



HAL
open science

Knowledge Base with XPER3 in Palaeontology: Calculated descriptors offer new functionalities

Adeline Kerner, Regine Vignes

► To cite this version:

Adeline Kerner, Regine Vignes. Knowledge Base with XPER3 in Palaeontology: Calculated descriptors offer new functionalities. TDWG 2016, Dec 2016, Santa Clara de San Carlos, Costa Rica. . hal-02557368

HAL Id: hal-02557368

<https://hal.science/hal-02557368v1>

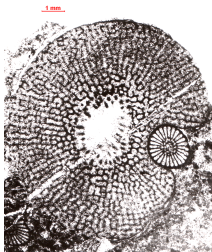
Submitted on 30 Nov 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial 4.0 International License



Knowledge Base with Xper3 in Paleontology: Calculated Descriptors Offer New Functionalities

Adeline Kerner¹ & Régine Vignes-Lebbe²
¹CR2P, UMR7207 MNHN-UPMC-CNRS, Sorbonne Université kerner@mnhn.fr
²ISYEB, UMR 7205, CNRS-MNHN-UPMC-EPHE, Sorbonne Université



Xper 3

- Web platform that
 - manages descriptive data
 - provides interactive identification keys
- Used for various taxonomic groups.
- Well adapted for identification in paleontology, because fossils are often incomplete and unsuitable for identification by means of classical dichotomous keys.
- Compatible with TDWG's Structured Descriptive Data (SDD) format.
- Descriptive model with three descriptor types:
 - categorical (i.e., qualitative or intervals)
 - numerical (continuous data)
 - calculated (logical combination of other descriptors).

Archaeocyathan knowledge base (Ca...)

Name	Definition	Detail
Hypocyathus	Hypocyathus (Rued.) 1978	
Hypocyathus	Hypocyathus (Rued.) 1978	
Hypocyathus	Hypocyathus (Rued.) 1978	

```

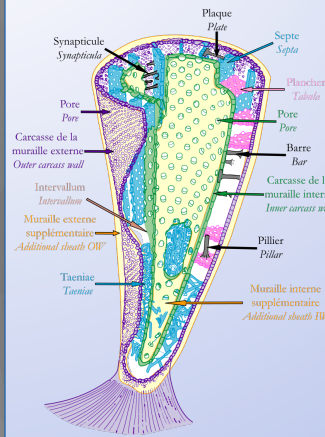
<?xml version="1.0" encoding="UTF-8"?>
<datasets xmlns="http://rs.tdwg.org/RS/2006/">
  <dataset xmlns="http://rs.tdwg.org/RS/2006/">
    <generator name="Xper3" />
    <notes>This software is developed and distributed by LIS
    </notes>
    <representation>
      <label>Archaeocyathan knowledge base (Cambrian)</label>
      <detail>The computer-aided knowledge base is composed by
    </representation>
    <revision/label>
      <creator>
        <agent ref="ai" role="aut"/>
      </creator>
      <dateCreated>2016-11-25T09:42:15</dateCreated>
      <dateModified>1978-01-01T15:03:00</dateModified>
    </revision/label>
  </dataset>
</datasets>
    
```

Xper3 interface and SDD export

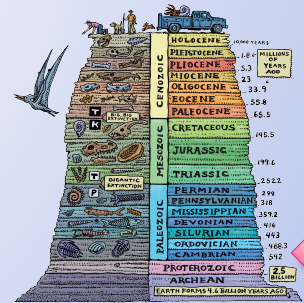
See <http://www.xper3.com>

Paleontological example: archaeocyaths ?

- 1st animal reef-builder
- Oldest calcified-sponges
- Exclusively Cambrian fossils



Schematic archaeocyath (modified from Debréne 1964)



Time scale (<http://www.earth-time.org/trollart.html>)

Schematic morphology:

- 2 walls
- 1 intervalum
- Vertical elements
- Horizontal elements
- Links between intervalum elements

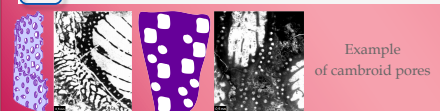
See <http://www.infosyslab.fr/archaeocyatha/>

Calculated descriptors

- New type of descriptors
- Automatically computed from other descriptors by using logical operators.
- Do not exist in SDD format => exported as categorical descriptors, losing the origin of the values.

Terminology

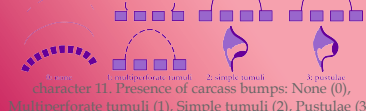
- Reconstruct the literature terminology from a set of more detailed descriptors.
- Example: "cambroid pores":
(Shape: simple or polygonal) AND (Repartition: regular distribution) AND (Repartition type: random)



Example of cambroid pores

Phylogeny

- Express the data in a new way.
- Example: for phylogenetic purpose, simple tumuli is equivalent to the combination of three detailed descriptors expressed for identification:
(Presence of bumps: present) AND (Number of perforation: simple) AND (Direction of bump perforation: simple)



Multilingual identification key

- Create a consistent multilingual interactive identification key.
- => All translations are computed from a single language set of knowledge.
- Example: here, the English version is the original dataset and the French one is a mirror. When you modify the description of a species in the English version, the French one changes automatically.

