



# 31<sup>st</sup> Annual International Conference of The Biotechnology Society of Nigeria (BSN) Covenant University



## THE ROLES OF BIOMIMETIC APPLICATIONS AND INTEGRATIVE RESEARCH IN WEALTH CREATION

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**SUNDAY 5<sup>TH</sup> – THURSDAY 9<sup>TH</sup> AUGUST 2018**

# Introduction

## Contents

- What is biomimicry?
- Areas of biomimicry applications
- Biomimicry and wealth creation
- Benefits of integrative research
- Hindrances to collaborative research in developing countries
- conclusion
- **Introduction:** Nature is a great teacher. The roles of biomimetic in medicine, nanotechnology, military apparatus and operations, Artificial Intelligence, Engineering, Architecture and other fields of human endeavor cannot be over emphasised. The practice of imitating the models ,systems, and elements of nature in order to solve complex human problems is known as biomimicry or biomimetics (G.Alexandridis *et al* 2016). Developing countries economic development and transformation could hinge on the development, appreciation and application of bio mimicry

# Objectives

- Highlight applications and the importance of biomimicry in wealth creation.
- Discuss the benefits and limitations of collaborative research among researchers in different disciplines.

# Methodology

- This paper reviews the applications of biomimetic in medicine, engineering, architecture and other fields of human endeavours.

# Experimental Setting

Different articles, journals and materials were reviewed and analysed for this presentation.

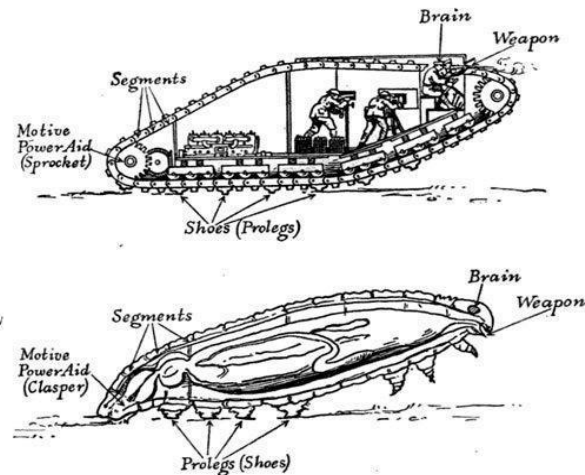
# Results and Discussion

## Biomimicry Applications:

- **Lead to drugs** used in the treatment of pinworm, hookworm, and giardia in humans were discovered by studying chimpanzee when ill. It was discovered that Chimpanzee normally seek for Vernonia genus trees when ill, later found to contain chemical compounds that can treat parasites such as pinworm, hookworm, and giardia in humans.
- **Hydrogel discovery:** Hydrogels are widely used in biomedical applications, especially tissue engineering. Hydrogels have been used for wounds treatment, degrade slough on the wound surface. Also useful in drugs delivery systems.
- **Design of aircrafts:** Wright brothers were keen observers of natural phenomena such as bird and insect flight which later resulted in aircraft discovery in 1903.

# Results and Discussion

- **Development of modern radar systems:** Modern radar (range and detection) mimicks the sonar mechanism used by bats and dolphins. (Charles Phua 2018)
- **Learning from chameleon and octopus :** has led to production of biomimetic material that will mimic an animal's ability for colour-change (Charles Phua 2018).
- **Military tanks development:** the first generation tanks took inspiration from caterpillars (and the traction system of modern tanks is still often referred to as 'caterpillar' tracks)



A tank and a caterpillar are first cousins.  
Notice the wonderful likeness in mechanical detail

Source: Charles Phua 2018

# Results and Discussion

## Benefits of collaborative research:

- sharing of knowledge, skills and techniques
- cost-efficient and effective utilisation of the merged skills and talents.
- It enhances availability of funds and grants for research.
- When research is interdisciplinary and collaborative, the diversity may serve as sources of new insights.
- Collaboration in research enhances making new contacts and expanding ones network beyond the home institution and organisations.
- **Challenges of collaborative research**
- Locating the ideal collaborators
- A substantial amount of time is required to adequately prepare joint proposals





# Results and Discussion

## **Biomimetic and wealth creation.**

Biomimetic would give birth to products development and its commercialization would lead to wealth creation and economic development in addition to societal transformation.

# Conclusions & Recommendations

- Biomimicry could help the Engineers and scientists of our time to obtain solutions from nature to take care of pressing needs and development of biomaterials, composite materials, robotics, optical technologies etc.
- Products development through biomimicry could be a springboard towards employment, wealth creation and social –economic development in developing countries.
- Collaborative research among researchers would create qualitative research, availability of funds, grants and equipment for further research

# References

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- Charles, Phua Chao Rong (2018), Learning from Mother Nature: 'biomimicry' for the next-generation armed forces
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# Acknowledgements

- **Acknowledgement:** The authors appreciate the supports of Covenant University in the creation of enabling environment towards the participation in this conference in addition to conference supports.

# Acknowledgements

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