DTSC: *A Dynamic Taxonomy on Structural Colour*

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Biomimetics of colour

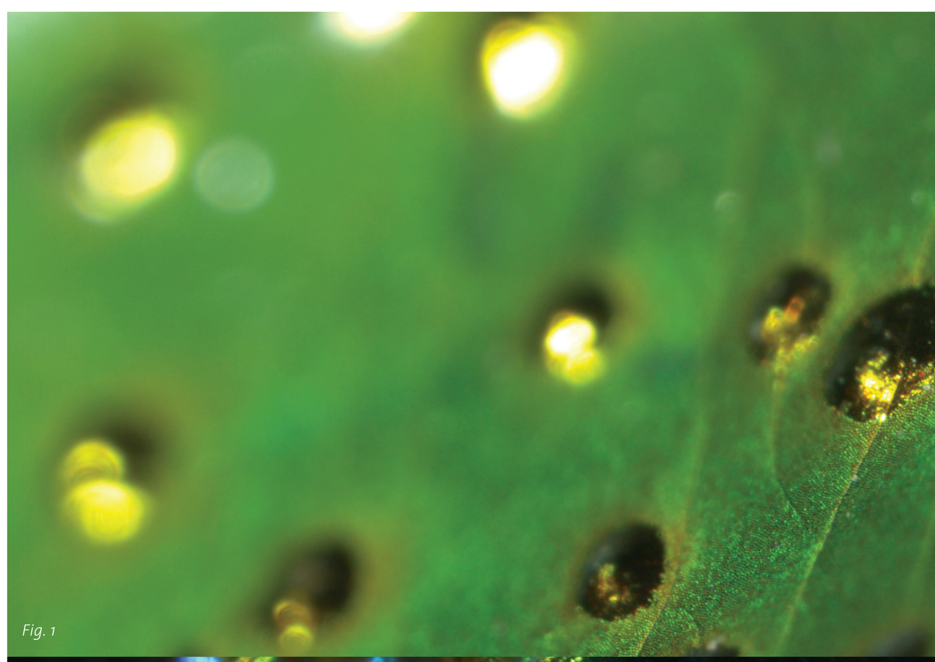
The emerging discipline of Biomimicry[1] studies "nature's best ideas" with the purpose of emulating them to address human problems by design. One of this ideas is Structural Colour –in physics "light interference"– which is a way of achieving colour without relying on pigmentation or chemical coloration processes, but rather by adding "information" to material surfaces at the nano-scale.

While Structural Colour has been initially explored and tested for application in new materials and technologies, it is still at an early stage of development. Existing information on structural colour is presented in a language rooted in hard sciences –biology and physics– and may limit access and understanding for further design exploration and implementation. This project is focused on addressing such limitation, and is articulated in one main research question: *How can available scientific information/knowledge on structural colour be more accessible to biomimetic practitioners?*

DTSC interface

DTSC –Dynamic Taxonomy on Structural Colour– is a system of interactive digital tools that facilitates the access to available knowledge on structural colour in nature, and aims to fill communication gaps between scientists and designers involved in current biomimetic projects, as well as inspire new ones. DTSC is an interface with the capacity of visualize and arrange scientific information based on a Rich Prospect Browsing[2] experience, where users customize their search.

The DTSC interface is also an opportunity for scientist to contribute with feedback, comments and new entries about Structural Colour. For this, an important part of the interface is the "contribution layer" which collects contributions to be peer-reviewed.



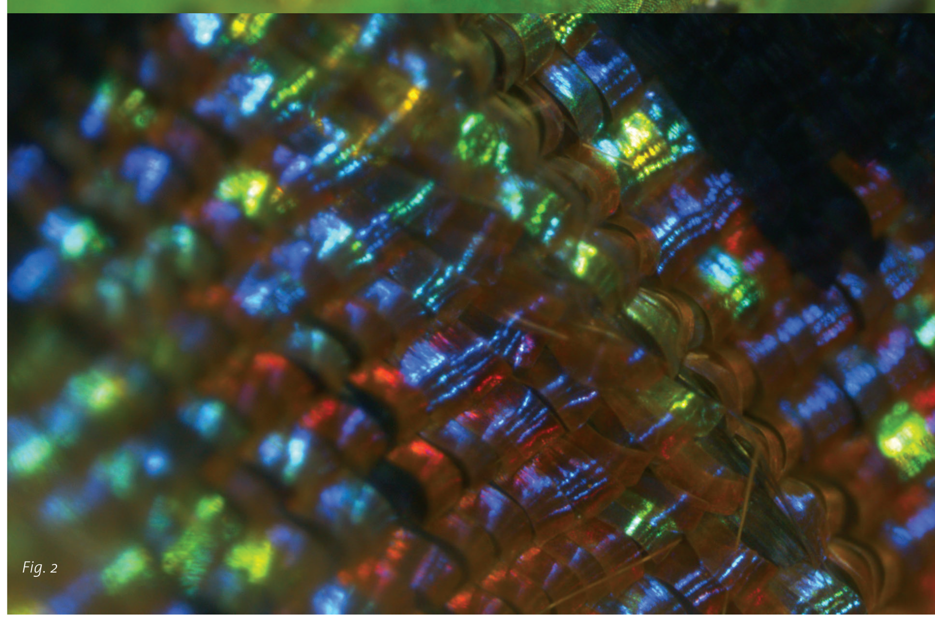
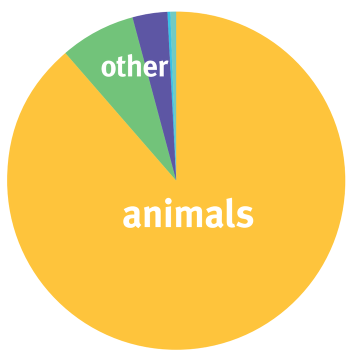


Fig. 1 Structural colour given by diffraction gratings mechanism in Sphaeridiinae, Hydrophilidae beetle. Microscopic photography by Tom Terzin
Fig. 2 Structural colour given by multilayer reflectors mechanism in Urania moth. Microscopic photography by Tom Terzin

8.7 million

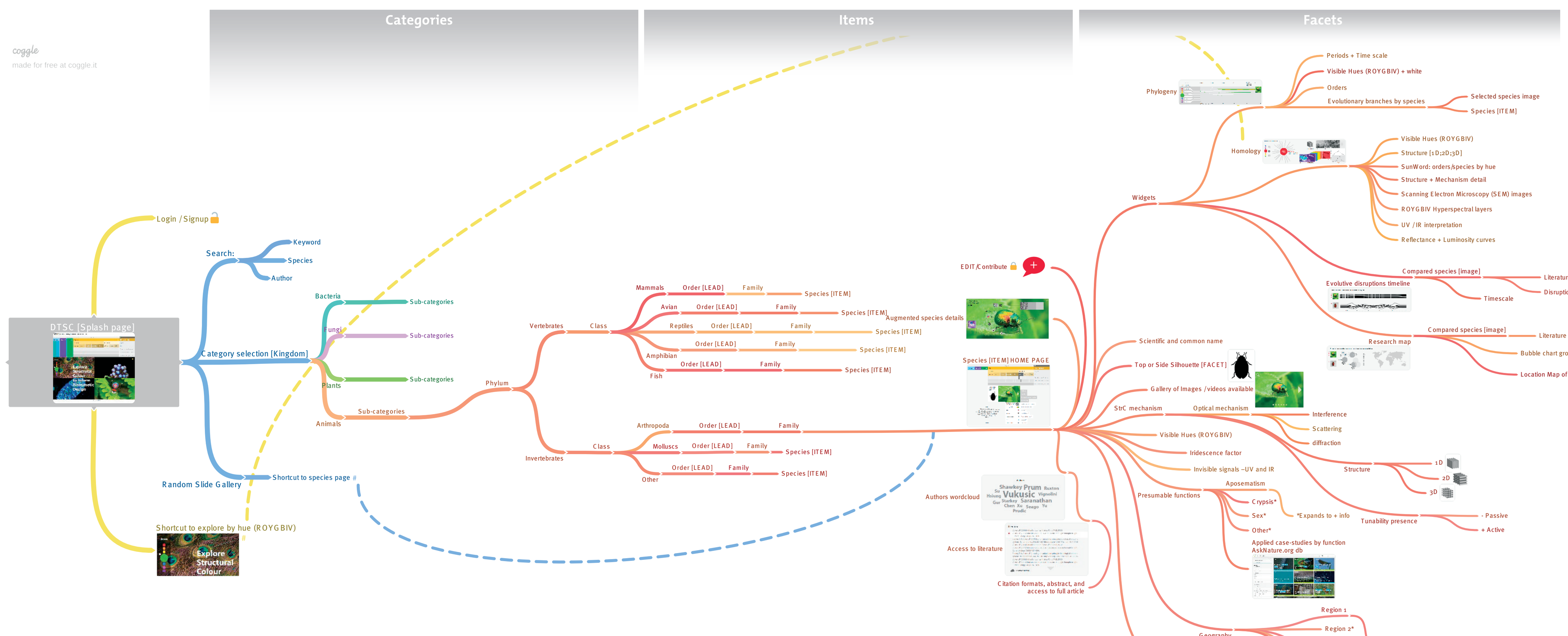
An estimation of 8.7 million species[3] distributed in five *kingdoms* live on earth. Around 89% are animals, while the remaining 11% contain plants, fungi, algae and bacteria kingdoms. Structural colour is abundant and widespread in all kingdoms. However, the number of species with structural colour is still unknown.



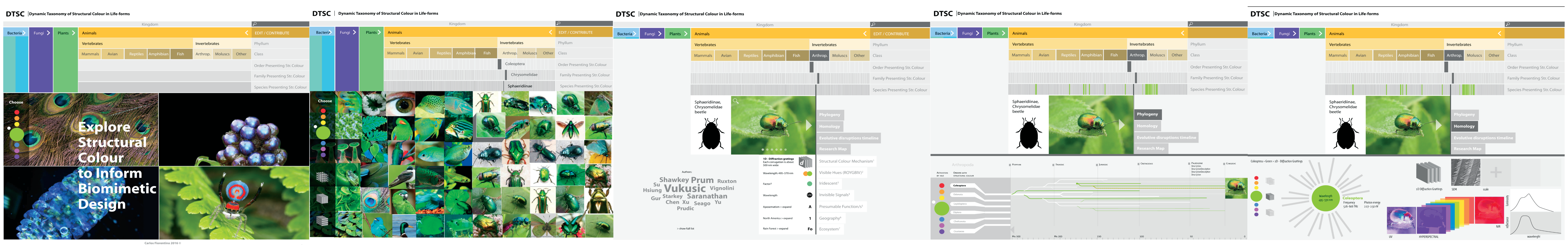
Introducing tarantula blue

90% of blue coloration in nature comes from structural colour. So is the case of blue tarantulas, with more than 40 species presenting non-iridescent blue appearance, in contrast to most of blue species showing iridescence. The nano mechanism behind this phenomena has been recently discovered and it can lead to significant innovations in the way electronic displays and colouring textiles may evolve.

Cobalt Blue Tarantula (Haplopelma lividum) retrieved from http://www.keepingexoticpets.com/cobalt-blue-tarantulas/
Research in progress on Blue Tarantulas by Bor-Kai Hsiung, University of Akron, Ohio.



Flowchart of the taxonomical content of the DTSC, organized by hierarchies: categories, items and details

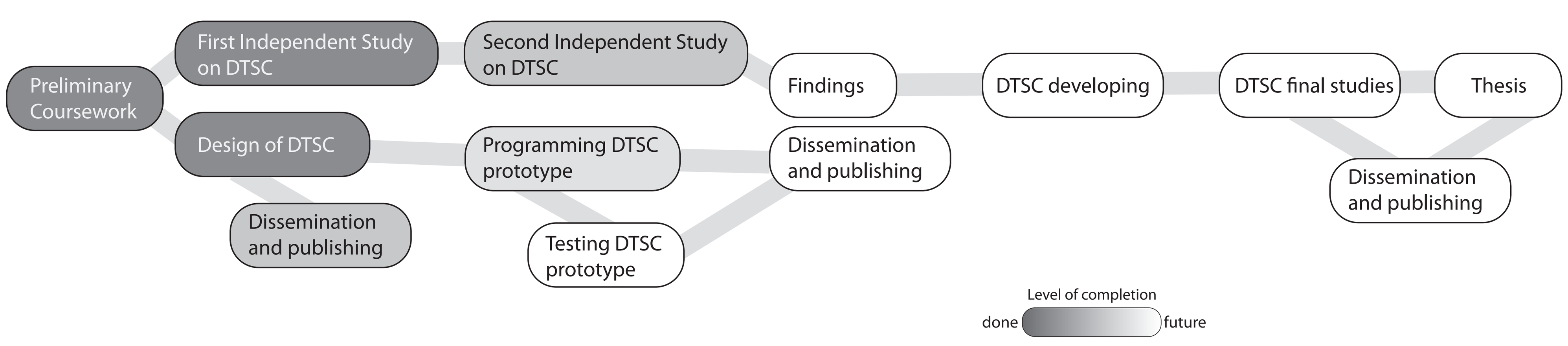


Sequence of screens selected from the DTSC interface simulation. A final prototype based on this design will be developed for user testing and further studies.

www.carlosfiorentino/DTSC.com

Future steps

The current stage of the project is focussing on user testing studies of the prototype, planning of data-access and data-analysis steps, and determining the future steps to build and make accessible the system for public use. During this and future stages of the project are completed, the experience, design process, and findings will be disseminated in symposia and peer-reviewed journals.



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1. The term Biomimicry (from bios, meaning life, and mimesis, meaning to imitate) was coined by Dr. Janine Benyus in seminal book Biomimicry: innovation inspired by nature (1997).
2. A Rich Prospect Browser is an experimental interface, in which the home page displays a visual representation of every item in a given collection, combined with tools for manipulating the display
3. UNEP's World Conservation Monitoring Centre (UNEP-WCMC), in Cambridge, UK http://www.coml.org