

## World's first comprehensive national encyclopedia of plants and animals takes form

**Prepare more space on the bookshelves, at least if you are a collector of identification handbooks. The Encyclopedia of Swedish Flora and Fauna will constitute 100 full size books when the final volume is released.**

The gigantic project will be the first in the world to describe a complete national fauna and flora. Sweden has over 50,000 multicellular species of which at least 30,000 can be identified without too advanced equipment. All species will be described, and for most of them illustrations and distribution maps will be provided.

*Torleif Ingelög was the director of the Swedish Species Information Centre from its foundation in 1984 until spring 2007. His current role is as a conservation councillor at the Centre.*



The project started in 2004, and 2–6 volumes will be published each year over a 20 year period. The first four published volumes covered mosses, butterflies, moths and myriapods.

### **Sweden – and Costa Rica**

Torleif Ingelög was, until recently, the director of the Swedish Species Information Centre (*Artdatabanken*) where the Encyclopedia is being produced.

The Swedish initiative to document the country's flora and fauna comprehensively is unique in the world. The only plan with similar ambitions that comes to Torleif Ingelög's mind is from Costa Rica, a country with a strong tradition of nature conservation.

"But unfortunately, they lack the resources, at least to launch a project such as the Swedish one", he says.

### **Swedish Taxonomy Initiative**

The Encyclopedia is one of the outcomes of the Swedish Taxonomy Initiative, which aims to describe all

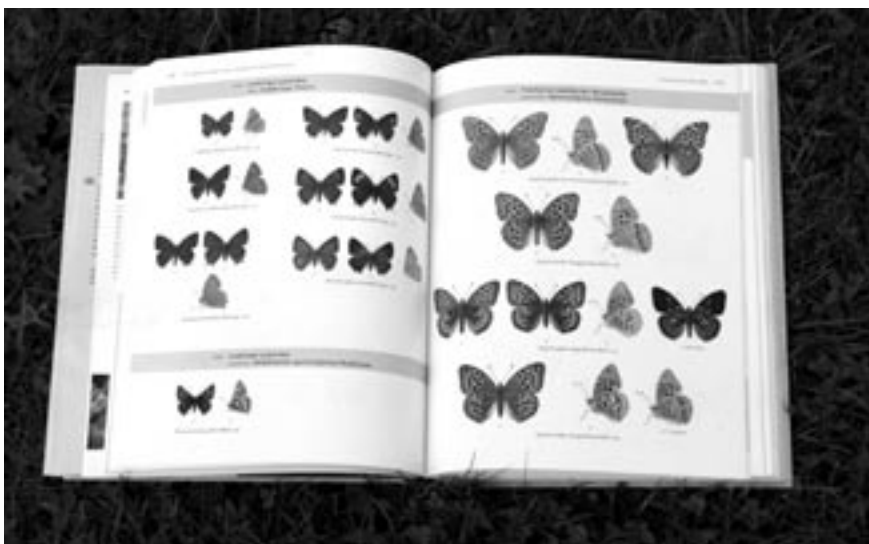
of the multicellular species in Sweden. The project started in 2004 and will continue for another 20 years. The budget of 65 million SEK/year is shared by:

1) **Taxonomic research and inventories.** About 1,000 new species have already been identified in the project, and another 5,000–10,000 are expected to be found (16 million SEK/year).

2) **The Encyclopedia of the Swedish Flora and Fauna** (29 million SEK/year).

3) **Museum collections.** Resources are being given to museums to restore old collections as well as to prepare, store and display new specimens (20 million SEK/year).

The Swedish Taxonomy Initiative is based in the Swedish Species Information Centre (*Artdatabanken*), and has been a separate unit of the Swedish University of Agricultural Sciences since 1990.



### Nordic cooperation

The project started as a Swedish initiative, but there have also been discussions to expand the project to a common Nordic level.

“We welcome Nordic cooperation, and we intend the product to be useful in countries other than Sweden, since we included all Nordic species in the first issues”, says Torleif Ingelög.

However, some upcoming volumes will be restricted to Swedish species.

“Unfortunately, we have neither the resources nor the full competence to cover the marine flora and fauna, so it has not been possible to include North Atlantic marine life in the books. We would be greatly helped by cooperating with experts in Norway and Iceland in this field”, says Torleif Ingelög.

Nordic representatives were invited to discuss a joint project before the Swedish species project started, and the subject was on the agenda of a previous meeting of Nordic environmental ministers.

“The ministers decided to investigate the fundamentals for a joint Nordic species project, but nothing has come out of it as yet”, says Torleif Ingelög.

Norway has a parallel organisation to the Swedish Species Information Centre, “*Artsdatabanken*” (the Norwegian Biodiversity Information Centre), which has also had contacts with its Swedish counterpart regarding possible cooperation. Finnish authorities are also open to cooperation.

### EU-discussions

The leaders of the Swedish project have also been approached by parties in the United Kingdom and the Netherlands, who have shown interest in initiating similar nation-wide species projects.

There have also been discussions about a species project at the EU-level.

Read more: [www.artdata.slu.se](http://www.artdata.slu.se); [www.nationalnyckeln.se](http://www.nationalnyckeln.se)

## A project in the footsteps of Linnaeus

The Swedish Taxonomy Initiative is the result of a long tradition of inventories and taxonomic work in Sweden, by both amateurs and professionals. A tradition which can be dated back to the days of Carolus Linnaeus (1707–1778), who expressed his contribution (without undue modesty) by stating that, “*God created, Linnaeus organized*”. Today, the sentence could be continued: “...and the Swedish Species Information Centre compiled and published”.

Torleif Ingelög, the founder of the Centre, does not want any such claim to be ascribed to him, but he agrees that the Swedish Taxonomy Initiative is a gigantic, unique undertaking, and that the tradition begun by Linnaeus has played an important role in fostering and maintaining taxonomic competence and knowledge in Sweden.

### Depending on devoted amateurs

“Sweden has thousands of devoted amateur biologists. Without their combined efforts it would have been impossible to accomplish such a huge project. The cost of inventories would have been astronomical”, he says.

Amateur botanists, birdwatchers and entomologists have compiled the inventories and collected specimens over a long time. The information is often put together in regional floras or bird descriptions, work that is also performed on a non-profit basis.

### Declining public knowledge

However, knowledge about species has declined among the public in recent decades, according to Torleif Ingelög. The current young generation learns much less than previous generations about species, partly because newly qualified teachers don't have the competence to teach it.

“An important way to counteract the declining competence is to provide useful identification guides. This is where the Encyclopedia of the



Carolus Linnaeus the inspirer...

Swedish Flora and Fauna will make a significant contribution”, says Torleif Ingelög.

### The Species Gateway

Another way is to stimulate amateurs to report their observations on the web. The Species Gateway on the internet has become a true success story. For some years birdwatchers have been able to report their observations of bird species systematically in a format that is immediately accessible to the public.

Torleif Ingelög believes that the Species Gateway, together with systems for alerting others to the presence of unusual bird species via cellphones, has greatly stimulated interest in birdwatching in the country.

“The Species Gateway has now added sections on plants, invertebrates, mammals and fishes to its portal. Since we launched the invertebrate pages, we have seen increased interest in the study of butterflies. Many birdwatchers are refocusing their binoculars closer to the ground and studying butterflies instead”, says Torleif Ingelög.

In May 2007, the 10 millionth observation was uploaded to the Species Gateway. It was of a beetle called *Plateumaris sericea*.

Last year, over 250,000 computers logged in to the gateway, either to upload observations or to download information.

# Nordic database stores fungal genetic codes

**There are 1,100 known species of ectomycorrhizal fungi in the Nordic regions, and genetic sequences of 1,047 of these fungi can currently be found in the joint-Nordic database UNITE. This SNS-sponsored project has been internationally recognized.**

The mycorrhizal associations between fungi and plants are highly important features of the Nordic forests. About 95% of the fine-roots of forest trees are colonized by ectomycorrhizal fungi, which help the plants to take up nutrients and water, receiving photoassimilates in return. Many mycorrhizal fungi also help to protect the plants against root pathogens and/or heavy metal toxicity.

## Genetic sequencing

The fruit bodies of the mushrooms we collect for food can usually be identified, but most of the fungal biomass occurs as mycelia beneath the ground. Therefore, other tools for identifying species are required. Genetic sequencing is such a tool, which makes it possible to identify

species and even individual strains.

UNITE is a database of genetic information about the Nordic and Baltic ectomycorrhizal fungi. The acronym UNITE stands for User-friendly Nordic ITS Ectomycorrhiza Database.

It can be used by those who need to identify species solely from samples of mycelia or root tips.

UNITE includes tools that can be used directly via the internet. A researcher who has sequencing equipment can paste an rDNA sequence of a fungal sample, compare it with sequences in the database, and thus identify the species.

The sequences are derived from authoritatively-identified specimens from herbarium fruit bodies or controlled collections in the field.

## Global contribution

The database is a Nordic-Baltic initiative, but taxonomists, ecologists and bioinformaticians from Norway, Sweden, Finland, Denmark, Estonia, Scotland and the USA are also involved.

SNS is contributing by supporting an integrated project of the NordForsk network, entitled "Identification and Ecology of Ectomycorrhizal fungi".

The database is being run by the University of Tartu in Estonia, and Gothenburg University was the main collaborator during its establishment.

## Successful database initiative

UNITE has been internationally recognized. It is included in the ISI Web of Knowledge, and it was cited as an example of a "successful database initiative" by the chief editor of the journal *Mycorrhizal research*.

## About the project:

The SNS project "Identification of ectomycorrhizal fungi in Nordic forests", which was awarded an SNS grant of 1.2 million NOK started in 2004 and ended in March 2007. The project leader was Trude Vrålstad, University of Oslo (trudev@ulrik.uio.no)

## More information:

<http://www2.dpes.gu.se/project/unite>

(Project webpage),

<http://unite.ut.ee> (the database).

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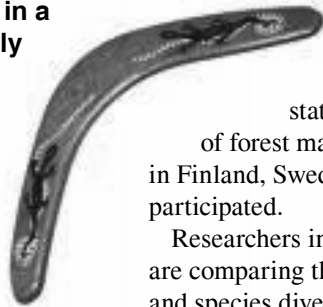
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*The ITS DNA sequence isolated from a fresh fruitbody of Boletus edulis (cep), collected in Uppsala in Sweden. This code, and codes from 1,046 other species, can be found at [www.unite.ut.ee](http://www.unite.ut.ee).*

## “Boomerang hypothesis” discussed at SNS-sponsored meeting

It may not be sufficient to take conservation measures in a single country, especially if the measures contribute to loss of biodiversity in another country. This so called “boomerang effect” was discussed at a SNS-sponsored seminar held recently.



### Finnish–Russian border

This is the situation in Finland’s eastern forests, which are heavily influenced by species migrations and gene flow to and from the bordering Russian forests.

Finland is the main importer of wood from northwestern Russia. Timber imports could, to some extent, substitute wood set aside for conservation purposes in Finland.

However, if Russian oldgrowth forests are more intensively logged and fragmented, they will become a poorer source of biodiversity for Finland.

This is an example of the “boomerang effect”, which is the main issue being assessed in the international project “Testing the boomerang hypothesis”.

The concept was discussed in May this year at an SNS-sponsored

meeting in Lammi, one of the University of Helsinki’s field stations. Representatives of forest management research in Finland, Sweden and Russia participated.

Researchers involved in the project are comparing the forest structure and species diversity in the forests on the western and eastern sides of the Finland–Russia border. They are also analysing changes over time, and trying to forecast future changes in order to optimize conservation efforts.

The aims of the project are:

- to identify the optimal areas to protect and to harvest;
- to assess whether changing harvesting intensity in one country affects the intensity of harvesting in the other (and if so whether compensatory adjustments should be made); and the corresponding effects of changes in regions within a country on other regions within the same country.

*More information:*  
[www.helsinki.fi/biosci/environment/boomerang\\_lammi.htm](http://www.helsinki.fi/biosci/environment/boomerang_lammi.htm)  
[Pekka.kauppi@helsinki.fi](mailto:Pekka.kauppi@helsinki.fi)

## Swedish and Danish forest owners organisations seek closer cooperation

The Danish Forest Association (*Dansk Skovforening*) is entering into formal cooperation with the Swedish organization Södra, which represents over 50,000 private forest owners in southern Sweden. Södra also runs companies producing paper pulp, diverse timber products and biofuels.

The Danish Forest Association is the forestry trade association in Denmark. Most of its members are forest owners.

The two organisations have announced that they will address practical and legal issues regarding membership that need to be resolved during the remainder of 2007.

Södra sees advantages in expanding its members’ sources of wood supplies, while the Danish association will benefit from having access to a more secure market for its softwood products through the Södra industries.

The long Danish tradition of competence in growing and handling broadleaves should also be beneficial for Södra’s companies, who want to strengthen their profile in hardwoods, according to a recent press release.

*Read more:*  
[www.sodra.com](http://www.sodra.com);  
[www.danskskovforening.dk](http://www.danskskovforening.dk)

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

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