BOTANIC GARDEN PROFILE: BOTANICAL GARDEN OF THE UNIVERSITY OF OSLO, NORWAY

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ABSTRACT

The Botanical Garden in Oslo was established in 1814 and is the oldest part of the Natural History Museum, one of the two museums of the University of Oslo. To celebrate the bicentenary, the Museum decided to launch an ambitious programme of events covering the entire year and adding several new permanent assets. This paper provides a brief history of and current information about the Garden and describes the previously existing and new features, along with a map of the Garden. The bicentenary celebrations raised the profile of the Garden enormously in Norway, and it experienced a huge increase in visitor numbers as well as extensive media coverage. The increased popularity of the Garden and the expected future rise in population in the neighbouring suburbs simultaneously challenge the Garden to satisfy the need for green space as well as providing scientifically based information which reinforces the importance of plants.

HISTORY

The Botanical Garden of the University of Oslo (BGUO) was established on 1 June 1814, only two weeks after the constitution of Norway was signed and less than three years after the university itself. King Frederik VI of the union of Denmark and Norway bought the Manor of Tøyen and its estate. He donated it to the university in 1812 with the intention that it should include the campus of the new university. Instead, it was decided to establish a botanic garden, although only around 5 per cent of the estate (7.5 ha) was designated for this purpose.

When BGUO was founded, the first keeper, Christen Smith, at the age of only 29, was appointed as Professor in Botany and Economics. Soon after the Garden was demarcated, Smith left to carry out fieldwork in the Canaries and Cape Verde, and in September 1816 died on the River Congo while participating in a British expedition. Before his death, he managed to collect 620 plant species in the Congo, 250 of which were new to science. This collection reached Sir Joseph Banks at Kew and was revised by the British botanist Robert Brown. The untimely passing of Christen Smith was a great loss not only to the BGUO but also to the botanical world.

One of the reasons behind the establishment of a botanic garden in Oslo was to find ways for the new nation of Norway to become self-sufficient in natural resources. During the Napoleonic Wars, the British trade blockade had led to food shortages and starvation. The administration of the new nation relied on botanists to

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find solutions and so the Garden, in its early years, conducted planting experiments of economically important crops, as well as hosting a scientific collection and serving as a recreational area for citizens. The balance of this threefold mission has varied throughout its 200-year history. For example, during World War II, the immediate need for potatoes and other vegetables resulted in a total transformation in the use of the Garden.

Head Gardener Johan Siebke established the oldest part of the BGUO in 1814–1818 based on a plan drafted by Frederik Ludvig Holbøll, Head Gardener of the Botanical Garden at the University of Copenhagen in Denmark (Fig. 1). This was done in the English style of landscaping and many trails still follow the original plan.

As Smith never returned to lead the BGUO, it suffered from poor management and funding; only after 1845 did the situation improve. By around 1860, a total of 1,700 species were cultivated, including a valuable selection of northern European montane plants, which made the Garden famous throughout Europe. The present-day Rock Garden, where several montane species grow, is still one of the special features today.

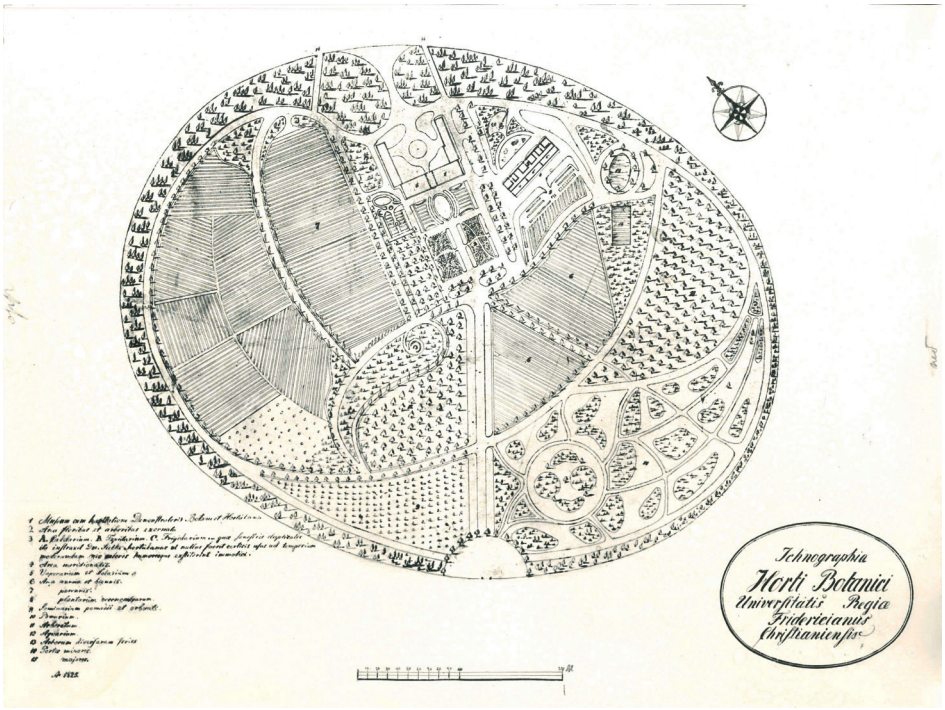

Fig. 1 The original plan of the Botanical Garden, Oslo, was sketched by Holbøll. This print is from 1825. Reproduced with permission of the Department for the Museum of University and Science History, University of Oslo.

MISSION

Today, the Garden maintains a living collection used for research and education at the University of Oslo. The collection includes at least 6,400 species and more than 33,000 individual plants, providing the basis for investigation and conservation of rare and endangered plant species. The collections are recorded in a database, IRISBG (Botanical Software Ltd, 2015), and the public can access these online via the BGUO website with the Garden Explorer (University of Oslo: Natural History Museum, 2015).

The BGUO is also a favoured oasis for the citizens of the city of Oslo as well as visitors from other parts of the country and abroad. Four gates enable free access to the garden from 7 am to 9 pm, and visitors entering and exiting are counted at each gate using laser beams. In 2013 the counts totalled 709,000 visitors.

LOCATION AND CLIMATE

The BGUO is located in the suburb of Tøyen, not far from the city centre at 59°55′5″N 10°46′14″E, around 1.5 km north-east of Oslo's Central Station. The fence enclosing the Garden is also the boundary of the Natural History Museum (NHM), one of the two university museums. This museum was established in 1999 by amalgamating the Botanical Garden with four museum institutes. The old Tøyen Manor is situated in the centre of the Garden and is used as university office and function space. It also has a small café and two small rooms for exhibitions. The highest point of the Garden, slightly north of the Manor, is 35 m higher than the lowest point in the south-west corner, only a few metres above sea level.

The day length varies from 6 to 18 hours, winter to summer. The average annual precipitation recorded at the meteorological station at Blindern is 763 mm and the daily mean temperature 5.69°C (42.24°F). Oslo has warm summers, with two out of three days in July reaching temperatures above 20°C. July 2014 was the warmest summer month ever recorded, with a monthly mean temperature of 20.8°C (69.4°F). In January, three out of four days are below freezing point and on average one day in four is colder than -10°C (Norwegian Meteorological Institute, 2015).

STAFF

The BGUO is a department within the NHM and is currently staffed by one head, three head gardeners, one botanical curator and 12 horticultural staff with various fields of expertise including seed germination testing, arboriculture, rockwork and workshop management. In addition, there are up to ten seasonal workers in the summer. Some of the botany staff and students from the Department of Research and Collections of the NHM contribute to curation and other Garden tasks, and this department also manages the herbarium. The Department of Exhibitions and Public Services (EXHIB) has two full-time botanists dedicated to interpretation and botanical exhibitions.

GARDEN FEATURES

Within the Garden are three large museum buildings that hold all the natural history collections including the herbarium (O). The museums and their surroundings were added to the original Garden area, resulting in its present size (Fig. 2). The original BGUO consists of a more park-like arboretum with a wide collection of native and exotic trees. Many of the trails still follow Holbøll's original layout (Fig. 1) and they connect several thematic features. These are listed below:

The Aromatic Garden is a cosy enclosure of yew hedges, raised beds and labels in Braille, allowing the visually impaired or visitors in wheelchairs to experience the scent of plants (Fig. 3).

Great Granny's Garden contains ornamental cultivars which have been growing in a known Norwegian garden for at least 50 years (Fig. 4). These plants are adapted to the local climate but are often not available in garden centres. The plant collections

Fig. 2 Map of the University of Oslo Botanic Garden. The fence of the Garden is also the boundary of the Natural History Museum: one of two museums of the University of Oslo. Map produced by Kari Sanengen.

Fig. 3 The Aromatic Garden enclosed by a yew hedge. Photo: Axel Dalberg Poulsen.

Fig. 4 Great Granny's Garden contains old garden cultivars adapted to the Norwegian climate and is most decorative in mid-summer. Photo: Axel Dalberg Poulsen.

and design of this area have been created to bring back memories of the past and have a soothing effect on people suffering from dementia.

The Herb Garden exhibits many plants from which we get fruits, vegetables, spices, cereals, fibres, dyes and medicine. While the BGUO generally aims to maintain a high percentage of accessions of known wild origin, the purpose of the Herb Garden is to demonstrate how humans use plants. It therefore consists of many cultivars and plants of garden origin.

The Manor Garden is located on the slope south of the Manor (Fig. 5). As one ascends the slope from the city along the oak alley, the baroque-style garden is intended to enhance the view of the Manor. The Manor Garden is the result of a post-war competition for landscape architects, and was only established in the 1950s.

Red- and Black-listed Plants are displayed in a small circle resembling yin and yang where the 'bad' invasive species are enclosed in concrete rings and the rare and endangered species clearly marked with red labels (Fig. 6). Endangered species are labelled similarly and are cultivated in many areas of the Garden. Seeds are stored in the seed bank of the BGUO.

The Rock Garden consists of c. 1,700 plant species divided according to geographical area: Africa, Asia, the Caucasus, North America and Scandinavia. It features a stream that ends at a small waterfall and a pond and is most attractive in May and June. The North American area includes a notable collection of *Trillium* established by Professor Rolf Berg, keeper of the BGUO between 1965 and 1990.

At the southern boundary of the Rock Garden is a small area featuring a hay meadow. When this was established in 2013, the topsoil was replaced with poor soil and plant species from areas in Norway where hay cutting has taken place for centuries.

Fig. 5 The Tøyen Manor and Manor Garden late in the evening during the performance of an open-air play to celebrate the bicentenary. An actor recreates the visit of Danish author Hans Christian Andersen. Photo: Axel Dalberg Poulsen.

Fig. 6 The circular bed with red- and black-listed plants is situated next to the Victoria lily Glasshouse and a gingko tree planted in 1870. Photo: Axel Dalberg Poulsen.

This was the first of the BGUO's attempts to exhibit plant composition in the context of cultural history. Next to the hay meadow is the Oslo Ridge where rocks and plant species typical of the Oslo area are shown together (Fig. 7). Rare species grown here include *Saxifraga osloensis* Knaben and *Dracocephalum ruyschiana* L.

The Systematic Garden is often used in teaching (Fig. 8). The collections are arranged according to the relationships between families and genera and hence are ideal for demonstrating the evolution of different pollination syndromes, seed dispersal strategies and other features. The planting positions of the taxa are still being changed in order to match recent findings in angiosperm systematics, including that of the Angiosperm Phylogeny Group (APG, 1998).

There are two display glasshouses in the Garden: the Palm House which was built in 1868 and the Victoria House, built in 1876 (Fig. 9). The former contains a small exhibition on the evolution of plants (Fig. 10A), as well as examples of species typical of the Mediterranean and other arid climates. The latter was built mainly to display the Victoria water lily in a circular pond (Fig. 10B) surrounded by some economically valuable tropical species, such as ginger, cocoa and sugar cane. The main building has two small wings: one with collections of epiphytes and carnivorous plants, and one with an exhibition of useful African plants.

Fig. 7 Botanist Kristina Bjureke (EXHIB) interpreting the Oslo Ridge, which consists of native species grown on their original substrate. Photo: Axel Dalberg Poulsen.

Fig. 8 The Systematic Garden. Photo: Axel Dalberg Poulsen.

Fig. 9 The glasshouses are popular retreats in the winter. The Victoria lily Glasshouse (left) has a wing with carnivorous and epiphytic plants to the left and a wing exhibiting economic plants mostly from Africa to the right. Photo: Axel Dalberg Poulsen.

Fig. 10A The Palm House has an exhibition about the evolution of plants which also includes real fossils. A date palm collected by Christen Smith in the Canary Islands grew here until 2000 when it died at the age of 185. Photo: Axel Dalberg Poulsen.

Fig. 10B In the Victoria Glasshouse the visitor may walk around the central pond with *Victoria cruziana*. Photo: Axel Dalberg Poulsen.

The Garden has needed much larger glasshouses for the last 85 years in order to display more of the diversity of plants from tropical rainforests and other vegetation types. The project to construct these has strong political support. A new programme has been formulated by the NHM and the University to build a modern and environmentally friendly glasshouse, and there are indications that the parliament is likely to approve the entire budget within the foreseeable future.

BICENTENARY CELEBRATION

To mark the bicentenary of the BGUO, a cross-disciplinary committee of the NHM decided not merely to make 1 June 2014 a special day but to compile an elaborate and ambitious selection of activities to be held throughout the year. These included indoor and outdoor exhibitions, guided tours, music and arts events, and scientific seminars. Professor Emeritus Liv Borgen prepared a comprehensive overview of the 200 years of the Garden (Borgen, 2014) and some of the photographic highlights from this work were displayed in the hall of Lid's House, formerly the Botanical Museum. New and permanent features were added to the Garden itself: the Bicentenary Benches, the Viking Garden, the Willow Garden and the Scandinavian Ridge.

The Bicentenary Benches

A total of 12 benches were erected during the year. The purpose was to create new spaces in which visitors could spend time in contemplation and also to convey natural history information. Three benches were named after people who have played an important role in the history of the Garden. Several descendants of those honoured turned up unexpectedly for the opening and in some cases shared information which provided new insights into the history of the Garden.

The first bench was part of an ice maze which was constructed by sculptor Peder Istad and weighed more than 70 tonnes (Fig. 11). On the opening weekend in January, more than 10,000 visitors came to see it. These high visitor numbers demonstrate the potential that a botanic garden has to attract visitors even in mid-winter. Although the Ice Bench soon melted, the Frederik VI Bench, a throne-like seat for two made by sculptor Kjersti Wexelsen Goksøyr, was launched on 1 June 2014 and is likely to last for the next 200 years (Fig. 12). The remaining ten benches were equally varied and took the following forms: a turf bench and one made from *Populus* sp. (poplar), constructed by the horticulture staff; a bench made of *Tilia cordata* Mill. (lime) and named after Carl Linnaeus; a dome-shaped bird observation seat overgrown by plants which played recorded bird calls; a meandering wooden bench which served as a meeting venue for a parliamentary politician; a circle of schist plates arranged like dominos enclosing one of the oldest trees in the Garden; a double hut made by willow artist Tom Hare commemorating the two head gardeners, Niels Green Moe and his son Elias Moe; a chieftain seat showing wood used in the Viking Age; and a cast-iron bench positioned with a view of the Victoria Pond.

The Viking Garden

The Viking Garden allows the visitor to travel back in time to explore natural resources which were important during the Viking Age (AD 793–1066). These resources include live plants, rocks and objects made from animals, which are displayed permanently outdoors (Figs 13–15). The visitor can learn how the Vikings used nature and how the transport of these resources affected nature. For example, soapstone used for making pots was one of the valuable export commodities during the Viking Age. Intercultural exchange of such material is not new. Some plants were imported with a purpose; others came with the ballast as seeds. Part of the gravel footpath that follows the perimeter of the BGUO has been transformed into a 26 m-long jetty made of planks of oak. Next to this is a 33 m × 8 m ‘time machine’ in the form of a ship made with boxes containing items of botanical, zoological and geological interest. The material used for these boxes is rusty corten steel and they take the shape either of raised beds for living plants or display cases for other objects. The choice of material was deliberate in order to avoid the visitor getting the wrong impression of what a garden might have looked like during the Viking Age. At the same time the design, including the ‘stern’ and ‘bow’ of the ship and its central pine mast, immediately reminds the spectator of that time and makes

Fig. 11 The Ice Maze, constructed by artist Peder Istad from more than 70 tonnes of lake ice, included the first Bicentenary Bench. Photo: Axel Dalberg Poulsen.

Fig. 12 The most high profile of the Bicentenary Benches was revealed on 1 June 2014 and commemorates King Frederik VI. It is made from the national rock of Norway, larvikite. The Palm Glasshouse can be seen in the background. Photo: Axel Dalberg Poulsen.

it attractive to children. Rather than making the sides of the ship solid, each box is an individual island allowing visitors to move sideways through the feature or to gather in groups around one box during a guided tour.

A literature survey sifting through the evidence as a result of archaeological excavations revealed that many plant species are documented. It is, however, difficult to prove their actual uses. Species which have been found outside their supposedly natural range, such as *Coriandrum sativum* L. (coriander), are more likely to have been used, though this is impossible to prove. The abundance of linseed and hemp in excavations indicates their importance during the Viking Age. The ancient sagas give evidence of the use of *Allium* spp. (onions) and *Angelica archangelica* L. (angelica). It is therefore not difficult to exhibit a cargo of Viking plants and currently nearly 200 species are grown there. A number of these still remain unconfirmed and are thus exhibited in a 'maybe' box. The area surrounding the jetty and the ship features small hills and in the future will continuously be developed as a Nordic arboretum. Another plan is to make an interpreted nature

Fig. 13 The opening of the Viking Garden on 31 August 2014. The most conspicuous part of this area is the 'time machine' in the form of a ship, with corten steel boxes exhibiting plants, rocks and zoological material. Photo: Axel Dalberg Poulsen.

Fig. 14 The hemp cage and a box of bones and antlers are examples of important natural resources used during the Viking Age. In the background are willow sheep made by British sculptor Tom Hare. Photo: Axel Dalberg Poulsen.

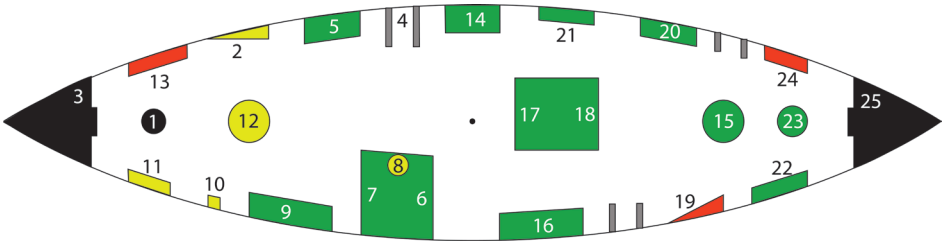

Fig. 15 An overview of the natural resources in the 'ship' of the Viking Garden: 1. Map of the Viking world. 2. Archaeology. 3. Wood. 4. Oar and rowing. 5. Nordic natural resources. 6. Grain field. 7. Weeds. 8. Quern stones. 9. Food plants. 10. Whetstones. 11. Soapstone. 12. Ballast. 13. Birds. 14. Angelica and onions. 15. Plants for brewing. 16. Medicinal plants. 17. Flax. 18. Oil plants. 19. Wool and weaving. 20. Dye plants. 21. Mysteries. 22. Ropes. 23. Hemp. 24. Bone. 25. Games. Diagram drawn by Axel Dalberg Poulsen.

trail and an area for special events where activities such as plant dyeing, storytelling, soapstone work or quern stone milling can take place.

One of the challenges of the Viking Garden is that it is quite close to a busy road and the traffic often disturbs interpretation. The soil mounds bordering the road have therefore been expanded and will be planted with Nordic species such as elder, hazel and rowan. Another challenge is that a lot of annuals have to be sown in the spring. In winter, when the beds and signs may be covered in snow, there are often not many plants for visitors to see, and so the ship provides a sensual experience at these times.

An additional purpose of the Viking Garden is to display some of the original cultivars of crops which we believe that the Vikings grew. This is a challenge, as we do not know what they actually looked like. We do, however, strive to display old cultivars. These are obtained from centres of genetic resources, such as the Norwegian Genetic Resource Centre (2015) and the Nordic Genetic Resource Center (NordGen, 2015).

The Viking Garden has a simple and flexible design, and it is therefore easy to use it as a platform to interpret aspects of Viking Age natural history derived from the most recent research. An example of this is the ongoing research project at the Centre for Ecological and Evolutionary Synthesis and NHM, University of Oslo, which aims to test whether the collections growing in the Viking Garden really are genetically similar to crops from the Viking Age.

A multidisciplinary project with the other university museums of Norway aims to use the exhibitions as a forum in which scientists interact with the public more, which in turn generates inspiration for new research. In this context, it is intended that the public will share their interpretation of Viking resources such as food plants.

The Willow Garden

For some time visitors have been requesting an area designated for children to play in and so, in 2013, willow hedges were planted. The Willow Garden has a tunnel, stepping stumps and a sand box where children can find fossils. British sculptor Tom Hare further elaborated on the willow theme with sculptures of apples, sycamore fruits and porcini

mushrooms. The Friends of the Garden generously sponsored the creation of all of these elements of the Willow Garden.

The Scandinavian Ridge

In June 2014 the Rock Garden was expanded, 25 years after it was officially opened at its current location in the BGUO. The purpose of the addition was to increase interest in local nature. Four kinds of rock were relocated to the BGUO and representatives of the corresponding vegetation were planted. The national flower of Norway, *Saxifraga cotyledon* L., flowers in summer here (Fig. 16).

Fig. 16A *Saxifraga cotyledon*, national flower of Norway as chosen by botanists. Photo: Per Arvid Åsen.

Fig. 16B The Scandinavian Ridge has a section with marble in which the national flower of Norway, *Saxifraga cotyledon*, has been planted. Photo: Axel Dalberg Poulsen.

POSITIVE OUTCOMES OF THE BICENTENARY CELEBRATIONS

The ambitious bicentenary programme meant that staff of the different departments of the museum (Horticulture, Science and Public Outreach) had to work more closely together to secure the success of the new projects. The result of this is that cross-departmental collaboration is likely to persist as a positive initiative in the museum.

The bicentenary celebrations at the NHM resulted in an increase of the number of visitors though the Garden gates by 100,000 compared to the previous year. A survey of the users has not been conducted, but it is our impression that we have not only attracted more people, but also been able to attract new visitor groups due to the more diverse subjects and displays made available during the year. The bicentenary certainly received a lot of attention in the media and the museum staff became better at using social media to promote events. Further, the role of the NHM as a future active player in the development of the suburb has become more evident.

FUTURE CHALLENGES

Oslo Council is planning an increase in population of the neighbouring suburbs of the BGUO. The implication of this is that the Garden will have to provide botanical and natural history information and events to a growing number of visitors. With the increase

in visitors, horticulture and public outreach staff are experiencing a higher incidence of undesirable behaviour, such as climbing trees, picking flowers, cycling through the Garden and unruly dogs. Even though the majority of visitors are well behaved, it is still important to emphasise that the BGUO is much more than a public park. The main challenge will be to coordinate an interaction between research activities and public engagement that is pleasing to all. The nearby Tøyen Park, just to the east of the BGUO, has the potential to further satisfy many needs of the public, providing a good location for picnicking and dog-walking and for children to play, so that the BGUO may focus on its exclusive mission to explain the wonders and importance of plants in a positive and environmentally friendly way.

ACKNOWLEDGEMENTS

The bicentenary celebration of the BGUO and NHM would not have been as successful had it not been for the donations and help received from many organisations and individuals. The University of Oslo approved an extraordinary budget for new lighting throughout the Garden, which allowed opening hours to be extended in winter. The book detailing the 200-year history of the Garden was also partly supported from this source. The DNB Savings Bank Foundation was the main sponsor of the Viking Garden and, among other activities, paid for six Bicentenary Benches and an activity booklet for children. The Friends of the Garden funded the Frederik VI Bench, the Willow Garden and several willow sculptures by Tom Hare. Oslo City Council made a significant contribution to the Ice Maze. Professor Emeritus Liv Borgen assisted with the historical accuracy of this paper.

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