

New key-tools for pollen identification in research and education

Jade Dupont, Nathalie Combourieu Nebout, Jean-Pierre Cazet,
Florian Causse, Régine Vignes Lebbe

Abstract — Pollen ID offers a free and easy access to various palynological information and compiles in the same web-space a pollen database and different services through a friendly user interface. Pollen ID proposes, or will propose, pollen and plant descriptions, terminology learning with an illustrated glossary and interactive images, identification keys, pollen analysis, pollen diagram construction, links with vegetation and climate data. The Pollen ID project is presently restricted to the European and Mediterranean geographical area, but it will be extended to other regions as well. This project is still in progress; its content and user interface – presently in French - will be soon available in English. In its final shape, the Pollen ID project will include palynological applications such as pollen determination tests, several original pollen analysis exercises with representations in diagrams and an easy interpretation of vegetation and climate. Pollen ID is accessible on <http://lis-upmc.snv.jussieu.fr/pollen/>.

Index Terms — pollen, free access key, identification.



1 INTRODUCTION

Palynology is commonly used in allergology, ecology, environmental reconstruction, climatology, and geology. Recently, it has been added in the current college program in France. Pollen identification by using books and online database is now largely used in palynology. Nevertheless numerous websites do not provide resource access for a large audience, from school education to research. Moreover, most of the websites do not link pollen data with the plant description and do not associate pollen applications to the descriptive content (our preliminary review has selected and analysed the

*Jade Dupont was a master student of the University Paris VI. E-mail: j_r_xen@yahoo.fr.
Nathalie Combourieu Nebout, Jean-Pierre Cazet are with the LSCE - Laboratoire des Sciences du Climat et de l'Environnement, UMR 8212 CNRS/CEA/UVSQ, Domaine du CNRS, avenue de la Terrasse, F-91198 Gif sur Yvette cedex, France. E-mail: Nathalie.Nebout@lsce.ipsl.fr.
Florian Causse and Régine Vignes Lebbe are with the LIS - Laboratoire Informatique et Systématique, UMR 7207 CNRS/MNHN/UPMC, MNHN Département Histoire de la Terre, CP48, 57 rue Cuvier, 75005 Paris, France.*

content of 16 websites dedicated to the pollen description and identification). The Pollen ID project tries to take the challenge to fill this gap.

2 WHAT IS POLLEN ID ?

Pollen ID offers a free and easy access to various palynological information and compiles in the same web-space a pollen database and different services through a friendly user interface. Pollen ID proposes, or will propose, pollen and plant descriptions, terminology learning with an illustrated glossary and interactive images, identification keys, pollen analysis, pollen diagram construction, links with vegetation and climate.

2.1 POLLEN ID COMPONENTS

Resources are stored in two types of information systems: a relational database (MySQL) and knowledge bases for descriptive data (Xper²) (Fig. 1).

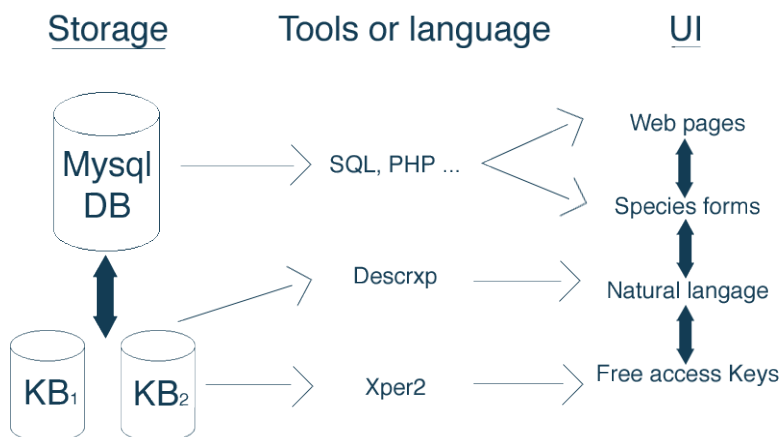


Fig. 1 – Pollen ID information technology architecture.

The relational database stores 1) nomenclatural data, plant information, photos and movies for the taxa, 2) definitions, pictures with image maps for the glossary terms, and 3) texts for the UI.

The descriptions of pollen are stored in two Xper² knowledge bases, and presently concern 94 Mediterranean species documented by texts, images and 67 videos:

- The first knowledge base is dedicated to beginners for training on pollen identification. 56 descriptors were selected, documented by text and images.
- The second one is more exhaustive and designed for expert users. It includes 115 descriptors with definitions and images.

The web pages are then dynamically constructed from the different resources (see Fig. 4).

3 POLLEN ID USE

The Pollen ID website user interface provides an original and large access to the complementary resources. Through the interactive buttons of the Home page, the user will discover numerous information from generalities on palynology, pollen descriptions and images to applications (in future developments) (Fig. 2)



Fig. 2 – Pollen ID interface

- (1) the menu, (2) Access to on-line identification services, (3) direct access to photos and videos, (4) details of the selected menu, (5) about Pollen ID.

The pollen ID project pays a special attention to beginners with the production of a rich information on palynology, from pollen extraction techniques to a glossary and interactive images and films for basic training.

3.1 LEARNING POLLEN MORPHOLOGY

In pollen ID, the user can explore easily all data: definitions, drawings, and images when necessary. The glossary has been inspired from [2]. In each page, hyperlinks are coloured and can redirect towards definitions and their associated drawings. Interactive drawings are managed by the rollover technique allowing the users to explore, to discover and to be familiarized with the terminology of pollen anatomy (Fig. 4). Then the beginner can learn the basic concepts of palynology.

The interface also combines real views (pollen and plant photos and pollen observation movies). The videos are constructed from a sequence of pictures (microscope X60), about 50 photos for each pollen, to have a good view of the total volume of pollen. The user can stop the movies as he wants, to compare with drawings describing anatomic structures. In the future, the ID project will intend to propose pollen photos with superimposed drawings in order to show the pollen characters directly on pollen views.

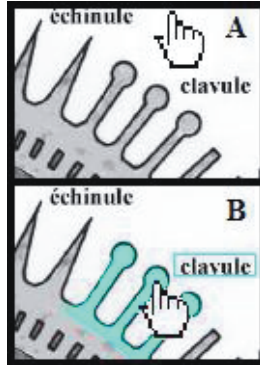


Fig. 3 – Example of an interactive drawing. The rollover technique highlights the morphological structure pointed by the user and displays the related definitions.

3.2 POLLEN ID IDENTIFICATION KEYS

Pollen ID includes at this step: two interactive free access keys, one dedicated to beginners and the other to advanced researchers. These two keys have been refined after [1]. They use the Xper² identification process and are a free access system available on-line. At the end of identification process, users can access the complete information on the taxon (Fig. 4).

3.3 POLLEN ID TAXONOMIC FORMS

Pollen ID produces taxonomic forms that gather nomenclatural data, geographical information, textual pollen descriptions, pollen images and

Fig. 4 – Taxonomic form example. (1) textual description (the part “DESCRIPTION” is produced in natural language from the structured Xper² knowledge base), (2) pollen photos access, (3) movies access, (4) plant photos access, (5) external links. Some words are hyperlinked to definitions in the glossary.

movies, plants photos and links to external websites (Fig. 4). All textual pollen descriptions are automatically generated from the Xper² structured descriptive data with added hyperlinks to the pollen glossary. Thus, the user can go through the different items to have a look at all information, and all the parts of the website are consistent.

3.4 TAXONOMIC RESEARCH

The user can also find directly a taxon by choosing it in the lists of forms, photos or movies. A classification is available with scientific and vernacular names. In the future the project will include an interface to construct diagrams from pollen inventories, and links with vegetation and climate data for environmental studies and archeo-paleo climatic reconstructions.

4 CONCLUSION

The Pollen ID project is presently restricted on the European and Mediterranean geographical area, but it will be enlarged to other regions as well. This project is still in progress; its content and user interface – presently in French - will be available soon in English. In its final shape, the Pollen ID project will include palynological applications such as pollen determination tests, several original pollen analysis exercises with representations in diagrams, and an easy vegetation and climate interpretation. Pollen ID is accessible at <http://lis-upmc.snv.jussieu.fr/pollen/>.

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