salary expenses	38 359	44 346	7 384	8 968	4 985	5 222	15 993	16 196	3 555	4 632	5 918	9 123	524	205
Indirect costs	10 265	12 996	1 034	1 256	1 221	1 285	5 198	6 566	1 101	1 740	1 497	2 067	205	82
R&D services	13 832	19 163					5 160	8 869			8 672	10 294		
Equipment	299	12 450					270	12 450	15				14	
Running costs	10 057	14 172	529	1 896	2 203	3 232	4 801	5 635	847	1 255	1 651	1 846	26	308
Travel and representation[2]	1 373	0	311		1 062									
Total	***74 176***	***103 127***	***9 258***	***12 120***	***9 471***	***9 739***	***31 422***	***49 716***	***5 518***	***7 627***	***17 738***	***23 330***	***769***	***595***

Expenses not in account 2013 (Nacc 13)

	Nacc 13	Bud 14	Nacc 13	Bud 14	Nacc 13	Bud 14	Nacc 13	Bud 14	Nacc 13	Bud 14	Nacc 13	Bud 14	Nacc 13	Bud 14
Salary expenses	30 212				15 797						14 415			
Indirect costs	17 154				10 965						6 189			
Total[3]	***47 366***				***26 762***						***20 604***			

Balance 2013/Budgeted balance 2014

	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
Revenues	130 718	93 897	11 100	10 500	35 546	9 194	35 843	51 744	5 921	6 653	41 414	15 332	894	474
Transf. revenues	10 660	19 836	-222	1 620	1 312	625	-365	4 056	995	1 398	8 922	11 994	18	143
Total expenses	121 542	103 127	9 258	12 120	36 233	9 739	31 422	49 716	5 518	7 627	38 342	23 330	769	595
Balance	***19 836***	***10 607***	***1 620***	***0***	***625***	***81***	***4 056***	***6 084***	***1 398***	***424***	***11 994***	***3 996***	***143***	***22***

All figures are given in 1000 NOK.

1) Not posted revenues for 2013. These are mainly defined as the efforts of those personnel that work within CEES, but receive their salaries from other parties

2) Travel and representation is included in running costs for all funding sources except RCN-CoE and UiO.

3) Not posted expenditures for 2013

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CEES-members

Core scientific staff

Name	Nationality	Position	Period	Funding 2013	CEES share (%)
Brysting, Anne K.	Norway	Assoc. Professor	Oct. 2007–	UiO-IBV	75
Ergon, Torbjørn	Norway	Assoc. Professor	Jan. 2013–	UiO-IBV	50
Hansen, Thomas F.	Norway	Professor	Oct. 2007–	UiO-IBV	75
Hessen, Dag O.	Norway	Professor	Oct. 2007–	UiO-IBV	75
Hjort, Nils L.	Norway	Professor	Oct. 2007–	UiO-Math	25
Jakobsen, Kjetill S.	Norway	Professor	Oct. 2007–	UiO-IBV	75
Lampe, Helene M.	Norway	Professor	Oct. 2007–	UiO-IBV	75
Mysterud, Atle	Norway	Professor	Oct. 2007–	UiO-IBV	75
Nesbø, Camilla L.	Norway	Researcher	Oct. 2007–Dec. 2014	Univ. of Alberta/ RCN	100
Ottersen, Geir	Norway	Senior Scientist	Oct. 2007–	IMR/RCN-CoE	25
Schweder, Tore	Norway	Professor	Oct. 2007–Jan. 2013	UiO-Econ	6
Slagsvold, Tore	Norway	Professor	Oct. 2007–	UiO-IBV	75
Stenseth, Nils Chr.	Norway	Professor, CEES Chair	Oct. 2007–	RCN-CoE	100
Storvik, Geir	Norway	Professor	Oct. 2007–	UiO-Math	20
Sætre, Glenn-Peter	Norway	Professor	Oct. 2007–	UiO-IBV	75
Viljugrein, Hildegunn	Norway	Assoc. Professor	Oct. 2007–	UiO-IBV	20
Vøllestad, L. Asbjørn	Norway	Professor	Oct. 2007–	UiO-IBV	75

Postdocs and Researchers

Name	Nationality	Position	Period	Funding 2013	CEES share (%)
Bailey, Richard I.	United Kingdom	Postdoc res. fellow	Aug. 2011–Aug. 2014	RCN	100
Bianucci, Raffaella	Italy	Researcher	Jul. 2013–Jun. 2015	ERC	37
Boessenkool, Sanne	The Netherlands	Researcher	Dec. 2012–Nov. 2014	RCN	88
Bramanti, Barbara	Italy	Researcher	Jun. 2013–May. 2018	ERC	50
Cadahia, Luis	Spain	Postdoc res. fellow	May 2011–May 2013	EU-MC*, RCN-CoE	41
de Blasio, Fabio	Italy	Researcher	Jan. 2013–Jan. 2013	RCN-CoE	8
de Muinck, Eric	USA	Researcher	Feb. 2012–Dec. 2013	RCN-CoE	40
Diekert, Florian	Germany	Postdoc res. fellow	Oct. 2011–Oct. 2015	NORDFORSK	83
Durant, Joël Marcel	France	Researcher	Oct. 2007–	RCN	100
Easterday, William R.	USA	Postdoc res. fellow	Jan. 2012–Dec. 2014	UiO-IBV	100
Eroukhmanoff, Fabrice	France	Postdoc res. fellow	Jan. 2013–Dec. 2014	EU-MC*	100
Falk-Petersen, Jannike	Norway	Researcher	Nov. 2012–Feb. 2013	NORDFORSK	33
Fischer, Barbara	Austria	Postdoc res. fellow	Oct. 2010–Mar. 2015	UiO-IBV	100
Gautestad, Arild Olsen	Norway	Researcher	Jan. 2007–Dec. 2013	RCN-CoE	20
Gerecht, Andrea C.	Germany	Postdoc res. fellow	Jan. 2011–Dec. 2013	RCN	100
Grimholt, Unni	Norway	Researcher	Oct. 2007–Dec. 2013	RCN	50
Gundersen, Hege	Norway	Researcher	Dec. 2008–Apr. 2013	RCN-CoE	4
Haverkamp, Thomas H. A.	The Netherlands	Postdoc res. fellow	Jun. 2012–Oct. 2015	RCN	100
Henderiks, Jorijntje	The Netherlands	Researcher	Jun. 2010–Dec. 2013	RCN-CoE	20
Hjermann, Dag Ø.	Norway	Researcher	Oct. 2007–Jan. 2015	RCN-CoE	30
Holen, Øistein H.	Norway	Researcher	Oct. 2007–Dec. 2015	RCN-CoE	100
Hutchings, Jeffrey	Canada	Researcher	Sep. 2010–Dec. 2015	RCN-CoE	20
Hänsch, Stephanie	Germany	Postdoc res. fellow	Jun. 2013–May 2016	ERC	58
Jorde, Per Erik	Norway	Researcher	Oct. 2007–Dec. 2014	RCN-IMR	100
Kausrud, Kyrre	Norway	Researcher/ Postdoc res. fellow	Jul. 2010–Mar. 2016	RCN-CoE, RCN	100
Kjesbu, Olav Sigurd	Norway	Professor	Sep. 2012–Aug. 2015	NORDFORSK	20
Knudsen, Endre	Norway	Postdoc res. fellow	May 2011–May 2014	RCN	100
Knutsen, Halvor	Norway	Researcher	Oct. 2007–Dec. 2015	RCN	10
Labra, Antonieta	Chile	Postdoc res. fellow	Sep. 2009–Jul. 2014	RCN-CoE	75
Lagesen, Karin	Norway	Postdoc res. fellow	Feb. 2010–Feb. 2013	RCN-CoE	16

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Langangen, Øystein	Norway	Researcher	Sep. 2010–Aug. 2013	RCN-Akvaplan-NIVA AS	100
Larsen, Søren	Denmark	Postdoc res. fellow	May 2013–Apr. 2015	RCN	66
Lindén, Torsten Andreas	Sweden	Postdoc res. fellow	Apr. 2012–Jun. 2013	EU-MC*	50
Liow, Lee Hsiang	Singapore	Researcher	Oct. 2007–Jul. 2014	RCN-CoE, RCN	100
Martinsen, Lene	Norway	Postdoc res. fellow	Oct. 2007–Jun. 2014	RCN	91
Matschiner, Michael	Germany	Postdoc res. fellow	Sep. 2013–Sep. 2016	RCN	25
Nederbragt, Alexander	The Netherlands	Researcher	Oct. 2007–Dec. 2015	RCN	80
Nielsen, Anders	Norway	Researcher	Oct. 2013–Dec. 2013	RCN	16
Nilsson, Anna	Sweden	Researcher/ Postdoc res. fellow	Mar. 2010–Sep 2016	RCN	100
Olsen, Esben Moland	Norway	Researcher	Oct. 2007–Dec. 2015	RCN	10
Orr, Russell	Norway	Researcher	Sep. 2013–Mar. 2014	RCN-CoE	15
Reitan, Trond	Norway	Researcher	Oct. 2013–Jan. 2014	RCN	4
Richter, Andries P.	Germany	Postdoc res. fellow	Mar. 2010–Apr. 2015	RCN-CoE, RCN	66
Rogers, Lauren	USA	Postdoc res. fellow	Aug. 2011–May 2016	NORDFORSK	50
Rueness, Eli Knispel	Norway	Researcher	Oct. 2007–Jun. 2014	RCN-CoE	65
Salzburger, Walter	Austria	Researcher	Sep. 2012–Aug. 2015	RCN-CoE	20
Schmid, Boris	The Netherlands	Postdoc res. fellow	Apr. 2012–Mar. 2014	EU-MC*	100
Star, Baastian	The Netherlands	Postdoc res. fellow	Sep. 2008–Mar. 2014	RCN	100
Stige, Leif Chr.	Norway	Researcher	Oct. 2007–Oct. 2016	RCN	85
Svennungsen, Thomas	Norway	Postdoc res. fellow	Aug. 2011–Dec. 2014	RCN-CoE	100
Tarka, Maja	Sweden	Researcher	May 2013–May 2013	UiO-IBV	8
Tominaga, Koji	Japan	Researcher	Oct. 2013–Feb. 2015	RCN	25
Trosvik, Pål	Norway	Researcher	Apr. 2012–Mar. 2015	RCN	100
Trucchi, Emiliano	Italy	Researcher/ Postdoc res. fellow	Feb. 2011–Jan. 2014	EU-MC*, RCN-CoE	100
van Leeuwen, Casper	The Netherlands	Postdoc res. fellow	Sep. 2013–Sep. 2015	RCN-NINA	33
Vindenes, Yngvild	Norway	Researcher	Apr. 2011–Feb. 2016	RCN-CoE	100
Voje, Kjetil L.	Norway	Researcher	Aug. 2012–Dec. 2013	RCN	83
Whittington, Jason	USA	Researcher/ Postdoc res. fellow	Jan. 2010–Aug. 2015	RCN, NORDFORSK	73
Wojewodzic, Marcin	Poland	Researcher	Oct. 2007–Mar. 2013	RCN	56
Yang, Hong	China	Postdoc res. fellow	Nov. 2013–Oct. 2015	RCN	16
Østbye, Kjartan	Norway	Researcher	Oct. 2007–Aug. 2014	RCN	50

** Marie Curie Individual Fellowship*

PhD students

Name	Nationality	Position	Period	Funding 2013	CEES share (%)
Athumani Ndmuligo, Sood	Tanzania	Research fellow	Aug. 2012–Jul. 2015	Quota Scheme	100
Atickem, Anagaw Meshesha	Ethiopia	Research fellow	Oct. 2008–Apr. 2013	Quota Scheme, RCN-CoE	30
Baalsrud, Helle T.	Norway	Research fellow	Sep. 2012–Sep. 2016	UiO-IBV	100
Berg, Paul R.	Norway	Research fellow	Oct. 2010–Sep. 2014	UiO-IBV	100
Beyene, Cherie E.	Ethiopia	Research fellow	Aug. 2012–Jul. 2016	Quota scheme	100
Cloete, Claudine C.	Namibia	Research fellow	Sep. 2013–Aug. 2016	RCN	33
Elgvin, Tore Oldeide	Norway	Research fellow	Jul. 2011–Jun. 2015	RCN	75
Helberg, Morten	Norway	Research fellow	Sep. 2010–Jun.2014	RCN	91
Hermansen, Jo Skeie	Norway	Research fellow	May 2010–Apr. 2014	UiO-IBV	100
Isaksen, Elisabeth T.	Norway	Research fellow	May 2013–Apr. 2016	RCN	66
Jalal, Marwa	Norway	Research fellow	Sep. 2010–Aug. 2013	RCN	100
Kassie, Addisu Mekonnen	Ethiopia	Research fellow	Aug. 2011–Jul. 2014	Quota Scheme	100
Kvile, Kristina Ø.	Norway	Research fellow	Aug. 2012–Jul. 2015	NORDFORSK	100
Liljegren, Mikkel	Norway	Research fellow	Oct. 2012–Sep. 2016	UiO-IBV	100
Malmstrøm, Martin	Norway	Research fellow	Jan. 2009–Jun. 2014	UiO-IBV	75
Mazzarella, Anna Virginia B.	USA	Research fellow	Nov. 2010–Nov. 2013	RCN	100
Mewicha, Berihun Geberemedhin	Ethiopia	Research fellow	Jan. 2009–Sep. 2013	Quota scheme	100
Nilsson, Pernille	Norway	Research fellow	Aug. 2013–Jul. 2017	UiO-IBV	41
Orr, Russell	Norway	Research fellow	Feb. 2007–Jan. 2013	UiO-IBV	8
Qviller, Lars	Norway	Research fellow	Sep. 2010–Aug. 2014	UiO-IBV	100
Rivrud, Inger Maren	Norway	Research fellow	Sep. 2008–Feb. 2013	UiO-IBV	41
Romagnoni, Giovanni	Italy	Research fellow	Sep. 2011–Aug. 2015	UiO-IBV	100
Solbakken, Monica H.	Norway	Research fellow	Jun. 2010–May 2014	RCN	100
Toljagic, Olja	Serbia	Research fellow	Sep. 2013–Aug. 2017	UiO-IBV	33
Trier, Cassandra N.	USA	Research fellow	Sep. 2012–Oct. 2016	UiO-IBV	100
Tørresen, Ole Kristian	Norway	Research fellow	Sept. 2011–Dec. 2015	UiO-IBV	100
Voje, Kjetil Lysne	Norway	Research fellow	Aug. 2008–Mar. 2013	RCN	16

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Research Assistants

Name	Nationality	Position	Period	Funding 2013	CEES share (%)
Arntsen, Tina	Norway	Research Assistant	Apr. 2013–May 2013	CEES	6
Birkeland, Siri	Norway	Research Assistant	Apr. 2013 May 2013	CEES	4
Bjørnæs, Ane Mari	Norway	Research Assistant	Dec. 2012–Mar. 2013	RCN-CoE	9
Brevik, Carsten L.	Norway	Research Assistant	May 2013–May 2013	CEES	0.1
Cunningham, Sari C.	USA/Belgium	Senior Executive Officer	Mar 2013–Jun. 2013	CEES	4
Dharma, Siri	Norway	Research Assistant	Sep. 2013–Nov. 2013	CEES	2
Espinoza Kim, Rafael D.	Spain	Research Assistant	Mar. 2013–Dec. 2013	CEES	2
Henriksen, Jostein S.	Norway	Higher Executive Officer	Nov. 2013–Dec. 2013	CEES	4
Hostyeva, Vladyslava	Norway	Research Assistant	Jan. 2013–Dec. 2013	CEES	16
Hylland, Vetle	Norway	Research Assistant	Dec. 2013–Dec. 2013	CEES	2.5
Kvinge, Ane S.	Norway	Research Assistant	Sep. 2013–Sep. 2013	CEES	0.01
Marcussen, Thomas	Norway	Researcher	Sep. 2013–Dec. 2013	CEES	4
Meshesha, Anagaw Atickem	Ethiopia	Research Assistant	Apr. 2013–Dec. 2013	CEES	69
Rutgers, Judith	The Netherlands	Consultant	Feb. 2013–Mar 2013	CEES	0.05
Shala, Nita	Norway	Research Assistant	Mar. 2013–Jul. 2013	CEES	16
Skylstad, Viljar A.	Norway	Research Assistant	Mar 2013–Oct. 2013	CEES	3
Wiig, Elisabeth	Norway	Research Assistant	Sep. 2013–Sep 2013	CEES	0.01
Øygarden, Anette	Norway	Research Assistant	Jun. 2013–Jul. 2013	CEES	4

Administrative and technical support staff

Name	Nationality	Position	Period	Funding 2013	CEES share (%)
Bakke, Hege Gilbø	Norway	Staff Engineer	Jan. 2008–Oct. 2013	RCN	75
Gundersen, Gry	Norway	Adviser	Oct. 2007–	UiO-IBV	100
Hansen, Marianne H. S.	Norway	Staff Engineer	Jan. 2012–Dec. 2015	UiO-IBV	100
Herland, Anders	Norway	Staff Engineer	Jan. 2008–	UiO-IBV	100
Jentoft, Sissel	Norway	Senior Adviser	Jun. 2009–Aug. 2014	RCN-CoE	100
Jogi, Suresh K.	Ireland	Senior Executive Officer	Jun. 2013–Jun. 2016	RCN-CoE	16
Nerli, Emelita R.	Norway	Senior Engineer	Oct. 2007–	UiO-IBV	50
Rygg, Kari Beate	Norway	Adviser	May 2008–	UiO-IBV	100
Skage, Morten	Norway	Senior Engineer	May 2008–Apr. 2014	UiO-IBV	100
Steen, Nanna Winger	Norway	Staff Engineer	Oct. 2007–	UiO-IBV	97
Thomsen, Camilla Signe	Denmark	Executive Officer	Nov. 2012–Nov. 2014	UiO-IBV, RCN-CoE	100
Tooming-Klunderud, Ave	Norway	Senior Engineer	Feb. 2011–Dec. 2015	UiO-IBV	100
Wallem, Tore	Norway	Adviser	Dec. 2007–	RCN-CoE	100

Guests of CEES in 2013

Longer research visits (more than one month)

Name	Nationality	Home institution	Period
Agapit, Corinne	France	University of Paris–Est Créteil, France	April–June 2013
Anderholm, Sofia	Sweden	University of Gothenburg, Sweden	Sept.–Dec. 2013
Barth, Julia	Germany	University of Otago, New Zealand	Sept.–Dec.2013
Bærum, Kim Magnus	Norway	Hedmark University College, Norway	Jan.–Dec. 2013
Catarino, Diana	Portugal	University of Agder, Norway	Oct.–Dec. 2013
Cianelli, Lorenzo	USA	Oregon State University, USA	Apr.–Sept. 2013
Evankow, Ann Marie	USA	Colorado College, USA	Jan.–April 2013
Ferreira, Ana Sofia	Portugal	Technical University of Denmark, Denmark	May 2013
Flodrops, Marion	France	University of Occidental Bretagne, France	Jan.–Mar 2013
Hernandez–Aguilar, R. Adriana	Mexico		Jan.–Dec. 2013
Holma, Maija	Finland	University of Helsinki, Finland	Oct.–Dec. 2013
Khelik, Ksenia	Russia	University of Oslo, Norway	Oct. 2013
Kokkalis, Alexandros	Greece	Technical University of Denmark, Denmark	Mar.–June 2013
Nielsen, Anders	Norway	Norwegian University of Life Sciences, Norway	June 2012–Oct. 2013
Nieminnen, Emmi	Finland	University of Helsinki, Finland	Oct.–Dec. 2013
Ohlberger, Jan	Germany	VISTA, Norway	Jan.–Dec. 2013
Olonova, Marina	Russia	Tomsk State University, Russia	Sept.–Oct. 2013
Ottesen, Vibeke	Norway		Jan.–Dec. 2013
Patin, Rémi	France	École normale supérieure, France	Mar.–July 2013
Pettersen, Ruben A.	Norway	University of Oslo, Norway	Jan.–Dec. 2013
Poslinka, Eva	Poland	University of Lund, Sweden	Jan.–Feb. 2013
Runemark, Anna	Sweden	University of Lund, Sweden	Sept.–Dec. 2013
Sivertsen, Therese	Norway	Swedish University of Agricultural Sciences, Sweden	Jul.–Sept. 2013
Solvang, Hiroko	Japan	Institute of Marine Research, Norway	Jan.–Aug. 2013
Spies, Ingrid	USA	University of Washington, USA	June–Aug. 2013
Supraha, Luka	Croatia	Uppsala University, Sweden	Jan.–Feb. 2013
Tarka, Maja	Sweden	University of Lund, Sweden	April–May 2013
Taugbøl, Annette	Norway	University of Oslo, Norway	Jan.–Dec. 2013
Turner, Wendy	USA	National Science Foundation, USA	Jan.–Dec. 2013

Short term guests (more than one week, less than one month)

Name	Nationality	Home institution	Period
Aravena, Guillermo	Chile	Catholic University of the North, Chile	May–Jun. 2013
Barcelo, Caren	USA	Oregon State University, USA	May 2013
Barlow, Samantha	United Kingdom	University of Liverpool, UK	Jan. 2013
Barnosky, Tony	USA	University of California, Berkeley, USA	May 2013
Bekele, Simegn Afework	Ethiopia	Addis Ababa University, Ethiopia	April 2013
Berenbrink, Michael	United Kingdom	University of Liverpool, UK	May 2013
Bonachela, Juan	Spain	Princeton University, USA	Nov. 2013
Cong, Xianbin	China	Chinese Centers for Disease Control and Prevention, China	Mar. 2013
Dewar, Ken	USA	McGill University, Canada	April 2013
Fashing, Peter	USA	California State University Fullerton, USA	Aug. 2013
Fortelius, Mikael	Finland	University of Helsinki, Finland	May 2013
Gante, Hugo	Switzerland	University of Basel, Switzerland	Oct. 2013
Grabowski, Mark	USA	University of Illinois, USA	May 2013
Haase, David	Germany	GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany	May 2013
Jeyasingh, Puni	USA	University of Oklahoma, USA	Mar. 2013
Kozyrskyj, Anita	Canada	University of Alberta, Canada	Nov. 2013
Langer, Gerald	United Kingdom	University of Cambridge, UK	Feb. 2013
Liu, Jun	China	Chinese Centers for Disease Control and Prevention, China	Mar. 2013
Mable, Barbara	United Kingdom	University of Glasgow, UK	Aug. 2013
Magurran, Anne	United Kingdom	St. Andrews University, UK	Aug. 2013
Myers, Richard	USA	Hudson Alpha Institute for Biotechnology, USA	Feb. 2013
Neinman, Maurine	USA	University of Iowa, USA	Mar. 2013
Oomen, Rebekah	Canada	Dalhousie University, Canada	Feb. 2013
Orians, Gordon	USA	University of Washington, USA	Aug. 2013
Pollo, Stephen	Canada	University of Alberta, Canada	Oct. 2013
Richards, Christina	USA	University of South Florida, USA	Feb. 2013
Salzburger, Walter	Switzerland	University of Basel, Switzerland	Jan. 2013
Simonson, Tatum	USA	University of California, San Diego, USA	Feb. 2013
Song, Yajun	China	Chinese Centers for Disease Control and Prevention, China	Mar. 2013
Sørhus, Elin	Norway	VISTA, Norway	Sept. 2013
Van Leeuwen, Casper	The Netherlands	Netherlands Institute for Ecology, The Netherlands	June 2013
Wang, Zuyun	China	Chinese Centers for Disease Control and Prevention, China	Mar. 2013
Weider, Lawrence	USA	University of Oklahoma, USA	Mar. 2013
Xi, Jinxiao	China	Chinese Centers for Disease Control and Prevention, China	Mar. 2013
Yang, Ruifu	China	Chinese Centers for Disease Control and Prevention, China	Mar. 2013
Zhang, Yujiang	China	Chinese Centers for Disease Control and Prevention, China	Mar. 2013

Research projects

RCN projects				
Name	**Project leader**	**Funding**	**Start**	**End**
Population genetics of *Silene acaulis* in the High Arctic	Brysting, Anne Krag	RCN	2013	2014
Phytoplankton size: Climate adaption and long-term evolution	Henderiks, Jorijntje	RCN	2010	2013
Genome size, cell size and growth, searching for the casual links	Hessen, Dag O.	RCN	2010	2013
Effects of climate change on boreal lake ecosystems: productivity and community responses (ECCO)	Hessen, Dag O.	RCN	2013	2016
BiodivERsA Behavioral responses to risk and uncertainty among Norwegian fishers	Hessen, Dag O.	RCN	2013	2015
Spatiotemporal variability in mortality and growth of fish larvae in the Lofoten-Barents Sea ecosystem	Hjermann, Dag Ø.	RCN	2010	2013
Translating the cod genome for aquaculture	Jakobsen, Kjetill S.	RCN	2010	2014
Norwegian High-Throughput Sequencing Centre	Jakobsen, Kjetill S.	RCN	2010	2016
Functional and comparative immunology of a teleost's world without MHC II	Jakobsen, Kjetill S.	RCN	2013	2017
The Aqua Genome project	Jakobsen, Kjetill S.	RCN	2013	2017
Genetic architecture in Drosophila – The role of the Y chromosome in gene expression across the genome	Martinsen, Lene	RCN	2011	2014
LAND: Partial migration of red deer and tick distribution at the altitudinal colonization border (TickDeer)	Mysterud, Atle	RCN	2011	2014
Biogeographic and population analyses of Thermotogales bacteria from hydrocarbon-rich environments	Nesbø, Camilla	RCN	2008	2015
Evolutionary ecology and hydrology – the effects of stream flow dynamics on the white-throated dipper	Nilsson, Anna	RCN	2013	2016
Flexibility and constraints in animal movement pattern: ecology, evolution and annual cycles	Stenseth, Nils Chr.	RCN	2010	2014
Fisheries induced evolution in Atlantic cod investigated by ancient and historic samples	Stenseth, Nils Chr.	RCN	2011	2016
ADCAP – Strengthening the adaptive capacity of institutions in fisheries	Stenseth, Nils Chr.	RCN	2012	2015
Bringing together evolution and ecology – Bringing together evolution and ecology through the Red Queen Perspective	Stenseth, Nils Chr.	RCN	2012	2016
Climate Changes and Zoonotic Epidemiology in Wildlife Systems (ZEWS)	Stenseth, Nils Chr.	RCN	2013	2016

ERC-Stenseth Red Queen coevolution in multispecies communities: long-term evolutionary consequences of biotic and abiotic interactions	Stenseth, Nils Chr.	RCN	2013	2017
On the evolutionary genomics and behavioural ecology of homoploid hybrid speciation in Passer sparrows	Sætre, Glenn-Peter	RCN	2011	2014
Applying a new demographic framework to understand and project consequences of climate change in size- and age-structured populations	Vindenes, Yngvild	RCN	2013	2016
Tracking signatures of adaptive diversification during postglacial colonization: the build-up of genomic isolation in three spine stickleback	Vøllestad, L. Asbjørn	RCN	2010	2015

Other public sector based projects

Name	Project leader	Funding	Start	End
Prøvetaking av gråmåke i Indre Oslofjord	Helberg, Morten	KLIF	2013	2013
Application of a new principle to combat infectious salmon anemia (ISA)	Grimholt, Unni	RCN/NVI	2011	2014
Biodiversity management and the Water Framework Directive under climate change (BiWA)	Hessen, Dag O.	RCN/NINA	2013	2016
CodS – restaurering och förvaltning av torsk i Skagerrak/Kattegat	Jentoft, Sissel	INTERREG	2013	2015
Prøvetaking av svarthvit fluesnapper i Sørkedalen	Lampe, Helene	KLIF	2013	2013
Managing ecosystem services in low alpine cultural landscapes through livestock grazing	Mysterud, Atle	RCN/NTNU Museum of Natural History and Archaeology	2012	2014
ADMAR Adaptive management of living marine resources by integrating different data sources and key ecological processes	Stenseth, Nils Chr.	RCN/IMR	2010	2015
Assessment of the effects of oil exposure on the population dynamics and abundances of Atlantic cod and haddock using state-space models – VISTA 6159	Stenseth, Nils Chr.	VISTA	2012	2014
Codflict: Managing Skagerrak cod – Managing resource and area conflicts in the coastal zone, exemplified by cod on the Skagerrak coast	Stenseth, Nils Chr.	RCN/IMR	2012	2015
Norwegian Marine Data Centre (NMDC)	Stenseth, Nils Chr.	RCN/IMR	2012	2022
Impacts of Deforestation on Biodiversity and Rural Livelihood: Conservation Implication for Sustainable Development in the Face of Global Climate Change	Stenseth, Nils Chr.	NORHED	2012	2013
Behavioral responses to risk and uncertainty among Norwegian fishers	Stenseth, Nils Chr.	RCN/SNF	2013	2015
Hydropower and connectivity in inland rivers	Vøllestad, L. Asbjørn	RCN/NINA	2013	2015

Private sector based projects

Name	Project leader	Funding	Start	End
Combined effects of ocean acidification, climate change and oil related discharges	Hjermann, Dag Ø.	RCN/IRIS	2010	2013
IRIS: Link populations to food-chain in an Integrated Model System	Hjermann, Dag Ø.	RCN/IRIS	2012	2015
SYMBIOSES – Constructing an integrated modelling framework for decision support in ecosystem-based management: case study Lofoten/Barents Sea	Stenseth, Nils Chr.	RCN/ Akvaplan-NIVA	2011	2014

International projects

Name	Project leader	Funding	Start	End
PIEF-GA-2009-255326 Timing of bird migration under climate change: phenotype plasticity, microevolutionary response or both? (BirdClimChange)	Stenseth, Nils Chr.	EU	2011	2013
PIEF-GA-2009-252252 Evolutionary response of two African Rodent species (*Hystrix sp*) to climate changes: the study of the past as an estimate of the future (REHYSTERIX)	Stenseth, Nils Chr.	EU	2011	2013
PIEF-GA-2010-274356 – Social complexity in Resource Management (SoCoRm)	Stenseth, Nils Chr.	EU	2011	2013
PIEF-GA-2010-273986 Climate-induced phenological change and its consequences for bird populations (Bird Populations)	Stenseth, Nils Chr.	EU	2011	2014
PlagueEco2Geno – Reconstructing the imprint of ecology on the genetic phylogeography of the Plague in Central Asia and China	Stenseth, Nils Chr.	EU	2012	2015
Climate Change Effects on Marine Ecosystems and Resources Economics – TFI NCoE Programme	Stenseth, Nils Chr.	Nordforsk	2011	2016
ARCHIGENE - The genetic architecture of secondary sexual traits during hybrid speciation	Stenseth, Nils Chr.	EU	2012	2014
MedPlag – The medieval plagues: ecology, transmission modalities and routes of the infections	Bramanti, Barbara	ERC EU	2013	2018
International Cooperation Project to Sequence the Atlantic Salmon Genome	Jakobsen, Kjetill S.	J. Craig Venter Institute, USA	2013	2013
AutoMAT – Anpassung und Weiterentwicklung von innovativen, nicht invasiven Monitoringsystemen und Auswerteverfahren für die Fishereiforschung	Jentoft, Sissel	Johann Heinrich von Thünen-Institute, Germany	2013	2014

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Seminars with invited speakers

Friday seminars and Extra seminars		
Name	**Title**	**Date Venue: CEES**
Büntgen, Ulf	European climate variability controls Alpine ibex vitality	10 January
Bramanti, Barbara	The role of infectious disease epidemics in the human evolution investigated by means of ancient DNA analyses	11 January
Hutchings, Jeffrey	Allee effects, evolution, and the recovery of marine fishes: reconsideration and reevaluation	18 January
Sæther, Bernt-Erik	Ecological and evolutionary dynamics of age-structured populations in fluctuating environments	1 February
Randolph, Sarah	Latest research in tick-borne disease epidemiology and future questions	8 February
Honing, Henkjan	Music, Cognition and the Origins of Music	11 February
Rikardsen, Audun	Atlantic salmon: A polar and deep water explorer	14 February
Silvestro, Daniele	Bayesian Inference of Speciation and Extinction Rates using the Fossil Record	15 February
Stoltenberg, Camilla	When an entire country is a cohort: Causes of autism and other CNS conditions	22 February
Pelabon, Christophe	Adaptive accuracy and adaptive landscape	28 February
Denamur, Erick	Evolutionary history of extraintestinal virulence in *Escherichia coli*	15 March
Bonachela, Juan A.	Improving the Predictability of Marine Ecosystem Models	20 March
Amundsen, Per-Arne	Ecological speciation in subarctic whitefish and Arctic charr	11 April
Englund, Göran	Predation drives rapid sympatric divergence in whitefish	11 April
Donaldson-Matasci, Matina	Environmental variation, individual information and group performance	26 April
Kjesbu, Olav Sigurd	Maternal effects and the match-mismatch hypothesis under a warming climate: the case of cod spawning in the Lofoten area	3 May
Grabowski, Mark	Strong selection on brain size, but not body size, dominates hominin evolution	16 May
Sirevåg, Reidun	Lady Mary and the history of smallpox	24 May
Palkovacs, Eric	Ecological Consequences of Contemporary Trait Change in Fishes	31 May
Salzburger, Walter	Convergence and Divergence in Cichlid Fishes	6 June
Bagard, Matthieu	Tropospheric ozone as a threat to food security: A case study of winter wheat exposed to ozone under field conditions	6 June
Björklund, Mats	Is evolution predictable?	7 June
Pandolfi, John M.	Historical Perspectives in Marine Ecology & Conservation	21 June
Fashing, Peter J. Nguyen, Nga	Behavior, ecology & conservation of gelada monkeys at Guassa, Ethiopia	23 August
Taylor, Paul D.	Bryozoans, space and time	27 August
Dyer, Adrian	Complex visual processing and learning in bees reveals individual differences and plasticity to quickly adapt	6 September
Rowe, Candy	Decisions, decisions… How educated predators can affect the evolution of aposematism and mimicry	20 September
Comstock, Laurie E.	Microbe-microbe interactions among abundant gut Bacteroidales species	26 September
Van Ert, Matthew	From MLVAs to TaqMamas: Reflections on Amerithrax and beyond	27 September
Catchen, Julian	A dynamic partnership between computer science and biology: how genome evolution led to the evolution of great software	11 October
Fortelius, Mikael	Fossil mammals and evolutionary change - stepping cautiously beyond the obvious	25 October
MacKenzie, Simon	A multi-scale approach toward understanding immunity and survival	15 November
Bonachela Fajardo, Juan Antonio	Evolutionary Comparison of Models for Viral Infection: The "Wrong" Talk.	21 November
Korlach, Jonas	The return of finished genomes	26 November
Kozyrskyj, Anita	Early life influences on the infant gut microbiota: Results from the Canadian Healthy Infant Longitudinal Development (CHILD) cohort	29 November
Levin, Bruce R.	The population and evolutionary dynamics of adaptive immunity in bacteria: the upside and downside of CRISPR-Cas	6 December
Hutchings, Jeffrey	The Communication of Science to Decision-Makers and to Society	12 December
Beaton, Margaret	Patterns of endopolyploidy and inducible defenses in Daphnia	13 December
Laudisoit, Anne	The perfect burrow for what?	17 December

Behaviour and speciation: FroSpects Workshop		
Name	**Title**	**Date and venue**
Dugatkin, Lee	*Presentations and discussions focusing on key questions on behavioural aspects in speciation research.*	6–8 February 2013 Rica Holberg Hotel, Oslo Organisers: Glenn-Peter Sætre and Jo Skeie Hermansen, both CEES.
Hopkins, Robin		
Irwin, Darren		
Jiggins, Chris		
Qvarnström, Anna		
Seehausen, Ole		
Servedio, Maria		
Svensson, Erik		

"Charles Darwin for full musikk!": A Darwin Day vorspiel		
Name	**Title**	**Date and venue**
Åse Kleveland (President of The Norwegian Humanist Association)	Introduction	11 February 2013 The House of Literature, Oslo Organisers: The Norwegian Humanist Association and CEES.
Nils Chr. Stenseth	Introduction	
Henkjan Honing	What makes us musical animals	
Jon Roar Bjørkvold	Human musicality	
Tuva Syvertsen	*Musical performance*	
Tuva Syvertsen	*Musical performance*	
Kouame Sereba	*Musical performance*	
String quartet "Nameless"	*Musical performance*	

Darwin Day 2013: Darwin and genetics through one and a half century		
Name	**Title**	**Date and venue**
Stenseth, Nils Chr.	Opening remarks	12 February 2013 Sophus Lies Aud., Blindern, Oslo
Rutherford, Adam	DNA: past and future	
Richards, Christina	Darwinism in the modern scientific era: Mechanisms of response to novel and changing environments	
Simonson, Tatum	Genetic and physiological adaptation in high-altitude Tibetans	
Myers, Richard	Darwin and the Genomics Revolution	

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Science Debate: Does Norway need a Chief Scientific Adviser?		
Name	Title	Date and venue
Stenseth, Nils Chr.	Opening remarks	22 April 2013
Glover, Anne (Chief Scientific Adviser to the President, European Commission)	Why would Norway want a Chief Scientific Adviser?	Vilhelm Bjerknes' hus, Blindern, Oslo
Ottersen, Ole Petter (Rector, UiO)	*Comments and panel discussion*	
Hallén, Arvid	*Comments and panel discussion*	
Li, Tore	*Comments and panel discussion*	
Boye, Erik	*Comments and panel discussion*	

Maintaining Humanity's Life Support Systems in the 21st Century		
Name	Title	Date and venue
Stenseth, Nils Chr.	Introduction	7 May 2013
Barnosky, Anthony	Maintaining Humanity's Life Support Systems in the 21st Century	Vilhelm Bjerknes' hus, Blindern, Oslo
Skedsmo, Arild (WWF Norway)	*Comments*	

Science Debate: Strategies of Human Mating		
Name	Title	Date and venue
Stenseth, Nils Chr.	Introduction	13 May 2013
Buss, David	Strategies of Human Mating	Vilhelm Bjerknes' hus, Blindern, Oslo
Ottesen, Vibeke	*Comments and panel discussion*	
Eia, Harald	*Comments and panel discussion*	

Bridging the gap between genomics and evolutionary biology II (*Colloquium 2* seminar)		
Name	**Title**	**Date and venue**
Stenseth, Nils Chr.	Introduction	6 May 2013 The Norwegian Academy of Science and Letters, Oslo. Organised by Kjetill S. Jakobsen, CEES.
Session 1: DNA as marker		
Ronquist, Fredrik	DNA as a marker – a phylogenetic perspective	
Jakobsen, Kjetill S.	The success story of DNA as an evolutionary tool	
Session 2: Associations between DNA variation and phenotypes		
Salzburger, Walter	Adaptive radiations – why and how?	
Ellegren, Hans	How can genomics of the collared flycatcher help us understand the phenotypic variation?	
Sætre, Glenn-Peter	A genomic perspective on domestication of sparrows	
Session 3: Actual identification of causative variation		
Berenbrink, Michael	Integrating physiological processes and genomics – are we there yet?	
Flatt, Thomas	Population genomic basis of clinal variation in Drosophila life history	
Purugganan, Michael	Ecological genomics of plant adaptations – is there a need to understand the causative variation?	
Andersen, Øivind	Causative variation in hemoglobin genes	
Session 4: Causally cohesive understanding of the genotype-to-phenotype relation		
Clark, Andrew	Are we towards a causally cohesive understanding of the genotype-to-phenotype relationship?	
Warringer, Jonas	Decoding the topology of adaptive landscapes in yeast	
Svennungsen, Thomas	How does epigenetic transgenerational inheritance fit into the scheme of genotype-to-phenotype relationship?	
Holen, Øistein		
Session 5: Analysis and synthesis		
Omholt, Stig W.	The conceptual structure of Darwinism in relation to the genomics revolution	
Hansen, Thomas F.	Panel discussion	
Omholt, Stig W.		
Jakobsen, Kjetill S.	Closing remarks	

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The Kristine Bonnevie lecture on Evolutionary Biology 2013		
Name	**Title**	**Date and venue**
Ottersen, Ole Petter	Opening remarks	2 September 2013 Georg Sverdrups hus, Blindern, Oslo
Scott, Eugenie C.	Defending evolution – and some other sciences	
Jones, Steve	What sex really means	
Stenseth, Nils Chr.	Debate and closing remarks	

Why evolution is right and creationism is wrong		
Name	**Title**	**Date and venue**
Eugenie C. Scott	Why evolution is right and creationism is wrong	3 September 2013 The House of Literature, Oslo
Steve Jones		

v		
Name	**Title**	**Date and venue**
Stenseth, Nils Chr.	Introduction	19 September 2013 The House of Literature, Oslo
Gleie, Dorte (Den Blå Planet, Danmarks Akvarium)	På dypt navn	
Jørgensen, Jan Birger (Norges Fiskarlag)		
Andresen, Lars H. (WWF Norway)		
Bjørnstad, Hugo (State Secretary, The Royal Norwegian Ministry of Fisheries and Coastal Affairs)		

Life quality and evolution: The Norway Project		
Name	**Title**	**Date and venue**
Sloan Wilson, David	Life quality and evolution: The Norway Project	12 October 2013 The House of Literature, Oslo Organisers: Evolution Institute (USA) and CEES.
Hessen, Dag O.		
Turchin, Peter		
Grinde, Bjørn		
Moene, Kalle		

Seminar with the Sophie Prize Winner of 2013: Bill McKibben		
Name	**Title**	**Date and venue**
Stenseth, Nils Chr.	Introduction	29 October Kristine Bonnevies hus, Blindern, Oslo
McKibben, Bill	I: Why 350 is the Most Important Number in the World	
	II: Notes from the Front Lines of the Climate Fight – how to push for change	

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PhD thesis defences

Hušek, Jan. 25 January. Match and mismatch between birds and other trophic levels – Effects on behavioural and reproductive traits. Supervisors: Stenseth, N. C., Slagsvold, T., Lampe, H. M.

Voje, Kjetil Lysne. 1 March. The relative effects of adaptation and constraint on phenotypic evolution. Supervisors: Hansen, T., Stenseth, N. C., Liow, L. H.

Orr, Russel John Scott. 8 March. Evolution and Distrubution of Saxitoxin in Dinoflagellates. Supervisors: Jakobsen, K. S., Shalchian-Tabrizi, K., Stüken, A., Kellmann, R.

de Muinck, Eric Jacques. 15 March. Deep characterization of Escherichia coli in a cohort of mothers and their infants. Supervisors: Stenseth, N. C.,Trosvik, P., Rudi, K.

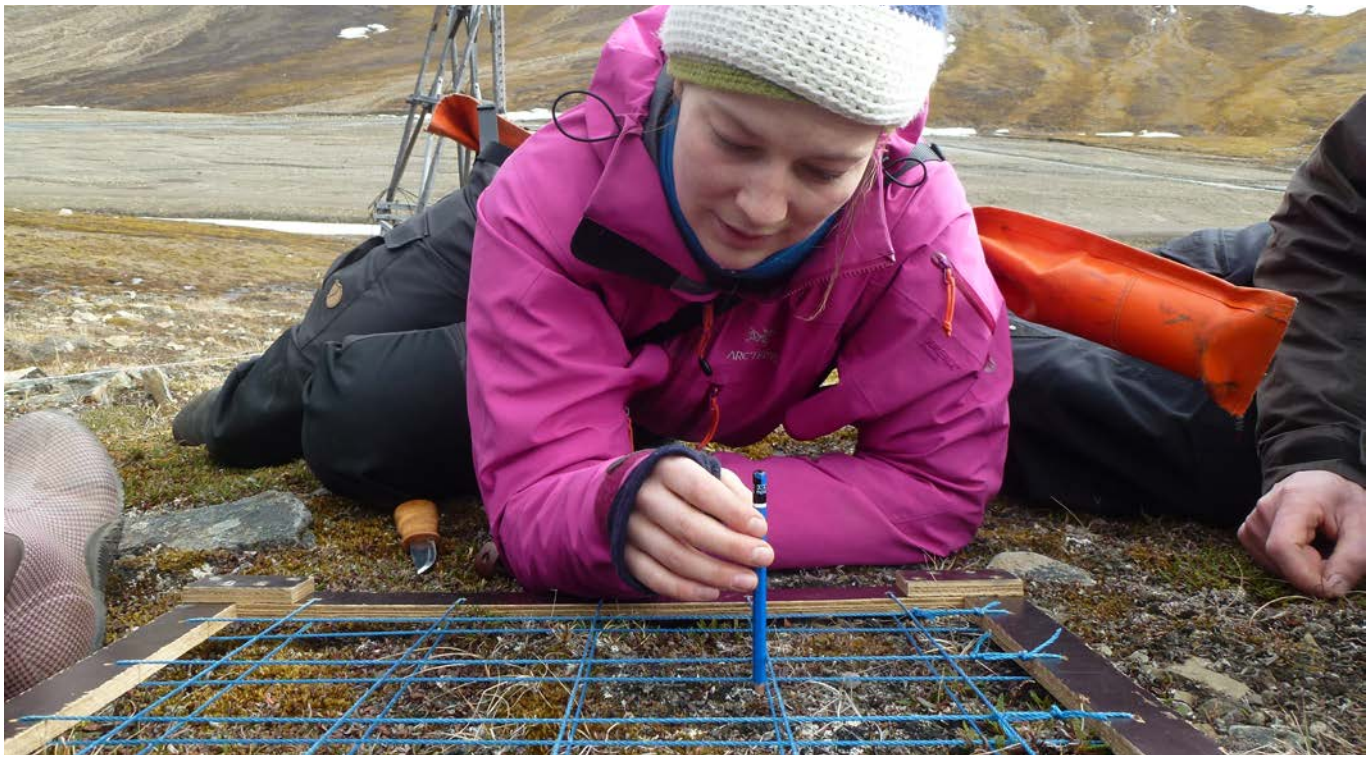
Holmen, Johannes. 12 April. The Eurasian minnow: Postglacial dispersal history and recent invasion patterns in Norway. Supervisors: Vøllestad, L. A., Jakobsen, K. S., Primmer, C.

Atickem, Anagaw Meshesha. 19 April. Landscape genetics and behavioral ecology of the mountain nyala (*Tragelaphus buxtoni*) in the southern Ethiopian highlands. Supervisors: Stenseth, N. C., Loe, L. E., Rueness, E. K., Bekele, A.

Rivrud, Inger Maren. 15 May. Space use, climate and selective harvesting of red deer. Supervisors: Mysterud, A., Loe, L. E., Storvik, G. O.

Sogge, Hanne. 21 June. Studies of *Planktothrix* diversification – Evolution and distribution of subpopulations in space and time. Supervisors: Jakobsen, K. S., Rohrlack,T., Lagesen, K.

Jalal, Marwa. 12 December. Genome and cell size responses to temperature in ectotherms. Supervisors: Hessen, D. O., Jakobsen, K. S., Brysting, A. K.



Master student Mildred Elvik Svoen conducting fieldwork on moss campion on Svalbard, for the project "Population genetics of (Silene acaulis) in the High Arctic". © Anne Krag Brysting

Production

Contributors affiliated with CEES in bold.

Articles in peer-reviewed journals

Abbott, R., *et al.* (**Eroukhmanoff, F.**, **Hermansen, J. S.**) (2013) Hybridization and speciation. *Journal of Evolutionary Biology*, 26 (2), 229–246.

An, D., *et al.* (**Nesbø, C. L.**) (2013) Metagenomics of hydrocarbon resource environments indicates aerobic taxa and genes to be unexpectedly common. *Environmental Science and Technology*, 47 (18), 10708–10717.

Anderson, T. R., **Hessen, D. O.,** Mitra, A., Mayor, D. J., Yool, A. (2013) Sensitivity of secondary production and export flux to choice of trophic transfer formulation in marine ecosystem models. *Journal of Marine Systems*, 125, 41–53.

Asmyhr, M. G., **Rueness, E. K.**, **Flagstad, Ø.**, Sillero-Zubiri, C., Zelalem, A., **Bekele, A.**, Randall, D., **Stenseth, N. C.** (2012) Evaluating non-invasive sampling as a monitoring tool for the Ethiopian wolf in northern Ethiopia. *Canid News*, 15, 1–8.

Atickem, A. M., Loe, L. E. (2013) Livestock-wildlife conflicts in the Ethiopian highlands: assessing the dietary and spatial overlap between mountain nyala and cattle. *African Journal of Ecology*, 1–9.

Atickem, A. M., **Rueness, E. K.**, Loe, L. E., **Serbezov, D.**, Bekele, A., **Stenseth, N. C.** (2013) Population genetic structure and connectivity in the endangered Ethiopian mountain nyala (*Tragelaphus buxtoni*): recommending dispersal corridors for future conservation. *Conservation Genetics*, 14 (2), 427–438.

Aubert, A., Svensen, C., **Hessen, D. O.**, Tamelander, T. (2013) CNP stoichiometry of a lipid-synthesising zooplankton, *Calanus finmarchicus*, from winter to spring bloom in a sub-Arctic sound. *Journal of Marine Systems*, 111, 19–28.

Backström, N., **Sætre, G.-P.**, Ellegren, H. (2013) Inferring the demographic history of European *Ficedula* flycatcher populations. *BMC Evolutionary Biology*, 13 (2), 1–14.

Bailey, R. I., **Eroukhmanoff, F.**, **Sætre, G.-P.** (2013) Hybridization and genome evolution II: mechanisms of species divergence and their effects on evolution in hybrids. *Current Zoology*, 59 (5), 675–685.

Bass, A., Haugen, T. O., **Vøllestad, L. A.** (2013) Distribution and movement of European grayling in a subarctic lake revealed by acoustic telemetry. *Ecology of Freshwater Fish*, 23, 149–160.

Bray, S. C. E., Austin, J. J., Metcalf, J. L., **Østbye, K.**, Østbye, E., Lauritzen, S.-E., Aaris-Sørensen, K., Valdiosera, C., Adler, C. J., Cooper, A. (2013) Ancient DNA identifies post-glacial recolonisation, not recent bottlenecks, as the primary driver of contemporary mtDNA phylogeography and diversity in Scandinavian brown bears. *Diversity and Distributions*, 19 (3), 245–256.

Brembu, T., Winge, P., **Tooming-Klunderud, A.**, **Nederbragt, A. J.**, **Jakobsen, K. S.**, Bones, A. M. (2013) The chloroplast genome of the diatom *Seminavis robusta*: new features introduced through multiple mechanisms of horizontal gene transfer. *Marine Genomics*, 1–11.

Budy, P., Thiede, G. P., Lobon-Cervia, J., Fernandez, G., McHugh, P., McIntosh, A., **Vøllestad, L. A.**, Becares, E., Jellyman, P. (2013) Limitation and facilitation of one of the world's most invasive fish: an intercontinental comparison. *Ecology*, 94 (2), 356–367.

Bunnefeld, N., Edwards, C. T., **Atickem, A. M.**, Hailu, F., Milner-Gulland, E. J. (2013) Incentivizing monitoring and compliance in trophy hunting. *Conservation Biology*, 27 (6), 1344–1354.

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Talks

Aas, A. B. The role of *B. anthracis* in the soil microbiome. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Anderholm, S. Nest parasitism and relatedness in the barnacle goose. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Baalsrud, H. T. Genomic insight into the evolution of cold adaptation in teleosts: the story of hemoglobin. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Bache-Mathiesen, L., Sætre, G.-P. Investigating the genetic basis of sexually selected male plumage traits involved in reproductive isolation. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Bahlk, S. H., Brysting, A. K. Can hybridization be detected between African wolves and sympatric wolf-like canids in Ethiopia? *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Bailey, R. I. Mechanisms of signal divergence and their effects on evolution in hybrids. *FroSpects workshop: Behaviour and speciation, Norway.* 8 February.

Bailey, R. I. A genomic perspective on self–domestication in sparrows and its evolutionary consequences. *CEES Colloquium II, Bridging the gap between genomics and evolutionary biology Norway.*6 May.

Bailey, R. I. The role of genetic constraints during speciation: Hybridization and the G matrix. *Frospects Speciation Conference, France.* 29 May.

Bailey, R. I. Does hybridization increase adaptability? *CEES Annual Student Conference 2013, Norway.* 14–16 October

Berg, P. R. Population genomics in Atlantic cod – Baltic vs. North Sea. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Bjørgaas, H. H., Kausrud, K. L. Procedure for testing of presence of transgenic protein using QuickStix strips in maize seeds lots produced by MPA in Eastern Santa Catarina. Justification, methology, possible improvements and conclusion. *VIII national congress for agroecology, Brazil.* 25–29 November.

Bonanomi, S. Spatiotemporal distribution and composition of mixed stock fishery of Atlantic cod (*Gadus morhua*) in West Greenlandic waters. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Bozzo, V., **Labra Lillo, A.** Interacciones sociales en el lagarto llorón (*Liolaemus chiliensis*). *IV Congreso de Anfibios y Reptiles, Chile.* 6–8 November.

Bramanti, B. MedPlag (2013–18): The medieval plagues: ecology, transmission modalities and routes of the infections – an ERC Advanced Grant. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Branderud, M. K., Brysting, A. K. Polyploidy and ecotype variation in the *Cochlearia officinalis* complex. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Brysting, A. K. Livets tre i lys av molekylære metoder. *Etterutdanningskurs: Bioteknologi og etikk for lærere, Norway.* 24–25 January.

Brysting, A. K. Müntzings klassiske lærebok-eksempel: allotetraploid *Galeopsis tetrahit*. *Møte i Telemark Botaniske Forening, Norway.* 6 February.

Byrkjeland, R., Mysterud, A. The role of rodents as hosts for ticks and tick-borne diseases in a northern forest ecosystem. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Brysting, A. K. Polyploiditet: Hva skjer når planter fordobler kromosomtallet sitt? Hvordan bidrar polyploiditet til artskunnskapen vår? Har vi plutselig mange flere arter enn vi trodde? *SABIMA-seminaret 2013, Norway.* 1–3 November.

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Brysting, A. K. Polyploidy and self–incompatibility in Arabidopsis and other polyploidy stories. *Guest lecture at Institute for Botany, University of Vienna, Austria.* 18 November.

Cadahia Lorenzo, L. Phylogenetic position of the helicid species *Cylindrus obtusus* based on nuclear and mitochondrial DNA marker sequences. *BioSyst.EU 2013, Austria.* 18–22 February.

Claudio, R., Michael, W., Labra, A. Variación intraespecífica en la respuesta del lagarto llorón a sus llamadas de auxilio. *XIV Congreso Argentino de Herpetología, Argentina.* 17–20 September.

Deane, K. H. O., Stenseth, N. C. Modelling plague transmission within medieval European cities. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Devine, J. A., Mehl, S., Fotland, Å., Huse, I., Nash, R. D. M., **Kjesbu, O. S.** Density-dependent post-recruitment dynamics in the Northeast Arctic and North Sea saithe. *Gadoid Fisheries: The Ecology and Management of Rebuilding, Canada.* 15–18 October.

Diekert, F. K. From Open Access to Individual Quotas. *20th Annual conference of the European Association of Environmental and Resource Economist, France.* 26 September.

Diekert, F. K. The growing value of age: Exploring economic gains from age-specific harvesting. *ICES Annual Science Conference, Iceland.* 27 September.

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Durant, J. M., Skern-Mauritzen, M., Krasnov, Y. V., Nikolaeva, N. G., Lindstrøm, U. Temporal dynamics of the major predator interaction in the Barents Sea. *ICES Annual Science Conference, Iceland.* 23–27 September.

Edvardsen, R., Furmanek, T., **Lie, K. K.**, Jordal, A. E. O., **Sørhus, E.,** Karlsen, Ø., van der Meeren, T., Mangor-Jensen, A., Rønnestad, I. Transcriptomic analysis of developing atlantic cod – understanding the mechanisms underlying high growth. *GIA 2013, Norway.* 3–6 September.

Eikeset, A. M. Eco-evolutionary dynamics and adaptations to climate and fishing in Northeast Arctic cod – implications for management and society. *Intecol, England.* 28–23 August.

Elgvin, T. O. A genomic approach to studying sparrow speciation. *Evolution Conference 2013, USA.* 25 June.

Enawgaw, B. C., Brysting, A. K. Transfrontier Migration Pattern, Habitat Requirement and Conservation of the white-eared kob (*Kobus kob leucotis*) in the Gambella-Boma Landscape. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Ergon, T. Separating mortality and emigration with robust–design spatial capture–recapture data. *EURING Analytical Meeting & Workshop 2013, USA.* 28 April–4 May.

Eroukhmanoff, F. The beak of the sparrow: a story of hybridization and species interactions. *International ESF Frospects Workshop. Behaviour and speciation, Norway.* 4–5 February.

Eroukhmanoff, F. The effects of gene flow on genetic constraints at different stages of speciation. *International ESF Frospects Workshop. Genetics and genomics of speciation, Switzerland.* 26–29 March.

Eroukhmanoff, F. The genetic mosaic of divergence in a hybrid species. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Evankow, A. Kelp population genetics along a light and temperature gradient. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Fernandez-Celemin, L., Sætre, G.-P. Geographic variation in beak morphology and the role of hybridization. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Fernando, A. G. Temporal variation on the colony attendance pattern on the Storm Petrel *Hydrobates pelagicus. EURING Analytical Meeting & Workshop, USA.* 28 April–05 May.

Fernando, A. G. Spatio-Temporal dynamics of small mammals at Finse: A multhimethodological approach. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Fischer, B. Allometry and childbirth in humans. *Congress of the European Society for Evolutionary Biology, Portugal.* 19–24 August.

Fischer, B. Allometry and childbirth in humans. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Freitas, C. M. A., Moland, E.**, Olsen, E. M.** Behavioural responses of wild Atlantic cod to sea temperature changes. *Nordic Marine Science Conference, Norway.* 28–30 October.

Gerecht, A. Phosphorus limitation does not change the ratio of calcite to organic carbon in *Coccolithus pelagicus. 14th International Nannoplankton Association Meeting (INA14), USA.* 15–21 September.

Gerecht, A. Temperature, but not phosphorus limitation, changes the ratio of calcite to organic carbon in *Coccolithus pelagicus. Nordic Marine Science Conference 2013, Norway.* 28–30 October.

Godiksen, J. A., Fonn, M., Solbakken, L., Thorsen, A., **Kjesbu, O. S.** Can otoliths and post–ovulatory follicles tell the spawning history of saithe (*Pollachius virens*). *Gadoid Fisheries: The Ecology and Management of Rebuilding, Canada.* 15–18 October.

Guldvog, C. Ø. Clock-genes, timing of breeding and reproductive isolation. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Hänsch, S. Historic Plagues: Analysis of historic Yersinia pestis strains with aDNA techniques – from short DNA fragments to evolutionary genetics of the plague pathogen(s). *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Hanssen, B., Vøllestad, L. A. The life history of corkwing wrasse: effects of harvesting. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Hansson, T. H., Vøllestad, L. A. Phenotypic Plasticity in threespined stickleback (*G. aculeatus*). *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Henderiks, J., Gerecht, A., Hannisdal, B., **Liow, L. H., Reitan, T., Schweder, T.,** Edvardsen, B. PhytoSCALE project: calibrating phytoplankton cell size as a proxy for climatic adaptation. *European Geosciences Union General Assembly, Austria.* 7–12 April.

Hermansen, J. S. Reproductive barriers in a hybrid species system. *14th Congress of the European Society for Evolutionary Biology, Portugal.* 19–24 August.

Höffle, H., Johannessen, M. E., Korsbrekke, K., Bakkeplass, K. G., **Kjesbu, O. S.** Environmental and demographic Controls on the distribution of North East Arctic cod spawning around the Lofoten Islands. *Gadoid Fisheries Symposium, Canada.* 15–18 October.

Holen, Ø. H., Svennungsen, T. O. Warning signals and handicap theory. *ESEB 2013, Portugal.* 19–24 August.

Holma, M. K. Biological and economic reference points in the Baltic Sea salmon fisheries. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Ivarsen, A. E., Slagsvold, T. Does brain size affect survival and reproductive success in a wild population of great tits *Parus major*? *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Jeppsson, T., Forslund, P. Species traits explain differences in Red list status and long-term population trends. *Intecol 2013, England.* 18–23 August.

Kausrud, K. L. A life history approach to zoonoses and climate fluctuations. a case study of anthrax in a natural system. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Kausrud, K. L. Pesten fra steppene. Krig, kunnskap og klima i svartedauens tid. *BIO-konferansen 2013, Norway.* 1 November.

Kjesbu, O. S. Maternal effects and the match-mismatch hypothesis under a warming climate: the case of cod spawning in the Lofoten area. *Friday Seminar, Norway.* 03 May.

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Kvile, K. Ø., Stenseth, N. C., Stige, L. C. Temperature-zooplankton associations in the Barents Sea vary on temporal, spatial and developmental scales. *ICES Annual Science Conference 2013, Iceland.* 23–27 September.

Kvile, K. Ø. Temperature-zooplankton associations in the Barents Sea vary on temporal, spatial and developmental scales. *CEES Annual Student Conference 2013, Norway.* 14–16 October

Kvinge, A. S. Evolution of early development in grayling, *Thymallus thymallus. CEES Annual Student Conference 2013, Norway.* 14–16 October.

Labra, A., Weymann M., Reyes C., Hoare M. Intraspecific variation in the response of the weeping lizard to its distress calls. *Behaviour 2013, England.* 4 August.

Labra, A. Intraspecific variation in the response of the weeping lizard to its distress calls. *Behaviour 2013, England.* 4 August.

Labra, A. What sons get from fathers? Song repertoires in the Pied Flycatcher. *Behaviour 2013, England.* 4 August.

Labra, A. Análisis de la diversificación estructural de las papilas linguales en Liolaemus y su función. *IV Congreso de Anfibios y Reptiles, Chile. 6–8 November.*

Labra, A. Comparación poblacional de la respuesta de Liolaemus chiliensis a sus vocalizaciones. *IV Congreso de Anfibios y Reptiles, Chile. 6–8 November.*

Labra, A. La respuesta de un depredador, Philodryas chamissonis, a las vocalizaciones de Liolaemus chiliensis. *IV Congreso de Anfibios y Reptiles, Chile. 6–8 November.*

Labra Lillo, A., Hoare, M. La respuesta de un depredador, Philodryas chamissonis, a las vocalizaciones de Liolaemus chiliensis. *IV Congreso de Anfibios y Reptiles, Chile.* 6–8 November.

Lampe, H. M., Labra, A. What sons get from fathers? Song repertoires in the Pied Flycatcher. *Behaviour 2013, England.* 4–8 August.

Liljegren, M. M. Closed-system ecology and the Red Queen: Using microbial cultures to create modelling systems for long-term competitive coevolution. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Liow, L. H. Decrypting the deep fossil record: estimating diversification & ecological dominance. *Imperial College London, England.* 26 February.

Liow, L. H., Hansen, T. F. The Macroevolution Group: monkeys, horses, moss- and other animals (and plants). *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Loman, N., Hadfield, J., **Nederbragt, A. J.** Seqbench: Open-source benchmarking of sequence platforms and software. *The 14th annual Advances in Genome Biology and Technology (AGBT), USA.* 20–23 February.

Malmstrøm, M. The 90+ teleost genome project. *Teleost Genome meeting, Switzerland.* 20 June.

Malmstrøm, M. Life without MHC II – a teleost genome project. *SAB-meeting, Norway.* 16 August.

Martinez, V., Valdecantos, S., **Labra Lillo, A.** Análisis de la diversificación estructural de las papilas linguales en Liolaemus y su función. *IV Congreso de Anfibios y Reptiles, Chile.* 6–8 November.

Mazzarella, A. V. B., Østbye, K., Vøllestad, L. A. Looking for genomic signatures of platelessness in the threespine stickleback (Gasterosteus aculeatus). *Evolution Meeting, USA.* 21 May–25 June.

Mazzarella, A. V. B., Østbye, K., Vøllestad, L. A. Looking for genomic signatures of platelessness in the threespine stickleback (*Gasterosteus aculeatus*). *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Mewicha, B. DNA metabarcoding analysis of diet composition and diet overlap between Walia ibex (*Capra walie*) and domestic goat (*C. hircus*). *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Moksnes, J. The effects of hybridization on beak morphology in sparrows. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Ndimuligo, S. A. Status of Savanna Chimpanzees (*Pan troglodytes*) in Western Tanzania. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Ndimuligo, S. A. Vegetation structure the declining chimpanzee habitat of Kwitanga Forest, western Tanzania. *Tanzania Wildlife Research Institute Annual Conference, Tanzania.* 4–6 December.

Nederbragt, A. J. The IPython Notebook: an introduction, and hands-on/live demo. *Computational Life Science initiative seminar series, Norway.* 28 August.

Nederbragt, A. J. High Throughput Sequencing technologies. *ForBio course: Introduction to RADseq bioinformatics, Norway.* 7–11 October.

Nederbragt, A. J. Repeat after me: Is our research reproducible (enough)? *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Nederbragt, A. J. Lessons learned from assembling the Atlantic cod genome. *CIGENE seminar series, Norway.* 23 October.

Nederbragt, A. J. The IPython Notebook: an introduction, and hands-on/live demo. *Computational Physics Friday Seminar Series, Norway.* 15 November.

Nederbragt, A. J. Improving and validating the Atlantic Cod genome assembly using error-corrected as well as raw PacBio reads. *Pacific Biosciences European User Group Meeting, England.* 19–20 November.

Nederbragt, A.J. Using PacBio Reads to Improve and Validate the Assembly of the Complex Atlantic Cod Genome. *PacBio Assembly Workshop, USA.* 17 December.

Nieminen, E. E. International Agreements of the Multispecies Baltic Sea Fisheries: A Partition Function Game Approach. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Nilsson, P. Evolution of host immunity and immune responses to plague (Yersinia pestis) – a case study of the great gerbils. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Nitter, E. L., Brysting, A. K. Effects of sheep grazing on bumblebee abundance in an alpine ecosystem. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Norum, J. K., Mysterud, A. Habitat use by roe deer (Capreolus capreolus) in presence of two predators with contrasting hunting style: How to behave in a multi-predator setting? *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Ohlberger, J. Stochasticity and determinism: How density-independent and density-dependent processes affect population variability. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Olsen, L. N. Icelandic Cochlearia (Scurvygrasses) – arctic or European, or both? *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Oomen, R. A. Genetic variability in population responses of Atlantic cod to environmental change. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Ottersen, G. Presentation of the paper: Temporal shifts in recruitment dynamics of North Atlantic fish stocks: effects of spawning stock and temperature. *CEES Late Lunch Talk, Norway.* 10 June.

Ottersen, G. Lecture on Sea fisheries- and integrated marine environment management. *Lecture in the course BIO4150-9150 Bevarings- og forvaltningsbiologi, Norway.* 15 September.

Ottersen, G. What governs the recruitment of Barents Sea cod – a review. *ICES Annual Science Conference 2013. Theme Session B. Responses of living marine resources to climate change and variability: learning from the past and projecting the future, Iceland.* 23–27 September.

Ottersen, G. The inter-sectorial management plans for Norwegian waters. A step towards a holistic approach. Holistic approaches to global challenges. *IIASA – Norwegian collaboration, Norway.* 6 November.

Pollo, S., **Nesbø, C. L.** Temperature adaptation in the Thermotogales Bacterium Kosmotoga olearia. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

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Qviller, L. Trekkende hjort og antall flått. *Miljø2015 – programkonferanse, Norway.* 7 February.

Qviller, L. Phenology of tick questing activity at differing altitudes in western Norway. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Qviller, L. Flått, utbredelse, klima og hjortedyr. *BIO-konferansen 2013 – Pest og plage, Norway.* 1 November.

Reyes, C., Weymann, M., **Labra Lillo, A.** Respuesta del lagarto llorón a sus llamadas de auxilio. *XVI Aniversario del ICBM. Facultad de Medicina. Universidad de Chile, Chile.*4–5 September.

Reyes, C., **Labra Lillo, A.** Descripción del "eyes–popping" en el lagarto llorón (*Liolaemus chiliensis*). *IV Congreso de Anfibios y Reptiles, Chile.* 6–8 November.

Richter, A. P. Anticipating socio-ecological collapses. *Arctic Frontiers, Norway.* 20–25 January.

Richter, A. P., Dakos, V. Using economic information to anticipate ecological collapses. *Arctic Frontiers, Norway.* 28 January–1 February.

Richter, A. P. Using economic data to anticipate resource collapses. *Lunch seminar economics cluster Wageninge, The Netherland.* 1 February.

Richter, A. P. The hidden dynamics of conditional cooperation. Cooperation or Conflict? The Netherlands. 18–21 June.

Richter, A. P. The transmission of sustainable harvesting norms when agents are conditionally cooperative. *Annual conference from the European Society of Ecological Economics (ESEE), France.* 18–21 June.

Richter, A. P. The transmission of sustainable harvesting norms when agents are conditionally cooperative. *Annual conference from the European Society of Environmental and Resource Economists (EAERE), France.* 26–29 June.

Richter, A. P. Using economic information to anticipate collapses in social-ecological systems. *15th Bioecon (Biodiversity and Economics for Conservation), England.* 18–20 September.

Richter, A. P. Anticipating transitions in social-ecological systems. *Departmental seminar NTNU Economics, Norway.* 14 November.

Rike, A. G. L., Håvelsrud, O. E., **Haverkamp, T. H. A.,** Kristensen, T., **Jakobsen, K. S.** Metagenomics in methane seep detection and studies of the microbial methane sediment filter. *EGU General Assembly 2013, Austria.* 7–12 April.

Romagnoni, G. Sensitivity Analysis of Ecospace Parameters. *ICES Annual Scientific Conference 2013, Iceland.* 23–27 September.

Romagnoni, G. Investigating the effect of Marine Protected Areas: are we ready to apply this tool? *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Runemark, A. Evolutionary processes driving population divergence in insular populations of the Skyros wall lizard. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Sadykov, A. Unified theory of population growth. *First meeting of the Evolutionary Demography Society (EvoDemoS 2013), Denmark.* 4–10 October.

Schmid, B. V. The Black Death and successive reintroductions of plague into Europe. *Yersinia 11, China.* 24–28 June.

Schweder, T. Integrating confidence intervals, likelihoods and condence distrubutions. *The 59th World Statistics Congress, Hong Kong.* 27 August.

Skau, L. F. Study on how the growth rate, genome- and cell-size are affected by temperature and differences in phosphorus levels in different algae. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Skjæraasen, J. E., Korsbrekke, K., Nash, R. D. M., **Kjesbu, O. S.** Skipped spawning in female Northeast Arctic gadoids. *Gadoid Fisheries: The ecology and management of rebuilding, Canada.* 14–18 October.

Solbakken, M. H. Functional insight into the innate immunity of Atlantic cod. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Solbakken, M. H., Jentoft, S., Seppola, M., Mikkelsen, H., **Jakobsen, K. S.** The immune system of Atlantic cod. *Institute Seminar, Norway.* 25 September.

Solbakken, M. H., Malmstrøm, M., Tørresen, O. K., Jakobsen, K. S., Jentoft, S. Atlantic cod displays an unusual TLR repertoire – a Gadidae-specific feature? *International Congress of Immunology 2013, Italy.* 22–27 August.

Valdecantos S., Martinez V., **Labra, A.** Glándulas precloacales de tres especies de Liolaemus: Una Comparación Morfológica. *XIV Congreso Argentino de Herpetología, Argentina.* 17–20 September.

Star, B. Historic whole genome analyses of Atlantic cod. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Stenseth, N. C. Grunnforskning, anvendt forskning og innovasjon: forskningsinstitusjonenes bidrag til vekst og bærekraftig oppdrettsnæring. *Forskersamling akvakultur, Norway.* 9 January.

Stenseth, N. C. Kunnskap trumfer alt. *Regjeringens nyttårsmiddag, Norway.* 11 January.

Stenseth, N. C. Experiences gained through the development and running of a CoE. *University of Agder seminar, Norway.* 14 January.

Stenseth, N. C. Darwin Day vorspiel. *Darwin Day vorspiel, Norway.* 11 February.

Stenseth, N. C. The dynamics in harvested populations: Influences from harvest and environment. *Lund University, Sweden.* 14 March.

Stenseth, N. C. Kan forskning ledes? *Nasjonalt program for yngre forskningsledere i psykologi, Norway.* 15 March.

Stenseth, N. C. Evolusjonsbiologien: Charles Darwin. *Evolusjonsbiologien: Charles Darwin (Ungomdsundervisningen ved UiO), Norway.* 15 April.

Stenseth, N. C. Havet og kysten. *Havet og kysten, Norway.* 18 April.

Stenseth, N. C. IUBS – International Union of Biological Sciences. *IUBS – International Union of Biological Sciences (Bio–Unions meeting), France.* 28 April.

Stenseth, N. C. The interplay between ecology and evolution in host-vector-pathogen systems: *Yersinia pestis* as an example. *ICSU BIO Union's meeting, France.* 28 April.

Stenseth, N. C. Bridging the gap. *Coll. 2 seminar: Bridging the gap II, Norway.* 6 May.

Stenseth, N. C. (A sneak preview of) A scientific consensus on Maintaining Humanity's life support systems in the 21st century. *A scientific consensus on Maintaining Humanity's life support systems in the 21st century, Norway.* 7 May.

Stenseth, N. C. Hvorfor nytter forskningsformidling? Betydning av å bygge omdømmet til forsker og institusjon. Hvordan forvalte dette strategisk? *Personalkonferansen: Formidling nytter, Norway.* 3 June.

Stenseth, N. C. The interplay between ecology and evolution in host-vector-pathogen systems: Yersinia pestis as an example. *The Yersinia meeting, China.* 24 June.

Stenseth, N. C. Forskningssammarbeid mellom havforskningsinstituttet (HI) og UiA. *Arendalsuka, Norway.* 9 August.

Stenseth, N. C. Recent work on the plague eco-evolutionary system: Extending our work from Central Asia to Caucus and China. *Almaty meeting, Kazakhstan.* 12 September.

Stenseth, N. C. Nordic Council Presentation (NorMER). *Nordic Council Presentation (NorMER), Iceland.* 16 September.

Stenseth, N. C. Får vi et kunnskapsløft for marin forskning? På dypt vann *(Forskningsdagene), Norway.* 19 September 2013.

Stenseth, N. C. NorMER Opening speach. *NorMER Opening, Iceland.* 25 September.

11 APPENDICES

Stenseth, N. C. Climate driven changes to harvested populations in Nordic marine ecosystems. *NMSC lectures, Norway.* 30 October.

Stenseth, N. C. Centre for Ecological and Evolutionary Synthesis (CEES) SFF-forum 2013. *SFF-forum 2013, Norway.* 4–5 November.

Stenseth, N. C. Modelling changing dynamics in marine ecosystems under enviromental variation: The Black Sea and The Baltic Sea as examples. *EuroSea meeting, Gran Canaria, Spain.* 6 November.

Stenseth, N. C. Marine Ecosystems: Past, present and future. *Havet og kysten, Norway.* 14 November.

Stenseth, N. C. Hvordan kan finansiering av forskning ved universiteter og høgskoler bidra til at kvalitetsbehov blir bedre ivaretatt? *NHO-konferanse, Norway.* 15 November.

Stige, L. C., Langangen, Ø., Yaragina, N.A., Vikebø, F. B., Gusdal, Y., Bogstad, B., Melsom, A., **Stenseth, N. C., Hjermann, D. Ø.** Disentangling the effects of ocean transport, temperature and food concentration on the distribution of fish larvae. *ICES Annual Science Conference, Iceland.* 23–27 September.

Stræte, T. Ø., Slagsvold, T. Significance of rearing conditions for personality later in life: a field study of great tits *Parus major. CEES Annual Student Conference 2013, Norway.* 14–16 October.

Svennungsen, T. O. Epigenetic inheritance across an invasion front. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Svennungsen, T. O., Holen, Ø. H. Epigenetic inheritance in invading species. *14th Congress of The European Society for Evolutionary Biology, Portugal.* 19–24 August.

Sætre, G.-P. Mechanisms of hybrid speciation, lessons from Passer sparrows. *FroSpects – Behaviour and Speciation Workshop, Norway.* 6–8 February.

Sætre, G.-P. Intragenomic conflict and its role in speciation. *FroSpects – Genetics and Genomics of Speciation Workshop, Switzerland.* 26–29 March.

Sætre, G.-P. Hybrid speciation through discordant cline movement of mito-nuclear and sex-linked incompatibilities. *FroSpects 2nd Speciation Conference, France.* 27–29 May.

Sørhus, E. Assessment of the long-term effects of oil exposure on early life stages of haddock using transcriptomics and fitness observations. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Thorsteinsen, C., Slagsvold, T. Winter survival and reproductive success in great tits in relation to individual personality. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Thrane, J.-E. Effects of light intensity on the optimal nitrogen: phosphorus ratio in phytoplankton. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Toljagic, O. The Triassic/Jurassic mass extinction as trigger for the Mesozoic radiation of crocodylomorphs. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Trier, C. N. Sex Linked and Mito-Nuclear Incompatibilities in Hybrid Speciation. *Evolution 2013, USA.* 25 June.

Trier, C. N. The Genomic Landscape of A Hybrid Species. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Tørresen, O. K. Improving the cod genome assembly: Combining assembly programs and different types of sequencing data. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Tørresen, O. K., Nederbragt, A. J., Miller, J. R., Walenz, B., **Jentoft, S., Jakobsen, K. S.** Improving the Atlantic cod genome using long-read PacBio in combination with 454 and Illumina sequencing data. *Genome 10K Conference, USA.* 25–28 April.

Valdecantos, S., Martinez, V., **Labra Lillo, A.** Estudiando las secreciones de las glándulas precloacales desde la morfología en tres especies de Liolaemus. *IV Congreso de Anfibios y Reptiles, Chile.* 6–8 November.

Valdecantos, S., Paz, A., **Labra Lillo, A.** Comunicación química en Liolaemus chiliensis: de secreciones precloacales a heces. *IV Congreso de Anfibios y Reptiles, Chile.* 6–8 November.

Van de Pol, M., **Vindenes, Y.,** Sæther, B.-E., Engen, S., Ens, B. J., Oosterbeek, K., Tinbergen, J. M. Effects of climate change on stochastic demography in a population of Eurasian Oystercatchers. *British Ornithologists' Union annual conference 2013, England.* 26–28 March.

van Leeuwen, C. Effects of dispersal barriers on migratory fish populations. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

van Leeuwen, C. Dispersal of aquatic organisms by waterbirds. *Professor Christer Broenmark, Department of Aquatic Ecology, Lund University, Sweden.* 20–22 November.

Viljugrein, H., Tavornpanich, S. Disease models and dynamics in aquaculture. *Avslutning av strategisk forskningsprogram innen fiskehelse, Norway.* 10 June.

Vindenes, Y., Edeline, E., **Ohlberger, J., Langangen, Ø., Winfield, I. J., Stenseth, N. C., Vøllestad, L. A.** Effects of climate warming on trait-based dynamics in a freshwater top predator. *INTECOL 2013, England.* 18–23 August.

Vindenes, Y., Edeline, E., **Ohlberger, J., Langangen, Ø., Winfield, I. J., Stenseth, N. C., Vøllestad, L. A.** Trait-based dynamics of a top predator in freshwaters and effects of climate change. *INTECOL 2013, England.* 18–23 August.

Vindenes, Y., Ohlberger, J., Langangen, Ø., Winfield, I. J. How does carrying capacity depend on temperature? A density dependent IPM for pike (Esox lucius). *1st meeting of the Evolutionary Demography Society, Denmark.* 6–10 October.

Voje, K. L. Allometric constraints on adaptive radiation in sticklebacks. *European Society for Evolutionary Biology Congress 2013, Portugal.* 23 August.

Voje, K. L. The Red Queen is dead, long live the Red Queen? *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Vøllestad, L. A. Akvakultur og sjømatproduksjon.Relevant forskning ved Institutt for biovitenskap. *Forskerseminar: Akvakultur og sjømatproduksjon, Norway.* 9 January.

Vøllestad, L. A. Inngrep i og omkring vassdrag. *Internseminar: Samlet belastning av naturinngrep, Norway.* 7 March.

Vøllestad, L. A. Status og framtidsutsikter for villaksen. *Seminar om villaks, Norway.* 14 August.

Vøllestad, L. A. Harren i Lesja: oppsummering av 20 år med forskning. *Forskning på innlandsfisk. Nye metoder – ny innsikt, Norway.* 4 October.

Westengen, O. T. Modern maize varieties going local in the semi-arid zone in Tanzania: Implications for adaptation to climate change. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Weymann, M., Reyes, C., Diaz, H., **Labra, A.** Variación poblacional en la distribución espacial del lagarto llorón. *XIV Congreso Argentino de Herpetología, Argentina.* 17–20 September.

Weymann, M., Reyes, C., **Labra Lillo, A.** Comparación poblacional de la respuesta de Liolaemus chiliensis a sus vocalizaciones. *IV Congreso de Anfibios y Reptiles, Chile.* 6–8 November.

Wiig, E., Vøllestad, L. A. Variation in bone armour of three-spine stickleback. *CEES Annual Student Conference 2013, Norway.* 14–16 October.

Wojewodzic, M. Genomic responses to environmental stressors: How Daphnia populations vary in their responses to chemicals and binary mixtures. *Gordon Research Conference (GRC) Ecological & Evolutionary Genomics, USA.* 1 July.

Wojewodzic, M. Will kids be what grandparents ate? Transgenerational effects of different food quality revealed by *Daphnia*. *XIV Congress of the European Society for Evolutionary Biology, Portugal.* 19–24 August.

Wojewodzic, M. Mechanisms of adaptation: Insights from Daphnia transcriptional responses to single compounds and their binary mixtures. *International Environment 'Omics Synthesis 2013, England.* 1 September.

CEES

Department of Biosciences
University of Oslo
P.O. Box 1066 Blindern
NO-0316 Oslo, Norway

Phone: + 47 22 85 44 00
Fax: + 47 22 85 40 01

cees-post@ibv.uio.no
www.mn.uio.no/cees