The computerised inventory of the palaeontological types and originals held in Austrian collections

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Introduction

A number of scientific institutions have gained experience in the use of computer-aided techniques to inventorize collections (BITZ 1991, SCHOEBER 1992, FRITZ 1996 a,b). The palaeontological collection of the Natural History Museum, Vienna, is being entered into a computerised database since the late 1980s. Types and originals contained in the palaeontological collection were also compiled in this database and automatically arranged according to various search criteria into two type catalogues (KOVAR-EDER 1990, 1995). Over the course of the years and with increasing experience, the goal became the inclusion of all the palaeontological types and originals in Austrian collections. The idea was to provide rapid primary information on the most scientifically valuable objects in palaeontology. A nation-wide inventorization has been underway since 1993 under a contract by the Austrian Academy of Science's Commission for the Palaeontological and Stratigraphical Study of Austria. To date more than 800 publications and 31 000 objects held by 10 Austrian institutes have been registered. An adapted version (some fields omitted) of this database, named "OETYP", is now available to the public on the internet.

Setting up databases on scientific and museum collections: background information

Generally, access to the enormous information content in collections can best be provided in the form of computerised databases. This technology opens up unheard opportunities, particularly in the field of natural science and museum research (i.e. search for and sorting of material based on multiple criteria, rapid access to stored information); efficient use of such systems can also simplify curatorial tasks (e.g. once the data is entered it can be printed out in many different formats: inventory, labels, etc.). Until the advent of this technology, human memory - based on experience gained over the years - more or less assumed this role. In the past, a change of curators generally went hand in hand with a hiatus in working up and cataloguing the collection. Under the premises and measures outlined below, automatic data processing enables any information that is once gained to be preserved over generations. This for the first time guarantees the continuity of the information-gaining process.

The success of computerised collection inventories depends primarily on clarifying a few basic questions:

- Before selecting the software and structuring a database, a decision must be made on whether the database system and its application will be restricted to individual collections or encompass other collections and other institutes as well.
- The order of magnitude of the data to be handled must be estimated because different software packages differ considerably in the amount of data they can manage, the type and speed of management, and data security.

[1] **Remark:** Head of the Staatliches Museum für Naturkunde Stuttgart since 2003.
[2] **Remark:** Updated by Andreas Kroh 16.Oct.2005.

- Tying many different institutes into one database requires installing the necessary hardware to run the software and making sure that a trained expert is available.
- The application must be set up as an open system: this will enable the database manager or supervisor to make future structural modifications. One prerequisite for setting up an application is sufficient knowledge about the particular field of science and about the tasks involved in managing and curating a collection. Conveying this knowledge to untrained personnel is extremely difficult. If the stuff provides insufficient information or if the responsible technician fails to fully understand the tasks at hand, then potential users will never be satisfied with the system.
- Prior to structuring the database, care must be taken to specify the form in which the data is available (e.g. as an inventory, on collection labels) or whether some or all of the data itself remains to be compiled (e.g. literature studies, photo documentation). This has direct bearing on the time and personnel required to compile the data and must be calculated when examining project feasibility. Computer databases are only useful when, within the foreseeable future (several years), the amount of information that needs to be accessed is more than human memory can handle.
- Compatibility with other database systems and compatibility of internal database structures are particularly critical if future applications are to include other collections and institutes.
- After all, a detailed, reproducible documentation of the database application is a further prerequisite for an efficient, uninterrupted, inter-institute database.

Database management

This task requires expertise in the natural sciences, curatorial experience, as well as suitable knowledge in computer-aided systems, particularly as it pertains to databases (and especially to the selected database system). Any structural modification of the application (for example expanding the field lengths) requires predicting the consequences for further database operations and for collection management. In addition, the effort required to correct or add data must be calculated. For this reason, such tasks should be left to trained database managers and only be carried out after thorough consideration.

Various forms, for example pertaining to queries, sorting and printing, can be designed by the database manager or other advanced users, depending on the complexity of the database system and the application. Before entering data, users must receive proper training. This training is primarily the responsibility of the database manager. Thereafter, experienced data entry personnel can pass their knowledge on to new colleagues. Database management must retain overall responsibility for ensuring data consistency. The time required to correct and maintain data consistency directly depends on the quality of the data input and on ongoing control by database management. Data administration (especially controlling for consistency) often requires considerably more time than originally planned.

Entrusting database management to a computer-literate fellow scientist is preferable to contracting outside experts: this helps guarantee the long-term continuity of a database. Such continuity in data management, which should be secured by involving more than one person, is also a prerequisite for data consistency. Database management by a commercial enterprise or a temporary staff member will fail to meet these criteria and puts both data continuity and consistency at risk. Finally, contracts to external experts or businesses are often associated with high, unpredictable subsequent costs.

OETYP - database of types and originals held in Austrian collections

The database system Mini-Micro-CDS/ISIS[3]

Mini-Micro-CDS/ISIS (hereafter abbreviated ISIS) is a UNESCO-sponsored database system. It comprises elements of both a hierarchical and a text database system. ISIS was selected for the OETYP database based on the following specifications:

- the maximum size of a dataset can be as high as 8000 characters. At the same time, only allocated characters take up memory, helping make storage management more economical.
- Experience has shown that several million datasets can be administered with ease. The speed of the search process is largely independent of dataset number.
- Indexing the data can be specifically and multiply determined for each field of a dataset, whereby several indexing modi are distinguished.
- all synonyms of a term can be determined and called up under each of the synonyms.
- the system has network capability.
- the system is compatible with other database systems.
- the system can be installed and run even with the simplest hardware (IBM-XT or compatible PC, 640 K RAM, monochrome monitor).
- the use of this database system is free of charge for scientific, non-profit institutions and applications.

Data entry for OETYP

Data compilation is decentralised at the participating institutions. Staff scientists are responsible for supervising the persons entering the data (mainly by trained students) in all curatorial matters. Data entered in this manner are stored at the central database of the Natural History Museum, Vienna, which oversees management. In turn, updates by the central database are provided to the participating institutes at regular intervals.

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[3] **Remark:** In 2005 the OeTyp-database was migrated to the WinIsis 1.5 software package distributed by UNESCO (http://www.unesco.org/isis/files/winisis/windows/doc/english/). This change of the underlying database software went by without major problems and allows for easier handling in an WindowsXP based environment.

The OETYP dataset structure

Datset structure is principally based on the information commonly contained on collection labels and in inventory lists. The format is the product of a co-ordinated effort by participating institutes. Compatibility with local collection databases of these institutions is guaranteed.

No provisions have been made to include more detailed information because the necessary funds and personnel for compiling and entering the data would currently be too high. In principle, such information could be added in the future.

Fields available within one dataset[4]:

Field description	Length	Field type
genus (incl.subgenus)	40	alphanumeric
species (incl.subspecies)	50	alphanumeric
author of (sub-)species	80	alphanumeric
collection site	150	alphanumeric
ÖK-sheet 1:50,000	3	alphanumeric
altitude	4	alphnumeric
right coordinates	7	alphanumeric
up coordinates	7	alphanumeric
depth from	7	alphanumeric
depth to	7	alphanumeric
geographic longitude	7	alphanumeric
geographic latitude	6	alphanumeric
major tectonic unit	2	alphanumeric
chronostratigraphy	40	alphanumeric

Field description	Length	Field type
lithostratigraphy	50	alphanumeric
biozone	60	alphanumeric
purchase	80	alphanumeric
reference	150	alphanumeric
figures	30	alphanumeric
remarks	500	alphanumeric
institute	8	alphanumeric
department	15	alphanumeric
inventory number	15	alphanumeric
number (of objects)	3	alphanumeric
type category	4	alphanumeric
data entry (by person)	15	alphanumeric
date (of entry)	8	numerical
dataset number	7	numerical

[4]**Remark:** In 2005 the page numbers of were removed from the “reference” field and transferred to the field “location in work” (alphanumeric, length=10). This allows easier output of the data sorted according to their occurrence in individual publications. Additionally the field “reference id” (numerical, length=5) was established to allow cross-referencing with a new publication database.

OETYP on the internet

OETYP can now be accessed on the internet under the address http://www.oeaw.ac.at/~oetyp/palhome.htm. This version contains a selection of fields with unrestricted public access: genus, species, author, type category, reference and figure as well as inventory number and the participating institute. Requests for the content of additional fields can be addressed to the holding institutes, since various parameters such as collection site are considered to be proprietary.

A list of all references dealing with types and originals enables the user to immediately determine the usefulness of searching the OETYP database for original material described in a publication. A list of participating institutions and contact persons along with their addresses permits users to quickly contact the curators of the respective collections. OETYP is updated at regular intervals in order to keep up with the wealth of new data.

Currently participating institutes

- Geologische Bundesanstalt Wien (Geological Survey of Austria)
- Karl-Franzens Universitaet Graz:
  - Institut fuer Botanik (Institute of Botany)
  - Institut fuer Geologie und Palaeontologie (Institute of Earth Sciences)
- Krahuletzmuseum Eggenburg
- Landesmuseum Joanneum Graz, Referat Geologie und Palaeontologie
- Naturhistorisches Museum Wien (Natural History Museum Vienna)
- Universitaet Innsbruck:
  - Institut fuer Geologie und Palaeontologie (Institute of Geology and Palaeontology)
- Universitaet Wien:
  - Institut fuer Geologie (Institute of Geology)
  - Institut fuer Palaeontologie (Institute of Palaeontology)
- Vorarlberger Naturschau Dornbirn (in natura)

Acknowledgements

This project was supported by the Austrian Academy of Sciences, the "Jubilaeumsfond" of the Austrian National Bank, and by the Natural History Museum, Vienna. My special thanks go to Univ. Prof. Dr. H. FLUEGEL, who strongly promoted this project and has made a continued effort to overcome all outstanding financial and organisational hurdles. Support for data compilation at their respective institutes was provided by Dr. A. DRESCHER (Institut fuer Botanik, Universitaet Graz), Univ. Prof. P. FAUPL (Institut fuer Geologie, Universitaet Graz), Dr. J. FRIEBE (Vorarlberger Naturschau, Dornbirn), Univ. Prof. Dr. W. GRAEF and DR. I. FRITZ (Landesmuseum Joanneum, Graz), Dr. H. KOLLMANN (Naturhistorisches Museum Wien), Univ. Doz. Dr. Karl KRAINER (Institut fuer Geologie und

Palaeontologie, Universitaet Innsbruck), Univ. Prof. Dr. G. RABEDER, Dr. K. RAUSCHER (Institut fuer Palaeontologie der Universitaet Wien), and Dr. F. STOJASPAL (Geologische Bundesanstalt, Wien).

C. BALLUCH (Rechenzentrum der Oesterreichischen Akademie der Wissenschaften) wrote the retrieval script for the internet version of OETYP.

Finally, my thanks go to the many people who have been entering the data over the past several years.

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