Biomimicry in Building Architecture: How Effectively does Theoretical Biomimetics Translate into Industry-Standard Construction Practice?

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The following is an excerpt from a longer piece. For full text, please visit https://scholar.colorado.edu/concern/undergraduate_honors_theses/nk322f51x

Abstract

Biomimicry—design inspired by the functional genius of nature—is becoming increasingly prevalent in fields of material science, architecture, and other sciences. Yet, when it comes to building, biomimicry is met with reluctance from the construction industry. Much of this concerns the accessibility of traditional, high-carbon materials, novel technologies, and lack of cross-collaboration. Thus, this study comprehensively explores how well biomimetics translates into buildings' material and structural qualities. Furthermore, this study aims to provide insight into how to fill the gap between biomimetics and the real world. As a result of this effort, architects and engineers will understand how to leverage nature to make buildings more sustainable. In the first part of this document, biomimicry is contextualized, and the scope of this investigation is explained. The second part transitions into a detailed exploration of biological models, processes, and their material feasibility in today's industry. Lastly, this study evaluates evidence from part two to compare how well biomimetic precedents are optimized based on available research. Evidence suggests that a paradigm shift towards system thinking is paramount to integrating nature's genius into a sustainable built environment.

Lay Summary

Copying nature's patterns, forms, and processes in new building technology is one way to achieve more efficient material and energy use. However, there are two key obstacles to sustainable building: lack of collaboration between industries, and short-term gain. This investigation explores how we can overcome these obstacles to bring more innovative solutions into the built environment. Key ideas about the green building are discussed, then existing research is explained. In the end, evidence is evaluated to demonstrate the potential for developing natural models in the real world.