

Poster session I1

GLOBAL POLLEN DATABASES

The Irish palaeoecological data synthesis and analysis project

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The Irish Palaeoecological Data Synthesis and Analysis Project (IPAL), funded under the Marie-Curie Fellowship scheme is based within the Department of Botany, Trinity College, Dublin. The project can be divided into two phases, primarily, the project is constructing a database of pollen-based research activity carried out in Ireland since the pioneering work of Jessen in the 1930's. Secondly, the database is used to investigate aspects of spatial and temporal vegetation dynamics in Ireland such as the interaction with climate change, human populations and links between palaeoecological and climate / vegetation model based reconstructions.

The database contains the raw pollen data (counts) and associated metadata (analyst, publications, radiocarbon, site details and stratigraphy) set up within a MS access format. To facilitate investigations on aspects of spatial and temporal vegetation dynamics in Ireland, such as the interaction with climate change, human populations and links between data and climate / vegetation model based reconstructions; the database is linked to a GIS (ArcView). The database engenders a range of investigates examples of two are provided. Firstly, we focus on the response of Irish vegetation to late glacial climate change by investigating the affinity scores to a suite of biome. Secondly, we investigate the role of the taxa in responding to environmental change, and emphasis the potential of overlaying the individual taxa. The database will be of long-term benefit to the Irish palaeoecological community, and will be developed and used outside the initial scope and duration of the project.

Poster session I2

APPLICATIONS OF POLLEN DATABASES

Modern pollen-climate relationships and inferred paleoclimatic patterns in the United States and Canada

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Modern climate-vegetation relationships at a continental scale demonstrate taxon-specific relationships consistent with the individualistic Quaternary histories of North American plant taxa. This paper and the

companion paper by Williams et al. present a new atlas of modern pollen distributions for the United States and Canada, grounded upon an expanded surface pollen dataset comprising over 5,400 samples. The dataset, built from data holdings at the Global Pollen Database, Brown University, University of Ottawa, Paleoenvironmental Arctic Sciences (PARCS), and the University of Arizona, will be archived at the World Data Center for Paleoclimatology upon publication. All modern surface sample locations have been assigned climatic values based on Climate Research Unit 10-minute gridded data, and adjusted to account for local lapse rates. We demonstrate the distribution of pollen abundances within climate space, and evaluate the relationship between pollen abundances and both traditional climatic variables (e.g., mean January and July temperatures) and "bioclimatic" variables (e.g., growing degree days). Here we show differences in the climate-pollen relationships at different scales by comparing the continental relationships with those from a subset of data from eastern North America. We then use these relationships to infer trends in Holocene climate conditions.

Quantitative relationship between modern pollen and climate for the Pampa grasslands, Argentina

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Modern pollen, potential vegetation and climate relationship for the Pampa grasslands and their ecotone with the xerophytic woodland of Argentina were examined using isopollen maps, scatter and percentage diagrams and Correspondence Analyses (CA). These studies are based on an array of 126 modern pollen samples extending between 34°-41° lat S and 56°-67° long W. In the Pampa grasslands were defined three potential vegetation units: humid pampa, inland dry pampa and southern dry pampa whereas in the xerophytic woodland were defined two units: Caldenal, in the southern west boundary, and Talar, in the northeast boundary of Pampa grasslands. Despite human disturb on the Pampa grasslands the CA and isopollen maps show a good correspondence between potential vegetation units and pollen samples.

Correlations and scatter diagrams between thirteen pollen variables: *Prosopis*, *Schinus*, *Condalia*, *Ephedra*, other xerophytic taxa, Poaceae, Cyperaceae, Chenopodiaceae, Asteraceae subf. Asteroideae, Asteraceae subf. Cichorioideae, Brassicaceae, Apiaceae and other herbs, and mean annual and seasonal temperature, precipitation and hydric availability are presented. Pollen taxa (except Brassicaceae and other herbs) show significant correlation with mean annual or seasonal precipitation and hydric availability. Only *Ephedra*, Cyperaceae, Chenopodiaceae, Asteraceae subf. Asteroideae, Asteraceae subf. Cichorioideae, Brassicaceae and other herbs present significant correlation with mean annual or seasonal temperature.

Hydric availability is the ecological factor that relate to the modern pollen distribution of the most important pollen types. These results suggest the potential of this database for quantitative climate reconstructions, particularly for precipitation and hydric availability.

Croatian pollen database

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Herbaria collection of some recent autochthonous and cultivated Croatian plant taxa and their anthers was used as the starting point for Croatian computer pollen database (sPeluds - Fig. 1). This is a preliminary database which will form the basis for the future complete Croatian pollen database of recent plant taxa.

The collection of the samples began in 2000 and up until now about 150 taxa have been sampled and processed – standard methods for light (LM) and scanning electron microscope (SEM) slides were used. The database includes a detailed description of the pollen grain, LM and SEM images of each pollen grain and basic data about samples and preparations. Computer programme allows a query of the database in any combination of pollen grain characters, including images.

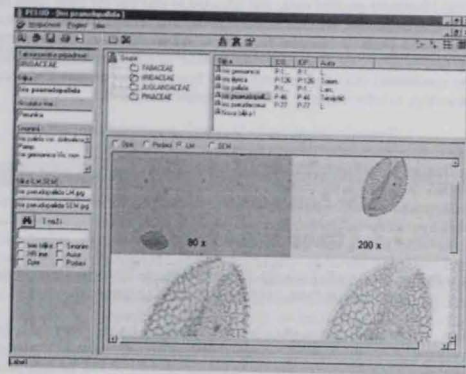


Fig. 1: Web portal/index page of the Croatian pollen database.

Polclas v1.1: a new software tool in order to pollen classification and identification

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POLCLAS v1.1 is the result of the collaboration between palynologists and engineers of the University of Alcalá. With this tool, it is possible to automate part of the traditionally followed processes in the identification and pollens classification, based on the use Pollen Type's General Key.

When we thought about implementation of the application we focused as objectives the simplicity of the tool and the minimum software necessity to execute it. The election of Matlab as programming environment and of Microsoft Access as database administration system assures the completion of these objectives. Matlab for their power in the image processing, Microsoft Access for their easy handling. Both for the possibility that they offer of being able to work with a single graphic interface.

The application runs under the operating system Windows 9x or higher version and requires to have installed Microsoft Access and a CD-ROM unit, to facilitate its self installation. Logically, the requirements of free space in the hard disk depend on the quantity of pollens that form the database.

Using this program, the following work methodology has to be applied: a) to obtain with the microscope the digital image pollen under test; b) to process the image; c) to obtain the parameters pollen under test that the program determines; d) to complete the data with the not measured parameters, of easy definition for the palynologist that carries out the study; e) to carry out the query database; f) to identify the pollen; and g) to archive in the database the information.

In a detailed way, the identification and classification of new pollen is as follows: obtain the image to use from the microscope, which we have prepared a thin sheet with pollen under test. The preparation process is out of the field of this program. The result is a digital image.

Once initialized the application, the image will be loaded. The creation of a cutting tool allows isolating the polar view or the equatorial one. The selected view processing allows obtaining its size. The later cutting of the other view also allows obtaining its size and the relationship P/E. The obtained data are introduced automatically in a Microsoft Access record form. The record is identified by its reference number, assigned automatically. Parameters like the ornamentation or the symmetry are introduced from the keyboard in the form. The automatic search in the database will conclude with the presentation of the pollen records that presents bigger coincidence degree with the studied one. Once identified the pollen under study, its record will be completed with the same name of that in the database. If no coincident pollen exists in the database the user should assign a name to complete the record, to which the polar and equatorial views of the pollen will be added.

The application also allows the introduction of comments in the record, such as the place and the date where the sample was taken.

From the database you can obtain reports of the different pollen types. Equally, they can be carried out consultations and searches, without more than choosing one or several of their characteristic parameters.

The works of the group are centred at the present time in the database population, starting from the traditional library of pollens of the Department of Geology of the University of Alcalá. As the database has more identified pollens, the identification and classification of new pollen will be easier. We also work in the code optimization for image processing that allow the characterization of the parameters whose values are introduced manually at the present time. We are developing new functions of layering and threshold processing. Simultaneously, we work in the process automation for obtaining images from the microscope. Soon, we foresee the use of techniques based on neural nets for the process optimization, as well as the internet use to facilitate to the palynological community the use of the tool, the consultation of the database and the inclusion of new pollens.

History of palynological research in Canada and the role of the Canadian Association of Palynologists (CAP)

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Palynological research has been conducted in Canada for more than 70 years. During this time, palynologists have made many contributions to our understanding of landscape, geologic, and climate history. Some of these achievements are highlighted in this poster. Quaternary palynology was pioneered in Canada in 1927 when Vaino Auer, from Finland, began his studies of peatlands in Ontario and Quebec. He was followed by other Europeans, including Gunnar Erdtman, who conducted research for a short time in Canada during the late 1920s. In the mid-late 20th century, strong traditions of Quaternary palynology, predominantly in Ontario, were fostered by the work of, for example, J. Terasmae, J. C. Ritchie and J. H. McAndrews. Especially in the years after WWII, stratigraphic palynology has also played a significant role in Canadian geoscience, especially in its application to oil exploration. Not unexpectedly, stratigraphic palynologists have tended to be located in western Canada (e.g., W.A.S. Sarjeant, L.V. Hills) and, more recently, in Atlantic Canada (e.g., G. L. Williams, R. A. Fensome).

During the last thirty years, the Canadian Association of Palynologists (CAP) has promoted palynology and encouraged communication among palynologists working in all geologic eras. The Association was formed in 1979 and has remained active ever since. Membership numbers have always been small (around 40 - 60). CAP has long been affiliated with the International Federation of Palynological Societies (IFPS) and CAP members have often participated in IPC meetings. CAP has been largely a newsletter society, with two issues a year. Since its formation, it has hosted and contributed to several important conferences both within and outside Canada. Several of these have resulted in publications and edited volumes. The vitality of the Association shows its continuing relevance as a communication forum and information nexus in the diverse world of palynology.