Getting started with BRAHMS v8

Updated November 2021

If you have not installed BRAHMS or connected to a database, refer to the installation guide.

This introductory guide provides a rapid walk-through some of the key functions and features available in BRAHMS v8. No previous experience with the system is expected.

The separate BRAHMS manual covers all aspects of system operation including administration, configuration, connections to data stores, import and export, Rapid Data Entry, editing, report design, image management and mapping.

The examples in this document mostly refer to the demo conifer database but you can use another v8 database if you have one available. You can also request a quick migration of your own data, free of charge.

For licensing enquiries, contact brahms@innovation.ox.ac.uk
To obtain an evaluation version, visit https://herbaria.plants.ox.ac.uk/bol/brahms/software/evaluations
Technical enquiries, contact brahms@plants.ox.ac.uk

BRAHMS © Copyright, University of Oxford, 2021. All Rights Reserved
CONTENTS

BRAHMS VERSION 8 ........................................................................................................... 4
MANAGING NATURAL HISTORY ....................................................................................... 4
BRAHMS DEVELOPMENT PRIORITIES ............................................................................ 5
ONLINE VIDEOS ................................................................................................................ 5
BUILDING A NATURAL HISTORY DATABASE .................................................................. 5
INTRODUCTION .................................................................................................................. 5
HARDWARE ......................................................................................................................... 5
DATA MIGRATION ................................................................................................................ 6
OPTIMISING DATA CAPTURE ............................................................................................. 6
EXPLORING YOUR DATA ..................................................................................................... 6
REPORTS .............................................................................................................................. 6
MAPPING ............................................................................................................................. 6
EXPORTING DATA .............................................................................................................. 6
SPECIAL MANAGEMENT AREAS ....................................................................................... 7
TAXA, MUSEUMS, BOTANIC GARDENS, SEED BANKS ......................................................... 8
TAXONOMIC DATA............................................................................................................. 8
COLLECTIONS AND PRESERVED SPECIMENS ................................................................. 9
BOTANIC GARDENS .......................................................................................................... 10
SEED BANKS..................................................................................................................... 12
LOGGING IN TO THE DEMO DATABASE ........................................................................... 13
TASK 1: SET SYSTEM BACKGROUND AND TAXON AUTHOR DISPLAY .......................... 14
TASK 2: OPENING TABLES AND USING DATA GRIDS ..................................................... 15
WORKING ON A SMALL SCREEN? .................................................................................. 15
OPENING AND CLOSING TABLES IN DATA GRIDS ....................................................... 15
OPENING MULTIPLE TABLES ............................................................................................ 16
TASK 3: DOCKING TABLES ............................................................................................... 17
TASK 4: DATA GRID NAVIGATION, FUNCTION KEYS, ZOOM ........................................... 19
NAVIGATION ..................................................................................................................... 19
FUNCTION KEYS ............................................................................................................. 19
RECORD ZOOM .................................................................................................................. 20
USING A RIGHT CLICK ON DATA GRIDS ......................................................................... 20
TASK 5: ADJUST AND SAVE COLUMN VIEWS ................................................................. 21
TASK 6: SORTING RECORDS ............................................................................................ 22
SORT ON SINGLE OR MULTIPLE COLUMNS ................................................................. 22
SAVING COMPLEX SORT COMMANDS ......................................................................... 22
SORTING COLLECTION EVENTS BY COLLECTOR AND NUMBER ............................. 23
DATE SORTING .................................................................................................................. 23
TASK 7: TAGGING FUNCTIONS ....................................................................................... 24
TASK 8: COLUMN SUMMARIES .......................................................................................................................... 26
TASK 9: FIND, FILTER, QUERY ............................................................................................................................ 27
 Queries using the grid filter row ......................................................................................................................... 27
 Queries using selection and +selection ............................................................................................................... 27
TASK 10: BUILDING AND SAVING MORE COMPLEX QUERIES ............................................................................. 29
TASK 11: SAVING DATA TO EXCEL .................................................................................................................... 30
TASK 12: DYNAMIC WEBLINKS .......................................................................................................................... 31
TASK 13: MAPPING FROM THE MAIN DATABASE ................................................................................................ 32
TASK 14: IMAGES AND DOCUMENTS .................................................................................................................. 33
 Images .................................................................................................................................................................... 33
 Documents ............................................................................................................................................................ 33
TASK 15: LITERATURE LINKS ............................................................................................................................... 34
 Adding and editing literature entries .................................................................................................................... 34
 Linking references to data ..................................................................................................................................... 34
TASK 16: OPTIMISING DATA ENTRY, LOOKUPS AND SHORTCUTS ...................................................................... 35
TASK 17: MERGING DATA VALUES AND RECORDS ............................................................................................. 36
 Value merging ....................................................................................................................................................... 36
 Record merging .................................................................................................................................................... 36
TASK 18: USING DATA FORMS ............................................................................................................................. 38
TASK 19: ADDING CUSTOM FIELDS TO BRAHMS ................................................................................................. 40
TASK 20: REGISTER AND OPEN A RAPID DATA ENTRY FILE ............................................................................. 41
 RDE Folders .......................................................................................................................................................... 42
TASK 21: IMPORT FROM EXCEL TO RDE ........................................................................................................... 43
TASK 22: MAPPING FROM RDE ............................................................................................................................. 44
TASK 23: ADDING AND EDITING MAP POINTS IN RDE ......................................................................................... 45
 Location searching ................................................................................................................................................ 46
TASK 24: REPORTING FROM RDE ........................................................................................................................ 47
TASK 25: CREATING YOUR OWN DATABASE ......................................................................................................... 48
 Creating a new database or data store - SQLite .................................................................................................... 48
 Creating a new database - MSSQL Server ............................................................................................................ 49
TASK 26: ADDING DATA TO A NEWLY CREATED DATABASE .................................................................................. 50
 Adding data directly to your new database .......................................................................................................... 50
 Using RDE to add the above data ....................................................................................................................... 50
 Transferring from RDE into BRAHMS ................................................................................................................ 51
TASK 27: ADDING A USER ACCOUNT AND SETTING PERMISSIONS .................................................................... 52
TASK 28: TWO CHALLENGES ............................................................................................................................... 53
BRAHMS Version 8

Managing Natural History

BRAHMS is a scalable management system for preserved, fossil and living natural history collections as well as those undertaking floristic or taxonomic research. Its development is based on almost 30 years of database implementation.

For collection managers in museums, botanic gardens, herbaria and seed banks, BRAHMS helps integrate your data for management and research, increasing outputs and productivity.

Data integration for research and collection management is a key objective with BRAHMS. Taxonomic data lie at the core of the system.

Some database project examples:

- manage a herbarium, grasshopper or beetle collection;
- develop a comprehensive botanic garden or seed bank management system;
- create a catalogue of fungi or cultivated plants;
- produce an annotated checklist for a mountain in Cameroon;
- create an online portal to search and display your data, images and maps;
- help prepare a monograph for a family or a genus;
- or all of these together within a larger natural history museum or herbarium.
BRAHMS has been developed to store all categories of natural history collection.

BRAHMS development priorities

**Intuitive** - similar to MS Office applications

**Scalable** - from individual researcher to multi-site enterprise systems

**Taxonomic Core** - comprehensive across disciplines

**Integrating Digital Assets** - including preserved and living collections

**Modular** - allow others to develop, including web-based add-ons

**International** - with respect to data store and user interface

**Sustainable** - long term development plan with Oxford University Innovation

Online videos

Online training videos can be found on: [https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8videos](https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8videos)

Building a natural history database

**Introduction**

The development of a well organised database is an important activity for managers and researchers. The strategy you adopt will vary depending on your resources, the amount of data to manage and your short and longer term objectives. However, in all these cases, the paths to successful database development are broadly similar.

**Hardware**

For individual researchers running their own show, the software and the database will be installed on a personal computer running Windows or on a Mac with Windows emulation. Aside from having sufficient disk space and as much RAM as possible (8GB or ideally more), there are no special requirements other than that the .NET version is sufficiently up to date. However, bear in mind that performance is broadly related to how well resourced your infrastructure is. *An under-resourced server and/or client workstations leads to poorer performance.*

For institutions with large collections, perhaps many millions, and many simultaneous users, the database will be stored on a server and it is very important that this is well resourced. The server will need sufficient disk space, adequate RAM and a good processor. If you try to run any large database on an inadequately resourced server, performance will be poor.

The BRAHMS software itself will either be installed on a shared drive that all users can access — or on individual client workstations. You can also have a set up with remote server log in by users located
on different sites. On larger networks, the set up you adopt will be fine-tuned to achieve the maximum performance, a specialised IT task that is not further discussed here.

In addition to the server where the database and usually the BRAHMS software are stored, the role of client workstations should not be underestimated. When you log into the BRAHMS software, the system uses the resources of the local workstation/PC. Thus, even if your server is extremely well resourced, under-resourced workstations will not perform well.

In summary, cutting corners on hardware set up is something of a false economy when it comes to establishing a healthy database environment, all the more so when there are large databases and many users. Institutions need to invest appropriately in managing their digital assets.

Data migration
You may have data in an earlier version of BRAHMS, in Excel or Access tables or in other database packages. These data are important and can be migrated into BRAHMS. V7 databases are automatically upgraded (refer to the BRAHMS manual) and data in Excel can be imported to BRAHMS via RDE. Data held in other packages will require some form of migration input.

Optimising data capture
Data entry efficiency (speed + accuracy) can be sensibly optimised for all projects, be they small or large. While smaller number of records can be added directly into BRAHMS, the recommended procedure for larger scale data capture is to use Rapid Data Entry (RDE). Data are added to external RDE spreadsheets (themselves portable mini-databases) and after checking, these data are transferred into the main database. RDE files can themselves be optimised for specific projects by setting up the desired fields and field order.

To take full advantage of RDE, your database can be kick-started by importing useful dictionaries of data, for example collector, taxa and geographic names. Lookup lists can be added for any field where you have a fixed set of values. Although lookup lists can be generated on the fly, it’s usually best to have these defined in advance. You are then in a position to force selection for a defined list or allow the data entry person to add new entries. A more complete range of optimising procedures is discussed in the RDE section of the main guide.

Exploring your data
BRAHMS allows you to explore your data in smart spreadsheets or data grids. While BRAHMS forms are great for data editing, the data grids, together with the many toolbar options, are used for viewing, sorting, filtering, calculating and analysis. Data grids are virtualized, ensuring they are fast even if you are working in table with millions of records.

Reports
Aside from using the data export options provided in BRAHMS, you may want to create report templates for lists, labels, loan forms and others. You can gradually build up a library of handy report templates – and many of the tricks to learn for that are reviewed in detail in the report design section of the main guide. Learning to design cool reports is one aspect of mastering BRAHMS where users with interest to do so can go the extra mile, delving into complete range of report design options as laid out, for example in https://www.stimulsoft.com/en/documentation and https://www.youtube.com/user/StimulsoftVideos

Mapping
Most projects want to produce maps and again, all the procedures for creating maps using different GIS options such as QGIS are reviewed in the manual map section. Bear in mind that if you are online,
you have access not only to the in-built ArcGIS API but also the map point location editor. One of the handiest features in BRAHMS v8 is the ability to view data records and map points together, dynamically linking these to highlight the current data record, and respect filters.

Exporting data
Aside from reporting, all data can be exported to Excel or CSV – and all such exports respect your currently selected column views, applied filters and sort order. You can also export data as Darwin Core Archive (DwC-A) format. Forthcoming is a new XML designer that will allow you to export to XML using a user-defined XML schema.

Special management areas
In addition to the powerful system-wide features and functions listed above, BRAHMS includes specialist modules for managing museums, herbaria, botanic gardens and seed banks. These modules have been developed collaboratively with numerous institutions ensuring that provide the day to day curation and research support that projects need.
Taxa, Museums, Botanic Gardens, Seed Banks

BRAHMS includes various specialist modules notably those that manage taxa, museums/herbaria, botanic gardens and seed banks. These modules provide the day to day curation and research support that projects need. The following notes provide an introduction to some of these features.

Taxonomic data

BRAHMS has separate tables for Higher Classification, Families, Genera and Species, the latter including infraspecific names and cultivars. All the key ICN and ICNCP ranks are covered. There are also separate tables to store authors, common names, plant uses and text descriptions. While some projects require only a simple list of names, others assemble comprehensive details as required for different types of research publication. In this respect, BRAHMS manages all details of nomenclature for taxonomic research.

Field selection in the higher classification table.

A sample species table with the data grid showing selected columns. The taxa form and column management tool are opened and docked right.
Collections and preserved specimens

If a collection event leads to vouchers being taken, the physical specimens will likely be deposited in a museum/herbarium collection. They may be formally mounted and incorporated to a museum collection. Examples are birds, insects, fungi, ferns, higher plants – or indeed any form of preserved natural history material.

Each specimen is linked to a collection event which stores the collector name and number, date, location, initial identification and usually some other details about the collection. A single collection event may lead to multiple specimens (or duplicates). These may be deposited at different institutions and be different types of material (an insect or bird, a herbarium sheet, a DNA sample, seeds, wood section, fruit, etc.).

Specimens may have barcodes and/or accession numbers. They may be ‘types’ of a certain category (holotype, isotype, etc.). Each specimen may have multiple determinations.

Selecting a specific collection category alters the toolbar menu options.

Material may be held in boxes and folders as shown here. Boxes can be barcoded as can the folders and specimens.

- Scalable, to manage any size of collection.
- Allows multiple users to add and edit data simultaneously, with access permission controls.
- Store data for any category of specimen.
- Store one to many physical specimens per collection event.
- Store one to many determinations per specimen.
- Add project specific fields to your database structure if these are not included by default.
- Link images to specimens as physical files or media library URLs.
- Design report templates for lists, loan forms, labels and determination slips.
- Optimize specimen data capture using the Rapid Data Entry module.
- Import specimen data donated from other databases and websites.
- Use specimen data to develop checklists and analyse diversity for differently scaled areas.
- Map geo-referenced collections to show distribution by species or any other queried dataset.
- Publish specimen details with images online.
Botanic Gardens
For more details, refer to the BRAHMS manual section *BRAHMS for Botanic Gardens.*
[https://herbaria.plants.ox.ac.uk/bol/content/software/v8/BRAHMS_Manual.pdf](https://herbaria.plants.ox.ac.uk/bol/content/software/v8/BRAHMS_Manual.pdf)

The BRAHMS living collections module manages data and images for botanic gardens, arboreta and other horticultural projects. The module, which already takes advantage of all standard features to edit, query, report, map, export and publish online, adds comprehensive additional features for managing garden accessions and plants. As these data are fully integrated within BRAHMS, it becomes possible to develop a comprehensive system for both management and research.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taxa</td>
<td>Develop an infrastructure of taxa from higher classification down to infra-specific levels, cultivars and hybrids. Add synonymy, common names, trade names, groups, series, grexes, patent IDs, descriptions, native distribution, hardiness, shade tolerance, water requirements, conservation status and more.</td>
</tr>
<tr>
<td>Garden Layout</td>
<td>Garden locations can be recorded from a defined garden area or theme zone down to pinpoint map location with options to record bed, grid numbering and map shape files.</td>
</tr>
<tr>
<td>Institutions</td>
<td>Manage comprehensive lists of institutions and addresses as suppliers or those receiving material through purchase or transaction exchanges.</td>
</tr>
<tr>
<td>Accessions</td>
<td>Store accession records including details of the type and quantity of material received, who and where from, the original or derived source, and the initial identification.</td>
</tr>
<tr>
<td>Propagation</td>
<td>Add propagation details for all plants including cuttings, grafts and seed - linking this to production propagation to supply garden plants.</td>
</tr>
<tr>
<td>Plant records</td>
<td>Add plant records, linked to accessions, storing all details of plants in the garden from planting out to their disposal, loss or death.</td>
</tr>
<tr>
<td>Plant events</td>
<td>Events for plants can be recorded. Examples are plant maintenance and stock-checks; name changes; observations on leaf flush, flowering, fruiting, disease and cause of death.</td>
</tr>
<tr>
<td>Plant requests</td>
<td>Requests can be logged in the plant management requests file with their ongoing status.</td>
</tr>
<tr>
<td>Transactions</td>
<td>Manage incoming material, garden exchanges and other transaction categories as defined.</td>
</tr>
<tr>
<td>Vouchering</td>
<td>Vouchers may be added from original wild collections and/or established garden plants.</td>
</tr>
<tr>
<td>Images and Documents</td>
<td>Link images and documents to accessions and plants (physical files or media library URLs).</td>
</tr>
<tr>
<td>Legal</td>
<td>Add details of all permits and related documentation for the acquisition and exchange of material.</td>
</tr>
<tr>
<td>Query/Report</td>
<td>Query on any table or field using simple or compound saved query commands.</td>
</tr>
<tr>
<td>Map</td>
<td>Map the location of garden plants using the in-built ArcGIS API or using your preferred GIS.</td>
</tr>
<tr>
<td>Online</td>
<td>Publish a virtual botanic garden or online plant catalogue.</td>
</tr>
</tbody>
</table>
Changing the Category of collection to Living Collection reveals the relevant menu options for these data.

The key tables and relationships associated with the Living Collections module.
Seed Banks

The seed module, developed collaboratively with the Millennium Seed Bank at RBG Kew, has broad curation and research applications for projects who collect, store, test and distribute seed. Seed accession and test data, related vouchers and images are all integrated and can be published online.

- Seed accession records including passport and wild origin data can be managed with links to voucher details, project and agreement details.
- Data on seed cleaning, cleaning time and results and store bank locations are stored.
- Duplication to other seed banks.
- Seed counting processes including absolute and estimates via seed sample weights, incorporation of x-ray and/or cut-testing analysis to provide adjusted quantities per collection.
- Germination test design including addition of multiple conditions and treatments.
- Germination test results provided for both germination and viability percentages, including germination rate.
- Automated scoring of collections/batches against Millennium Seed Bank Partnership Seed Conservation Standards.
- Documents can be linked to accession, individual plant, species and other records. Examples are material transfer documents.
- Images of seed or plants in their original habitat can be added, together with voucher images as available.
- Projects can extend the standard BRAHMS seed data file structures by editing BRAHMS extension files which become a part of your database.
- The Rapid Data Entry (RDE) module is used to capture new seed accessions and test data or to transfer data from other formats such as Excel worksheets.
- You can design your own website and publish a virtual seedbank garden or online plant catalogue directly from BRAHMS using BRAHMS WebConnect. For example see the RBG Kew MSBP data Warehouse at http://brahmsonline.co.uk/msbp.
Logging in to the demo database

If you haven’t installed BRAHMS and/or do not have a link to the conifer database or any another database, refer to the installation guide:
https://herbaria.plants.ox.ac.uk/bol/content/software/v8/BRAHMS_installation.pdf

Otherwise, the login steps for the conifer database are as follows:

- Locate and run the brahms.exe file. You can create a desktop shortcut to this file. If the application does not start, refer to the troubleshooting section in:
  https://herbaria.plants.ox.ac.uk/bol/content/software/v8/BRAHMS_installation.pdf

- On the log in form, choose the settings as shown below:

![BRAHMS Login Form](image)

A splash screen window is displayed as the system gathers the necessary resources. With BRAHMS Authentication, the default user name is ‘Demo’ and the password is lower case ‘demo’. The above settings assume that the conifer database has been located in your personal Documents\BRAHMS folder and is named brahms.db (=default).

Note: if the conifer database is located on a shared drive and your data connection is to the shared drive, multiple users can be logged into the database at the same time.

![Opening Screen](image)

The opening screen will vary, depending on your background image selections.
Task 1: Set system background and taxon author display

To set the BRAHMS application background, select System > Options > Background Image. For example, you can also display background images from your own image gallery choosing Use my images.

Background

To set the BRAHMS application background, select System > Options > Background Image.

Author display

You can control how author names appear in calculated species names. For example, you may want to exclude authors or only include the lowest ranked epithet author name.

Note: If author names are excluded by default, you can override this on a name by name basis using the Force Author options found on the main species form:

No force: Alnus incana subsp. rugosa var. occidentalis
Force all: Alnus incana L. subsp. rugosa R.T.Clausen var. occidentalis (Dippel) C.L.Hitchc.
Force last: Alnus incana subsp. rugosa var. occidentalis (Dippel) C.L.Hitchc.
Task 2: Opening tables and using data grids

Working on a small screen?

If you are working on a small screen and/or have the screen resolution set to lower values, the toolbars may collapse as shown in the screen below.

![Collapsed toolbar](image)

Clicking on the collapsed toolbar opens the otherwise hidden options.

Opening and closing tables in data grids

By default, BRAHMS uses data grids with context sensitive toolbars to browse, locate, sort, edit, query and analyse your data. Data tables are opened using a single click on the selected menu entry. The use of forms is discussed in the Using data forms task.

- On the Taxa menu, click once on Families.

![Taxa menu](image)

When a table opens, the toolbar will usually change to Data Tools which is where you will likely find what you need to do next. For Taxa specific tools or if you want to open another taxa table, return to the Taxa menu.

- To close the table, select the X next to the opened table name.

![Closing a table](image)

Closing a table using the X mark next to the table name.

- Alternatively, to close tables, use Alt+X. Function keys such as Alt+X are listed using Shift+F1 when in any data grid. A grid must be active to do this. Refer to the section on navigation and function keys.
Opening multiple tables

See examples on https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8#multiple

You can open and utilise different tables at the same time. The task here is to open the main family, genus, species and collection events tables.

- On the Taxa menu, click once on Families.
- Return to the Taxa menu and click on Genera. Repeat this now for Species. Note that each time you open a table, the Data Tools toolbar is activated – so you have to return to the Taxa menu.
- Finally, on the main menu, select Collections and choose Collection events.

Each table has a tab which can be selected to view the data in that table.
Task 3: Docking tables

See examples on [https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8#multiple](https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8#multiple)

Video: [https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8videos#opendocklink](https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8videos#opendocklink)

To view two or more of the tables opened in the last exercise at the same time, use the docking features. Tables can be detached from a centrally docked position and docked to the side, above or below another table – or dragged to a different monitor. Forms, images, external web sites, maps, query tools and others are all dock-able.

Positioning tables and other items takes a little practice - there are many potential docking arrangements. The tasks here assume one monitor – but if you have two or more, take advantage of these to display tables and other screens fully undocked.

- Drag table tabs to undock them. Initially, it can be a little tricky to grab the tab correctly. When you drag any table to undock it, a series of yellow ‘docking boxes’ appear.
- Drop the table on one of these docking options – the central box redocks the table as it was.
- As a first try, drag the genus table and re-dock this by placing and releasing your mouse pointer over one of the yellow docking points. Repeat for the species table.

Here the genus table has been undocked and is floating above the other tables. And the species table is about to be docked to the right.

- Repeat this with the collection events table, docking elsewhere or moving it to a different monitor.

The various tables rearranged with collections events dragged off the main application

The yellow docking points appear when you drag a table from a docked position. Docking options vary depending on the windows opened. Some experimentation is required.
Map screen undocked and dragged to separate monitor. In this example, data records have been tagged using different colour symbols, these reflected on the map. A column summary on the Tag column is also active and docked to the right of the main grid.

Left monitor with genus and species tables docked next to the TROPICOS Weblink. The collection events table is shown in the lower small screen and an ArcGIS map with Google Images on the left monitor. The events table is set to update to the selected species record – together with the map and the images.
**Task 4: Data grid navigation, Function keys, Zoom**

There are a few tricks to learn to move efficiently between columns and rows in BRAHMS data grids.

**Navigation**

BRAHMS draws data from your data store into the grids and presents these data with low-lag data virtualization, storing as much data as possible in memory. As you scroll up or down, the system retrieves the relevant data to memory and refreshes the opened grid.

- Close all the tables used in the previous task.
- Select **Collections > Collection Events** to open the events table. Activate the grid by clicking in any data cell. The default mode for data grids is read-only mode, nothing can be edited.

<table>
<thead>
<tr>
<th>Action in non-edit mode</th>
<th>Keys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Move to the next / previous column</td>
<td>Right / Left Arrow</td>
</tr>
<tr>
<td>First/Last column</td>
<td>Home / End keys</td>
</tr>
<tr>
<td>First/Last row</td>
<td>CTRL Home / CTRL End</td>
</tr>
<tr>
<td>Next /Previous row</td>
<td>Down / Up arrow</td>
</tr>
<tr>
<td>Scroll up and down</td>
<td>PgUp / PgDn</td>
</tr>
<tr>
<td>Select or activate a column or cell</td>
<td>Click in the cell</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Action in edit mode</th>
<th>Keys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Move to the next / previous column</td>
<td>TAB / Shift TAB</td>
</tr>
<tr>
<td>Next /Previous row</td>
<td>Down / Up arrow or use Alt+Arrows in memo or numeric fields</td>
</tr>
</tbody>
</table>

**Function keys**

List Function Key assignments using Shift+F1. Before selecting Shift+F1, click anywhere in a data grid. Examples are using F6 to tag or un-tag records; using the DEL key to mark a record for deletion; CTRL+E to swap to Edit mode and Alt+X to close a table.

- Press Ctrl+F6 to ensure all records in this table are untagged.
- Now press F6 several times to tag a few records.
- Try Alt+F6 to set a filter on the tagged records. Ctrl+F11 removes all filters.

Record Zoom

The record **Zoom** function is a great way to summarise and view the current record – but you can also use it for navigating to a column. This can be used in any table.

Double-click on the Zoom field header name e.g. ‘Description’ to go to that column. If it is not visible, it will be made so. The Zoom window can be undocked. You can show all fields or just the non-empty fields.

Using a Right Click on data grids

Right-clicking on data grids opens up a short-cut menu to widely used options.

The functions offered here are all available on the main toolbar. Most have shortcut F keys.
Task 5: Adjust and save column views

Video: https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8videos#columnviewvideo

When you open a table, the default data grid columns will be visible. You can adjust and save new column views using the Column Management options. This applies to all tables. Selecting a particular set of visible columns is a handy way to view selected data and speed up specific editing tasks.

- Select Collections > Collection events then Grid Tools > Manage Columns...

The Column Management Tool allows you to select visible columns.

You can save a view using Save layout on the Grid Tools toolbar. This will create a small data grid view file with extension .dgv saving this file to your BRAHMS\Columns folder. You can create as many views as you want, choosing the view using the Layout dropdown.

Deleting a .dgv file from the Columns folder will remove it from your list. You can also share saved views by copying the saved dgv file to the application shared\columns folder.

An example view with a selection of re-ordered fields, the records sorted in this case by country + year.

Another way to adjust visible columns and field order is to right-click on any of the column headers. This opens a dialogue form with options to show hidden columns and alter the column order. You can also drag column headers to change order and size. And here’s another handy way to hide columns:

- Click anywhere on the Family table to make it the active table. Now click in a field you want to hide. Select the Grid Tools tab and then Hide Current – this hides the selected field.

In summary, there are various ways to select and view columns in your data grids. Different views are useful for specific editing tasks. Views can be deleted and shared.
Task 6: Sorting Records

See examples on https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8#sorting

Sort on single or multiple columns

If column sorting is enabled, tables can be sorted on single columns by clicking on the column header, Shift Clicking on multiple column headers ... or using the Sorting Tool. To use header-click sorts, make sure this option is enabled by setting Enable Header Sort on the Sort toolbar dropdown. You can also set this on by default for all tables in System > Options > Grid options.

- Select Taxa > Genera to open the main genus table.
- Click once on the Family column header to sort A-Z. Click the same column header again to sort Z-A. Click a third time to remove the sort.
- You can combine as many columns as needed using Shift Click on columns headers.

![A single column sort, here descending (Z-A).](image1)

![A multiple column sort, here ascending (A-Z).](image2)

Saving complex sort commands

Using the Sorting tool, you can add fields of any type to create complex sorts. You can save these sorts using the Save option provided.

Using the sort form, any combination of character, numeric, date and logical field can be selected to sort your records. Complex commands can be named and saved for future use.
Sorting collection events by collector and number

Collection event field numbers are alphanumeric and thus, by default, sorting the field number column AZ gives an incorrect sort order.

<table>
<thead>
<tr>
<th>Collectors</th>
<th>Field Number</th>
<th># Field Number (Sortable)</th>
<th>Suffix</th>
<th># Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilson, EH</td>
<td>4079</td>
<td>00000000004079</td>
<td>October 1916</td>
<td></td>
</tr>
<tr>
<td>Wilson, EH</td>
<td>4082</td>
<td>00000000004082</td>
<td>October 1916</td>
<td></td>
</tr>
<tr>
<td>Wilson, EH</td>
<td>4083</td>
<td>00000000004083</td>
<td>October 1916</td>
<td></td>
</tr>
<tr>
<td>Wilson, EH</td>
<td>40 3</td>
<td>00000000004013</td>
<td>04 October 1916</td>
<td></td>
</tr>
<tr>
<td>Wilson, EH</td>
<td>4053</td>
<td>00000000004053</td>
<td>06 October 1916</td>
<td></td>
</tr>
<tr>
<td>Wilson, EH</td>
<td>479</td>
<td>0000000000479</td>
<td>28 April 1900</td>
<td></td>
</tr>
<tr>
<td>Wilson, EH</td>
<td>572</td>
<td>0000000000572</td>
<td>May 1901</td>
<td></td>
</tr>
<tr>
<td>Wilson, EH</td>
<td>60111</td>
<td>00000000006011</td>
<td>1014</td>
<td></td>
</tr>
<tr>
<td>Wilson, EH</td>
<td>60111</td>
<td>00000000006011</td>
<td>10 February 1900</td>
<td></td>
</tr>
<tr>
<td>Wilson, EH</td>
<td>6027</td>
<td>00000000006027</td>
<td>19 February 1900</td>
<td></td>
</tr>
<tr>
<td>Wilson, EH</td>
<td>6025</td>
<td>00000000006025</td>
<td>21 February 1900</td>
<td></td>
</tr>
<tr>
<td>Wilson, EH</td>
<td>6078</td>
<td>00000000006078</td>
<td>1314</td>
<td></td>
</tr>
</tbody>
</table>

As can be seen here on the left, sorting these Wilson, EH collections on Field Number gives a bad result. This is resolved using the calculated field # Field Number (sortable) shown on the right which pads the number field with zeros.

- To display this field, select Grid Tools > # Calc Fields
- You could now sort the collection events table on the Collectors + Field Number (sortable) fields but in reports, still refer to the column Field Number. NB If you do not see data in the sortable field number field, use Data Tools > Calculate > Recalculate.

Date sorting

Records can be sorted on date fields. For example, you can sort on the audit fields Created By, Created On, Last Modified By and Last Modified On and such sorts are useful for a variety of purposes.

When you add a new record, the data grid is auto-sorted on the Created On field. But you may find it useful to sort on this field (click on field header) at other times, perhaps in combination with other fields.

For example, to view records most recently added, you can sort on Created On, clicking the column header twice to bring the most recently added record to the top of your data grid.

If you want to sort collection events by date, sort on year, month and day in that field order, shift clicking on fields for multiple selections.

You can also easily sort on the Last modified date, or using the dropdown on that toolbar option, Date Created.
Task 7: Tagging functions

See examples on https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8#tagging

Video: https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8videos#tagsandmaps

Tagging refers to the addition of a single character to the TAG field. This field is available in all tables in the first column. Tagging has multiple uses throughout BRAHMS with record selection and grouping. While the default tag symbol is *, you can tag records with different symbols or numbers. Each of these can be assigned a colour. Tags are user-specific, thus one users’ tags do not interfere with those of another working in the same table.

Select System > Options > Grid Options to edit the default colour options. Clicking on the Tag option on the Data Tools toolbar adds the selected symbol to the TAG field. The Tag toolbar dropdown provides a list of handy tagging options.

| Transfer tags | Copy tags to child records, for example, species tags can be copied to all collection events, specimens and det history records |
| Count tags | A count of all tagged records. |
| Filter on tagged | Show only tagged records * |
| Tag all | Tag all records in table – respecting any filters |
| Clear all grid tags | Remove your tags from all tables – does not respect filters |
| Clear current grid tags | Remove your tags from the current table – respecting current filters |
| Invert tags | Tagged records are set to no tag; records that had no tag are tagged * |
| Tag with | Choose tag symbol from list |

Records tagged with a variety of symbols.

Tag groups

By using Tag > Tag Groups, you can create and save ‘groups’ based on your tagged records. Tag groups can be shared with other users.
Some sample tag groups in the species table. One of these groups (Doubtful entries) is shared and thus can be seen by other database users.

Tag transfers

Tag > Transfer tags provides options to copy tags to related tables, either up or down a data hierarchy. This tool has multiple applications throughout BRAHMS.

For example, in the species table, tagging down would copy tags to child records including collection events and living accessions. By select the ‘Tag all child records’, the tags will also be copied to the specimen and determination history tables.
Task 8: Column summaries

See examples on https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8#colsum

The column summary option lists the different values in the selected column, providing the total number of records per value.

• Select Collections > Collection events.
• Locate and click in the column # Full Name and then select the Summary option on Data Tools. If you do not see the summary option, refer to the section on small screens.

Here, the summary shows the number of collection events per family. Moving to a different column will update the summary, assuming Auto-update on column change is selected. Click on the summary columns to sort by field name or count.

The summary option can also be used to apply filters on one or more selected values.

• Open any table you want and test the Column Summary function in any column. Moving to different columns auto-updates the list unless the form option Auto-update on column change is disabled.
• Try saving a summary list to Excel using the Export option provided on the summary form.

The Summary tool also has a Merge Value option, handy for cleaning up spelling errors and the like.
Task 9: Find, Filter, Query

Video: https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8videos#datagridfilters

Queries using the grid filter row

See examples on https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8#explore

• Open the main file collection events table using Collections > Collection Events.
• Enter values into the yellow, top grid filter row as shown below. You can use operators *, =, <, >, <=, >= and combine values using capitalized AND/OR statements. You can also use keywords NOT and NULL. <> means not. Thus, adding <> NULL shows non-empty records. The grid filter bar is an efficient way to apply filters and locate records. Note that you must use capitalized key words such as AND and OR.

Using the grid filter row, you can add values to as many columns as needed. For text strings, the default filter mode is 'includes'. Use = to make a precise match.

An example in the Month field using the operators < and >.

• You can use * to select ‘starts with’ and ‘ends with’, thus:

Setting a filter where collector name starts with ‘ter (left) or includes ‘ter’ (centre) and right, where the genus ends ‘illa’.

Queries using Selection and +Selection

You can set filters on current cell values using the Selection and +Selection options.
• Open the main file collection events table using **Collections > Collection Events**. Set a filter on a cell value by clicking on the value and then the **Selection** toolbar. This option overrides any previous filters.

• You can add multiple cell-based queries using the **+Selection** option. As soon as you select **Selection** rather than **+Selection**, the filter will be again restricted to a single value.

Using the **Selection** toolbar options.

![Selection toolbar options](image1)

Use the **Filter Info** toolbar option to list current filters.

![Filter Info toolbar option](image2)
Task 10: Building and saving more complex queries

Using the main Query tool form, you can design and save your own queries. Queries can mix and match fields of any type. Each command you add is saved unless you remove it from the list. You can then selectively enable and combine the one-line commands and optionally name and save combinations of commands.

- Select the toolbar option to open the main Query Tool. Use the various drop downs to add the query commands you want, using Add to add the command to the command list. The AND/OR settings can be adjusted if necessary.
- Use Apply filters to run the query.

An example Query Tool form with previously used commands, three commands enabled. You can name and save a combination of query commands. The Query Tool form can be undocked and dragged off the application.

A further example Query Tool form with previously used commands, four commands enabled. Note that the SQL command used by BRAHMS is displayed in the lower part of the screen.

Active filters can be displayed using the Filter Info option next to the Filter option.
Task 11: Saving data to Excel

See examples on [https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8#exporting](https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8#exporting)

Data are easily exported to Excel spreadsheets using the **Tag -> Excel** or **CSV** options on **Data Tools**. Exporting works only with tagged records. Exports respect applied filters and your currently selected column view.

In this task, export specimen data from BRAHMS, sorted by family and species name, restricting the export to some columns and the filter selection to holotypes. Adjust filters as necessary, depending on your data.

- Select **Collections** from the main menu and choose ‘Preserved Specimen’ using the Category drop down.
- Select **Specimens** to open that table.
- Now select **Grid Tools > Manage Columns** and here you can remove any columns you don’t want to export and sort the table as wanted.
- Locate the Type Category column and enter ‘Hol’ or ‘holo’ in the filter bar to apply a filter on Holotypes.
- Select **Tag > Tag all**
- You can now use the **Export Tagged** option to save the tagged records. If you do not see the Export option, refer to the section on small screens.

![Export tagged records to Excel.](image)

You can list all saved files using the **View** option on the Export Data toolbar section.

In data grids, you can click on a record to select the record. You can use Shift Click to select groups of contiguous records or CTRL Click to select individual records – the same as in other packages. Selected records are displayed in a shaded colour. Copy the selection using CTRL+C. You can then paste CTRL+V these records elsewhere, for example to Excel. Be sure to select the correct paste option to format the data appropriately.
Task 12: Dynamic weblinks

You can dynamically link your database to external websites as provided on the WebLinks toolbar. WebLink options will soon be configurable in BRAHMS, allowing you to add the websites that you find most useful. WebLinks are available from many of the BRAHMS tables, especially when there is a species name in the table. You can test these options in different tables but for this initial task:

- Select Taxa > Species to open the main species table.
- Select WebLinks > POWO (Plants of the World Online).

In this example, the POWO website has been opened on Podocarpus taxifolius, a synonym of Prumnopitys montana. Moving data grid records auto-updates the open weblink page. The species form is opened on the synonyms tab and the various windows are docked.

Examples with the ant genus Acromyrmex, top Google Images, lower using AntWeb.
Task 13: Mapping from the main database

See examples on https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8#mapping

Video: https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8videos#mappingvideo

NB. You can also map your data to ArcMAP, QGIS, DIVA, Google Earth and GeoCAT. These topics are explained in the manual.

The in-built ArcGIS API provides a wealth of handy mapping features which you can take advantage of without installing any further GIS software. You do need to be online.

Some advantages of the in-built ArcGIS tool:  * No installation required; * data points are highlighted on the map as you browse through your data grid; * clicking on a map point locates the grid record, an excellent way to locate errors; * maps are auto-updated as you apply grid filters; * calculation of Extent of Occurrence (EOO); * selectable base map including world imagery; * map tagged only or map all, exclude cultivated records; * search maps; * save map as a png file and import to a document.

• Select Collections > Collection events then select the Mapping toolbar followed by ArcGIS in BRAHMS.
• If no filter is applied, by default, this will plot all tagged records. To plot records, tagged or not, adjust the Tagged only option. The map window can be dragged to another monitor and made full screen size.

A map displaying all conifer collections (no filters applied).

The setting here does not restrict to tagged records and a dark gray base map is selected.

The current data grid record in Kenya is highlighted on the map.

Here, a filter set on New Zealand with the base map set to World imagery.

The point colour has been changed and the current grid record is highlighted.

With the ArcGIS Auto Zoom disabled, you can plot different taxa without changing the current base map area.
Task 14: Images and Documents

See examples on https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8#images

Images

Images can be linked to any record in BRAHMS and you can link multiple images to the same record. All images are listed in the central images table with their full pathname or web URL.

Images may be located in any location including in media libraries and cloud servers. Read more about managing images in BRAHMS. You can store links to images using a URL – you do not need to have a copy of the image file.

Images can be viewed from the main file and/or wherever they are linked. As an example, you can link some images to a species:

- Select Taxa > Species. On Data Tools, select Images… to open the Image Viewer.
- Here, you can either use the Link … button or drag images to the Image Viewer.

The Image Viewer has several handy toolbar options (Rotate, Zoom, etc.). You can also use F keys and your mouse to control the viewer, for example Shift + mouse wheel = zoom in/out around central point.

As discussed in the RDF sections, images can be transferred from Excel files to RDE and also from RDE to BRAHMS.

Documents

Multiple documents of any type can be linked to any record in BRAHMS. This could be a PDF material transfer agreement or collection permit linked to a specimen, accession or transaction; a protologue description linked to a species; a sound file linked to an animal entry; or perhaps a video or slideshow linked to a botanic garden greenhouse record.

Linking pdf, docx, wav, pptx and xlsx documents to a species record. Media and documents can be opened using the Open option or double-clicking on the linked entry.
Task 15: Literature links

You can store references of any category (books, journal articles, websites, etc.) and then link these to any record in your database. For example, you may want to link a book, a book chapter, a report or journal article to a species or to a selected text entry for a species.

Adding and editing literature entries

- Select Biblio > Literature List to open the main table for literature. On the same Biblio menu, you will find table of literature categories and journal listings.

Viewing reference entries in the main literature table. The demo conifer database includes sample reference entries.

Reference entries can be stored as complete reference text strings in the Full Reference field with no attempt to separate the text into the component fields—or you can store the reference using the separate fields for author, title, journal, pages, year, etc. The Full Reference field is auto-updated from the other fields if an entry is made in the TITLE field.

If the Full Reference field is empty or requires updating, select Recalculate on Data Tools toolbar.

- You can add some new reference entries using the standard Add option.

Linking references to data

Literature links are created using the Literature option on the Data Tools toolbar.

This option allows you to select any item from your main literature list and link this to the current record. You can link multiple literature links to any record, optionally adding the relevant page/plate numbers, the link status (for example ‘Synonymy’) and comments.
Task 16: Optimising data entry, lookups and shortcuts

When editing data, the challenge is to maximise efficiency. This comes through mastering the use of function keys, lookups and a few handy tools such as value merging. Function keys make most editing tasks more efficient, lookups minimise typing and help standardise your data. Other tools help find and clean errors. Users often assume it’s easier to add/edit data using forms. However, as a rule, it’s faster working in the grids. You can create and save custom column views and use function keys to look-up and copy data.

- To enable edit mode (grids and forms), select the Edit option on the Data Tools toolbar or use CTRL+E. By default, tables are opened in read-only mode.

The behaviour of the data grids changes slightly in edit mode. For example, you will find that TAB and Shift TAB are needed to move through the fields rather than the left and right arrows.

- Select Taxa > Species to open the main species table.
- To list available function keys, enter Shift+F1 in an active grid. An example: use Alt+X to close a table.
- New records are added using Add on the Data Tools toolbar. You can add a single record or in batches as offered on the Add drop-down. Adding records enables edit mode. A faster way: use CTRL+N.
- To mark the records for deletion, use the toolbar option or your DEL key (toggle). To remove these records, choose Remove records marked for deletion on the toolbar Delete dropdown.

Some fields in the main tables cannot be edited directly - usually fields from a related table or calculated fields. Examples are Genus and Species Author. To edit these, you must use a lookup. These fields have a lookup icon in the header and have a darker shade.

There are two categories of lookup, both activated using F9, CTRL+L or using Lookup on the toolbar. a) selecting values from the larger database dictionaries such as people, taxa and place names and b) selecting values from your central lookup dictionary.

- In the main species table, Add a blank record and then click in the newly added genus cell. Use F9 or CTRL+L to open the genus lookup. The specific epithets Species, Subspecies, etc. are typed in as these are free text fields to be edited.

The field Taxon Status uses values stored in your custom lookup list. The list is edited using Management > Lookup Lists. In edit mode, the Taxon Status field displays as a drop down because it is registered in the custom lookups list.

The Edit Lookup Values form allows you to define and edit lookup values as well as the properties of the lookup field.
Task 17: Merging data values and records

*Video: https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8video#mergevalues*

The tasks here demonstrate Value Merging and Record Merging.

**Value merging**

The Column Summary tool, as well as listing and giving a count for each different value in the selected column, can be used to quickly **clean up data errors** in non-relational, non-read-only fields. Value merging standardises different spellings of the same value in a column – and is a fast way to find and clean these errors. You can use value merging in any table – as long as the field is not read-only.

- In the conifer demo database, select Geo > Gazetteer and select the Major Admin Name and/or Minor Admin Name columns.
- Select the Summary tool on the Data Tools toolbar. Sort the summary record by values by click on the value header.
- Tag the value(s) to be merged - then select the correct value by click on that record (no need to tag). Use **Merge to Selected** to complete the task.

In the example on the left, either spelling of Alpes-Maritimes may be acceptable but clearly, it is better to be consistent. The right-side example is in the Minor Admin Name column where you will find plenty of other entries to correct. Note that a grid filter has been used with the Minor Admin example to narrow down the summary entries.

**Record merging**

Record merging leads to 2 or more similar or identical records being merged into one record with a resulting deletion of the merged records. When record merging takes place, the system must ensure all child records are moved to the selected record. Record merging is used to clear up double (or more) entries of entire records – for example if you had two or more entries in the genus table for the same genus, both with linked species, you could not simply delete one, you would need to merge the records.

*The Merge records tool is found on the Edit dropdown.*

In this example, you can merge some gazetteer records.

- In the conifer demo database, select Geo > Gazetteer and enter ‘jiang’ in the grid filter bar for the field Locality Name. Click on the column header to sort by name. Locate the entries ‘Nu Jiang - Qi Qu divide’ which is entered twice, slightly differently.
- Tag the one you want to remove and then select the record to merge into. Then select the Merge option on the Edit dropdown on Data Tools.
In this example, the calculated field shows each of these Nu Jiang records has 1 linked collection event. These will be joined under the selected entry.
Task 18: Using data forms

Video: https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8videos#speciesformvideo

Forms are provided for most of the main data grids. As well as being used for editing, they often provide options to list related records and calculated fields. The data on forms update as you navigate to different data grid records. Forms can be docked (default), dragged elsewhere and re-sized. In order to edit data on forms, you need to be in **Edit mode**. If you are not, data will not be saved and lookup options are not enabled.

![Form with Edit mode icon](image)

The form icon indicates if you are in Edit mode or not.

Most forms have the option to edit data and then **Save** or **Cancel** the edits made. Once any edits have been made, the form is given a red surround.

- As an example, select **Taxa > Species** and then select the **Form** option on **Data Tools**. The species form is, by default, docked right.
- Review the various tabs on the species form, moving through grid records to update the form.

![Species form](image)

Data can be viewed and edited using grids or forms. Forms can be resized, docked or dragged to separate monitors.
Summary of collections displayed from the main species form. Move to a new species in the grid to update the form. Note that in the conifer database, only accepted names (Taxon Status='Accepted') have linked collection events/specimens.

An example form in the main collection events table showing the specimen tab. The table has the calculated field # Specimens included in the view and this has been used to sort the records.
Task 19: Adding custom fields to BRAHMS

BRAHMS databases and the tables they contain are provided with a defined structure. However, as well as defining the data columns that you choose to see in your data grids, you can add new data storage fields that are specific to your project.

You can choose the field name, type and size. These custom fields become a permanent part of your database unless you subsequently opt to delete them. This also applies to RDE files.

- Select Collections > Collection events - or another table if you prefer.
- Select Grid Tools > Manage Columns.
- Add one or more new columns using the Custom Columns tab. Field names can include spaces.

The Column Manager form - options to add and edit custom columns are enlarged on the right side.

On this form, you have the option to add new fields. If the field is of type Text and you set Max. Chars to NULL or 0, this creates a text field equivalent to a v7 memo field. Using the Editor tab options, you can list and remove your custom fields. Field position can be modified using the buttons provided above the field list. You can also load existing field layouts, edit and save as a new layout.

Custom fields appear in your main data grids, assuming they are selected for inclusion in your data grid view. They have a different font to standard fields.
Task 20: Register and open a Rapid Data Entry file

Video: https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8videos#labelstoppt

While data can be entered directly into BRAHMS, RDE is recommended for entering larger numbers of records and also as a first step when importing or transferring data from other software packages such as Excel.

RDE files are entirely separate mini SQLite databases linked to your main BRAHMS database. They provide portability and flexibility – optimising data entry and cleaning.

You can store data in one or more RDE files and use these data to create summaries, maps, reports, manage images, and in general, use most of the BRAHMS tools and functions.

This example opens an RDE file of specimen data prepared by John Wood (Oxford based botanist) from his field work in Bolivia.

- First download the file RDE_Bolivia_JRIWood.zip and open the zip to the folder Documents/BRAHMS/RDE. This is the default location for RDE files. The zip file includes an RDE file of specimens and a report template sample for labels.
- Log into BRAHMS – choosing any project and select Rapid Data Entry > RDE File Manager. This will list any RDE files located in your registered RDE folders.
- To open the RDE file downloaded above, double-click on the RDE manager entry ‘JRI Wood Bolivia’.
- Explore this RDE file using the Summary option on Data Tools.

An RDE opened with a column summary in the Family field. The summary shows the number of records per different family. Clicking in a different column will update the summary.
RDE folders

All users, regardless of their database role, have access to their default Documents\BRAHMS\RDE folder. Beyond this, non-admin and non-manager users need to be given access to folder(s) by the system administrator or database manager.

RDE files can be stored in any registered folder. New folders are added using the Add option of the left panel. Administrators can register new RDE folders and assign access permissions to one or more non-admin level users.
Task 21: Import from Excel to RDE

Data and images can be imported from .xlsx tables into RDE using the Excel Data Import Wizard. This allows you to match the columns in the Excel file to your RDE file. The matching between Excel and RDE columns can be adjusted as necessary to pull in as many fields as possible. This process also allows you to import data from custom fields – assuming the custom fields have been added to your RDE file. Fields in foreign languages can be mapped to the standard names. For example, your Excel table may store country names in a column with heading PAÍS or 国家 or PAYS. The task is to align this with the standard RDE field COUNTRY.

This example uses collection data (species x locality) taken from museum specimens. But you could work with other data, for example, just a list of taxon names. If you do not have your own data to experiment with, download the sample Excel:
https://herbaria.plants.ox.ac.uk/bol/Content/Software/v8/SampleExcel_RDE_Import.xlsx.

- Select Rapid Data Entry > RDE File Manager then use the Add option on the Data Tools toolbar to create a new RDE file. Choose the Category ‘Specimens’ – and provide a file title. Enter Next.
- If you want to add some custom columns to the RDE, use the options provided in the right-side panel. Knowing whether to add custom data fields requires some knowledge of what the default fields are.
- When you Finish, the new RDE will be created and registered in your RDE manager.
- Open the file by double-clicking on the record. Then choose Rapid Data Entry > Import from Excel…
- Follow the Excel Data Importer steps as prompted.

These screens show the matching process (left) and the data processed and ready to import to RDE. This may not be fully possible if the data are in the wrong format – but you will probably be able to get close. Data in different formats can be adjusted in Excel or processed after transfer to a custom field in RDE.

If your Excel file includes image references as physical file names (path + file name) or URLs, these can be imported to and viewed in the RDE file. If there is more than one image cited in the same field, the entries should be comma or semi-colon separated or on different lines.

Once the data have been processed by the Excel Wizard, you can then choose to transfer selected records or all the data into your new RDE file.
Task 22: Mapping from RDE

If you do not have an RDE file with specimen data, download the file RDE_Bolivia_JRIWood.zip and open the zip to the folder Documents/BRAHMS/RDE.

You need to be online for this task which uses the in-built ArcGIS API (no installation required). You can also map to QGIS, Diva GIS, ArcGIS, Google Earth and GeoCAT. Further mapping tasks are provided in the section Mapping from the main database.

• To map the RDE file opened above, select Maps > ArcGIS in BRAHMS.
• Initially, if no records are tagged, no points will be plotted. To map the entire file, remove the mark from Tagged only on the map toolbar.

The RDE file mapped with the Tagged only option de-selected.

• If you now tag some records, you can use the Tagged Only option to restrict the map to tagged.
• The yellow point represents the current grid record. This updates as you move to a different grid record.
• With the map remaining open, set a filter on a geographic area. In the example below, the text ‘vela’ has been added to the grid filter bar in the field Minor Area Name, here selecting the area Velasco.
• You can change the base map using the option provided on the ArcGIS screen.

On the map, Use Tag Colours is selected, in this example plotting the Convolvulaceae in a different colour.
Task 23: Adding and editing map points in RDE

You need to be online to use this feature. The map location editor can be used in RDE and in the main tables for collection events and botanic garden plant points. You can use the map location editor to add a new map point or edit an existing one. The editor opens a map form which updates as you move through the data grid. A right-click on the map resets the point position and either auto-saves this to the grid or awaits confirmation via the Save option.

- In the opened RDE file, select the Map point editor option on the map toolbar. In Edit mode, you can also use the standard F9 lookup from the latitude or longitude fields.

Once opened, the location editor can be used to edit points and altitude in your data grid.

The map location editor displaying the current point, set to Auto-save. In this mode, a right-click on the map will update the Latitude and Longitude values in the data grid without using the Save option. This example screen has no zoom and is displaying the entire globe.

The same point displayed at a very different zoom level. Right-click the map to edit point location.
Location editor settings

<table>
<thead>
<tr>
<th>Setting</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base map</td>
<td>Choose base map that best suits the editing task in hand.</td>
</tr>
<tr>
<td>Auto-zoom on/off</td>
<td>If selected, as you move to different records, the map zooms to the current point using your zoom scale setting.</td>
</tr>
<tr>
<td>Zoom to marker</td>
<td>Zoom to current point based on your Zoom Scale setting.</td>
</tr>
<tr>
<td>Zoom Scale</td>
<td>Choose the optimal zoom setting. Maximum shows a world map.</td>
</tr>
<tr>
<td>Reset Zoom</td>
<td>Reset the zoom, if adjusted, to your current setting.</td>
</tr>
<tr>
<td>Map units</td>
<td>Select the entry mode for manually editing data.</td>
</tr>
<tr>
<td>Lat Long checked</td>
<td>Mark a record as ‘map checked’.</td>
</tr>
<tr>
<td>Auto-save</td>
<td>If selected, a right-click on the map will adjust the point and save the map point change.</td>
</tr>
</tbody>
</table>

Location searching

The internal Map Point Editor, dynamically connected to your data grids, has a location search tool. Localities can be searched for by name or part of a name, adding a region or country to help improve the results listed. Clicking on the suggested locations list adds a blue suggestion marker to the map. A right-click on the map adds the map reference to the data grid.

Using the location search option with the Map Editor.
Task 24: Reporting from RDE

You can print reports directly from RDE or send the outputs to documents, Excel or elsewhere. Report design is covered in detail in the BRAHMS manual: https://herbaria.plants.ox.ac.uk/bol/content/software/v8/BRAHMS_Manual.pdf. The reporting example here uses the sample report included in the RDE file download: RDE_Bolivia_JRIWood.zip.

To produce some labels from your opened RDE file, tag some records as the reporter only works with tagged records. If you wanted to print labels for the entire file, use the Tag all option on the Tag dropdown.

- To open the sample report template provided, select Reports then File > Browse and locate the report file ‘RDE specimen label sample.mrt’. It will be located in the same folder as your RDE file – Documents/BRAHMS/RDE.

The reporter opened here on the Home tab which is where report design can be edited. Report design is not further discussed here.

- To view the labels, select the Preview tab at the top of the reporting application.

On the Preview tab, you can choose various Save options including MS Word. If exported to MS Word etc., your labels can be edited prior to printing.
Task 25: Creating your own database

You can create a new database project in just a few steps. For practice purposes, it will be fastest to create this using SQLite but you could also use MSSQL Server or PostgreSQL. Another decision is whether to use an existing data store or whether to create a new one. For example, you could create a new database/project using the existing conifer data store conifers.db, bearing in mind that a single data store can hold more than one database project. This example starts by creating a new project in the default personal brahms.db store.

Creating a new database or data store - SQLite

To create a new project in the existing brahms.db data store:

- Log into the default personal store. If this has no database projects (as initially installed), as soon as you log in, the Database Projects Manager Form will open.
- If you already have created a project here, select System > Manage Database Projects... > New and enter the project name and a few other details as requested.

You can also create an entirely separate personal SQLite data store in any folder location:

To create a new data store:

- Log into the default personal store (or any other data connection).
- Select System > Manage Data Connections > New choosing the Local Filesystem option.
- Choose Create a new file...
- Once created and saved, you can log in to this new
Creating a new database – MSSQL Server

To create a new data store in MSSQL Server (local or server based) or to connect to an existing one:

**Prerequisite:** You must be able to connect to an MSSQL Server with sufficient permission to create new databases and to manage user login accounts. This will usually be someone with a Database Administrator (DBA) role.

- Log into the default personal store (or any other data connection).
- Select System > Manage Data Connections > New choosing the ‘MSSQL Data Provider’ option.
- Choose **Create** (a new MSSQL hosted data location).
- Follow the Wizard Tool instructions – which will lead to a script being run in the connected MSSQL Server to create a completely new BRAHMS data store.
Task 26: Adding data to a newly created database

You can add data directly to BRAHMS or import data from RDE files. The tasks here will do both. These examples use data grids rather than forms.

Adding data directly to your new database

In practice, you would not use this method to add many new records but it is reviewed here in multiple steps to explain the process.

- **Select Taxa > Higher Classification.** Here, you can add a new record, adding as much detail as you wish from Kingdom to Order. You may want to add custom fields to define additional taxa levels.
- **Select Taxa > Family.** Add a family name, here e.g. Acrididae (grasshoppers). Use a lookup in the Order field to connect the Higher Classification record just added.
- **To link an author, use a lookup in the Family Author field.** On the name selection form, use New if the name is not included in the compiled author name(s) list. You may also have to add new person names/abbreviations.
  - A similar process can now be used to add genus and species records, using lookups and adding new authors where needed.

![Image of BRAHMS interface](image1.png)

*In this example, some higher classification data have been added (top grid) from Order name upwards. The field Superorder has been added as custom field. The family table (lower grid) also has some custom fields added.*

![Image of BRAHMS interface](image2.png)

*Having added the family and genus names, the species level data can be added, in this case, 4 subspecies of Melanoplus sanguinipes, with their authors. A lookup is used in the Genus and Author fields.*

Using RDE to add the above data

In practice, if adding multiple taxa names as above (or adding new specimens etc.), it will be far faster to add these using RDE. The key point is that new family, genus, species and author names can be more easily added to a single RDE table. The same applies to specimen and other data categories. If the names are new to BRAHMS, they are added to the relevant database tables when the RDE file is transferred into BRAHMS.
A sample RDE file with 4 entries added. The first 4 columns have been copied down using the F4 copy function.

Transferring from RDE into BRAHMS

- On the main menu, select **Rapid Data Entry** and open the RDE table you wish to transfer to BRAHMS. You can optionally restrict the transfer to tagged records and if you wish to do that, tag the records to transfer. Otherwise, this is not necessary.
- Back on the **Rapid Data Entry** menu, select **Transfer RDE to BRAHMS** and on the 'Step 1: Run data analysis' page, you can restrict to tagged if necessary.
- Select **Run Analysis** – this will list the data that are new to BRAHMS and those that already exist. The report enables you to review the quality of the data.

A part of an analysis report.

- Now select **Next** to go to **Step 2: Import the Data** and select **Import Data**

The data transfer from RDE to BRAHMS adds new records to your database as needed.
Task 27: Adding a user account and setting permissions

Video: [https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8videos#useraccount](https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8videos#useraccount)

Video: [https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8videos#userpermissions](https://herbaria.plants.ox.ac.uk/bol/brahms/software/v8videos#userpermissions)

Adding users and setting permissions is described in detail in the BRAHMS guide. You can add users with BRAHMS, Local Windows account or Domain account authentication. Users can be assigned access and permissions to one or more databases.

In this example, add a new **BRAHMS authentication** user and assign this user some permissions. Feel free to add other user accounts including your own local Windows account, this allowing you to log in with no additional password entry. **NB. You cannot save changes to the ‘Default’ permission set as used by Administration.**

- Log into the demo database and select **System > Manage Users and Permissions**.
- Choose the **User List** option above the grid (or use **Add** on **Data Tools**).
- Select **New User > Add BRAHMS User** adding the User Name, Password and ‘Known As’ name. Do not set the user as an Administrator.

Select **Create this User** and follow the prompts through.

Close the user form and select the new user on the **User Management** data grid. Then select the **Access and Permissions** option.

- After editing the settings, assign new permission role name (here ‘Transaction Manager’) and use the **Apply As** option to save the settings and assign this Permission Set to the current user.

Choose the options you feel appropriate for this user.

Save the permissions as a permission set using **Apply As**. This set can then be used for other users.
Task 28: Two challenges

Create screens similar to those shown below:

This conifer database example with docked windows shows collection event data filtered to Pinus hwangshanensis, a map, a column summary and POWO and Google Images weblink options.

In the main species table, generate the above screen for a species, (here Araucaria nemorosa). The sorted species list has selected columns including the IUCN category which is filtered to vulnerable taxa. It includes website links to Tropicos and Google Images. The species form is opened listing collections.