



Fungi are important as decomposers, pathogens and symbionts. The photo shows *Mycena strobilicola*. Photo Holger Krisp, Wikipedia commons.

## Molecular revolution deepens our understanding of forest fungi

**“A network about a network”. Possibly the most important network in the forest ecosystem consists of the fungal hyphae. A hectare of forest soil can contain thousands of kilometres of these fungal threads.**

**The SNS/EFINORD-supported network NEFOM, North European Forest Mycologists, connects mycologists and molecular ecologists throughout the Nordic and Baltic countries to gain a greater understanding of fungi.**

### **No fungi, no forest life**

Fungi are extremely important for the functioning of the Nordic forest ecosystem. They decompose organic material, making nutrients available for trees and plants. They help roots to take up nutrients and water through

the amazing mycorrhizal system. Some of them are pathogenic, thereby controlling the dynamics of the ecosystem.

The role of the fungal community in the carbon cycle has received increasing attention. Recent findings in Sweden demonstrated that most of the carbon that is sequestered in



“NEFOM gives us a firm platform to keep the networking going”. Rasmus Kjøller. Photo Private

northern forests is actually stored via roots and root-associated fungi. The fungi themselves constitute an enormous mass within the soil – in one hectare of forest land, there will be thousands of kilometres of hyphae, weighing up to a ton.

Cataloguing the species of fungi has always been a challenge. It is very likely that most of the species in the fungal kingdom remain undetected. An article in *PLoS Biology* in 2011 estimated that the earth has over 600 000 species of fungi, but only 43 000 have been catalogued. The situation in the Nordic forests is no different. Every soil sample taken to describe the fungal diversity reveals new fungi that have not, at least, been sequenced before. This is true even for samples collected to study supposedly well known fungal groups.



### Fast development of new technology

High throughput DNA and RNA sequencing has opened new windows for studying the diversity of fungi in the soil and in living or dead plant tissue. Sequencing techniques have evolved extremely rapidly in the last decade. Currently, it is possible to generate thousands of fungal specific sequences from many samples in a few days. The research groups within NEFOM have been on the front line since this molecular revolution was initiated. NEFOM labs have been instrumental in setting up guidelines for good experimental design and creating bioinformatics pipelines for retrieving and storing data after sequencing.

Equipment for DNA sequencing is now standard in several Nordic labs and, in the last three years, the network members within NEFOM have published over a dozen scientific papers across laboratories, based on sequence data obtained using High Throughput techniques. This cross-lab cooperation has resulted in an impressive number of publications, including papers in prestigious journals such as *Science*.

### About NEFOM

The North European Forest Mycologist network (NEFOM) was founded in 2013 with the aim of strengthening the collaboration between labs working on forest fungi ecology. The collaboration is not new, labs have been cooperating for a long time in joint international projects.

– However, NEFOM gives us a more firm and stable platform to keep the networking going, ensuring that the young scientists get a chance to present their results and for organising and populating PhD courses. Actually, our annual network meeting has the particular aim of bringing PhD students and post docs within the network's labs into the spotlight, says Rasmus Kjøller, coordinator of the network.

Several ongoing research collaborations exist within the NEFOM network. One example is ForHot ([www.forhot.is](http://www.forhot.is)), in which Lund University and Icelandic Forest Research collaborate on the effects of increased soil temperature on fungal growth. In the Danish ASHBAG project, researchers at Copenhagen and Lund Universities look at potential risks associated with returning wood ash to forests.

The network builds and shares knowledge about the diversity, functional roles, ecological niches and

applied aspects of fungi in forests. Besides research cross-talk and joint project proposals, cutting-edge PhD courses and exchange programmes are arranged to encourage young scientists to cooperate.

Examples of courses where NEFOM has been involved are: *Bioinformatic treatment of microbial sequencing data* in 2013, *Forest biodiversity and ecosystems in Finland and Russia – ecology and taxonomy of lignicolous basidiomycete fungi* in 2014 and *How to prepare a sample for HTS of fungal communities* in 2014. Several NEFOM co-sponsored PhD courses are also planned for 2015, see the networks webpage.

In 2015, NEFOM will continue to explore the possibilities within the rapidly evolving field of molecular and sequencing methods, including bioinformatics. The annual meetings, held in Uppsala in 2013 and Riga in 2014, have attracted some 40-50 participants each time. The 2015 network scientific meeting is planned for September in Finse, Norway.

Read more: NEFOM homepage: [www.nefom.dk](http://www.nefom.dk)

Contact: Dr Rasmus Kjøller, Copenhagen University, [rasmusk@bio.ku.dk](mailto:rasmusk@bio.ku.dk)

Partners: Labs are represented from Denmark, Norway (including UNIS at Svalbard), Sweden, Finland, Iceland, Estonia, Latvia and Scotland.

Ectomycorrhiza on root tips. Photo Rasmus Kjøller



## New and continuing networks

**Networking among researchers is the core idea of SNS and EFINORD. For 2015, nine networks were granted financial support, each receiving 5000 to 22500 € to cover meeting and travel costs. The conferences, workshops and PhD courses arranged by the networks are ideal platforms to strengthen ongoing research collaborations and to introduce PhD students to the Nordic and Baltic research community.**

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### Insight in fungi ecology

*North European Forest Mycologists (NEFOM)* continue their successful collaboration on fungi ecology and taxonomy. See the article above in this News & Views.

Contact: Rasmus Kjølner, Copenhagen University, [rasmusk@bio.ku.dk](mailto:rasmusk@bio.ku.dk).

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### Bioenergy extraction

The new network *Developing forest Energy Governance in Northern Europe* will arrange a workshop on the same theme in Joensuu, Finland in June 2015.

Contact: Javier Arevalo, University of Eastern Finland, [javier.arevalo@uef.fi](mailto:javier.arevalo@uef.fi)

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### Yield of mixed forests

The *Nordic Growth and Yield network* will arrange a conference in Malmö in June 2015 in order to assemble growth and yield researchers in the Nordic and Baltic countries. The main focus on the conference will be on production, physiology and silviculture of mixed forests.

Contact: Urban Nilsson, Swedish University of Agricultural Sciences, [urban.nilsson@slu.se](mailto:urban.nilsson@slu.se)

### Guidelines for reforestation material

The *Nordic network of forest regeneration* was founded in 2001 and arranges activities about every second year. In 2015, a workshop will be arranged with the tentative title “Smart use of reproductive material for forest regeneration.” The workshop will, inter alia, revise guidelines for best practices with respect to the use of reproductive materials.

Contact: Marek Metslaid, Estonian University of Agricultural Sciences, [marek.metslaid@emu.ee](mailto:marek.metslaid@emu.ee)

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### Old-growth forests and climate change

The *Nordic working group on the history of primeval boreal forests (PRIFOR)* will arrange a joint workshop with the Fordis network in Poland, and also take part in a symposium in Montpellier, France.

Contact: Bengt Gunnar Jonsson, Mid Sweden University, [bengt-gunnar.jonsson@miun.se](mailto:bengt-gunnar.jonsson@miun.se)

The network is presented in *News & Views No 6, 2012*.

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### More wood in house-building

The long-term network *Wood Science and Engineering (WSE)* will arrange a workshop in Poland on the theme “Knowledge that will facilitate increased use of wood in buildings in the North European urban areas”.

Contact: Erik Larnøy, Norwegian Forest and Landscape Institute, [lae@skogoglandskap.no](mailto:lae@skogoglandskap.no).

Read more about the network in *News & Views No. 2 2012*.

### Methods in national forest inventories

The *Nordic-Baltic Co-operation group for forest inventory* will arrange a conference in August 2015 in Finland under the theme “Possibilities to merge national forest inventories and management planning”.

Contact: Kari Korhonen, Finnish Forest Research Institute, [kari.t.korhonen@metla.fi](mailto:kari.t.korhonen@metla.fi)

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### Dead wood dynamics

The network *Ecosystem Services from dead wood in North European forests* will arrange research meetings and a workshop in Riga in October 2015.

Contact: Jogeir Stokland, Norwegian Forest and Landscape Institute, [jogeir.stokland@skogoglandskap.no](mailto:jogeir.stokland@skogoglandskap.no)

The network is presented in *News & Views No 5 2014*.

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### Theory of forest disturbances

The network *Natural Disturbance Dynamics Analysis for Ecosystem Based Management (FORDISMAN)* will co-arrange a workshop with PRIFOR, as well as a PhD course on theory development of forest disturbances.

Contact: Kalev Jõgiste, Estonian University of Life Sciences, [kalev.jogiste@emu.ee](mailto:kalev.jogiste@emu.ee)

The network is described in *News & Views No 3 2014*.

## Editor shift in SNS's scientific journal

**From 2015 on, authors submitting manuscripts to *Scandinavian Journal of Forest Research* will find someone new evaluating their articles. The new scientific editor, Johanna Witzell, is Professor in Wood Materials Science at University of Eastern Finland, and also Associate professor at the Swedish University of Agricultural Sciences.**

### Tell us a bit more of your research background and interests?

Since my PhD in 1998, I have worked mainly on research topics related to tree health and the effects of environment and forest management on it. My primary research interests are within the fields of tree physiology and biotic interactions, forest ecology and pathology.

### What thrilled you to take the position as editor?

Basically, I like reading and writing. Things that have to do with words, sentences and texts interest me. That is probably the ultimate reason. However, I realised that being an editor is above all a big responsibility and when this opportunity presented itself, I discussed the pros and cons with several colleagues who have experience of editorial work. They all had somewhat different stories, but only one advised me to not take the job. The others talked about the rewarding opportunity to contribute



Photo: Mats Hannerz

to the process of publishing, which is the core of science. They also talked about how the editorial position allows you to watch, from a box seat, how trends in research are taking shape. In the end the pros outweighed the cons.

### Will authors and readers face any changes under your leadership?

The authors and readers can feel safe. At least during the first year, I will focus on doing my best to continue the tradition of the journal as a reliable forum for publishing results of forest research. One concrete change, however, can be expected soon, as I plan to engage a co-editor.

### What are your best advices to authors?

Perhaps two specific pieces of advice: 1. Read the instructions to authors, and 2. Follow them. A third, more

general recommendation could be always to think about the reader, and write accordingly.

### And old editor says good bye

Mats Hannerz has been responsible for editing *Scandinavian Journal of Forest Research* from 2001 to 2014. Over the 14 years, he has received and read more than 1800 submitted manuscripts. Of these, 950 have been approved and finally printed in the journal.

“Being an editor of one of the world’s leading forestry journals is a rewarding, but also responsible and demanding job. Rewarding in the sense that I have made so many acquaintances over the years: authors, referees, students and members of the editorial board. Rewarding also because reading new manuscripts is to see what is going on at the forest science frontier.

The duty also involves the responsibility of safeguarding the quality of the journal, and helping the authors to improve their papers.”

Mats Hannerz will now move on to new duties in his own company Silvinformation, focussing on popular science communication. He will still carry on writing the News and Views section and the News feed from the journal. Both of these are published on the webpage of SNS.

*Read more about the history of the journal in Scandinavian Journal of Forest Research – 25 years supporting forest science. SJFR 25(4), 280-282. 2010.*

## Contact News & Views

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[www.nordicforestresearch.org](http://www.nordicforestresearch.org)

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