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Hidden Treasures. Discovering the Design Potential of Natural History Collections

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Abstract: Biomimicry is a practice that seeks to translate nature's strategies into sustainable solutions. The emerging discipline has the potential to become a leading approach for sustainable design. When it comes to drawing inspiration from nature, nothing beats an up-close study of real-life plants and animals. While metropolitan regions may be far from wildlife preserves and natural habitats, they still offer tremendous troves of biodiversity: the neatly organized collections of natural history museums. These collections contain organisms ranging from insects and birds to plants and reptiles, bringing biological inspiration from around the world to the fingertips of designers. This workshop, offered at the D'Arcy Thompson Zoology Museum, will introduce participants to the hidden design possibilities of natural history museums. Participants will engage in guided activities that help them derive design inspiration from nature.

Keywords: Natural History Collections, Biomimicry Thinking, Life-centered Design, Biology

1. Context of Workshop

Nature has been developing and testing adaptations for thriving communities over the past 3.95 billion years (Baumeister, Tocke, Dwyer, Ritter, & Benyus, 2013; Tashiro et al., 2017). Living organisms are inherently efficient with materials and energy, which is key to sustainability. Taking inspiration from nature, biomimicry is a design practice that seeks to translate nature's strategies into human design solutions (Benyus, 2002) and has great potential to become a leading approach for sustainable design (Fayemi, Wanieck, Zollfrank, Maranzana & Aoussat, 2017). Solutions can be found at multiple levels, from the forms of organisms to the processes and systems of nature (Fecheyr-lippens, 2017). Facing enormous social and climatic challenges, designers can tap into this vast database of inspiration for life-friendly and ethical solutions. Various methodologies to learn from nature's genius have been developed (Fayemi et al., 2017), one of which is the Biomimicry Thinking framework by the consulting firm Biomimicry 3.8 (Baumeister et al., 2013).

This framework divides the process into four components:

- Scoping: frame the design problem and set the appropriate context.
- Discovering: identify organisms that face similar challenges and abstract bio-inspired design principles.
- Creating: design based on the abstracted design principles from identified organisms.
- Evaluating: apply Life's Principles (Baumeister et al., 2013) to evaluate the suitability and sustainability of the proposed design.

For designers, one of the most difficult steps in this process is the Discovering phase, which requires designers to locate organisms that can be used as models for design solutions (Rowland, 2017; Kennedy & Niewiarowski, 2018). Designers often live in urban areas with little access to wild lands that hold the bulk of the world's biodiversity (Pimm et al., 2014). For designers living in urban areas, there is another treasure trove of biodiversity that is little used by those outside specialized fields in taxonomy: museum of natural history collections. These collections contain organisms from across the globe, and they compose a vast database of potential solutions for sustainable innovation. Here we propose a hands-on, 90-minute workshop held at the D'Arcy Thompson Zoology Museum that attempts to connect designers with natural history collections. In this workshop, we will explore how designers can tap into nature through museum collections as inspiration for functional design.

2. Planned Activities and Expected Outcomes

The goal of this workshop is to introduce designers to a functional approach to learning from natural objects and to create an awareness of the potential of natural history artifacts in museum collections to inspire sustainable design solutions. To meet this goal, participants will get up-close and personal with specimens that they are unlikely to have ever seen or encountered before.

The workshop will start with a short introduction to what Biomimicry is and how it can be a helpful tool for sustainable design. The various phases of the Biomimicry thinking methodology are presented, specifically the "function bridge," which is the translation from biology to design. To explore this approach, participants will get the opportunity to engage hands-on with natural artifacts to discover how nature solves problems and to compare them with their needs as designers. Participants will learn to identify functions performed by organisms in the collection and develop ways that the organisms can inspire sustainable solutions to human design challenges by interacting with and learning from the artifacts in the museum.

Figure 1. Designers from Visual Communication Design and Architecture learn by discovering functional strategies of natural artifacts. Photo©Fehler (2018).

Figure 2. Backroom of a major natural history museum that is under-utilized and rarely seen by the public. Photo©Penick (2016).

Figure 3. Seeing butterflies up close allows for a better understanding of insects and their strategies. In this particular case, the structural color and how it reflects light could be explored. Photo credit@Fehler (2016).

3. Intended Audience

This workshop welcomes participants from a diverse background. Biomimicry supports a functional approach, so any problem solver can benefit from this workshop. No prior knowledge of biology or biomimicry is required to attend.

12–20 participants would be ideal for this workshop and time frame.

4. Length of Workshop

The workshop will include an introduction to the Biomimicry Thinking design process (20 min), a hands-on multi-sensory exploration (20 min), a problem-focused activity (30 min), and a recap and discussion (20 min).

5. Space and Equipment Required

This workshop will be held at the D'Arcy Thompson Zoology Museum located just a short 4 min walk from the conference venue. Matthew Jarron, the museum curator is on board and excited to host us. Participants are encouraged to bring their notebooks, sketching materials, as well as a curious mind. Participants will be provided a participant Information sheet and also any necessary hand-outs for the workshop activities.

6. Potential Outputs

The workshop will reveal questions about the method of extracting functional knowledge from natural artifacts. These questions will prompt future research to develop tools and resources that can help designers engage in a life-friendly approach to solutions.

Additionally, the use of natural history collections as a source of design inspiration could play an important role in preserving the "biodiversity" of natural history collections themselves. Over the past decades, natural history collections and museums are increasingly struggling to stay open and are at risk of being moved or destroyed (Conniff, 2016). One way to ensure their survival is to expand on the current offerings they provide for society. In the words of Hagedorn et al. (2018, p. 2): "As global biodiversity declines, the value of biological collections increases.". If designers can find benefits from working with natural collections, perhaps they can help maintain and grow these important historical treasures that hold the secrets of life for the future.

After the conference, a report of around 500 words documenting the outcomes of the workshop will be written and permission given to EAD to publish it on their website.

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