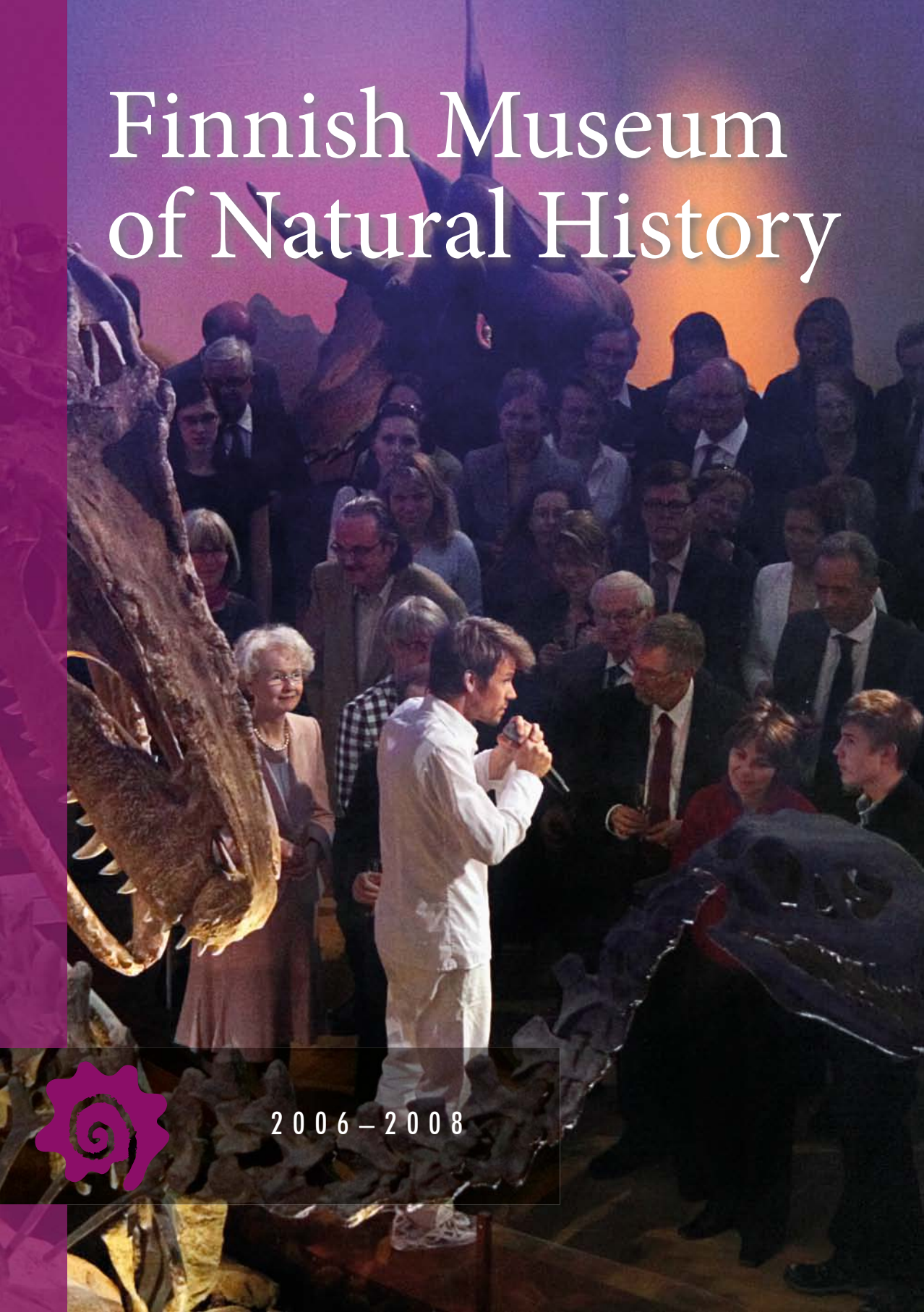
Finnish Museum of Natural History



2006–2008

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FOREWORD

The Finnish Museum of Natural History has renewed its strategy over the past eighteen months. Maintaining and accumulating national collections, together with research related to the collections, remains the top priority. What is new is that the museum is geared towards environmental administration more clearly than before, especially on issues related to monitoring the state of Finnish nature. Museum staff have accumulated a great deal of expertise in this field. The new composition of the museum board reflects the organisation as well as cooperation with other natural history museums in Finland: The Ministry of the Environment, the Finnish Environment Institute and Finland's other natural history museums are represented among the members of the board.

The new Universities Act, planned to enter into effect at the beginning of 2010, regulates the position of the Finnish Museum of Natural History as an organisation which maintains and accumulates our national collections of natural history and presents them to the public. This is a welcome regulation, as it strengthens the status of the museum considerably.

The museum has made a great success of the exhibitions redesigned after the renovation of the museum premises. Nearly 200,000 people visited the exhibitions during the first seven months after the renovation, which even by modest estimates is more than three times the number of visitors before the renovation.

Juhani Lokki

THE FINNISH MUSEUM OF NATURAL HISTORY IN 2006-2008

The Finnish Museum of Natural History is an independent research institute functioning under the University of Helsinki. It is also one of the three central national museums in Finland and responsible for the national collections in its field.

The collections, which include botanical, zoological, geological and paleontological specimens from all over the world, serve research in the fields of biology and geology as well as educational purposes.

The museum is divided into five sections. The general department provides services for all of them. In addition, the museum has a joint molecular ecology and systematics laboratory with the Department of Biological and Environmental Sciences. The museum employs personnel of about 130. The Finnish Museum of Natural History also has three public exhibitions in Helsinki: Natural History Museum, Botanic Garden at Kaisaniemi and Geological museum's Mineral cabinet at Helsinki University Museum. Botanic Garden at Kumpula will be opened at summer 2009.

Laura Hiisivuori

Vili Koskinen constructed a nautiloid orthocera replica of almost 9 meters long for the History of Life exhibition.

Responsibilities

1. to study fauna, flora, geology and paleontology, conduct research in the fields of systematics and taxonomy and teach all of the above-mentioned sciences
2. to perform datings, conduct research and teach in the field of age determinations using physical methods
3. to enlarge and maintain the present collections
4. to maintain domestic and international living botanical collections needed for educational, research and seed exchange purposes
5. to produce natural history exhibitions
6. to prepare inventories of Finnish nature and conduct long-term research
7. to make the collections available for zoological, geological and botanical research and teaching
8. to inform, instruct and publish in the field of natural history
9. to participate in international research projects in the field of natural history
10. to act as the scientific authority in Finland concerning the CITES treaty
11. to coordinate the research, scientific collecting, data gathering activities and environmental studies in natural history museums and botanical gardens in Finland
12. to prepare exhibitions for nation-wide use
13. organize training for natural history taxidermists

Maria-Leena Hiisivuori

To mark "100 days to to the opening" -countdown, the staff of Natural History Museum took the bison out for a walk in the centre of Helsinki.

Finnish Museum of Natural History opened to the public

In 2008, 186,000 people visited the Finnish Museum of Natural History, which hosted more than 800 guided tours. The museum building was closed in August 2005 and reopened to the public on 25 May 2008. Since then, visitors have been flocking to the museum.

Laura Hiistvuori

Taxidermist Roni Andersson is hanging black-headed gulls up to flight positions in the Urban Nature -section of the Nature of Finland exhibition.

The renovated museum boasts about 2,300 square metres of space for exhibitions, of which 350 square meters are still under construction.

In addition to the exhibitions, researchers at the Zoological Museum have returned to the renovated premises, and new, suitable underground premises were built to house the national natural history collections.

Renovation of the museum building, built in 1913, began in autumn 2005 when the Department of Ecology and Systematics moved to the Viikki campus, revealing the museum's poor state.

The neo-baroque style of the building was restored to its original state, when it was still a Russian boys' school. The designs were often based on photographs dating from the early 20th century. As much as possible, the original layout of the rooms was preserved.

The exhibitions went through a transition along with the renovation of the building. Previously, the floors were divided into mammal, bird and fish rooms. The new exhibitions leave this traditional division behind. Rather, flora and minerals share exhibition space together with animals.

At the time of the opening, the museum offered four larger exhibitions: Finnish Nature, which, as its name suggests, presents Finnish nature from the Gulf of Finland to the great fells of Lapland. The exhibits were built into entities, or dioramas, where animals, plants and minerals are displayed against high-quality paintings by artist Seppo Polameri.

Another large and completely redesigned exhibition is the History of Life, built in a 12-metre-high hall. It illustrates the development of life and evolution from the Big Bang to the latest ice age. The subject is exam-

The Nature of Finland exhibition includes a life reconstruction of a brown bear, here looking straight to camera.

Laura Hiisivuori

Laura Hiisivuori

From left: Mr. Fabio Frachtenberg (Grupo Cultural), head of Exhibition Department Kirsi Hutri, Mr. Oscar Frachtenberg (Grupo Cultural), Educational curator Satu Jovero, Dr. Jorge O. Calvo (professor from Univ. Nac. del Comahue, Argentina) and Exhibition curator Ville Heimala pose in front of *Giganotosaurus carolinii* -reconstruction that has been just assembled.

ined globally, but with emphasis on Finland. The animations of the exhibition have been produced in cooperation with the Evtek University of Applied Sciences and Channel Four Finland News.

The museum's large bone collection is located on the ground floor. Temporary exhibitions are opened with an exhibition about the history of the museum, which includes photographs and other material related to the almost 100 years of the building's existence. The permanent exhibitions of the museum are not yet ready, however. An exhibition on the nature of the world, for which preparations have already begun as of autumn 2008, will open in spring 2010.

In 2009, the museum's exhibition functions face great challenges: continuing to build the exhibition on world nature, to produce at least one temporary exhibition and to participate in the grand opening of the Botanical Garden of Kumpula in summer 2009.

BOTANIC GARDEN

The summer of 2006 was among the driest ever recorded in Helsinki. Continuous irrigation kept the systematic beds in shape despite the drought.

The Botanic Garden was founded in Turku in 1678 and moved to Helsinki in 1829. It was administratively transferred from the Faculty of Science to the Finnish Museum of Natural History in the beginning of 2004. It has been instituted to:

- maintain a scientific collection of living plants and participate in international seed exchange to support research and teaching
- engage in botanical research and instruction
- provide advice, education and information on plants to the public
- coordinate the activities of botanic gardens in Finland

It also participates in international cooperation in plant conservation.

Marko Pesu

Developing collections, exchanging plants

The Garden's old collections are in the city centre (5 ha and 11 glasshouse sections). A new outdoor collection of 6 ha in the district of Kumpula has been under construction since 1987. It has hitherto been used mainly by researchers, teachers, and students, but in 2005 preparations for the opening of the new garden for the general public in 2009 was started. Substantial refurbishment of plantations was the main focus of the work in 2006-07. More than 1 500 m3 of soil and mulch was used in the geographical sections in 2007. Thousands of perennials were dug up and replanted after improvement of their beds.

The Garden has established seed exchange relationships with 469 sister institutions in 72 countries. In the *Delectus Seminun – List of seeds and spores available in 2007*, 256 accessions of mainly wild-collected native Finnish plants were offered for exchange; 784 seed lots were sent to partners.

Research: focus on Amazonia

Currently the main area of research is Amazonian phytogeography and systematics. Cooperation is done, i.a., with the Dutch Annonaceae research group and the Amazon Research Team of the University of Turku, Finland.

Mikko Paartola

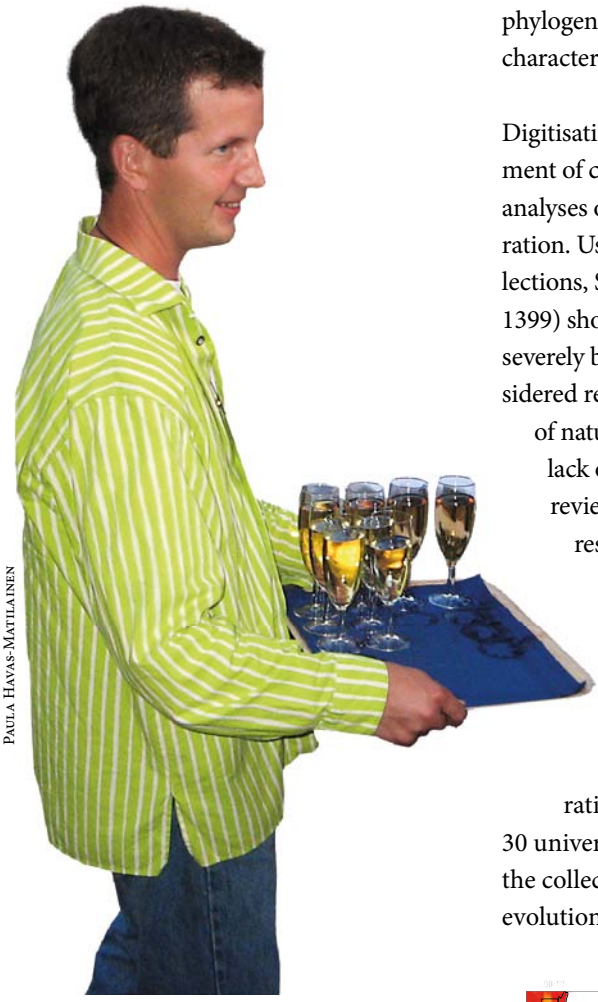
Plantations in the new Kumpula Botanic Garden require toil, tears, and sweat before they are ready for the inauguration festivities due in June 2009.

Table 1: The collections of the Botanic Garden in the end of 2007. In 2007, 771 new accessions were registered and 817 were removed as dead or unnecessary for the collections. The net gain in 2007 was -46, while it was +148 in 2006.

	accessions	species (appr.)
open-air collections	4 397	2 700
glasshouses	970	900
only in nursery	1 783	700
TOTAL	7 150	4 300

A long-term study on the anatomical structure of barks in Neotropical Annonaceae was completed (Junikka, L. & Koek-Noorman, J., 2007, *Ann. Bot. Fennici* 44:79-132). It showed that certain bark characters lend support to recent phylogenetic hypotheses based on other morphological characters and on DNA.

Digitisation of herbarium collections, and the development of cartographic tools (GIS), has enabled effective analyses of the geographical coverage of botanical exploration. Using a dataset of over one million digitised collections, Schulman and colleagues (*J. Biogeogr.* 34:1388-1399) showed that plant collecting in Amazonia is still severely biased spatially; only 2% of the area can be considered relatively well collected (map). The delimitation of nature reserves lies on weak foundations due to this lack of basic biological knowledge. A critical literature review showed that, consequently, the Amazonian reserve network samples the region's biodiversity in a near-arbitrary manner (Schulman et al., 2007, *Biod. Cons.* 16:3011-3051).

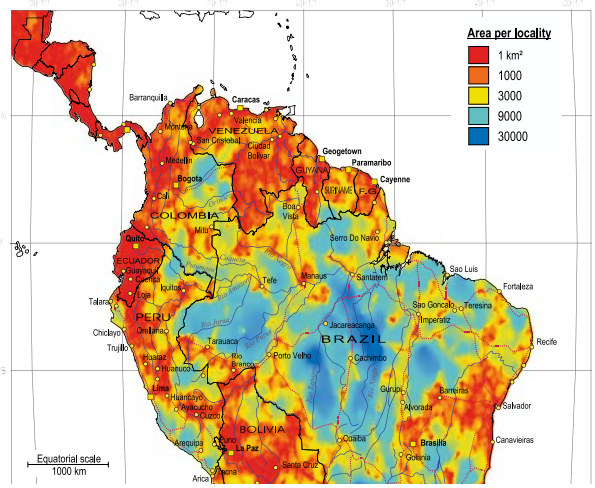


Paula Havas-Matilainen

After a hard day's work the botanic garden representatives from all over Finland gathered for an evening banquet during the 20th cooperation meeting hosted by Helsinki in 2007.

Education and information

The living plants of the Garden are inspirational material for teaching. In 2006-07, some 30 university-level courses (nearly 300 students) utilised the collections for studies in topics ranging from plant evolution to landscape architecture. In addition, school



Variation in botanical collecting activity in the Neotropics (reproduced from Schulman et al., 2007, J. Biogeogr. 34:1388-1399). In the least explored areas plants have been collected only at one point in the centre of a polygon larger than 10 000 km2.

classes visit the Garden regularly to provide pupils with experiential learning.

The number of visitors in the glasshouses has steadily increased; in 2007 it was 77 900, which is 4% higher than in the previous year and 56% higher than five years ago. The Garden ranks among the ten most popular science attractions in Finland.

Selected topical issues are interpreted to the public in special exhibits. The Christmas exhibition of 2006-07, Red Alert!, dealt with threatened plants and means to conserve them. In 2007, the 25-year research work of Finnish tropical scientists was presented under the title Amazonia through Finnish Eyes.

The need for plant-related information within the society is constantly high. In 2007 the Garden replied to more than 1 000 botanical enquiries, and acted 63 times as consulted specialist towards the media, public authorities, or actors from the private sector.

Networking home and abroad

The 20th cooperation meeting of Finnish botanic gardens was hosted by Helsinki in 2007. One of the outcomes was the launch of a portal for Finnish scientific gardens (www.botanicgardens.fi). In 2006, the Garden was accepted as party to the European Native Seed Conservation Network ENSCONET (www.ensconet.eu).

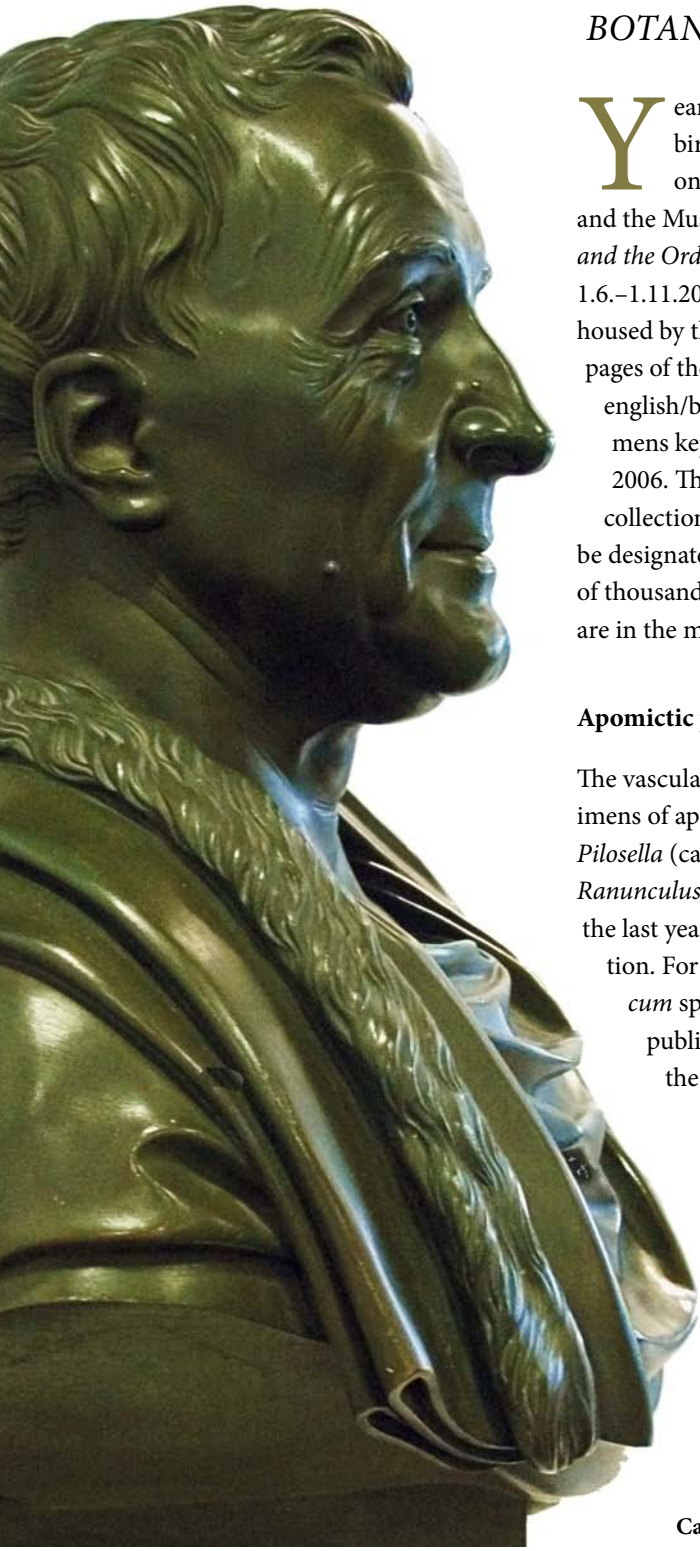
The Director of the Garden is the Finnish representative in the European Consortium of Botanic Gardens. It convenes twice a year to develop guidelines in scientific, technical, and policy matters common to all scientific gardens of the continent. One of the forms of its activities is the EuroGard congress organised every third year. In 2006 the Consortium granted Helsinki EuroGard V to be held June 8-12 2009 (www.luomus.fi/eurogardv/).

Reijo Pekanpalo

The annual Mayday event organized by biology students at the University of Helsinki is a popular family attraction. In 2006 visitors of all ages learnt about the eutrophication of the Baltic Sea.

Paula Havas-Matilainen

In 2006, biology students of the University of Helsinki organized in Kumpula Botanic Garden a special climate change information event for high school pupils.



Laura Hiisivuori

BOTANICAL MUSEUM

Year 2007 was the 300 Year Anniversary of the birth of Carolus Linnaeus. To solemnize this, a one-day symposium was arranged on 27.9.2007, and the Museum participated in the exhibition *Linnaeus and the Order of the Nature* at the University Museum 1.6.–1.11.2007. The 80 Linnaean herbarium specimens housed by the Museum were photographed for the www-pages of the museum (www.fmnh.helsinki.fi/english/botany/linne/). Photographing of type specimens kept in the Botanical Museum was set up in 2006. The work was started from the Phanerogam collections, and when commonsensible, the types will be designated. In all the Botanical Museum houses tens of thousands type specimens, especially numerous they are in the moss and lichen collections.

Apomictic plants

The vascular plant collections contain over 200 000 specimens of apomictic plants, e.g., *Hieracium* (ca. 65 000), *Pilosella* (ca. 40 000), *Taraxacum* (ca. 65 000), and the *Ranunculus auricomus* group (ca. 40 000). In course of the last years much effort has been given to this collection. For instance, a considerable number of *Taraxacum* species new to adjacent Russia were traced and published by Alexander Sennikov, new curator at the museum.

Lichen collections and research

The Botanical Museum holds almost 400 000 specimens of lichenized fungi. The collection of Erik Acharius, "Father of Lichenology", and that of William Nylander belong to the most significant lichen collections in the world. In 2007 the Botanical Museum received a unique

Carolus Linnaeus (1707–1778).

Laura Hiisivuori

The Linnaeus symposium was held at the Botanical Museum in Helsinki.

donation from the German lichenologist, Professor Aino Henssen (Marburg). Her private collections include more than 40 000 lichen specimens, especially cyanolichens.

The collections are used in research of lichen taxonomy, phylogeny and biogeography by the Museum staff, associate researchers and foreign lichenologists from throughout the world. In 2006–2007 the herbarium was frequently visited particularly by Russian lichenologists. This was due to several major Russian–Finnish cooperative projects. These include *Lichens and lichenicolous fungi of the Eastern Leningrad Region*, published in 2007 as Norrlinia volume 16.

Basidiomycete taxonomy and ecology

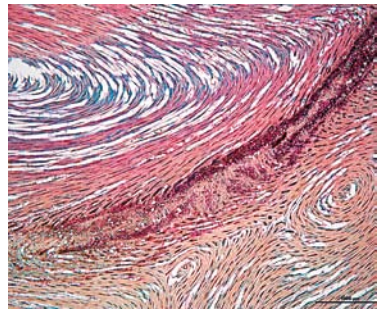
In 2006–2007 most of the published results dealt with wood-inhabiting Basidiomycota. A new genus *Anomoloma* was described on the basis of nuclear rDNA sequence data and other evidence, and molecular phylogenetic studies were continued by Otto Miettinen, especially in the genera *Skeletocutis* and *Postia*. The genus *Antrodiella* was revised, and Chinese Hymenochaetaceae were treated in a monographic study together with Yu-Cheng Dai (Academia Sinica). These studies are linked with nature conservation and old-growth forest ecology. In a multi-year programme Dmitry Schigel inventoried and analysed wood-inhabiting fungi as a substrate for fungivorous beetles, in particular the rare and threatened ones.

Research on liverwort systematics and evolution

Bryophyte research has focused on liverworts: their origin, phylogeny, patterns of diversification, and adaptive innovations. This has been done using morphological, molecular, developmental, and ultrastructural evidence. The research was supported by the Academy of Finland, first to Sinikka Piippo, and in 2007–2010 to Xiaolan He-Nygrén. Doctoral theses were completed by Inkeri Ahonen on Porellales in 2005 and by Aino Juslén on Herbertaceae in 2006. The

Pertti Rantiala

Curly wood of aspen, *Populus tremula*. Stained tangential longitudinal section from the xylem showing an exceptional alternation in the direction of the vessels, fibres and rays cells.



Microscope slide P. Harju, photo T. Timonen

current comparative genomic study of the group aims at a new approach using large-scale genomic characters to investigate liverwort evolutionary history. Morphological, ontogenetic, and developmental studies on important characters across major groups of liverworts are also addressed, as their evolutionary significance could not be clarified without a phylogenetic framework. Yu Sun, Sanna Laaka-Lindberg and Pirkko Harju at the Botanical Museum are involved in the research, with support from the Department of Biological and Environmental Sciences and Institute of Biotechnology of the University of Helsinki.

Wood anatomical research

Botanical Museum has a Microtechnique Laboratory, which offers technical expert services to researchers of the Museum, and to other research institutes and governmental authorities. Tuuli Timonen's current research on wood anatomy focuses on tree species showing the curly wood structural feature. Curly (masur) birch is a well-known tree embodying this feature but similar structures have been found also on other species. The expertise on wood anatomy is applied in a joint project with the Maritime Museum of Finland of the shipwreck of *Vrouw Maria,* sunk in 1771 in the Turku archipelago while carrying art treasures to the Russian empress Catherine the Great.

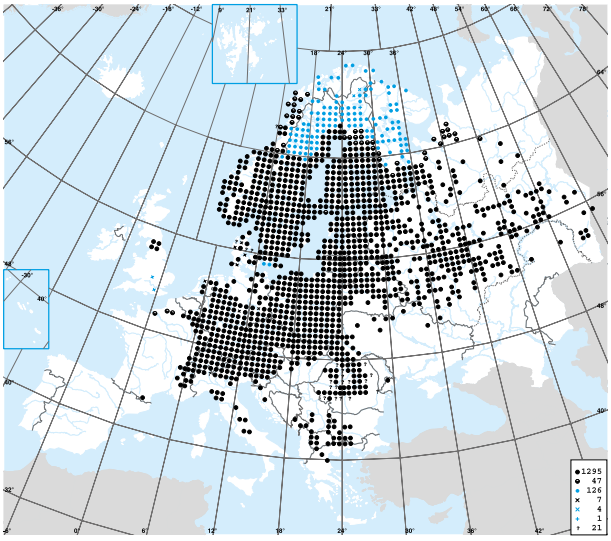
New plant atlases

Two extensive mapping projects on vascular plants are in progress at the Botanical Museum. Volume 14 of the pan-European *Atlas Florae Europaeae* was published

in 2007 together with *Societas Biologica Fennica Vanamo*. This second volume of Rosaceae was edited by Arto Kurtto et al., and deals with taxonomically complicated genera *Alchemilla* and *Aphanes*, altogether 439 species. They have never before been mapped in their entirety on a European scale. The collecting of data is going on for the next volume, covering the genus *Rubus* with still more numerous species. It is expected to be published in 2009.

The third version of the digital atlas of Finland, *Finnish Vascular Plant Atlas online* (www.luomus.fi/kasviatlas, www.luomus.fi/vaxtatlas) was launched in 2007. Currently, the maps are based on 5 255 000 records in the floristic database of the Museum, including ca. 1 million herbarium specimens, ca. 1 million literature data and 3.3 million archives data.

The floristic database also contains ca. 100 000 field data, literature records and herbarium specimens from adjacent Russia. Floristic data have been collected during several years from the lesser known parts of Russian Karelia during expeditions arranged under the auspices of the Finnish–Russian Working Group on Nature Conservation. The 2006 expedition to the northwestern archipelago of the White Sea was participated by four researchers from the Botanical Museum.



AFE 3675. *Alchemilla monticola*.

David Glenny

For obtaining fresh material of taxonomically important liverwort species occurred in the southern Hemisphere for the ongoing research at the Botanical Museum, Xiaolan He-Nygrén made a collecting trip to South Island, New Zealand in Feburary 2007. The photograph tells that the collector was amazed by the size and structure of leafy liverwort *Schistochilia appendiculata* (opposite page) collected from lowland podocarp forest, near Lake Matheson, South Westland, New Zealand.

DATING LABORATORY

The Dating Laboratory is a national resource operating in a multidisciplinary field of science and on the background many topical news items. The operations are based on three main pillars: the radiocarbon method, luminescence technique and stable isotope measurements.

Back in time with the radiocarbon and luminescence techniques

The unearthing of old human remains in a mass grave in Huhtiniemi made the headlines in Finland recently. Although the radiocarbon method is the most successful dating method for the remains of modern humans, it faces challenges when its results are translated into calendar years for relatively young samples: the environmental concentration of the ^{14}C isotope has been altered strongly partly due to the industrial revolution caused by – modern human. Nevertheless, in solving the Huhtiniemi puzzle, radiocarbon dating was successfully applied on all the human remains discovered.

The radiocarbon method has applications also at the older end of its age range. Particularly, the mammoth remains from Finland and Latvia have been studied. In addition, two archaeological research projects were completed in 2007: on Northern African rock art and on the fascinatingly rich Scythian grave of Arzhan-II.

Nina Heiska/HUT and Hannu Heinonen/ Nordic Geo Center Oy

Tragedies of the past in Huhtiniemi revealed by the present methods. Remains in Huhtiniemi mass grave were examined by radiocarbon technique.

The radiocarbon content of biogenic material of geologic age (oil, coal) is zero whereas in any contemporary biogenic substance, a measurable amount of radiocarbon is still detectable. Within the context of the emission trading system and biofuels, the Dating Laboratory has been involved in a TEKES project to develop methods for measuring the bioportions of fuels and flue gases. The radiocarbon method has also been used to study time-dependences within the carbon cycle in projects with the Finnish Environment Institute, the Finnish Forest Research Institute and the University of Kuopio. Several collaborative efforts have also been outlined together with the AMS facility at the Accelerator Laboratory of the University of Helsinki. These pave the way for future efforts to widen the range of radiocarbon measurements in Finland.

Kari Eskola

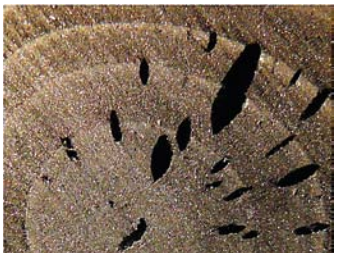
Reaching the excavation site at the Vanhalinna hill-fort

Contributions to geological research include measurements of sediment samples from Northern Lapland, Svalbard (see a separate article), Latvia and from Patagonia, Argentina. The latter three used the luminescence technique and it has also provided information on two-millennia old ceramics found in southwestern-Finland.

Climate and environment information through stable isotopes

Stable isotope measurements of tree rings are about to be extended 1000 years back in time within the ISONET (completed in 2006) and Millennium projects. This paleoclimatological knowledge will be later combined with information from multi-disciplinary sources to strengthen the foundation for future climate models. The laboratory has also continued its involvement in various research projects studying the water and carbon cycles, the latter tying the radiocarbon and stable isotope measurements closely together.

Markku Oinonen



Wood stores information

Laura Hiisivuori

GEOLOGICAL MUSEUM

Geological museum has arranged one day long geological excursions around the Helsinki area during last ca. 20 years. There are two types of excursions:

1. "Classical "geological excursions to see and study rocks in outcrops, road and street cuttings, old closed mines, and large erratic boulders (of rapakivi granite). During these years, a number of busses full of eager Finnish mineral and rock hobbyists and teachers or first year students and guests from Estonia (Tartu University) have seen many different geological objects and outcrops of magmatic and metamorphic rocks of the Helsinki area.

2. Another type of excursion is also arranged and guided by the Geological Museum. This is a "city excursion" to see building stones (dimensional rocks), architecture, culture and history. During a walk within the city of Helsinki, about ten to fifteen buildings and two squares are visited.

A city excursion may be started on the old Senate Square. The houses represent the architecture from the beginning of the 19th century (architect C.L. Engel, 1778–1840). The Palace of Council of State was finalized on the eastern side of the Square in 1822, and the main University Building ten years later. The white Helsinki Cathedral on the northern edge of the Senate Square was completed not until in 1852.

The groundings and the outer stairs of the houses are constructed of hammered massive granite and veined gneiss of very local origin or of erratics from NE of Helsinki, also some large erratics of rapakivi granite (named

To honour the retirement of prof. Martti Lehtinen (Head of Geological Museum), the Finnish Museum of Natural History organised a public event to wash the stairs of the Helsinki Cathedral. Here with brush in his hand Prof. Martti Lehtinen.

viborgite) are used. Same rock material is also used for pavement of the local streets. Inside the houses, there are fossil-bearing (trilobites and orthoceratites) Estonian limestone used for the stairs.

In general, the rocks are still in good condition with exception of some technical problems like breaking of block corners due to rusting of iron hooks. The granitic stairs of the Helsinki Cathedral are in good condition but should be washed.

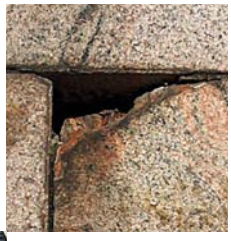
The Finnish building stone industry started at the end of the 19th century. There were geologists, architects and representatives of Finnish stone industry who established new companies. This is visible in many ways at the edge of the Square of the Railway Station of Helsinki. Houses like Ateneum (1885–87, Theodor Höijer), National Theatre (1899–1902, Onni Tarjanne) and the Main Railway Station (1904–16, Eliel Saarinen) are good examples of how the architects used Finnish natural stones (mostly granites) from Hanko, Uusikaupunki, Kuru, Kökar, Juuka (soapstone), and Ruskeala (marble). Later additions are made of red rapakivi granite from Vehmaa and Taivassalo.

The new Kamppi Terminal and Shopping Center, ca. 500 m west of the Main Railway Station, is an example of very modern usage of natural stones (dimensional stones). The rock is here normally used as polished or honed slabs of different sizes. The rocks originate around the world, and there are many color and textural varieties of granite (even-grained, porphyritic and with rapakivi texture) from Finland but also from China, Portugal, and South Africa. Variable surface treatments like polished, honed, flamed, and bush-hammered are visible, too. Marble comes from Italy and porous travertine from Turkey, even Finnish anorthosite with gem-quality spectrolite crystals, is used.

Lauri Hill

A group of participants is guided on stairs of the Helsinki Cathedral.

Jukka Lehtinen

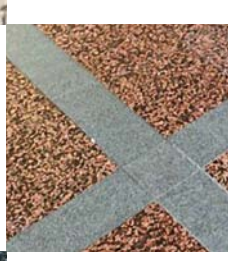


Broken corner of a granite block from the wall of the Helsinki Cathedral.

Jukka Lehtinen

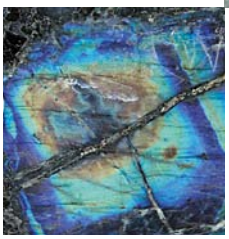
Wall of porous travertine in Kamppi (= the Kamppi Terminal and Shopping Center), Helsinki.

Jukka Lehtinen



Reconstructed floor of the Helsinki Main Railway Station. Gray rock = fine-grained Kuru granite, red = coarse-grained Taivassalo rapakivi granite.

Jukka Lehtinen



A gem-quality spectrolite crystal in anorthosite from Ylämaa, Finland.

ZOOLOGICAL MUSEUM

INVERTEBRATE BIODIVERSITY SURVEY OF LESVOS

– a faunistic research and sampling project

View from Mount Lepetymnos to NE showing typical hilly landscape of Lesvos.

Juhani Terhivuo

The island of Lesvos (Lesbos) belongs to Greece and it is located in the Aegean Sea, in close neighborhood with Turkey. Among the Greece islands Lesvos is the third in size (over 1600 km^2). The highest point in Lesvos is Mt. Olympos, which is almost one kilometer height. Two large bays broke the outline of Lesvos giving it a peculiar appearance. The nature of the island is diverse and varies between arid, semi-deserted hills and comparatively luxuriant forests of chestnut. The most common tree is the olive. Valleys with creeks and brooks cross frequently the hill areas, pastures and cultivated fields. The large variety of environments recognized on the island is surprising. In April-May the nature and the climate of Lesvos is luxuriant and most enjoyable.

The invertebrate fauna of Lesvos is sparsely investigated and regarding many invertebrates accordingly not well-known. To one's surprise Greece lacks a national zoological collection.

The Zoological Museum belonging to the Finnish Museum of Natural History and the Zoological Museum of Turku University have a long and successful tradition of collaboration in doing science. There are, however, very few examples of expeditions in common aiming to sample material for taxonomic research. The present survey to Lesvos carried out by the two leading taxonomic institutes in Finland is strongly dependent on their counterpart in Greece. The present project is a case of fruitful cooperation between two states, i.e. Finland and Greece, both being members of the European Union.

The project started with an expedition to Lesvos made in common in the year of 2005 by the Zoological Museum and Helsinki Society of Entomology. In the year 2006 the Zoological Museum of Turku University joined the project. The third expedition to the island was conducted in spring 2007. The counterpart of

Greece, the Department of geography and biology of the Aegean University, has in various ways assisted all expeditions, especially through ensuring successful field trips and samplings on the island. In the year 2008 the project continued but this time the field work took place in autumn instead of spring.

The Turku museum focuses mainly on spiders and related groups while the Helsinki museum concentrates on the insects. Various sampling techniques such as pit falls, malaise traps, light collection, dry funnel extraction, field and water netting etc. have been applied, with the aim to obtain as extensive knowledge of the fauna composition as possible. The sampled material will be divided between the counterparts of the project. A considerable part of the material is preserved so that the specimens can be used for DNA analyses. The sampled material thus far counts several thousands of specimens. Especially rich collections include groups as Coleoptera, Diptera, Lepidoptera, Hemiptera, Hymenoptera, Myriopoda, Araneae and Acari. The Finnish counterparts are responsible for the management of the material. Accordingly, the material is sorted and mounted in Helsinki and Turku. Besides own museum staffs the determination of specimens also relies on foreign experts, so far from Germany, Austria, the Netherlands and Poland. New species for science have thus far been detected among Diptera (family Sciaridae) and Lepidoptera (family Elachistidae). An important goal of the project is to establish a reference collection of invertebrates for the Aegean University. Another goal is to collect fresh material for taxonomic work and to enlarge our knowledge of the Aegean fauna of invertebrates.

Juhani Terhivuo

Sampling in a dry river bed close to the village of Scala Callonis

On personal level the Greece counterpart in the Aegean University is professor Theodora Petanidou, head of the Department of Geography and Biology. The project is planned to cover five years of field work. The handling of the sampled material will, however, require a considerably longer time period. The base for the field works has been the idyllic village of Scala Callonis located in the central parts of the island. Besides in Finland the project has also achieved some international interest, which is exemplified by interviews made by the Swedish radio and Norwegian press.

Olof Biström & Juhani Terhivuo

ZOOLOGICAL MUSEUM

FARMLAND BIRDS IN BOREAL AGROECOSYSTEMS

Laura Hiisivuori

During the past decades agricultural intensification has caused dramatic population declines in many taxa related to farmland habitats. A study project regarding how boreal farmland landscape characteristics and agricultural land use affect the abundance and diversity of farmland birds was performed using GIS-methods on bird territory mapping data collected in various parts of Finland. The results show that the area and openness of agricultural areas are key determinants of farmland bird abundance and distribution. A landscape composition with enough open farmland combined with key habitats such as farmyards and ditch margins provides essential prerequisites for the occurrence of a rich farmland avifauna.

In boreal agroecosystems farmland birds favour fields with springtime vegetative cover, especially agricultural grasslands and set-asides. Hence, in the spring cereal dominated Finnish agroecosystems the absence of field vegetation limits populations of many farmland bird species. As a consequence of specialization in crop production and the decline in cattle husbandry, crops providing vegetative cover in the spring have persistently declined, and thus greatly contributed to the declines of farmland birds. Other key habitats, such as ditches and ditch margins have also dramatically declined during the last decades.

A major problem for farmland bird conservation in Finland is the conflict between landscape structure and agricultural management. Areas with mixed and cattle farming are virtually absent from the large agricultural plains of southern and south-western Finland, where the landscape structure is favourable for rich farmland bird assemblages. On the other hand, mixed and cattle farming is

Laura Hiisivuori

View of Finnish countryside with hay bales wrapped in white plastic

Partridge is one of the typical birds of the countryside which is becoming more rare

still frequent in northern and central parts of the country, where the landscape structure is not suitable for many farmland birds requiring open landscapes.

The results imply that considerable attention needs to be paid to landscape factors when selecting areas for conservational management actions.

Markus Piha

http://urn.fi/URN:ISBN:978-952-10-3980-5

BASIDIOMYCOTA SYSTEMATICS

Focusing on the species

Tuomo Niemelä

The pre-DNA classification of Basidiomycota was highly artificial, much more so than, for instance, the classification of plants. Recent advances in Basidiomycota phylogeny have provided us with a sound framework of the relationships between the main taxonomic groups. This new-born Fungal Tree of Life now needs more leaves on its branches. The picture becomes more accurate gradually, when further species are placed in their proper phylogenetic context. Assembling this puzzle goes deep into the very roots of mycology: to the species.

In 2007 mycologists working on various groups of fungi in the University of Helsinki and the Finnish Environment Institute set up a joint Basidiomycete Research Group. This initially a ten-member group obtained long-term research grants from the Ministry of Environment, and the common target of these projects was to fill gaps in our knowledge of Basidiomycota taxonomy. Botanical Museum serves as the home address of the group.

Both mycorrhizal and wood-rotting basidiomycetes have intimate links with trees, and so our studies focus on forests, be they boreal or tropical. With extensive fieldwork, detailed microscopy, and DNA sequence analyses we have revealed a large number of cases where previously uniform-considered fungi turned out to include numerous sibling species. This knowledge is important because these are genetically isolated taxa, and unique in their host preferences and other ecology. They are also separable in their morphology after they have become properly known. In our boreal environment these 'micro species' may often be the outcome of glacial periods, when fragments of previously widespread fungal populations survived in different forest patches, and became specialized enough to avoid introgression when forests re-expanded to their former width.

Tuomo Niemelä

***Fomes fomentarius* (grey) and its successor, *Antrodiella pallescens*.**

More than any other research group worldwide, we have revealed successional links among wood-rotting fungi. Host specificity is a well-known characteristic, but much less is known on mutual relationships between fungi that grow simultaneously or successively on the same host. We have revealed tens of cases where a certain fungus (the so-called successor) is found predominantly

Basidiomycete Research Group in 2007, with members from the Botanical Museum, the Department of Biological and Environmental Sciences, and the Finnish Environment Institute. New members have joined the group since that.

or exclusively on trees previously inhabited by certain other species (predecessor). In these predecessor–successor links, the latter ones are often exactly those highly-specialized 'micro species', another hint pointing to a strong selection pressure in the past.

The knowledge of these details in basidiomycete taxonomy and ecology has direct applications in nature conservation. The value of old-growth forests is emphasized, and even the structurally simple-looking northern coniferous forests maintain much more articulate fungal communities than previously known.

Tuomo Niemelä
http://www.basidio.fi

BRACKISH WATER BIVALVES IN NORTHERN EUROPE

New views of their origin and evolution

The fauna of Northern Europe is composed of species that invaded these areas since the end of the latest ice age, some 10 000 years ago. In marine environments, this holds particularly for the brackish Baltic and White seas, which now support only a fraction of the species number in the neighboring fully saline seas. It has traditionally been assumed that the populations of marine species in these postglacial seas are directly derived from those in the adjacent Atlantic, and therefore would have little unique features. However, by using molecular genetic markers to study the faunal history, it has now been proven that the composition of North European marine fauna is more complex and involves unique genetic diversity that is not found anywhere else.

Raisa Nikula

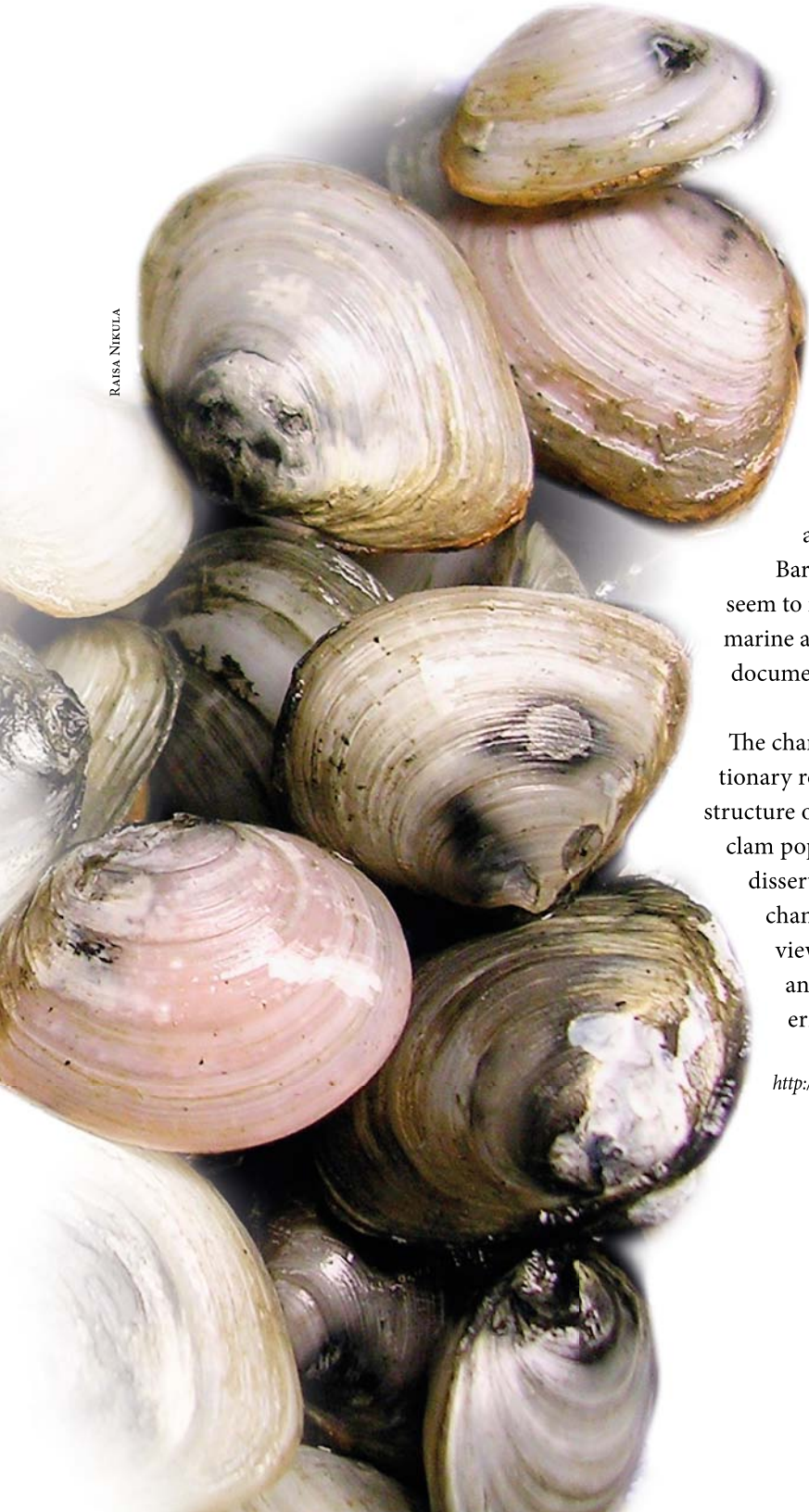
Raisa Nikula carried out part of her PhD studies at Molecular Ecology and Systematics Laboratory which is a joint facility of Department of Biological and Environmental Sciences and Finnish Museum of Natural History.

My dissertation work was part of a Finnish-Russian collaboration to study the history of North European bivalve mollusks. Particularly I focused on the clam *Macoma balthica*, which is abundant both in the soft sediments of the Baltic Sea and also very common on the intertidal shores of the White and Barents seas. Originally, this clam has arrived to Europe and the Atlantic from the North Pacific Ocean, already before the Pleistocene ice ages, more than 2 million years ago. The invasion took place across the Arctic Ocean basin.

Tracing the history from mitochondrial DNA and protein polymorphisms however showed that the North Pacific *Macoma* clams have invaded Europe twice, in two separate waves. The second invasion was very recent, right after the latest glaciation. The mitochondrial types marking these invasions are now found side by side in Northern Europe. Our brackish water *Macoma*, for instance in the Baltic Sea, thus originate from a post-glacial re-invasion wave of North Pacific clams that has mixed with descendants of the original Pacific-to-Atlantic invaders that have resided in Europe for two million years.

The molecular markers were used to quantify the relative proportions of the 'old' and 'new' Pacific genomes (or Atlantic and Pacific subspecies) in different sea areas. Each of the North European marginal seas, the Baltic, White and Barents seas, features its own specific mixture of and a globally unique genomic composition in this respect.

Genotypic analysis shows that following their post-glacial contact, the two long-isolated subspecies have hybridized relatively freely. All individual clams have a mixed ancestry and the



Raisa Nikula

populations are in local genetic equilibrium. Despite the pervasive historical interbreeding within the marginal Baltic and White seas, their populations remain distinct from the adjacent pure Atlantic populations. Such equilibrium populations of mixed ancestry are called hybrid swarms, and the Baltic, White and Barents Sea clam populations seem to represent the most extensive marine animal hybrid swarms so far documented.

The characterization of the evolutionary roots and standing genetic structure of the Northern European clam populations provided by my dissertation work profoundly changes the traditionally held views over the zoogeography and biodiversity of the Northern European postglacial seas.

Raisa Nikula

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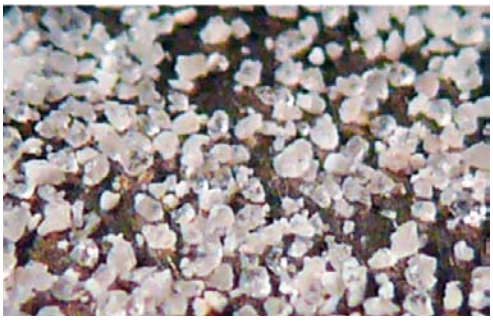
GLIMPSE INTO THE ICE AGE

Anu Kaakinen

The luminescence dating technique provides a method to study glacial history chronologically. A member of the International Polar Year (IPY) consortium, the Department of Geology at the University of Helsinki will use the technique in its Svalbard expedition until 2010 as a part of a larger international effort (www.kinnvika.net). The project follows in the footsteps of the pioneering Finnish-Swedish explorers who eventually established the Kinnvika station on Nordaustlandet, Svalbard, in 1957. Here, close to the Vestfonna glacier, the undisturbed environment offers a glimpse into the ice age. The first look at the glacier chronology was provided by the nine sediment samples extracted in 2007.

The chronology of the sediment layers of interest is mostly based on the results obtained with the Optically Stimulated Luminescence (OSL) method on quartz samples and supported by radiocarbon dating on mollusk shells. The OSL method uses the ability of mineral grains (quartz, feldspar) to act as natural dosimeters for background radiation. Radiation detaches electrons from their orbital locations in atoms, and they may be trapped inside electrical potential wells created by defects in the crystal lattice. The radiation exposure is counted by the trapped electrons. The more electrons are trapped, the larger the dose that is absorbed.

Kari Eskola



Quartz grains for measuring luminescence

Heat (thermoluminescence, TL) or light exposure (OSL) can empty the traps and the amount of the resulting luminescence light corresponds to the radiation dose absorbed by the grains. In the measuring routine, the natural luminescence signal is first measured from a quartz sample. A calibration curve is then created for the sample by measuring its luminescence signals due to known radiation doses. The natural dose – corresponding to the natural luminescence signal – is determined by using the curve. In addition, the natural radiation dose rate needs to be measured in order to determine the age of the sample.

The luminescence technique dates the last bleaching event that emptied the electron traps. For example, in archaeological samples this can mean heating of a fireplace or ceramics. In geological sediment samples such an event is typically a moment when aeolian or alluvial (or even colluvial) sand is

Ice age in Nordaustlandet, Svalbard

exposed to light during its transport. When sand is buried, the exposure stops and electrons start to get trapped again.

Based on these studies the glacier chronology at Vestfonna, Svalbard starts to build up. Sample collections, background radiation measurements and luminescence studies will proceed in the future. This research will lead to a better understanding of this region where the topography and sedimentary environment resemble those of Finland during the Weichselian glacial stage.

Kari Eskola and Markku Oinonen
Dating Laboratory

FIFTH EUROPEAN
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Botanic Gardens in the Age of Climate Change

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