

Station Linné

Öland, an island off the eastern coast of Southern Sweden, is visited by 3 million visitors every year. Many of them travel to Öland to enjoy the special nature on the island. The unique combination of limestone, geographical location and cultural heritage provide excellent circumstances for rich plant and animal life. For example, 75 % of the number of insect species of Sweden exist on Öland.

Öland is also an island with strong agricultural traditions. The southern part – an old agricultural landscape with coastal meadows, old village structures and a large area of limestone pasture (Stora Alvaret) – is a UNESCO World Heritage Site. Despite the high value of Ölands nature and the presence of a UNESCO world heritage, there is no facility yet on the island that offer visitors enrichment of their nature experiences.

Linneaus – Linné

The natural features on Öland attract scientists and nature lovers from all over the world. One of the first scientists who visited Öland, almost 300 years ago, was Carolus Linneaus, in Sweden better known as Carl von Linné. This world famous scientist is the founder of the namegiving system of plants and animals: Systema Naturae. His travels on the island have been documented and still inspire people to discover and enjoy the nature of the island.

Our goal

We want to establish a new Öland centre, Station Linné, which will act as a visitor centre, meeting place and market place for everybody who is interested in nature, culture and environment. The station will focus on popular science and research, culture, tourism and environment, with a special interest in the nature and culture on Öland. We also want to provide a marked place for local and green produce as well as demonstrate green technologies and solutions.

Station Linné is located at the same site where the Uppsala University Ecological Research Station was situated. The research centre is beautifully situated on the outskirts of the Alvar with views over the sea to the city of Kalmar and is easy reachable for visitors. The research centre attracts over one hundred researchers per year. Furthermore, a special unit at the station, Porten till Alvaret, organises guided walks and nature activities for the public, which attracts over 4000 paying visitors per year. These successful activities manage to sustain even though the buildings are old and in need of rebuilding.

The new buildings of Station Linné will contain facilities for research, education and conferences. The station will also provide visitor facilities in the form of accommodation, restaurant and exposition areas. The station will be built with advanced environmental technique and with the aim to be impact free and self sufficient. A permanent exposition will show the latest technol-



Station Linné,
Ölands Skogsby

ogy and solutions. The activities, exhibition, education, popular science and research will attract 50,000 visitors per year. This, we believe, is a realistic assessment.

How shall we achieve that?

The station will be driven by an independent foundation, Station Linné, which aims to execute research, education and youth activities in the area of Ölands nature and cultural heritage. In March 2008 the foundation Station Linné was founded by the association Station Linné. The association has a further task to collect funds and means for the foundations activities. The association has several working groups who focus on fundraising, exposition and leadership.

The year 2008 promises to be eventful: the foundation will buy property and in the summer of 2008 several parts of the ecological centre will be driven by the foundation. Starting 2009 the foundation will run the centre completely independently. Station Linné is beginning to take shape, but achieving our goal will take a lot of volunteer work. There are already many involved, but we welcome anyone who wants to contribute!

A knowledge and information center of nature and culture values



**School visiting
Porten till Alvaret**

To catch the interest of children and grown ups Station Linné organise unique and learnfull nature tours with scientists between May and late August. Kids do not want to miss our nature experience programme – within the frame Porten till Alvaret – which we organise throughout the summer.

The Ecological Research station hosts several projects ranging from landscape studies to charting insects! Some of our scientists study orchids and invite you to come along on an exciting walk through the fields of orchids. At night-time some of our researchers study bats. Sweden hosts up to 18 different species of bats – how many will you find on your excursion?

Examples of activities:

Flowers & Bees excursion

Orchid tour

Our beautiful butterflies

Alvar tour

Botanical tour

Night myst

Creepy creatures, facts and myths about natures most scary animals

Nature detectives for kids

Station Linné – Research

In 1963 a Research Station was established in Ölands Skogsby under the guidance of Uppsala University. The aim was to find out possible links between insects and flowers within the pollination process.

After a few years intensive research the role of pheromones sent out by the flowers to attract pollinating insects was stated. In focus was the Fly Orchid (*Ophrys insectifera*) with flowers imitating insects and with a smell just like the female of the specific pollinating insect.

Except for the new knowledge of odours being important for pollination the various aspects of insect behaviour were studied. Stepwise more and more projects were included in the research at the Research Station.

Landscape aspects became a new field parallel to, and integrated with, the entomological branch – e.g. wetlands, coastal meadows, limestone pastures and various deciduous woodlands.

The role of man in the landscape is another important part for understanding the changes in the landscape over time – not least concerning the large limestone pasture, the so-called “Stora Alvaret” – and the changes in land-use in the Midland forest.

Now after 45 years of research about a hundred scientists from all over the world use the Research Station during a year. Parallel to that a public branch has developed – “Porten till Alvaret” (The Gate to the Alvar) sharing scientific results etc. via excursions and “Open Lab.”

During these years a large scientific network has been built up and a high number of dissertations and other scientific publications have links to the Ecological Research Station.

From now this work will continue within the frame of the recently established Foundation Station Linné – with ability for Swedish and International Universities to continue cooperation.

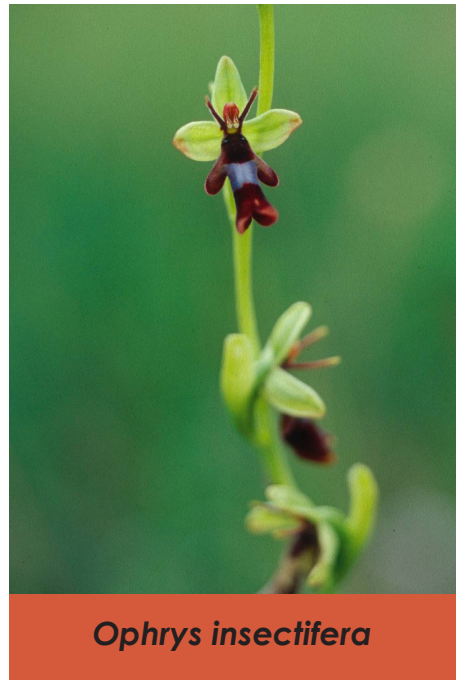
Research for the moment deals with:

- Evolutionary aspects related to the Bird’s-eye Primrose (*Primula farinosa*) and the orchids Lesser Butterfly-orchid (*Platanthera bifolia*) and Greater Butterfly-orchid (*P. chloantha*).
- Conservation and monitoring of the endangered violet (*Viola elatior*), and long term studies and population dynamics of the Hoary Rock-rose (*Helianthemum oelandicum*).
- Present and historical management of the Jordtorp rural area and the Stora Alvaret limestone pastures.

A considerable part of entomological classification research is done within the so-called

- Malaise-trap project.
- Geese influence on coastal meadows; snail communities in karstic areas are other branches.

A few examples of these projects are presented below.



Swedish Malaise trap project



Aglais urticae

The Swedish Malaise Trap Project (SMTP) is a nationwide inventory project, focusing in particular on poorly known insect groups, such as small hymenopterans and dipterans. More than 70 Malaise traps have been deployed at selected localities across the country during a three-year period (2003-2006). The traps have been emptied year round, mostly by volunteers (more than 100 people have been involved in the project so far). In total, the catch represents 189 trap years and contains an estimated 40 million insect specimens. After sorting to orders, superfamily, family or subfamily level (depending on group), the clean sorted insects are made available for taxonomic studies. About 20 % of the total material has now been sorted in this way and taxonomic specialists throughout the world are working with parts of this material. To date, this effort has resulted in more than 1,000 new species records for Sweden; about half of these species are new to science. The goal of the project is to identify all of the collected specimens.

An example of the results of the Bird's-eye Primrose (*Primula farinosa*) Project

In this thesis, I combined comparative and experimental approaches to examine selection on reproductive traits and population differentiation in the insect-pollinated, self-incompatible, perennial herb *Primula farinosa*. More specifically, I (1) determined whether the effects of floral display and interactions with pollinators and seed predators, and plant reproductive success were frequency-dependent and affected by surrounding vegetation context, (2) examined the consequences of intermittent drought years on population dynamics using numerical simulations based on demographic data collected over seven years, (3) analyzed among-population differentiation in flowering phenology and reproductive allocation, and its relationship to soil-depth at the site of origin.

A field experiment suggested that conspicuous plants facilitate inconspicuous plants in terms of pollinator attraction, and that the facilitation effect is contingent on the height of the surrounding vegetation. Further experiments revealed that both mutualistic and antagonistic interactions can result in frequency-dependent selection on floral display. Among inconspicuous plants, both fruit initiation, and damage from seed predators increased with the proportion of the conspicuous morph. The relative strength of these effects, and therefore their net outcome on the relationship between morph ratio and seed production varied among years.

I combined information on vital rates and their relation to environmental conditions in simulations to predict future population viability in changing environments. Simulated stochastic population growth rate decreased with increasing frequency of drought years.

Reproductive allocation varied significantly among populations both in the field and in a common-garden experiment, but was correlated with soil depth at the site of origin only in the field. The results suggest that among-population variation in reproductive effort in the field mainly reflects plastic responses to environmental conditions, and that this plasticity may be adaptive. The common-garden experiment suggested that the study populations have diverged genetically in flowering time.

Toräng, Per (2007). Pollinators, Enemies, Drought, and the Evolution of Reproductive Traits in *Primula farinosa*. I: Uppsala Disserterations from the Faculty of Science and Technology, ISSN 1651-6214 ; 341.

Alvar vegetation of Öland – changes, monitoring and restoration

Alvars are habitats characterised by thin soils on limestone bedrock. The largest alvar area in the world is the Stora Alvaret, Öland (25,500 hectares), which is characterised by the presence of several plant communities of high conservation value. Emigration at the end of the nineteenth century reduced land-use intensity resulting in scrub encroachment, mainly by *Juniperus communis* L. This later accelerated, leading to abandonment because grazing in the low-productivity pastures was uneconomic.

Monitoring in permanent plots over a twenty-year period (1971–91) showed an increase in juniper cover over time and a clear correlation with a decline of other vascular plant species. This resulted in a gradual loss of both a valuable mosaic structure and a high level of bio-diversity in the landscape.

An EU funded LIFE project (1996–99), which examined the effects of grazing and scrub clearance, is outlined. Various management techniques were tested and evaluated, providing valuable information for the present large-scale restoration

and management programme supported by the European Union agri-environment schemes. In 1994 less than 60% of the Stora Alvaret was grazed. By 2005 this had increased to 98%.

The reintroduction of grazing has resulted in a significant increase in the abundance of twelve out of 72 vascular species in permanent plots (1997–2001). Sheep and cattle numbers increased in Öland during the last decade, whereas they decreased in Sweden as a whole over the same period. Sixteen nature reserves have been established in Stora Alvaret, and a functioning alvar pasture landscape has been re-established. Almost all alvars in Öland have been designated as Natura 2000 areas.



Restoration

Rosén, E. Biology and Environment: Proceedings of the Royal Irish Academy. Vol. 106B, No. 2, 387-399 (2006).