

TURIN BOTANIC GARDEN: ANCIENT AND MODERN

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ABSTRACT: The Turin Botanic Garden, founded in 1729, was used for growing medicinal plants and for *ostentio simplicium* for students. The records we have of activity in the Garden testify to following development of botanical studies and the continuity of regional floristic research. The recent reintroduction to the Garden of wild plants of particular interest for the region, in taxonomically arranged beds, and cross-referenced to palynological, chemotaxonomic and molecular research, allows current research to be related to the past.

The most significant work recently undertaken at the Garden has included the construction of an *Alpinetum* and a large hothouse to recreate a series of South African vegetation types, thus getting away from a simple display of species arranged by families. We have also increased the collections of glasshouse and frost-resistant succulent species overwintering with only a cover to keep the rain off.

The recent collection of old fruit tree cultivars on a south-east facing bank as living examples of the important models of 18th century fruit varieties made by Garnier-Valletti, exhibited in the new “Fruit Museum” of Turin.

KEY WORDS

Turin Botanical Garden, history, new collection, South Africa Flora.

INTRODUCTION

Most scholars consider the origin of the present-day Botanic Gardens date back to ancient times, searching for ancestors in the “botanic garden of Karnak” which belonged to the curiosities of Thutmose II, or in the collections of useful plants which Theophrastus used for medical treatment in 4th century BC Athens, or in the gardens kept by the Zen monks more than 2000 years ago in the Far East.

Certainly the present-day Botanic Gardens have evolved from the cultivations of aromatic and medicinal herbs which already existed before the year 1000 in the *Horti sanitatis*, located in monasteries and the houses of physicians and druggists. During the Renaissance at the university schools of medicine, species that were useful for therapeutic purposes were cultivated in marked out plots, called *Horti simplicium*; these were similar to mediaeval monastic gardens. Among the oldest of these facilities we should recall the Vatican Botanic Garden in Rome (1447) of which there are no material traces and the Echten Botanic Garden of Cologne (1490), which is better documented.

In Padua the oldest *Hortus Simplicium* in Italy was born in 1545, connected with the teaching of medicine, to be followed by the universities of Pisa (1545), Florence (1545), Bologna (1568), Leyden (1577), Leipzig (1580), Koenigsberg (1584), Breslau (1587) and Paris (1590) (Consolino & Banfi, 1997).

These *Horti* provided a “new proposal” in the complex reality of the garden: while maintaining a formal look similar to those of traditional gardens, they responded to the need of doctors and druggists, to study living plants useful in therapeutic practice, having the function of open-air laboratories.

Throughout the 18th century Botanic Gardens preserved a close tie with medicine although the great geographical discoveries and the consequent arrival in Europe of exotic species - many of which important for their food or ornamental interest - imposed new topics of study and new problems linked to acclimatisation.

It became necessary to acquire deeper knowledge on plant anatomy, physiology and ecology: this led to the almost obligatory birth of the figure of the “botanist” whose research concerned plants as such, above and beyond their therapeutic uses.

Knowledge of the territory and its natural resources was another important subject of scientific investigation, both for the exploitation of resources and for territorial management.

THE BIRTH OF TURIN BOTANIC GARDEN

It was set against this background that Turin’s Botanic Garden was born, in the first half of the 18th century.

University issues in Piedmont date back to Ludovico of Savoy who in 1404 founded a “*Studium*” in Turin, recognised by the imperial and papal authorities, where along with law and theology medicine was taught. The seat of learning was later moved to Chieri, then to Savigliano and Mondovi. It was in Mondovi, in 1560, that Duke Emanuele Filiberto instituted a “*Lettura dei semplici*” and Readers (instructors) flanked professors in the teaching activity.

In 1566 the University was transferred back to Turin where it went through a difficult period owing to the political and economic affairs of the State, overwhelmed by wars and famine.

In the early decades of the 18th century Vittorio Amedeo II - committed to the work of an economic, social and cultural revival of his State which, after the Treaty of Utrecht, had obtained a place among European Powers - promoted the renewal of the University.

The institution of a chair of Botany with the attached Botanic Garden was part of the plan for enhancing the medical and scientific disciplines.

The foundation of the Botanic Garden dates back to those years and in 1729 the physician Bartolomeo Caccia (?- 1747) became its first director.

We have the manuscript of the lectures that Caccia held in 1732, transcribed by his pupil, the physician Giovanni Battista Mundino. This allows us to know the subjects that were covered in his course. Very probably it was Caccia’s task to indicate which plants were worthy of inclusion in the *Farmacopea Taurinensis*, the first manual that was valid for all doctors and druggists in the State of Savoy, which was officially published in 1736.

Medicinal plants were certainly grown in the Botanic Garden, but information on the size of the collections is scarce: among the few sources there is a copy of the list of the 317 species which formed the material of the “*Raccolta di piante dell’Orto dei Semplici di S.M. il Re di Sardegna, artificiosamente conservate, presentata a S.E. il Signor Conte Carlo Luigi Caissotti di S. Vittoria, primo Presidente del R. Senato del Piemonte e reggente della R. Università degli studi di Torino da Sante Andreoli, botanico di S.M.*”, under the supervision of Oreste Mattiolo in the early 20th century.

Another document on the initial organisation of the Botanic Garden, is the water colour drawing which appeared on the title page of the work by Milanese painter Giovan Battista Morandi (? – 1751), entitled “*Exterarum et rariorum plantarum quae in Horto Regio Academiae Taurinensis excoluntur. Imagines ad vivum expressae*”, considered the site’s official plan. In the picture, dated 1732, the land is subdivided into geometrical plots with circular beds converging on two ponds.

It is to Caccia's merit that he started territorial floristic research, which was to become a dominant theme for the Institution: his exploration is documented by "*Catalogus plantarum in Valle Ulciensii nascentium*" containing 725 species, named according to the polynomial nomenclature of C. Bauhin. Not many years later Carlo Allioni identified among the species some 19 of the taxa mentioned for the first time by Caccia himself.

Naturalist exploration was continued by the second director of the Botanic Garden, the eclectic Vitaliano Donati (1717-1762) (Scalva, 2000). The numerous travels undertaken at the wish of the Sovereign within and outside the States of Savoy impeded his continuous presence at the Botanic Garden, where he was substituted by Carlo Allioni, a dominant figure for the whole of the rest of the century.

One of the most important initiatives started by Donati was the formalisation of the start of the work entitled "*Iconographia Taurinensis*": in 1752 the first two volumes were completed, each containing 150 plates and in the next four years six further volumes were added. The beginning of the work and the realisation of the first volumes was possible thanks to the fact that the botanist painter Francesco Peyrolery (circa 1710-1783) had already produced many plates in previous years, under the supervision of Caccia.

On Vitaliano Donati's death in 1762 he was succeeded by Carlo Allioni (1728-1804), who was director until at least 1799.

Allioni was a naturalist who was open to all sectors of science: known as a doctor, as an expert on insects, minerals and rocks although, above all, as a botanist (Caramiello, 2004).

One of his first works (1755) was "*Rariorum Pedemontium Stirpium. Specimen primum*" in which the species, still indicated with polynomial nomenclature, are represented in an accurate iconography consisting of twelve plates, almost all by Francesco Peyrolery. This work is considered a preliminary draft of his fundamental work, "*Flora Pedemontana*", published many years later in 1785 in which are listed and described about 2800 species identified in the territory of the States of Savoy in more than twenty years of floristic exploration, often accompanied by mention of the places where they were found and by notes on medicinal uses.

In 1760-61 he published the first printed list of species cultivated in the Botanic Garden entitled "*Synopsis methodica stirpium Horti Taurinensis*". In this, for the first time in Piedmont and among one of the first in Italy, the binomial nomenclature proposed by Linnaeus in 1753 was used, thus placing the Botanic Garden in an avant-garde position in Europe (Caramiello & Forneris, 2003, 2004).

His method of investigation entailed exchanges of plants, seeds and *exsiccata* with Italian and European scholars. It should be pointed out that the *exsiccata* received from his correspondents are part of his herbarium containing about 11,000 specimens.

A lot of information on plants cultivated in the Botanic Garden are "captured" in the water colours that make up the first 28 volumes of *Iconographia Taurinensis*, a work that was to continue until 1868 with the production of 64 volumes which saw the collaboration in addition to that of Peyrolery, the author also of the majority of the plates in *Flora Pedemontana*, of three other botanist painters, Giovanni Bottione, Peyrolery's nephew, his daughter Angela Rossi Bottione and Maddelena Lisa Mussino (Chiapusso Voli, 1904; Forneris, 1985-86).

The path marked out by Allioni was followed by his pupils who too became important figures in botanic spheres such as Pietro Dana and Giovanni Battista Balbis, his successors as directors of the Botanic Garden.

In 1796 Vittorio Amedeo III added a new piece of land to the Botanic Garden, which for many years remained unused.

The beginning of the 19th century, with the Napoleonic period and the successive Restoration, brought about deep socio-political and cultural changes. After the death of Dana, the directorship of the Botanic Garden was entrusted to one of Allioni's most devoted pupils, G.B. Balbis. After taking refuge in France several years before because of his political ideas and re-entering Piedmont as a doctor in the French army, he obtained considerable funds from the Government for the Botanic Garden.

With the return of the Savoys Balbis was removed and the directorship was taken up by Giovanni Biroli and then by Carlo Matteo Capelli, who both continued until 1829 a praiseworthy work of increasing the living collections and the Herbarium. However, it was the appointment as Director in 1829 of Giuseppe Giacinto Moris (1796-1869), one of Balbo's pupils, that was to give a new turn to the organisation and modernisation of the Botanic Garden.

Under his directorship in 1831 the garden sector was laid out again and enhanced with a central tree-lined avenue. Many of the species planted then still exist and are fairing well (*Ginkgo biloba*, *Liriodendron tulipifera*, and *Tilia tomentosa*).

In the northern area, donated by Vittorio Amedeo III, the so-called "Boschetto" was laid out as a romantic woodland-park, with tree species inserted according to De Candolle's natural method.

By consulting the expenditure ledgers and the lists in which the gardeners noted the new trees planted, one can reconstruct the history of certain specimens that today are characterised by age, size and wealth of "historical" information that allow them to be considered as monumental trees.

Between 1839 and 1849 the "wintering" frames built, for acclimatising Alpine species and the years 1848-50 saw the construction of the "Serra Volante" (a greenhouse originally designed to be dismantled in summer but never was), which remained functional until 1934, and two sunken "Dutch style" greenhouses, for the cultivation of tropical species of which one remains. This was restored in 1999 and houses Orchidaceae and Bromeliaceae, as well as other specimens of tropical flora and threatened species, within the auspices of *ex situ* biodiversity conservation schemes.

With Moris the Botanic Garden, with its some 12000 cultivated species, reached its maximum splendour.

His pupil and successor Giovanni Battista Delponte, scholar of Cryptogams and plants of agricultural interest, documented the state of collections in a work published in 1874 entitled "*Guida allo studio delle piante coltivate nelle aiuole di piena terra nell'Orto Botanico della Regia Università di Torino*", conceived as a study guide.

The situation of the Botanic Garden has remained almost unchanged until the present day. The work of Giovanni Arcangeli and of Giuseppe Gibelli was important especially in the sectors of plant anatomy and physiology with little impact on the collections. Also during the short directorship of Severino Belli the situation of the Botanic Garden did not change.

Oreste Mattiolo, a scholar with a vast culture and many interests, who was director from 1900 to 1932, was one of the key personalities for the Botanic Garden in the 20th century. In addition to being a biologist and mycologist, he was aware of history: among his achievements in this field we should recall the celebrations for the first centenary of the death of Allioni that led to numerous scientific publications on the work of the Master (Mattiolo, 1929; Ceruti, 1978; Montacchini, 1992; Caramiello, 2002; Caramiello & Fossa, 2007).

Interest for pharmaceutical botany induced Mattiolo in 1932 to transform one of the greenhouses into a classroom-laboratory for the teaching of this subject, equipped with *exsiccata* and models of flowers and other plant structures.

The events of the First World War, together with the shortage of personnel and fuel, brought about serious damage to the living collections. From 1932 to 1948, during the directorship of Carlo Cappelletti, life at the Botanic Garden continued to be fraught with difficulty: the Second World War caused even more damage than the First, both to the greenhouses and the “*Boschetto*”.

Beniamino Peyronel was director of the Botanic Garden from 1951 to 1960, followed by Arturo Ceruti until 1981: both, although interested in the floristics and systematic botany of higher plants, were mycologists who were particularly attentive to new scientific and technological developments.

From the structural point of view some action was taken under the auspices of the “Italia 61” (Italian Unity Centenary) celebrations and in 1962/63 Ceruti entrusted Bruno Peyronel, an expert in Alpine flora, with the creation of an Alpine Garden, consisting of a mound of earth and rocks for the cultivation of Montane and Alpine species from mountain chains worldwide. Already in the past there had been successful attempts at the Botanic Garden to grow Alpine species, which had allowed Mattiolo in 1884, at the request of the Club Alpino Italiano, to present at the Alpine Exhibition in Turin some 200 high altitude species, most of which were grown in the Botanic Garden (Fig. 1).

In 1969 to replace the greenhouses which had been dismantled for the building of new classrooms, on



Figure 1. *Alpinetum* instituted in 1963.

the west side, in place of the former “*Serra Volante*” a new greenhouse was built for the cultivation in the earth and in pots of subtropical and tropical species (Scalva, 2002).

THE BOTANIC GARDEN TODAY

Since 1996 the Botanic Garden has been open, with guided tours, not only to schools but also

to the general public with works for updating and completing collections and the provision of new signs with illustrated study cards (Fig. 2).



Figure 2. Botanic Garden. 2005 Plastic relief map (Politecnico di Torino, Facoltà di Architettura).

In the greenhouses, on the occasion of the restoration works carried out in 1999 and 2000, specimens were displayed in a didactic way, with explanatory panels that allow the development of topics on systematic botany, anatomy and ecology.

The succulent plant greenhouse accommodates about 350 species of different continents, with collections of Aizoaceae, Cactaceae, Compositae, Liliaceae, etc. (Fig. 3)

In the sunken greenhouse there are over another 300 species, mainly of

Bromeliaceae and Orchidaceae, which have recently been increased by new acquisitions.

The “wintering” frames now have a collection of medicinal species which is a thematic collection set up by selecting local species cited in the ancient *Pharmacopoea Taurinensis* of 1736.

In the frames opposite the succulent plant greenhouse there is a collection of *Opuntia* (“prickly pear”) that survive outside all year round, with the production of flowers and fruits.

The open flowerbeds are used for systematic collections regarding the different families and in all contain about 1400 taxa. They also host species used in chemotaxonomic and biomolecular studies; *Artemisia* and *Mentha* hold a predominant place among the studied genera.

Furthermore a small itinerary has been prepared for those with partly or fully impaired sight, with 16 observation points with special cards written in large print and in Braille.

Following the approach that presents environments instead of simply showing the names of the trees, for the “*Boschetto*” too a new “interpretation” is suggested. This sector, which was born as a woodland-park, today is proposed as a strip of Po valley woodland, rich in various elements that derive from the Villafranchian to today.

Palynological analyses performed on layers of Villafranchian soils found only a few kilometres from Turin allow us to claim that *Carya*, *Pterocarya*, *Zelkova*, *Pseudotsuga*, *Taxodium*, *Sciadopitys*,



Fig. 3. Succulent plants in green house.

Sequoiadendron etc, introduced in the 19th century to show the public “rare and exotic taxa”, were part of the floristic heritage of the ancient woodland: on this basis it is today possible to interpret much of the “*Boschetto*” in a diachronic key.

In 2002, within the framework of the project for the musealisation of the collection of Garnier-Valletti’ pomological models acquired from the City of Turin, an orchard with 59 specimens of ancient fruit trees was created. Today the trees are sold by Italian and French nurseries with names corresponding to those of the models at the end of the 19th century. The aims of this *in vivo* collection are manifold: to allow visitors who see the display of models to observe in nature the trees with their fruits; to stimulate curiosity for naturalist observation and interest for residual local production; to evaluate with phenological observations whether the cultivars have preserved the features of bearing, blossoming and fructification reported in fruit-growing literature in the 19th and 20th centuries.

Furthermore, biomolecular studies allow one to check the effective appurtenance of the various cultivars to the “pomological families” proposed in the old works based exclusively on morphology. The work is part of the programmes to preserve the ancient germoplasm of the most common fruit trees (Caramiello *et al.*, 2004; Caramiello & Fossa, 2007) (Fig. 4).



Figure 4. Beurré Giffard, part of the ancient fruit collection models made by Garnier-Valletti and cultivated in the Botanical Garden.



THE “NEW GREENHOUSE”

The latest addition, opened in 2007, is the so-called “New Greenhouse” built on the same site of the old “*Serra Volante*” and that built in the 1960s and demolished in 2005 (Fig. 5 a, b).

It is equipped with temperature and humidity control systems and houses exotic species from the main floristic-vegetation environments of South Africa, which the greenhouse reconstructs.

The choice of this set of habitats has been dictated by the particular wealth of flora and by the presence in South Africa of 14 of the approximately 200 plant biodiversity centres worldwide. Among the region’s numerous environments only some have been selected. These are proposed in various parts of the greenhouse and are represented by about 550 species.

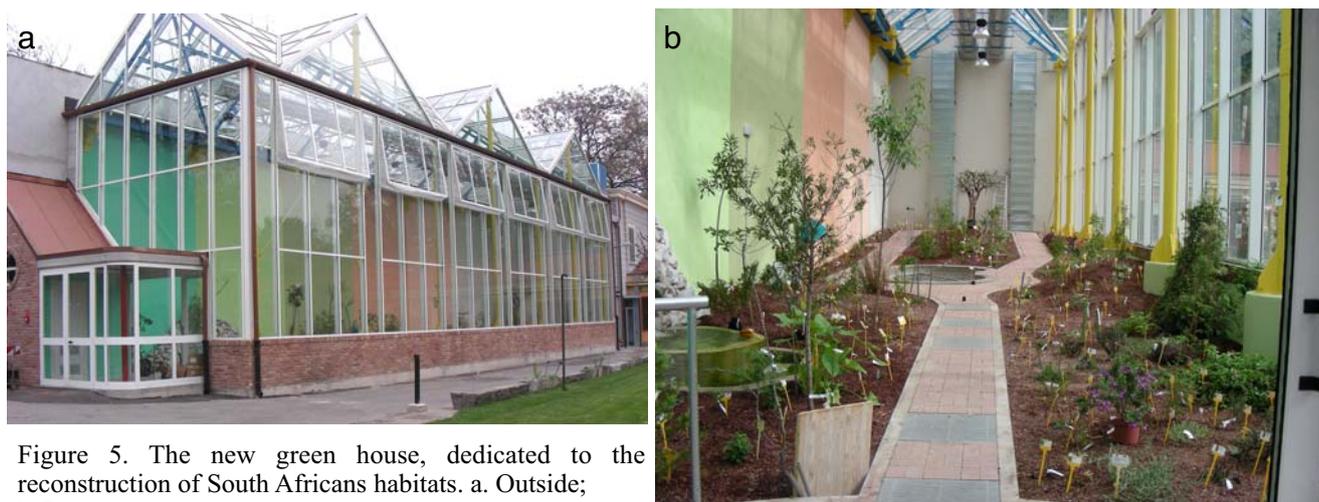


Figure 5. The new green house, dedicated to the reconstruction of South Africans habitats. a. Outside; b. Inside.

Near the entrance there is the sector of the hot-humid forest called Tsitsikamma, considered as residual compared to its original extension; this is followed by the Fynbos, characterised by high rainfall and temperatures similar to those of the European Mediterranean, in which there is a prevalence of evergreen sclerophyll. In the central part we find examples of flora of the Swartberg mountains, which separate the Fynbos from the increasingly more arid South African inland regions, and which are characterised by a tall grass vegetation belonging to the Restionaceae family.

This is followed by a representation of the flora of the Cape Region, one of the least extensive but one which is particularly rich in endemisms and subject to a considerable environmental risk. The upper part of greenhouse hosts species from the Karoo, a very arid zone with rainfall decreasing from east to west, rich in succulent and bulbous plants.

Alongside this there is a strip of Namaqualand (Bushman's Land) flora, this too with a hot dry climate; finally we have an example of Richtersvald vegetation, a zone where temperatures reach 50° C. Here there is a large specimen of *Aloe dichotoma*, the species that is the symbol of this area.

Along the route the visitor will find explanatory signs and two information points with in-depth videos on the various biomes, on international regulations that govern trade in threatened species (CITES), on some genera exhibited in the greenhouse (*Pelargonium*) and on the history of the Botanic Garden.

GARDENS CONNECTED TO THE BOTANIC GARDENS

The Botanic Garden is a dynamic museal reality, that updates its collections and dedicates space to thematic displays linked to interests or events that can change rapidly.

An example of its openness is its creation of gardens in the Mediaeval Village in the Valentino Park, consisting of a *Hortus simplicium* and of one for food plants, for which were chosen species and garden furnishings following the indications found in documents regarding 15th century castles of the hilly and mountainous areas of Piedmont and the Aosta Valley.

A further expansion of the Botanic Garden's collections is to be found in Moncalieri (near Turin) with the creation of the "Carlo Allioni Phenological Garden" in the Turin stretch of the Po River Park. The Garden was created in 2000 with the planting of 23 guideline species, chosen from trees and shrubs typical of

European regions with a continental climate, introduced following schemes that are common to other institutions of the same kind present in Italy and other European countries (Caramiello *et al.*, 2004).

Weekly phenological readings are taken here to evaluate the influence of climate and microclimate on the periodic vegetative and reproductive responses. The results of the monitoring will allow one, with the use of mathematical forecasting models, to plan short and long-term interventions.

In addition the Botanic Garden is taking part in programmes for renovating city parks, in collaboration with the Parks sector of the City administration, and in the preparation of guides for visitors.

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