

An identification website to arthropods associated with Douro Region vineyard agroecosystem

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Abstract

Arthropods are the most diverse and successful multi-cellular group in the planet, belonging to this group organisms of great economic importance that directly or indirectly affect several aspects of human life. Some species of arthropods can cause crop damage, others perform important ecosystem services such as control of crop pests, pollination and recycling of soil organic matter. Due to their beauty and / or rarity, several other species provide cultural services, currently highly valued by society. Thus, this work, aimed to construct a website where information regarding the morphology, biology and photographic documentation of arthropods associated with the vineyard ecosystem of the Douro Demarcated Region (DDR) could be available in a simple and objective way, in order to be easily used by non-skilled public. The identification keys are organized in 137 families belonging to 7 classes of arthropods, namely: Arachnida, Malacostraca, Entognatha, Insecta, Chilopoda, Diplopoda and Symphyla. Thus, users have at their disposal key information for a good management of the ecosystem namely concerning the aspects related to pests, including possible invasive species, beneficial organisms and other species considered of sociocultural interest, such as endemic species. This information will be available on the website www.artropodesvinha.utad.pt.

Methodology

The website was developed using a development tool easy to use and configurable to support a variety of programming languages. In this case, the HTML5 language (*Hyper Text Markup Language*) was used, which defines a formatting and structure of the pages. Initially, a layout (site design) was developed. The “Menu” bar consists of five tabs: Início, Apresentação, Artrópodes, Bibliografia, and Contactos (Fig.1). These items are represented on all pages, as well as other parameters, namely browser compatibility commands (Fig.2) and Cascading Style Sheets (CSS) execution and page layout commands that define their body, font, animations and text boxes (Fig.3).



Fig.1: Representation of “menu” bar commands included on all pages, with five items: home (início), presentation (apresentação), arthropods (artrópodes), bibliography (bibliografia) and contacts (contactos).

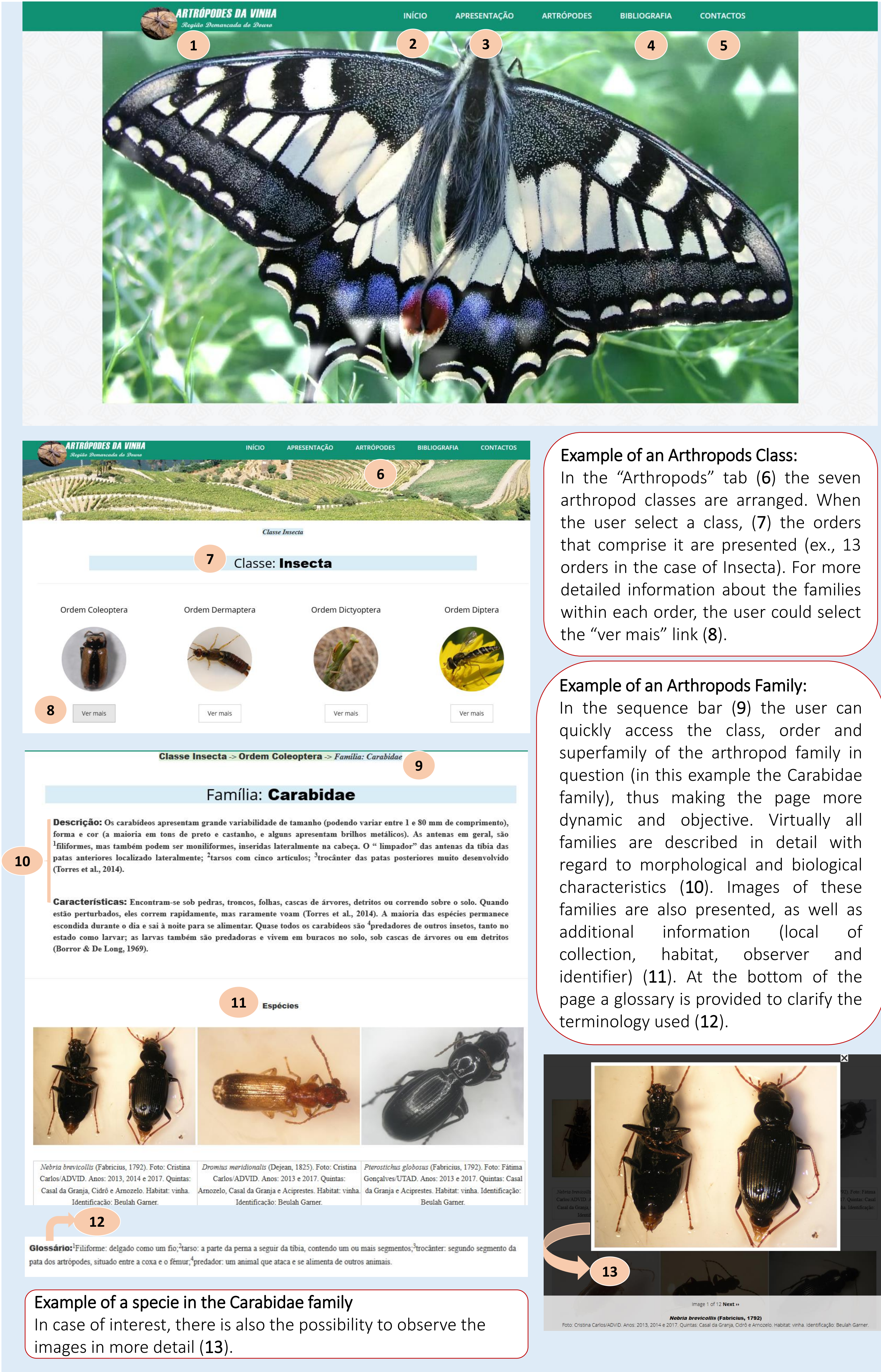
```
1 <!DOCTYPE html>
2 <html lang="pt">
3 <head>
4 <meta charset="utf-8">
5 <meta http-equiv="X-UA-Compatible" content="IE=edge">
6 <meta name="viewport" content="width=device-width, initial-scale=1">
7 <title>Artrópodes da Vinha</title>
8
9 <link href="css/bootstrap.min.css" rel="stylesheet">
10 <link rel="stylesheet" href="css/animate.css">
11 <link rel="stylesheet" href="css/font-awesome.min.css">
12 <link rel="stylesheet" href="css/font-awesome.min.css">
13 <link rel="stylesheet" href="css/jquery.bxslider.css">
14 <link href="css/overwrite.css" rel="stylesheet">
15 <link rel="stylesheet" type="text/css" href="css/normalize.css" />
16 <link rel="stylesheet" type="text/css" href="css/demo.css" />
17 <link rel="stylesheet" type="text/css" href="css/secti.css" />
18 <link href="css/style.css" rel="stylesheet">
19 <style type="text/css">
20 .portfolio .container .row .col-md-10.col-md-offset-1 table tr td div {
21 font-family: Lucida Console, Monaco, monospace;
22 }
23 .portfolio .container .row .col-md-10.col-md-offset-1 table tr td div {
24 font-family: MS Serif, New York, serif;
25 }
26 .portfolio .container .row .col-md-10.col-md-offset-1 table tr td div {
27 font-family: Tahoma, Geneva, sans-serif;
28 }
29 .portfolio .container .row .col-md-10.col-md-offset-1 table tr td div {
30 font-family: Palatino Linotype, Book Antiqua, Palatino, serif;
31 }
32 .portfolio .container .row .col-md-10.col-md-offset-1 table tr td div {
33 font-family: Comic Sans MS, cursive;
34 }
35 .portfolio .container .row .col-md-10.col-md-offset-1 table tr td div {
36 font-family: Times New Roman, Times, serif;
37 }
38 </style>
```

Fig.2: Representation of web browser compatibility commands

Fig.3: Presentation of the execution commands and structure of the web page, namely page body, font, animations and text boxes

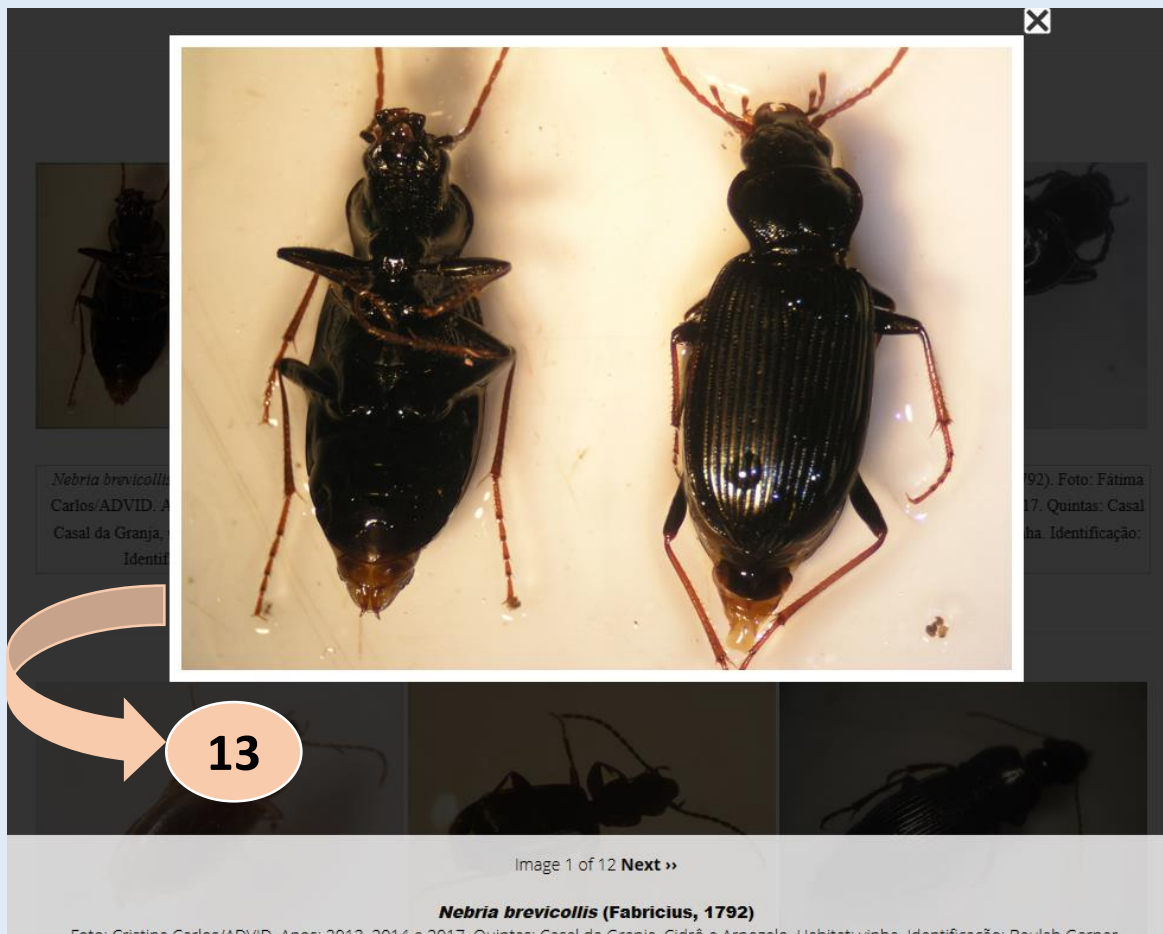
Results

Web page Layout ➡ In the “Menu” bar of the webpage are arranged the following items: the page logo (1); the “Início” tab divided into 4 sections (short page presentation, author’s autobiography, description of each of the arthropod classes and contact details of the author and the University of Trás-os-Montes and Alto Douro) (2); the “Apresentação” tab is an introduction to arthropods associated to the vineyard in the Douro Demarcated Region (3); the "Bibliografia" (4); the “Contactos” (5).



Example of an Arthropods Class:
In the “Arthropods” tab (6) the seven arthropod classes are arranged. When the user select a class, (7) the orders that comprise it are presented (ex., 13 orders in the case of Insecta). For more detailed information about the families within each order, the user could select the “ver mais” link (8).

Example of an Arthropods Family:
In the sequence bar (9) the user can quickly access the class, order and superfamily of the arthropod family in question (in this example the Carabidae family), thus making the page more dynamic and objective. Virtually all families are described in detail with regard to morphological and biological characteristics (10). Images of these families are also presented, as well as additional information (local of collection, habitat, observer and identifier) (11). At the bottom of the page a glossary is provided to clarify the terminology used (12).



Example of a specie in the Carabidae family
In case of interest, there is also the possibility to observe the images in more detail (13).

Conclusions

In this work, it is presented information on different groups of arthropods from the vineyard ecosystems of the RDD, in particular on its general characteristics and role in the ecosystem. Using this web page, the winegrowers will have available information essential to the proper management of the ecosystem, especially in aspects related to the pests, including possible invasive species, beneficial organisms and other species considered interesting from the socio-cultural point of view, as is the case of endemic species.

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