HISCOM97

ADELAIDE 24 - 26 September 1997

Herbarium Information Systems Committee (HISCOM)

REPORT and PROCEEDINGS

The **1997 Herbarium Information Systems Committee,** was convened at the Botanic Gardens & State Herbarium of South Australia, North Tce, Adelaide.

These proceedings are divided into two parts, the first briefly documenting each of the presentations given over the three days by way of a short abstract or summary of salient points. The second part documents the Actions and Recommendations arising from the meeting for the Council of Heads of Australian Herbaria and the attention of HISCOM members over the ensuing year.

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Compiled and edited by the convener: Alex R. Chapman, November 1997
Western Australian Herbarium, Department of Conservation and Land Management

PART 1. SUMMARY OF MEETING with ABSTRACTS

1. Welcome (Laurie Haegi)

Participants were welcomed and introduced to the facilities available, modifications to the agenda, and general housekeeping arrangements.

2. Review HISCOM96 actions (Convener)

Alex Chapman, PERTH (Convener and Chair of HISCOM97) welcomed participants and thanked the State Herbarium of South Australia for their organisation of the facilities for this meeting.

The HISCOM96 actions were reviewed during this session and the outcomes are outlined below.

Action Item	Outcome summary
HISCOM Action 1 That each institution through its HISCOM member be urged to join or further develop the testing of electronic data interchange associated with exchange and loans under HISPID standards and to report to the group on success or problems. All HISCOM members (December 1996)	PERTH, AD, DNA and BRI have received HISPID format data and are developing procedures for importing and exporting exchange and loan data in HISPID format, joining NSW and MEL.
HISCOM Action 2 That a draft edition of HISPID Version 3 be sent for tabling at the forthcoming Excecutive Committee of TDWG in Toronto in October 1996. Barry Conn (August 1996)	Sent 24 July 1996 and tabled at the Toronto meeting.
HISCOM Action 3 That the Editor of the third edition of HISPID finalise its contents and index ready for publication by CHAH. Barry Conn (August 1996)	Published in October 1996. A copy has been placed on the HISCOM World Wide Web home page. Expected to be recognised in the TDWG meeting in Taiwan.
HISCOM Action 4 That advice be sought on international exchange standards for spatial data, particularly in relation to the different spatial reference systems adopted in various countries and in relation to a general trend to changing to a global reference system. Bill Barker, Peter Bostock (August 1996)	Advice sought, and a presentation scheduled for HISCOM97 (see Agenda Item 4, this document)
HISCOM Action 5 That a data interchange format be developed to cope with nested hierarchies (arising from multiple value items such as determiners, collectors, exchange institutions, etc.) in time for the next meeting of HISCOM. Barry Conn, Jim Croft, Greg Whitbread, Alan Brooks (July 1997)	Carried over to HISCOM97.
HISCOM Action 6 HISCOM members download Platypus and demonstrate it to their herbarium head, noting its developer's desire to extend it into the botanical arena in response to demand within and outside Australia. HISCOM members (July 1996)	Done at most herbaria. General concensus was that considerable modification would be required to be of full use to botanists.

HISCOM Action 7 That a test of the World Wide Web interface for data entry and editing be conducted internally at the Centre of Plant Biodiversity Research with existing editorial staff. Jim Croft, Greg Whitbread (November 1996)	A consultant (Chris Puttock) was employed during the period and successfully validated a range of plant groups.
HISCOM Action 8 That the acceptance testing of APNI be extended to an external specialist with entry and editing of data relating to accepted names and synonyms within a specialist group. Greg Whitbread, Bill Barker (June 1997)	External access to APNI was not able to be provided during the year.
HISCOM Action 9 That the overall outcomes of the APNI testing process be reported to HISCOM. Jim Croft, Greg Whitbread (June 1997)	See HISCOM97 Agenda item 9, this document.
HISCOM Action 10 Depending on the response from CHAH and the Queensland Herbarium to the above Recommendations to CHAH on tracking Kew Cibachromes in Australia, a suitable database format for Cibachrome and other image data from Kew be developed and circulated to HISCOM members for comment. Peter Bostock (December 1996)	A sample Access database which could potentially be used by the ABLO to keep track of Cibachrome requests and their subsequent completions (KewPhoto.mdb) was created during the year and demonstrated at HISCOM97. This database contained about 1800 photographs, for about 1400 taxa. See HISCOM97 Agenda item 12, this document.
HISCOM Action 11 That the drafted questionnaire on computerisation in Australian herbaria be completed, to be filled in by HISCOM representatives, and collated. response by HISCOM members (October 1996), collation by Alan Brooks (November 1996)	Questionnaire completed by members and compiled by Jim Croft at the end of 1996
HISCOM Action 12 That a registry of DELTA data sets be set up by the Western Australian Herbarium as part of the proposed DELTA Newsletter site on the World Wide Web, and that HISCOM members provide information on ongoing and completed DELTA-based projects when requested. Alex Chapman, all HISCOM members (June 1997)	An international listing of papers published from projects using the DELTA methodology is now maintained at the main DELTA site: http://www.keil.ukans.edu/delta/ A registry of data sets is being compiled at PERTH, however, the DELTA Newsletter web site is now in place at: http://www.calm.wa.gov.au/science/delta/news/
HISCOM Action 13 That a HISCOM home page be developed and linked to the CHAH home page Alan Brooks, Jim Croft (December 1996)	HISCOM home page completed by September 1996 at: http://www.rbgsyd.gov.au/HISCOM.
HISCOM Action 14 HISCOM decided to annually elect a Convener to enable communication with the chairperson of CHAH and with HISCOM membership. Alex Chapman was elected Convener.	Role confirmed August 1996
HISCOM Action 15 HISCOM also decided that it should appoint a provisional representative for CHAH meetings, not necessarily the local representative. Alan Brooks was nominated for HISCOM96	Role confirmed August 1996
HISCOM Action 16 HISCOM accepted the offer by the State Herbarium of South Australia to host its next meeting to coincide with the 1997 ASBS Symposium	Achieved

3. Software in Systematics meeting (Bill Barker)

Bill took an early opportunity to brief HISCOM members on the final format of the Software in Systematics meeting and the expected roles for participating members. The final programme of presentation and demonstration sessions is reproduced here in order to document the significant role HISCOM members played in this meeting.

SUNDAY, 28th September
SOFTWARE IN SYSTEMATICS
Theatre presentations and *ad hoc* demonstrations
(Session repeated on Tuesday evening)

12.30 – 4:10 p.m. (SUNDAY)
7:30 – 10:30 pm (TUESDAY)

Ngapartji Cooperative Multimedia Centre,
211 Rundle Street

12.30 p.m. (Sunday) **7:30 p.m (Tues)**	Theatre presentations (Programme below) and individual demonstrations (listed below) will be run concurrently. Registrants are encouraged to wander between the two. Please note that the theatre presentations on the Tuesday evening start at 7.30 p.m. sharp.

THEATRE PRESENTATIONS (CONCURRENT WITH AD HOC DEMONSTRATIONS)

ASSEMBLING AND DISSEMINATING DISPARATE AND DISPERSED DATA

12:50 p.m. (Sun) **7:30 p.m (Tues)**	Keith Houston	PLATYPUS: A database package designed for taxon based, faunal work.
1:15 p.m. (Sun) **7:55 p.m. (Tues)**	Nick Lander	MAX - personal computer software for managing species data.
1:40 p.m. (Sun) **8:20 p.m. (Tues)**	Jim Croft	[A Census and Nomenclator of Australian Plants]
2:05 p.m.(Sun)	Alan Brooks	[The National Herbarium of New South Wales Information System]
8:45 pm (Tues)	Alex Chapman	A prototype for an integrated flora information system: the Western Australian Herbarium.
2:30 p.m. (Sun) **9:10 p.m. (Tues)**	Karen Wilson	The IOPI Global Plant Checklist in action

TWO INTERACTIVE IDENTIFICATION TOOLS

2:50 p.m.(Sun) **9:30 p.m. (Tues)**	Nick Lander and Alex Chapman	Interactive Identification and information retrieval with DELTA and INTKEY
3:20 p.m. (Sun) **10:00 p.m. (Tues)**	Bruce Maslin & Peter Bostock	*Acacia* identification with LUCid

*AD HOC DEMONSTRATIONS CAFÉ FOYER & STUDIO 1: CONCURRENT WITH THEATRE PRESENTATION)
(Also may be able to be viewed at discretion of demonstrator in Huxley Computer Suite, Physics Building, on Tuesday, Wednesday and possibly Thursday afternoon)

Bostock, Peter.
Botanical Latin Translation

Brooker, Ian , John Connors & Andrew Slee
EUCLID

Brooks, Alan
[The National Herbarium of New South Wales Information System]

Chapman A.R.
A prototype for an integrated flora information system.

Chapman A.R.
An Interactive Key to the Western Australian Flora.

Croft, Jim R.
[A Census and Nomenclator of Australian Plants]

Crosby, Trevor K., John S. Dugdale and Dominic J. Thoreau
Images of primary type specimens of New Zealand Lepidoptera on the Web and CD-ROM: new access to collection information

Dauncey, E.A. Jackson, M. Rayner T.G.J. & Shah-Smith, D.A.
A computerised identification system for poisonous plants and fungi

Dauncey, E.A. Jackson, M., Kirkup, D
[The Royal Botanic Gardens Kew's Index Kewensis on CD ROM: a index to protologues of the Worlds higher plant species brought into the electronic era]

Hastings, Anne
Digital Technology and its role in Biological Imaging at CSIRO, Entomology

Houston, W.W.K.
PLATYPUS: A database package designed for taxon based, faunal work.

Lander, N.S
MAX - personal computer software for managing species data.

Lander, N.S
An Interactive Key to the Western Australian Threatened Flora.

Mackay, D.A.
SPLUS: an example of a statistical software package

Maslin, Bruce
"Wattle": an information system for sustainable utilisation of *Acacia*

Morrison, David A.
[Some phylogenetic software packages]

Nelson, Gareth and Pauline Ladiges
TASS: a tool for interpreting cladograms

Simon B.K., W.D. Clayton, P.D. Bostock, D. Sharp and W.A. Smith
Interactive keys to the grasses of the Moreton Pastoral District, south-eastern Queensland.

Wilson K.L.
The IOPI Global Plant Checklist in action

MONDAY, 29th September

SOFTWARE IN SYSTEMATICS
Evaluation and the future
Convener: Bill Barker
KE sponsorship

8.40 a.m.	Welcome by Bill Barker	
8.50 a.m.	Launch by Dr Tom Stubbs, Director, Resource Information Group, SA Dept of Environment and Natural Resources	
9.00 a.m.	Alan Brooks	Specimen Databases - today and into the future.
9.40 a.m.	Jim Croft	Taxonomic and nomenclatural data
10.20 a.m.	**MORNING TEA**	
10.50 a.m.	Alex Chapman	Taxonomic descriptive data
11.30 a.m.	Tony Boston	Mapping and Modelling
12.10 p.m.	Kevin Jeans	Publishing systematics in a multi-media future
12.40 p.m.	**LUNCH**	
2.00 p.m.	Anne Hastings	Digital Technology and its role in Biological Imaging at CSIRO, Entomology
2.40 p.m.	Jim Croft	Towards a Virtual Australian Herbarium
3.20 p.m.	**AFTERNOON TEA**	
3.50 p.m.	Duncan Mackay	A review of current developments in software for statistical analysis
4.20 p.m.	David Morrison	Phylogenetic software

4. World Geocentric Datum upgrade and conversion issues (Geoff Sandford)

Geoff Sandford is Coordinator of Geodetic Services in the SA Department of Environment & Natural Resources

Geoff gave a comprehensive presentation on the background to the upcoming world geocentric datum upgrade which will come into place on January 1, 2000. He also provided a package of supporting documentation to HISCOM members providing the detailed arguments on the need for change.

Fundamentally, research over the last 15 years has enabled the Australian continent to more correctly placed with reference to the world geocentric geodetic datum. This requires a shift in the order of 200 metres to our current Australian system (AMG84) to be on the GPS earth-centred global system.

Consequently latitudes and longitudes have to change to the new MGA94 grid. This is scheduled to take place on the first day of the year 2000.

Many GPS units already us the global system and hence are giving an error of 200 metres. Moving to the global system will enable GPS units to provide a direct and more correct readout in the new coordinates. (Of course, GPS readings will commonly still be out by c. 100 metres in the new system dues to military obscuring.)

Additionally, there are simple transformations which can be applied to existing geocode data to bring it into line with the new system. Interestingly, the amount of transformation needed to be applied is different between most states, and so there are state transformation algorithms available as well as the standard national transformation.

There are a number of consequences for herbarium systems in dealing with this change.

- All geocodes will need to be accompanied in future by an extra field to indicate whether it is referenced to the old AMG84 system or the new MGA94 grid. This will need to be reflected in the HISPID exchange format.
- The amount of difference between state transformations appears to be negligible (c. 20 - 50 metres) for our type of data and there was provisory agreement between members to apply the standard national transformation.
- Ideally, all herbaria will agree to a date for application of the national transformation, after which time all data exchange will be in the new MGA94 format.
- Herbaria will need to educate collectors so that they communicate the system in which the specimen geocodes have been captured.

After some discussion, it was agreed that HISCOM members will consult with their state Geodesy representative, organise a local information session on the topic, and investigate local transformation and database issues, before the next HISCOM meeting (see Action 5).

5. HISPID3 and data exchange (Barry Conn)

Barry Conn (NSW) discussed recent and upcoming modifications to some HISPID fields, the outcomes of which are reflected in Actions 7-11, then briefly ran through a presentation on the benefits of data exchange (summarised below).

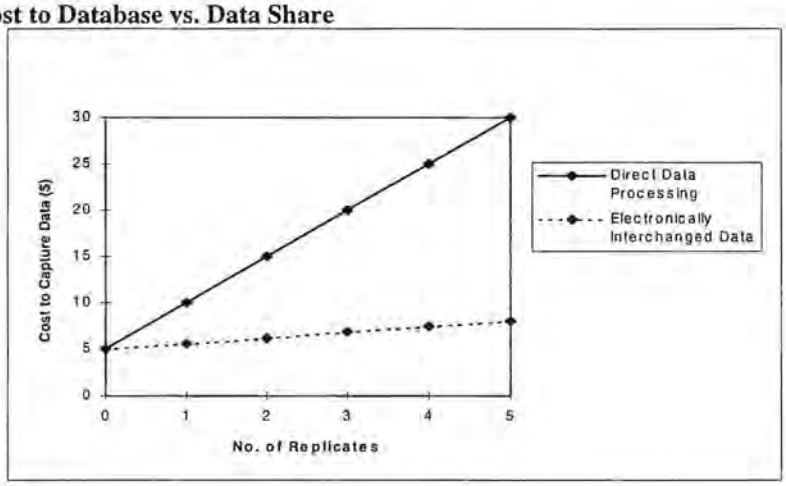
HISPID3 - Data Entry Costs

- Cost to Directly Data Entry One Collection: AUS$5:00 CAN$5:30 UK£2:45 US$4:00
- Rate of Completely Databasing Collections: 4-8 Collections per hour

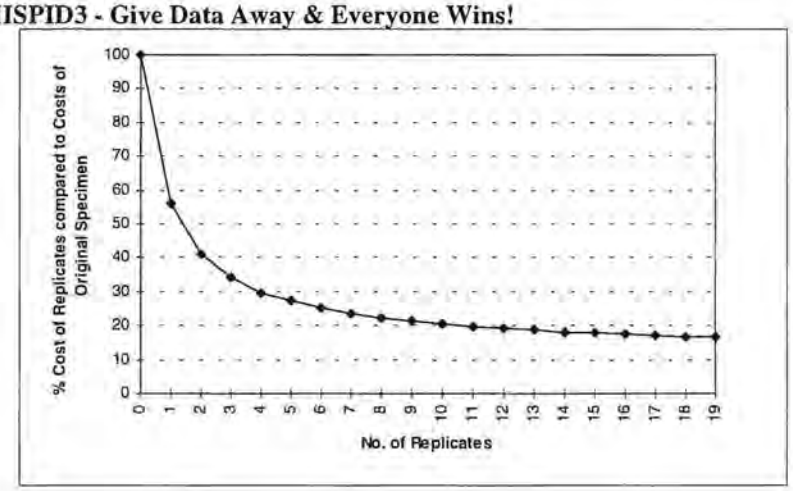
HISPID3 - Sharing Data Costs based on Time

- Rate of Loading Previously Databased Collections: 50-100 Collections per hour
- Therefore, Cost to Indirectly Data Enter One Collection: AUS$0.60

Cost to Database vs. Data Share



HISPID3 - Give Data Away & Everyone Wins!



Cost to Share Electronic Data Between Institutions

- Initial Costs of Developing HISPID3/ITF Transfer File: $4,500
- Costs per Electronically transferred Record (by email) $ 0.30

Cost to Share 3,500 Collections with 3 Institutions

- TO DONATE COLLECTIONS
  - To Data-Entry Collections Once$ $17,500
  - To Convert Data to Transfer Format (3 replicates) $1,050
  - SUBTOTAL $18,550

Cost to Receive 3,500 Collections by 3 Institutions

- TO RECEIVE COLLECTIONS (3 Institutions)
  - To Convert Data from Transfer Format into Db $2,300
  - SUBTOTAL, for 3 Institutions $6,900

Conclusion

Total cost of sharing with 3 institutions **$ 25,450**
Compared with 4 Institutions data-entering the collections **$ 52,500**

Therefore the Overall Costs per Collection is $2.40, not $5.00

6. Specimen and curation databases (Alan Brooks)

Alan Brooks (Database Manager, NSW) gave a precis of his *Software in Systematics* talk on specimen databases.

Specimen databases first began in Herbaria in the 1970s. The early focus for databasing in Herbaria was specimen data capture. The focus today is increasingly shifting to the use of specimen data and many other data sets (and objects that add value to the data eg. Images) in an information system.

Information systems integrate data access and management relating to:

- Specimen data
- Census data
- Images (Multi-media in general)
  - Photographs
  - Illustrations
  - Scanned prologues and other publications
- Maps
- Collection Management (eg. Loans)
- Names Index/List
- Living Collections data
- Plant descriptions
- Identification keys

As we move to integrated Information Systems there are important issues in application design. The Internet provides an excellent platform for internal and external clients to view these systems. Internet access allows us to market data systems more effectively. However, data entry through the Internet is still not practical for large scale data input. The next generation of Herbarium Information Systems need to be based on a Graphical User Interface (GUI) which fully integrates all aspects of data use and collections management.

In order to maximise our investments in these systems, we must look at what needs can be serviced from this data (inside and outside the organisation). We must consider what benefits can be delivered to Herbaria in research and management of collections.

7. The use of Platypus by the NT Herbarium (Anne Fuchs)

The NT Herbarium obtained a single user license of *Platypus* after HISCOM96. Since this time it is being used to maintain a checklist of all taxa on the NT Census. It has also been explored for use as a general taxonomic database to record descriptive information about individual taxa. The NT Herbarium currently maintains a list of approximately 10,500 names, including NT, other Australian and world flora. This will increase as the Darwin Botanic Gardens vouchers their living collection. Currently the checklist in *Platypus* can be downloaded into the Herbarium database (HOLTZE) on request to provide a reference list of names within this application.

In the future NT Herbarium would like to develop a comprehensive taxonomic database that would operate as a central source of names for all other flora databases within the Commission. This database would contain names, synonyms, descriptions, conservation status, bibliography, images, distribution maps, attributes or characteristics such as habit, phenology, morphology, ecological uses, etc both as coded attributes and as descriptive information. The concept is that this would provide a central resource for information for the Herbarium, Parks, Botanic Gardens, other government departments, and the public.

In this context *Platypus* is being investigated as an option to provide this functionality. The model within *Platypus* provides much of the functionality required with the ability to interactively create new classes of information especially useful. However to meet the requirements for a taxonomic database the following issues would need to be addressed :-

Plant names :-

1. Ability to accommodate all levels below species eg. subsp, var and forma, and cultivars to two levels.
2. Ability to link type citation data directly to a specific epithet without having to create the name in duplicate.
3. Change edits within *Platypus* to conform to flora conventions. eg. family names that end in EAE, allow hyphenated names.
4. Ability to track changes to names.
5. Ability to link to the Australian Plant Name Index (APNI).

Bibliography :-

1. Bibliography entry is difficult because is based on entering a string of partial characters from the authors name, etc. Ability to use a drop down list would be useful or a search by keywords.
2. Bibliography is targeted to generating a book reference. Prefer that bibliographic references are treated as a source of information for any aspect of the taxon that has been recorded.

General :-

1. Support of HISPID V3.0 standards.
2. Ability to support ad hoc queries, especially in printing the full taxonomic name easily.
3. The mapping capability provided within *Platypus* is not sufficient to meet our requirements. Wish to link to a GIS.
4. Prefer recording of distribution in a more generic form, rather than worldwide distribution.
5. Minor bugs eg:-
   - after saving a record in the branch in level 2, closes level 2 and opens a branch in level 1
   - cannot change the authors name eg. from Sm to Sm.
6. Provide a way of flagging taxa in the checklist that are of particular interest, for example highlight introduced species on the checklist, possibly by colour, or a tag.
7. Provide a simple interface to entry of attribute and descriptive data. LucID provides an interesting possibilty.
8. Ability to enter, maintain and query data across a wide-area network in a timely manner.
9. Ability to link easily to Oracle databases.

In conclusion, the NT Herbarium will continue to use *Platypus* while a more comprehensive solution is investigated. It currently provides a means of recording and maintaining the data in a form that is an advance on what was previously available and as such is proving to be a valuable tool.

8. Members reports

A round-the-table summary by members and participants of the years highlights or other significant events at their home institutions. Some members deferred more than brief comments at this time in favour of their main presentation.

This session provided a chance to hear from new MEL representatives Marco Duretto and Paul Cholodniuk, Euan Nichol talked briefly on CHR and Barbara Mackinder touched on some issues at Kew which were elaborated in the afternoon session.

Peter Bostock gave a demonstration of his Department's *Wildnet* web application, which enables fundamental conservation management data for the Queensland biota to be easily accessed across the departmental intranet.

There was general comment to the effect that there was increasing growth in and reliance on information technology in home institutions, with a concomitant demand for robust IT infrastructure and software design administered by skilled professionals.

9. Australian Plant Name Index - APNI (Jim Croft and Greg Whitbread)

Jim Croft summarised the work performed over the last year on both the data structures that comprise the APNI database, and the data content. With regard to the data content, records across a range of families in APNI had been updated due to the efforts of part-time consultant botanist Chris Puttock.

Jim also discussed the new Plant Names Project (PNP), a joint initiative between ANBG, Kew and Harvard to coordinate the integration of their names databases (APNI, Index Kewensis and the Grey Cards respectively) to provide a core international plant names database. HISCOM members saw great merit in this project both internationally and nationally, as it enabled a streamlined path for state census data to pass into APNI and then through to the PNP database.

Jim raised the question at this point, relevant also to our later discussions, as to the type of tool needed as an interface to the PNP database, either PC-based software or a distributed network application.

Greg Whitbread then demonstrated the most recent ORACLE GUI interface to APNI, with some detailed discussion on the requirements for the interface and how it reflected the underlying database structure.

Discussion

Lengthy discussion ensued as to the components necessary to ensure that APNI could be brought fully up to date and then maintained. A number of issues were raised as being fundamental to its maintenance, but the prime issue was agreed to be the need for a dedicated coordinator to maintain APNI, coordinate input from the states, and resolve alternative taxonomies. A range of potential solutions were suggested, but any decisions were held over for the following session.

10. *Platypus* and APNI (discussion)

This *ad hoc* session was scheduled following Anne Fuchs presentation on *Platypus* so that members could be fully appraised of the status of APNI before discussing the relationship between the two. During sessions 7, 8 and 9 a number of components were discerned which together could enable the capture of plant names in the national database, problems resolved and the information then maintained in a timely manner.
Upon further discussion, these components were identified as:

1) a **mechanism** to effect the flow of census data from the custodian of plant names in each state into a central holding database at the national level. This mechanism would perhaps be analogous to the exchange of specimen data using the HISPID data exchange standard.
2) a **coordinator** dedicated to compiling and maintaining APNI by resolving problems with amalgamating data from state sources, including the issue of resolving alternative taxonomies and capturing new data as required.
3) a **software tool** to allow specialists in particular Australian plant groups to maintain and extend the taxomomic information about their group, which would then allow its incorporation into the national database. This component requires the development or refinement of appropriate software.
4) a **list of custodians** for particular plant groups prepared to maintain the data in the above software. It is obviously important for the projects success that the software be of such use to the custodians in their own research that they agree to maintain the national listing for their group.

Some groundwork has already been done in each of these areas, however, the software interface was identified as the most crucial element. Three candidate applications were nominated for further evaluation by a small working group of HISCOM, two PC-based and the third a distributed Internet application. See Recommendations 3-5 and Actions 15-19.

11. IT progress at Kew

(Barbara Mackinder, Mark Jackson and Don Kirkup)

Two years ago at the Royal Botanic Gardens, Kew a group was formed to investigate the IT requirements of the General Service Unit (GSU). The GSU is the section in the Herbarium which handles all incoming and outgoing material (loans, acquisitions, exchanges etc.). The group itself consist of 7 staff, the Head of the GSU, 4 taxonomists with special interest in collections management (this include Don Kirkup and myself and 2 members of Kew's IT team (Mark Jackson is one).

Part one: Overview of the Herbarium and related collections - Barbara Mackinder

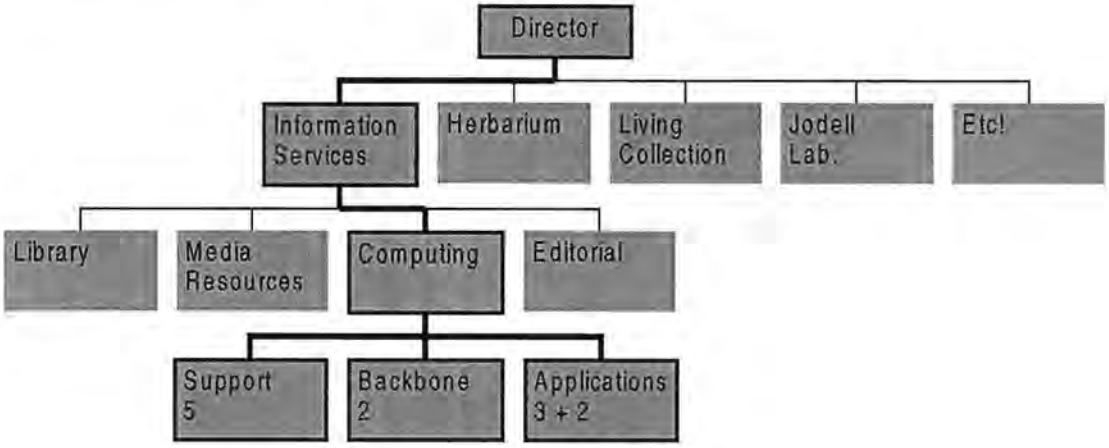
The Herbarium of the Royal Botanic Gardens Kew was founded in 1852. In the subsequent century and a half the collections have grown to around 7 million (including 250,000 types) which together represent around 95% of all flowering plant species. There are several major collections to which the herbarium collection is related. In spirit there are 60,000 items, we have about 50,000 carpological specimens and 175,000 illustrations. The transparency collection exceeds 30,000.

Other major collections held elsewhere at Kew , to which the herbarium sheets may be cross-referenced are the Ethnobotany Collection comprising 43,000 artefacts of plant origin and 30,000 wood samples, the Living Collection with 72,000 accessions representing 52,00 taxa and several slide preparation collections (pollen, wood anatomy and cytology slides). There also exists a DNA extract collection. The Herbarium collections are researched and managed by around 100 scientific staff and consulted annually by 2,500 visitors. In a typical year the GSU handles 100,000 specimens of which half are received as acquisitions ie gifts/exchanges and around 7-10,000 are distributed from Kew as gifts/exchanges. We borrow around 15-20,00 specimens each year from other herbaria and send a similar number of Kew sheets on loan. As part of our loans procedure we microfiche Kew Types (c. 1300 p.a.) and take 6000 cibachrome images, the majority of which are sent as gifts.

These figures are represented diagrammatically. The diagram is colour coded to indicate the reliability of the figures displayed. Those in green are most reliable being based on existing database records. Those in yellow are reasonably accurate estimates. They are based on well documented paper procedures (GSU) or a partly databased collection (transparencies). Those in red are best guesses bases on taking a sample and extrapolating. The scale and diversity of the collections have obvious implications for our computerisation.

Part two: IT Infrastructure at Kew - **Mark Jackson**

COMPUTING SERVICES



IT INFRASTRUCTURE
- c850 registered users
- single site c1km by 2km, with 2 satellites
- Fibre-optic WAN, ethernet LANs
- Internet connection, web site
- mainly networked devices
- Novell & Unix servers, Universe dbms
- Windows 3.1 with Microsoft Office Pro.

APPLICATIONS
- Bespoke software development
- Applications support
- Training
- Access consultancy service

DATABASES
- Index Kewensis
- Plant Genera & Authors
- Living Collection
- Seed Bank
- Bibliographies
- SEPASAL

SUPPORT
- LANs & desktop
- Novell administration
- Ethernet cabling & hubs
- Purchasing & installation
- Maintenance and upgrades
- Security, backups & virus checking
- Help Desk

BACKBONE
- WAN, Routers & bridges
- External communications
- Internet connection
- Web site
- Unix database and comms. servers

CURRENT WORK
- Living Collection Client/Server
- Plant Names Project
- Poisonous Plants & Fungi
- Spruce archives

Part three: IT and the Kew Herbarium - **Don Kirkup**

Don summarised the breadth of databases managed by the Kew Herbarium, including:
- **Institutional** databases such as Index Kewensis, Kew Record, Plant Genera and Authors
- **Species** databases such as ILDIS, Palms, Cyperaceae, Araceae
- **Specimen** databases of Ethnobotany, Spirit, Brunei and Madagascar

Of particular interest was the news that after a long review process, Kew Herbarium had chosen to use the Smithsonian Institute's **CRIS** database system, built in SYBASE and Powerbuilder.

12. Australian Type Photo Index (Peter Bostock)

As a result of various CHAH initiatives, the type photos held by most Australian Herbaria were databased earlier this decade. Qld Herbarium accepted the task of combining the datasets, and of maintaining a centralised Type Photo Index database. For various reasons, this database has not been updated since at least early 1995.

At HISCOM96, during discussions relating to RBG Kew and ABLO cibachrome requests, it was decided to generate an Access database which could potentially be used by the ABLO to keep track of Cibachrome requests and their subsequent completions. In order to assist ABLOs with this task, it was considered useful to pre-load this database with those photographs which had in the past been supplied by Kew, British Museum and Edinburgh.

Peter Bostock duly created a sample database (KewPhoto.mdb), which was demonstrated at HISCOM97; this database (in Access 2.5), contained about 1800 photographs, for about 1400 taxa. This dataset was deficient in some areas, most notably that the recipient of the photograph was not recorded, and most herbaria did not record the type of photograph (ciba, colour slide, B&W etc) in their original data-entry process.

A number of constructive changes were suggested by the members, one of which was the suggestion (by Alan Brooks) that the Type Photo Index would be a useful vehicle for trialling Web query/update principles.

This approach would have a number of benefits over the simple stand-alone database technique previously considered. It would ensure that:

- synchonisation of individual State Herbarium and ABLO databases would not be necessary.
- ABLO could enter preliminary information regarding a type photo eg. sufficient information to identify the specimen and the recipient, and dates etc to track the progress of the photography at Kew, and subsequently, the recipient of that photo in Australia could update the database with an institution accession number and other details more of interest to taxonomists than to ABLO.
- all botanists connected to the system could see easily just what photographs were available, thus hopefully reducing the ABLO workload.

Alan Brooks offered to design a trial version of the proposed Web-server version of the Type Photo Index, to be hosted at NSW.

13. GIS & the SA Biological Survey (Sandy Kinnear)

Sandy Kinnear is Senior GIS Analyst in the Geographic Analysis and Research Unit in the SA Dept Housing and Urban Development.

The South Australian Biological Survey has been running for a number of years collecting ecological information on the states flora and fauna. A large amount of specimen data has been collected, both vouchered and non-vouchered, and the botanical material ends up at the SA Herbarium for identification and archiving.

Geographical Information Systems have been used for a number of years to map the work of the survey projects, record and analyse distribution patterns. The major applications in use these days are ARC/Info and ARCView, with statistical data analysis using PATN. Survery data is entered into DENR's ORACLE databases, but it is common for the data to be 'lumped' into a flat file for use in Info.

Kangaroo Island survey data was used to illustrate the sort of standard GIS analysis performed, with more speculative methods using 3D SceneViewer and 3DAnalyst demonstrated at the end of the talk.

Sandy's presentation highlighted the excellent interpretive work that GIS can be put to in order to visualise patterns of distribution and variation within plant groups. It also signalled, however, that herbaria should be closely involved with the analysis in order to minimise spurious misinterpretations of their data. Ideally herbaria in future could package their data in formats where inconsistencies were filtered out and the raw data was already in a value-added format.

14. Year 2000 issues (Trevor Christensen)

Trevor Christensen is Horticultural Botanist and administrator of the SA Botanic Gardens living collections database. He was a member of the SA Dept Environment and Natural Resources Year 2000 Committee.

Trevor presented a summary of the Year 2000 problem as dealt with by his state department, with particular reference to the evaluated impact on the Botanic Gardens and State Herbarium of SA.

The Year 2000 'bug' manifests itself in various ways but is fundamentally related to computer software or processor designed with an inbuilt dependency on the last two digits of the year, which renders the century ambiguous. It was suggested that computers, computer software or digital processing equipment more than a couple of years old can be compromised in this way.

Specific examples of the systems affected were given, including the environmental control systems for the Conservatory, where although the watering system wouldn't actually stop, the logging of data trends would be interrupted. This required a costly software upgrade.
It was suggested that at worst, personal computers internal clock would need to reset and therefore the effect was merely disruptive.

Software such as major databases needed to be evaluated for Year 2000 compliance. Trevor mentioned in passing that TEXPRESS, the database software used in SA, was compliant. However, although the software itself was compliant, the living collections database key was based on a 2 digit year key (such as 941232). In this case a one day database redesign and rebuild was required, so the impact was not great, however, if all accessions had to be retagged, then the cost would have been much more considerable.

In summary, the cost to the SA Botanic Gardens was roughly $15-20,000, compared to $650-750,000 across the whole department.

In discussion it was considered that Australian herbarium specimen databases were already Year 2000 compliant by nature, but herbaria should participate in their departmental Y2K surveys for other gear.

15. SA Plant Biodiversity Information System (Bill Barker& Laurie Haegi)

Historical background

The State Herbarium of South Australia (AD) has built on a long history in South Australia of provision of data to the community in the form of the traditional hard copy publications: e.g. four editions of the *Flora of South Australia*, handbooks to lichens, mosses, fungi, trees and shrubs, orchids and *Acacia*, censuses of South Australian plants, and lists of taxa of conservation significance.

In the late 1970s and early 1980s the Information Systems Branch in the then Department of Environment and Planning, under Dr Tom Stubbs, developed initial taxonomic and specimen data sets in collaboration with the State Herbarium. First there was the need of a project for them to develop a custom made databse management system, and all Stackhousiaceae specimen data assembled on loan was utilised. Then was the development of a progressively updated electronic census of South Australian Vascular Plants, as an important component of the Department's burgeoning data sets of environmental data, which has now produced its fourth edition in hardcopy form.

From about 1989 capital funding was obtained to develop a database of the data associated with the general collections of the State Herbarium. The capture of *Eucalyptus* data was the initial project with initial capital funding for 3 full time staff, reduced quickly to one FTE. Development of the system Titan was greatly enhanced by borrowing from the experiences of assembling the database of Living Collections of Botanic Gardens of Adelaide and from those of other herbaria who were well on the way with assembling data on their own collections (PERTH, CANB, BRI, DNA, NSW). A policy of permanent clerical staff databasing incoming collections has been maintained. Commonwealth funding through ERIN soon took over and supplied funding for key physiognomic groups: *Acacia*, Casuarinaceae, selected grass genera, Chenopodiaceae. Some [60 000] specimens were databased through their programme, but funding from that source has now dried up (at around 100 000 specimens overall of over 800 000).

In the past two years, following some structural changes in the Botanic Gardens & State Herbarium and persistent lobbying together with the adoption of a strategic approach to presenting cases for resourcing, our Department of Environment and Natural Resources has begun to recognise the importance of the State Herbarium's collections and taxonomic expertise to its electronic information base.

As an initial phase of the strategic approach to developing the Plant Biodiversity Information System, Alex Chapman and Paul Gioia of the WA Department of Conservation and Land Management, Perth undertook a review of the PBIS. Outcomes to date have been:

- The establishment of a PBIS Steering Committee with staff, and Departmental IT and user participation.
- The establishment of a position of Senior Analyst/Programmer to play a major role in planning and development of the PBIS
- Increasing recognition that the Plant Biodiversity Research branch of the Botanic Gardens & State Herbarium needs to be involved in planning programmes, rather than being expected to come on board established programmes developed by our users.
- Recognition of the custodianship of the taxonomic data associated with our Census of South Australian Plants (housed electronically in the SA Biological Survey database system in the Department of Housing and Urban Development!).
- Some $100 000 has been allocated to developing the Plant Biodiversity Information System, effectively a doubling of the Herbarium's operating budget.
- Agencies using our expertise in identification and classification are beginning to include allowance for resourcing of data capture and identification services in their project budgetting.

The South Australian Plant Biodiversity Information System: its current state

The major components of the PBIS and its relationship of the main databases in the SA Biological Survey's information system are shown in the Figure.

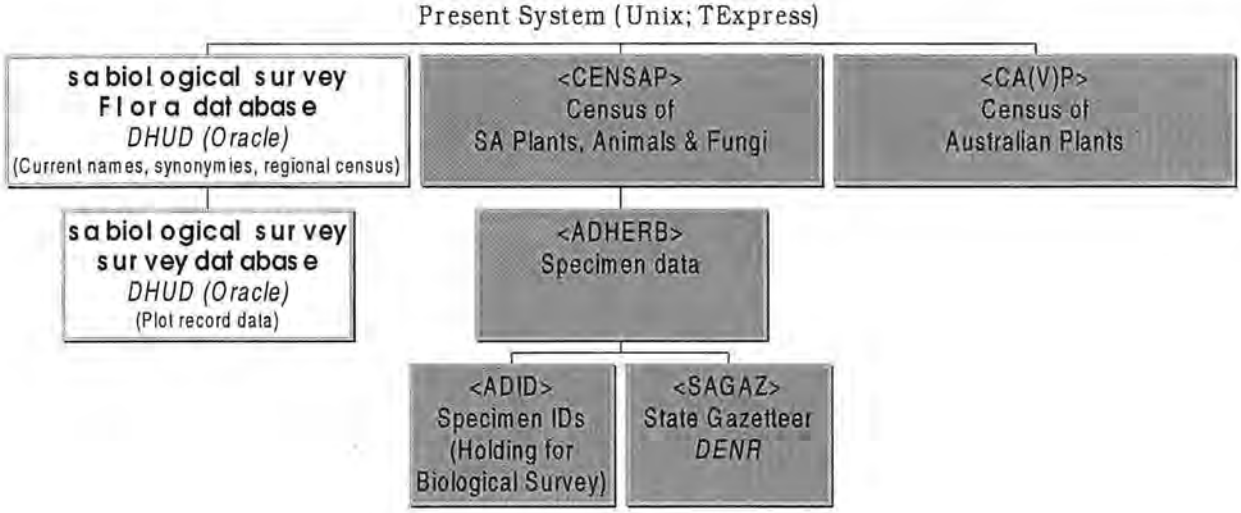


Figure:

Currently we have the equivalent of 2.5 full time temporary data entry operators entering data from the incorporated holdings, together with the equivalent of 1.2 full time permanent staff dealing with incorporated and incoming collections. We have now captured data of 120 000 collections, mainly part of the 400 000 South Australian collections. Our strategy for data capture is being expanded to ensure that the 200 000 collections from other Australian states and 200 000 from elsewhere in the world are not left out. Data capture projects must serve our needs as well as others.

In comparison with other herbaria the introduction of the PBIS has not as yet meant the introduction of computerised practices, apart from the production of labels. To date we have been very much at an initial data capture stage. Barcoding, loan, identification and exchange management systems, postscript label and report production, relatively seamless distribution map production, linkage of the Census to the specimen database, for example, have been broached but are still to be subject to staff evaluation. Usage by staff of the PBIS is at this point continuing to be low. However, the injection of funding and management and staff involvement means that this is subject to change.

First steps in the development of the SA Plant Biodiversity Information System
These have included and will include:

- Introduce information management into the Botanic Gardens & State Herbarium and Departmental Strategic Planning. This involved development of a Botanic Gardens & State Herbarium Information Technology Strategic Plan
- Review the existing PBIS (achieved)
- Establishment of the PBIS Steering Committee (achieved)
- Establishment of a Plant Biodiversity Data Interchange Coordinating Committee (achieved)
- Making an appointment to assist in planning, design and programming of the PBIS (in progress)
- Upgrade our Census CENSAP
    - ◊ recognition amongst other State bodies dealing with plant names of the State Herbarium's custodianship of the Census (gained)
    - ◊ improve link to specimen database ADHERB by vouchering each taxon and then each regional record in the census, using specimens duplicated in State Herbarium's Reference Herbarium in first instance (in progress)
    - ◊ facilitate a link between CENSAP (in Texpress) to a Census on a fully relational database platform (Oracle), either the SA Biological Survey's *Flora* database, the present source of CENSAP or the "*New APNI*", as projected certainly the ideal way of efficiently updating our Census to conform with the concepts of specialists.
    - ◊ develop a protocol for continual updating electronically
    - ◊ make Census available to customers via Botanic Gardens & State Herbarium web home page as way of promoting relevance of Plant Biodiversity Research branch (principally the State Herbarium), and add in first instance useful information in digestible form, e.g.
        - ♥ images (photographs, line drawings)

- ♥ broad scale maps (perhaps just regional shading)
- ♥ current *Flora of South Australia* descriptions and, under genera and families, keys
- ♥ amendments to keys and notes
- ♥ examples of more sophisticated, useful or informative products for which financial support required (e.g. computerised identification tools, dot maps)

- review current curatorial practices and electronic data management and priorities (in progress).
  - ◊ ensure upgrades to PBIS HISPID compliant
  - ◊ take on board where possible the advances made by other herbaria. (The PBIS has already benefited greatly from the generosity of our Australian counterparts). Potential examples are:
    - ♥ the Data Exchange System developed in NSW (currently being introduced)
    - ♥ the Loan Management System (NSW)
    - ♥ the use of field tool to encourage data entry at its source. One of our collectors has used the WA Herbarium's collection data tool *Herbie*. The MAX package of the WA Herbarium is to be evaluated shortly as to its suitability and how it must be upgraded to meet our needs.
  - ◊ provide a HISPID compliant set of databases and protocols for our systematic botanists to assemble their loan data
  - ◊ provide a friendly distribution map generation facility

Conclusion

Regaining lost ground

For various reasons the development of the SA Plant Biodiversity Information System is not as advanced as those in other herbaria. However, none of our herbaria and museums are as advanced as the demands of our traditional and potential customers would want. In this day and age each institution must be proactive to survive. A tradition of relevance is no guarantee of life, certainly not of a rosy future.

We firmly believe that the longevity of our State Herbarium is intrinsically tied to the development and acceptance of its PBIS. To achieve this, we must:

- be relevant to our customer base, and change with the circumscription of that customer base and its needs
- be strategic. We must know our business and what we can achieve with the resources we have or can glean
- be active in selling the capablity and potential of our data. The customer is unlikely to believe he needs you. Here in South Australia others had begun to take our traditional ground from under our feet

At the State level.

So what are our achievements to redress this at the State level.

- In our Department of Environment and Planning, recognition through participation in Strategic Planning and in other Department programmes. Results:
  - ◊ introduction of desktop computing a local area network and inclusion in the Government wide area network.
  - ◊ For the next two years a $100 000 investment in development of the PBIS.
  - ◊ In the Biological Survey of South Australia programme, recognition of the Botanic Gardens & State Herbarium as a major player, with some efforts to redress the problems caused by the increased demands of this survey.
  - ◊ Lead role in a Departmental review of coordination of plant biodiversity activities, out of which is anticipated that the Botanic Gardens & State Herbarium will gain its role in decision making appropriate to its contribution and expertise.
  - ◊ Success in recognition of need to increase resourcing of Botanic Gardens & State Herbarium and PBIS from National Heritage Trust to redress demands from the development of our State's Regional Biodiversity Plans
- In the community, such as Landcare, the Society for Growing Australian Plants, development of recognition of the potential of the State Herbarium to assist in providing access to the plant biodiversity knowledge base that we invariably find a major issue. We are currently perceived as

providing unfriendly identification tools and our under-resourcing has meant long delays in our identification service.

At the Commonwealth level

We may be able to achieve at the State level some of the vital components of our computerised future what others have already achieved, for example the full databasing of our specimens. But this is not assured. Nor can we expect that this will be successful for all Australian herbaria in a reasonable time frame. It is significant that the two largest herbaria are among those least unlikely to achieve this goal. Yet the Melbourne collection is not only the largest, but it is over significance to all Australian states in providing the most complete picture of Australia's plant biodiversity before European colonisation.

We submit that the herbaria of Australia, who have so ably worked together in developing compatibility at the data standard level, must extend their coordinated approach to attracting the resourcing for our push into the future of plant biodiversity activities.

The Commonwealth holds the principal purse for funding our needs. It maps the directions of much that goes on in the States by the conditions it puts on funds provided. Surely we must promote our value and needs there.

The two phases of funding from firstly the Australian Biological Resources Study (resulting in the computerisation of collections of Darwin and Brisbane herbaria) and then the Environmental Resources Information Network (resulting in incomplete databasing of collections of the major ground-cover groups in our herbaria) is over. Nothing is in its place.

Can we afford to be parochial? What is the result of the Commonwealth coming to us wielding dollars for data. Some States have thankfully done very well over these phases. Three have been fully databased. But the outcome overall is a very patchy coverage of the flora of our continent. A cynical view would be that our herbaria have been milked by the Commonwealth to serve its needs. Certainly, apart from a handful of genera, the databasing programmes have left much to be done before this past investment has use in our major business: the production of authoritative views of plant, algal and fungal groups.

We must look to the national level to help focus the demand for improved access to the information base on the Australian herbaria. We must identify our customer base, actual and potential, and enlist them. Only through the sort of strategic approach and involvement at the State level can we hope to generate the resourcing that we so sorely need.

Two areas come immediately to mind that would focus on our expertise and collection resource. Both would promote completion of data capture of our collections:

◊ Identification of rare and threatened taxa. Herbarium research and collection records provided and continue to provide the basis for identifying the lists of such taxa and summaries of their distributional attributes which are basic to Commonwealth initiated programmes. Yet this is a very subjective process based on traditional inefficient methods of assessment which are upgradeable only by repeating the whole process. There is only limited capacity to produce distribution maps of rare species. We do not believe that the nation is served by selling off (for little return) our data on rare species, when so much valuable information is locked up in the remaining undatabased collections

  Value-added applications involving rarity may assist in computerising collections. We have endeavoured in funding applications to promote the concept of specimens as vouchers for populations and the view that conservation planning involving maximising rare species coverage should be complemented by maximising the conservation of isolated populations of species (potential founders in climate change).

◊ Giving the concept of a *Virtual Australian Herbarium* the go-ahead and a high strategic profile. We have a collective jewel in a National crown here. It is a big picture project, yet attainable, and therefore attractive to Government and/or industry to fund. The biggest hurdle to its completion is the databasing of our collections, but we have sufficient collections to promote the concept.

Discussion

Much discussion followed. The meeting accepted the need for a national approach and the need to promote the *Virtual Australian Herbarium*.

The need for a Strategic approach to HISCOM and its future promotion of a coordinated approach to data management in Australian herbaria, and ultimately globally, was agreed.

PART 2. ACTIONS and RECOMMENDATIONS

SECTION A. Herbarium Information Systems Committee

These actions and recommendations are relevant to the functioning of HISCOM as a group or as general items arising from the meeting for attention by members over the coming year.

Action 1: HISCOM to develop a Strategic Plan, to include:

- our vision - of an integrated system for accessing Australian herbarium information (the Virtual Australian Herbarium)
- a mission statement outlining major objectives
- outline of proposed projects covering the next 3 years

The strategic plan, to be drafted initially by Paul Cholodniuk and reviewed by HISCOM members, is to available in draft form for discussion at the next CHAH meeting in Hobart during 4-5 November 1997.

(All members - October 1997)

Recommendation 1: That CHAH supports the further development of HISCOM's Strategic Plan as a tool with which to seek funding to support our vision.

We would also seek advice from CHAH as to sources of funding enabling the HISCOM vision, and their active support in gaining such funding.

Recommendation 2: That CHAH undertake to write to ABRS with a submission for their new policy directions (currently under formulation), suggesting financial support for integrated information systems which strategically underpin the study and communications regarding Australia's biological resources.

Action 2: HISCOM members to report back to their Head of Herbarium on the HISCOM meeting on their return, and run through the final report to be tabled at CHAH with their Head of Herbarium just prior to the CHAH meeting.
(All members - October 1997)

Action 3: Simplify Jim Croft's 1996 herbarium computing questionnaire, and update the information yearly at HISCOM, appending it to the HISCOM report. This may also provide a component of the Australian Herbarium Resources booklet.
(Alan Brooks + Barry Conn - December 1997)

Action 4: With regard to the World Geocentric Datum upgrade, HISCOM members will aim to agree on date for the application of the national geocode transformation within their herbarium's specimen databases. In particular, it was agreed that members will consult with their state GEODESY representative, and report back at HISCOM 1998 on specific transfomation issues. **(All members - July 1998)**

Action 5: On behalf of ASBS, HISCOM has been asked if it would be interested in submitting a proposal for a general symposium session at the next International Botanical Congress in St Louis, USA, August 1999. A number of members expressed interest in giving presentations about HISPID, APNI and the Plant Names Project, and (hopefully) the Virtual Australian Herbarium. A formal reply requesting space/time etc was to have been made to the Congress organisers by 15 September 1997, however, it has been suggested this deadline may be extended.
(All members - November 1997)

Action 6: Peter Bostock was nominated as HISCOM98 convener, for which there was general support in the committee. **(Peter Bostock - November 1997)**

SECTION B. HISPID

These actions are relevant to the maintenance and refinement of the HISPID data exchange standard.

Action 7: Add decimal degrees to HISPID (8 decimal places), and add additional geocode source fields. **(Barry Conn - February 1998)**

Action 8: Build HISPID metadatabase for Web. User access defaults to latest version plus information on field history. **(Barry Conn and Alan Brooks - July 1998)**

Action 9: Investigate the export of HISPID metadata in order to allow a metadata-driven version of Access (or perhaps even Oracle) to be coded, such that
(1) programmers don't have to enter all Hispid field names manually (or hard-wire them in code) and
(2) as a corollory to this, the program won't fail if a name is used which is not entered initially.
Of course, field names which are invented in the future will have to be processed by exception report, but these are listed in the header so are less of a problem.
(Peter Bostock - July 1998)

Action 10: HISPID version control was defined such that a:

- major (integer) version change = a change to HISPID *format*
- minor (decimal) version change = a change/addition of a field

(Barry Conn - February 1998)

Action 11: (*Carried over from HISCOM96 - Action 5*). That a data interchange format be developed to cope with nested hierarchies (arising from multiple value items such as determiners, collectors, exchange institutions, etc.) in time for the next meeting of HISCOM. **(Barry Conn, Jim Croft, GregWhitbread - July 1998)**

SECTION C. Australian Type Photo database

HISCOM intends to develop a simple web interface to this database, to be available generally to herbaria and the ABLO for query and maintenance over the Internet. Such access to a centralised database will enable more timely access to information about existing type photos in Australian herbaria, and allow newly requested photos to be logged by the ABLO and tracked by the requesting botanist.

Some additional fields need to be included in the database:

- KEW booking No. and full institutional accession No.
- Single user and password access
- URL for image reference

Action 12: BRI to finalise existing Type Photo Database **(Peter Bostock - October 1997)**
NB. Alan Brooks has been sent a copy of the ABLO Access 2.5 database (KewPhoto.mdb) as well as the latest version of TypePhoto.mdb (essentially unchanged since about July 1995).

Action 13: Forward latest data from their institution to NSW when requested **(All members)**

Action 14: NSW to create database and load data **(Barry Conn, Alan Brooks - March 1998)**

The real significance of this database will be in providing proof of concept for the utility of online access to significant datasets by all Australian herbaria. This will give developers the opportunity to test the methodology in preparation for an updated APNI web interface, and users more insight into the concept of the Virtual Australian Herbarium.

SECTION D. APNI

These actions are relevant to the development and refinement of Australian Plant Name Index (APNI).

HISCOM believes that maintaining APNI as a national listing is the shared responsibility of each state herbarium. As CHAH has already recognised that APNI is the central authoritative list of Australian vascular plant names, we seek the following:

Recommendation 3: A commitment from CHAH to assign specialists within Australian herbaria to agree to act as custodians for plant group names in APNI.

Recommendation 4: State custodianship for the maintenance of its census information in APNI.

Recommendation 5: That CHAH acknowledge the need for a dedicated coordinator for APNI.

Action 15: A HISCOM working group has been formed to develop a specification for requirements to capture and maintain data in APNI
1) via standalone application
2) via a web interface **(Peter Bostock, Jim Croft, Anne Fuchs - February 1998)**

Action 16: HISCOM to forward this specification to relevant parties (*Platypus*, MAX, APNI developers) for detailed costing.
(Peter Bostock, Jim Croft, Anne Fuchs - March 1998)

Action 17: Development of a web interface to APNI for query
(Greg Whitbread, Jim Croft - February 1998)

Action 18: Extend the web interface to APNI for editing/maintenance by appointed custodial specialists **(Greg Whitbread, Jim Croft - June 1998)**

Action 19: All state herbaria be prepared to submit a copy of their existing census data for inclusion in APNI. **(All members)**

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