Further comprehensive books on plants
The State Herbarium has a long tradition of publishing books on South Australian plants. An example is the *Flora of South Australia* which has had four editions since 1926; the last in 1986 described the 4500 South Australian flowering plants known to that time (now out of print, it has been digitised and is projected on the *Electronic Flora* website). Staff also participate in the national collaborative work *Flora of Australia.* An illustrated new *South Australian Native Grass Flora*, a popular work on the Sturt Pea, and a new edition of *Plants of the Adelaide Plains and Hills* are current books in prepation.

***Electronic Flora of South Australia*: moving to web publications and tools**
Computerisation of the State Herbarium's specimen data and the current scientific name, descriptions, notes and images on each of our plants provides another means of providing up to date information to users, including maps of distribution. The *Electronic Flora of South Australia* on *www.flora.sa.gov.au* is being developed progressively to project this information.

The South Australian node o*f Australia's Virtual Herbarium*, which links databases relating to 6 million specimens in Australia's State and Commonwealth herbaria, is accessible via the *Electronic Flora* site. In its initial stage users can view a distribution map of each Australian plant species as its specimen data is captured. The AVH, the prototype of which was developed in 1998 at the State Herbarium, is a global first in its projection of continental distribution maps of a major group of organisms by linking data housed in widely distributed herbarium databases.

The State Herbarium is currently involved with building a new AVH able to deliver data more quickly and with better checks on "down-time" to increase chances of complete access across the herbaria. The project has been supported by the CRC for Australian Weed Management. A Weed Tracking tool is being built to report on significant extensions of range of any weed of interest to a registered user.

The State Herbarium has been involved in collaborated ventures to produce CD identification tools for *Families of Flowering Plants, Wattle (Acacia)*, and *Blackberry: an identification and best-practice and weed-management tool.* It is well-advanced in developing further electronic identification tools for *Hakea* and Solanaceae drawing on the work of our specialists in these groups.

Botanical illustrations
Illustrations have always been important in helping interpret technical descriptions of plants and to convey an instant impression of the plant. Analytical drawings illustrate key diagnostic features. Photographs can often be useful adjuncts. Copiously illustrated, *Plants of the Adelaide Plains and Hills* is about to move into its third edition.

Rare plants: bringing knowledge of biology to conservation
Action to save rare plant species faced with extinction needs to be based on good scientific knowledge. Improvements in communicating in distributional and taxonomic data to other sections of the Science and Conservation Directorate are being made enhance recovery plans and on-ground actions.

The Library: a specialist facility
The Library is a key repository of literature on botanical classifications and horticulture in South Australia. It is specialist in subject area and diverse in resources and principally serves the needs of State Herbarium, Botanic Gardens and other Science & Conservation staff, local, national and international botanists and horticulturists, and, by appointment, members of the public. Material ranges from 16th century printed works to modern electronic information.

Volunteers. Members of the public have contributed in many ways to building the State Herbarium's collections, their curation and the institution's research programme.

The Public Reference Herbarium: identifying a plant yourself
The main public-access area of the State Herbarium, the Eric Jackson Reference Herbarium, is a facility for those with at least some skills in plant identification. Services for enquirers include:

- **Named specimens** of all SA species.These specimens are arranged in plant families.
- **Books** about South Australian plants; these are available to help you identify your plant.
- A **microscope** for closer study of specimens. A microscope is frequently necessary to observe features important for identification.

The Reference Herbarium is open to the public 9 am - 5 pm, Monday - Friday.

For further information contact:

The Chief Botanist, State Herbarium of South Australia
Plant Biodiversity Centre,
Hackney Road, Adelaide, SA 5000.
(08) 8222 9311 (ph); pbc@saugov.sa.gov.au

The State Herbarium of South Australia

Key centre for knowledge and information on South Australia's native and naturalised plants, algae and fungi

Located at South Australia's Plant Biodiversity Centre
Hackney Road, Adelaide SA 5000

Science & Conservation Directorate
Department for Environment & Heritage

Board of the Botanic Gardens & State Herbarium

15 March 2006

Government of South Australia | Department for Environment and Heritage

Users of information produced by the State Herbarium of South Australia

Knowledge of our plants underpins all plant sciences and is crucial in environmental management. Through its collections, their study and information contained in them, the State Herbarium collates accurate information about the State's flora including a State and regional census and the geographical occurrence of each species. Its publications provide a variety of information such as variation, habitat, biology, illustrations and and a means to identify plants.

The State Herbarium is therefore an essential resource for carrying out flora and fauna surveys (e.g. Biological Survey), vegetation mapping programs (e.g. Dept for Environment & Heritage), native vegetation conservation (e.g. National Parks and Reserves, Urban Forest Biodiversity Program), weed identification (Quarantine, Animal & Pant Control Commission) and community management and rehabilitation programs (e.g. Land Care, Bushcare).

From dispersed collections to Plant Biodiversity Centre

The State Herbarium collection housed in the Plant Biodiversity Centre was first brought together from dispersed personal and institutional collections (e.g. of Prof. J.B. Cleland and the University of Adelaide) under the roof of the original State Herbarium of South Australia in part of the old administration building of the Botanic Gardens of Adelaide in the mid 1950s. They were given their own custom-built home in 1966, followed by two building extensions. This site has now made way for the National Wine Centre. Relics of the former building are found in most of the metal shelving systems in the redeveloped "Tram Barn A". The change of name for its home, reflecting the Centre's basic role in providing a knowledge base of plant biodiversity of the bush. While the traditional link of the State Herbarium with the Botanic Gardens of Adelaide is maintained, the shift of location has coincided with the cementing of closer ties with wider scientific and conservation programs in a new Directorate of Science & Conservation in the Department for Environment & Heritage, with all programs in the Directorate about to be consolidated at the Hackney site.

From field to folder: processing and dispersing specimens

Drying: Plants collected into presses in the field may not have completely dried. Final drying usually takes place in large drying cabinets.

Freezing: Institutions with large holdings of biological collections are constantly vigilant to avoid insect infestation, particularly in the storage areas (***vaults***). All plant specimens coming into the Centre and removed from the vaults are frozen for 7 days to kill any associated insects or their eggs. Past methods for controlling insects have involved dipping specimens in mercuric chloride and more recently regular gassing of the vaults with potent chemicals. Integrated pest management has been implemented as a preferable way of monitoring and control and sticky traps are used to keep a look out for the tiny beetles involved.

Mounting: The specimen and associated information label are attached to a sheet of acid-free card with acid-free glue. The removal of acid from the paper and glue ensures a longer life for the specimen. Excellent herbarium specimens dating from the 1700s exist in European herbaria.

Identification: Specimens are identified by members of staff expert in use of the extensive global and local literature about our South Australian plants.

Storage and use of the specimens in research: Specimens are sorted and stored in the vaults where the State Herbarium collection currently comprises 925,000 dried plant specimens. The vaults are specially constructed to minimise temperature extremes and insect attack and are provided with a state-of-art, environmentally friendly fire-suppression system. The collection is valued at $43 million, though, through vegetation clearance, many specimens would be only replaceable by sampling different populations.

A global network: Extra specimens (***duplicates***) of the same collection are sent to herbaria all over the world. In ***exchange*** we receive specimens from other herbaria. Botanists carrying out research into plant groups are ***loaned*** specimens from other states of Australia and overseas. Workers all over the world also ***borrow*** our own specimens.

This ***global exchange and reciprocal loan of specimens*** is crucial. By these means we can compare our specimens with those from elsewhere in Australia or from other countries. We need to know that the name we use for a plant here is the same as that used interstate or overseas, particularly when dealing with weeds and quarantine issues.

Computerising our specimen label data: Data on the labels of over 580,000 of the State Herbarium's 925,000 specimens has been captured. Almost five years of Commonwealth and State *Natural Heritage Trust* funding supplemented by a significant private investment (totalling $8.5 million have hastened this process. We are now probably 70% way towards capturing data associated with the bulk of the 6 million specimens in all Australian herbaria. Outcomes from the capture of this wealth of data include the production of maps showing the distribution of species and the history of occurrence of species. This information is now being projected over the World Wide Web and and is accessible by the public (see *Electronic Flora* below).

The collections: a place of discovery

Discovering new species

New finds in the field are rare. Most discoveries of new species result from in-depth studies of specimens already in collections. An example is the marked variation in what is currently known as a single species, the Common Everlasting (*Chrysocephalum apiculatum*). This variation has been well known for many years but remains poorly understood. Further detailed taxonomic work will undoubtedly show that several species are involved. Such problems, a major reason for name changes, are tackled regularly by State Herbarium taxonomists in the course of advancing knowledge of our bushland plants.

> *In the past 10 years an average of 20 native and 10 naturalised species have been added each year to the almost 4700 species of South Australian flowering and other vascular plants*

Which species are rare or threatened?

With the advance of suburbia, historic vegetation clearance and other human activity, many species once considered to be quite common have now become rare or threatened, some extinct. Collections in herbaria can give an indication of previous vegetation and which species are now threatened. Initial lists for Briggs & Leigh's *Rare or Threatened Australian Plants* (ROTAP) and Lang & Kraehenbuehl's *Plants of Particular Conservation Significance in South Australia's Agricultural Regions* were based extensively on herbarium collections. Recently Commonwealth and State agencies dealing with threatened species have begun to build data sets able to deal with the changing taxonomies that follow research.

Feral plants: Australian and foreign threats to our native vegetation

Our native bush is being invaded. Many of these invaders were originally introduced as garden plants but have been able to multiply beyond the garden gate. These invaders are not just garden plants introduced from overseas (e.g. *Gazania, Oxalis*) but may also be some of our own Australian plants from other states (e.g. Cootamundra wattle). The State Herbarium collection and staff are frequently consulted on the correct identification of these alien plants and can play an important role in the early warning of potential environmental invaders.

Historical specimens

Botanists and artists accompanied the earliest European visitors to our shores. With Captain Cook in 1770 came Joseph Banks, Daniel Solander and Sydney Parkinson. In 1802, Matthew Flinders was accompanied by the botanist Robert Brown and the artist Ferdinand Bauer. Specimens collected on both of these voyages as well as the plant illustrations produced by the artists still survive and some of the collections are housed in the State Herbarium.

Old collections, housed in this and other Australian and overseas herbaria, give us an insight into the pre-European flora and enable the production of books such as Kraehenbuehl's *Pre-European vegetation of Adelaide*, now widely consulted by revegetation groups.

Products of the State Herbarium

Keeping up with changing plant names

Plant names change as we find out more about them. Such changes reflect advances in our knowledge and understanding of them and their relationships. Original work giving reasons for these name changes is published in scientific journals, including that produced by the State Herbarium. A *Census of South Australian Plants*, listing current scientific names of our plants and superseded names previously applied to them, is available on the Web and is now being maintained digitally for more immediate projection of advances in knowledge. A 5th Edtion of the Census has been published in early 2005. Australian herbaria have embarked on a new national collaborative initiative, the *Australian Plant Census*, which will facilitate the compilation of our State and regional censuses and help reduce discrepancies in the application of names.

Often overlooked plants (mosses, liverworts, lichens, algae and fungi)

Less conspicuous plants are not often studied in detail by botanists. However, South Australia has a tradition of producing handbooks on many of these groups. There are for example handbooks on South Australian lichens, mosses, fungi and algae, all based on collections housed in the State Herbarium. The final sixth volume of the *Marine Benthic Flora of southern Australia* was published in 2003. It is an flora which has brought international acclaim to its author and covers a major region of diversity for these organisms.