

# BIOMIMICRY

How everyone can be inspired by how nature solves problems



*Åsa Jomård*

*Ann-Margrethe Iseklint*

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## **Breathe in nature, be inspired, solve problems, dream, build!**

Nature offers a perfect source of inspiration for parents, nature schools, and teachers. By studying and being inspired by nature, we gain access to solutions that nature has been working on for millennia. Playing and being creative is important in today's world – biomimicry is a unique way of looking at and learning from nature. Biomimicry allows and inspires us to be curious and provide us with a unique chance to develop sustainable designs and solutions to problems.

### **What is Biomimicry?**

Biomimicry means that we use ideas from nature to solve problems. **Ecosystems and organisms face the same challenges as we humans do.** They have evolved over 3.8 billion years into a model of sustainability that have and can continue to inspire human inventions and designs. Often, we learn about nature, but biomimicry shifts to focus to what we can **learn from nature.**

# We can learn from the millions of animals, plants and fungi that we share our planet with

## Fantastic inventions inspired by plants

Georges de Mestral invented the Velcro inspired by the properties of burdock plants. He was out walking in the Swiss mountains with his dog. Seeds got stuck in the dog's fur. The hooked seeds of the burdock plant easily gets stuck in an animal's fur. This means that seeds can be moved from one place to another and thus disperse its seed. Velcro straps that you find in clothing or shoes are usually made of nylon. Today however, innovators strive to use durable materials.



Note the small hooks on the spines.

## Nature never ceases to amaze and surprise



**Some plants have structures that keep them clean**

The petals and leaves of a lotus flower are water and dirt-repellent. The self-cleaning properties of the plant have inspired products such as self-cleaning paints and water-repellent coatings for vehicle paint.

# **Biologists collaborate with architects, engineers and designers to solve problems and help us to create a more sustainable future**

## **Animals have many clever solutions to problems**

The gecko lizard has special toes with a sticky material that has inspired engineers to develop a remarkable adhesive. The glue is so strong that it is possible for people to climb up a glass wall.



## **What could be better than a creative combination of nature, design and innovations?**

One of the most important tasks that parents, nature schools, and teachers have is to help children develop knowledge and understanding about what a sustainable society means and how we can work together for sustainable development. Discussions about sustainable development deal with several complex problems and issues. It is crucial to provide examples of what can be done to solve problems facing humanity.

- What measures can we take to avoid or reduce the effects of our and society's negative environmental and climate impacts?
- What kind of society do we want to create and live in?

## **Explore and ponder – outdoor learning**

Children love to build and create so biomimicry with its focus on solutions lends itself perfectly. Mention frog slime to a group of kids and you might hear a loud collective "Yuk". But for children looking for solutions to problems, the frogs' slimy skin is incredibly fascinating. When you go on a biomimicry journey of discovery, the focus is on how we can use slimy substances to design, for example, plasters or new cancer treatments. Frog slime, spider spit and leaves can be used to create sustainable solutions and technologies for people.

Biomimicry does not require new equipment as children can be inspired by the local animals, plants & fungi.

**It's easy to get excited when you use nature as inspiration for designing solutions**



## Education for sustainable development

Living sustainably means preventing further degradation of the planet and caring about and taking responsibility for a just and peaceful world. It is important to encourage children to live sustainably but it is also important to help children feel a sense of responsibility and care for nature as well as to encourage new solutions and ideas. Without new ideas and solutions, it is difficult to achieve an ecosystem with biological diversity and a society where there is a balance between economic well-being with respect for the environment and social justice.



One problem is that we do not know what actions lead to a sustainable future. To deal with an uncertain future, we need to be flexible in our thinking and have the required skills to consider several future possible scenarios. Teaching children to think and critically study solutions is essential. It is important to also encourage a search for creative possible solutions to a problem.



## **Create a climate where children can feel safe and where they can develop their wild and fantastic ideas**

Above all, biomimicry develops children's creative thinking. A variety of creative tools can be introduced to solve problems and design things inspired by nature's often ingenious ways of solving problems. Crayons, brushes, clay, randomness and memory maps can be used to create unique solutions. Moral and ethical aspects can be examined and discussed. Solving problems and inventing things is exciting and fun, but it is important to remember that it is also a challenge.

Developing sustainable ideas and biomimicry develop children's and students' critical thinking, and instead of presenting ready-made solutions and answers, the focus is on developing children's ability to ask interesting questions and investigate different solutions and perspectives.

Biomimicry and a sustainable approach have, in addition to the ecological dimension, also a social and economic dimension. Biomimicry can be used to develop working methods in schools as well as in organizations based on equality and justice. The economic dimension can be introduced into the work in several different ways: we must be careful with our natural resources as well as human resources.

The book *Biomimicry with Theo & Tuva: Nature Spotting Inspires Wild Ideas* offers an opportunity to discover nature together with children. With nature's help, we can build a world together that is designed to work together with nature instead of against it. A world that helps us all live and develop to our full potential.



## Future dreams

Regardless of what future dreams and ambitions a child have a sustainable approach is important, and engineers as well as medical personnel can benefit from studying nature. Today, it is easy to imagine a range of scenarios that are not hopeful. Many trends that we can detect in our modern society seem to lead to unpleasant conclusions regarding our future. A nature-inspired approach offers a strong counterweight. **A strong hopeful counterbalance.**

## Focus on creative thinking

With a biomimic lens, children learn facts, but the focus is on studying functions and strategies. By examining the patterns and strategies that animals, plants and fungi use, children can design their own solutions to a problem.



## **Study a specific behaviour**

Spending time outside in nature may be a goal but sometimes achieving it is a challenge. During parts of the year, the weather may be an obstacle, but the environment can also make it difficult to stay outside - many preschools and schools have restricted access to beaches, forests and wetlands. But schools have an excellent infrastructure that can be used to study animals, fungi and plants.

The Internet offers a rich variety of videos that can be used. A video is a perfect tool that gives the child an opportunity to play it several times. An excellent opportunity to learn more and to carefully study a specific behaviour. New insights comes from carefully studying nature.

Amazing creatures and plants have existed on our earth for millions or perhaps trillions of years and their lives are noticeably void of pollution and debris.

Nature produces more than we humans, something that may surprise many, but nature does not waste resources and it uses everything that it produces. Thus, you will not find any rubbish produced by nature, but everything is reused and recycled. Thus, we can learn about sustainable living by studying nature.



## **Sustainable and hopeful solutions**

Biomimicry encourages children to ask questions, observe and study a situation that they want to change. Biomimicry in the classroom offers opportunities to sketch, draw or build a model that illustrates the shape an object must have to fulfil a function that helps solve a problem. The child can compare strengths and weaknesses in terms of how well different proposals meet the requirements to solve the problem.

It is also possible to introduce an economic dimension.

- What materials should be used to build the innovation?
- How it costs a lot to build, both in terms of the use of raw materials and human resources.



## Have fun together!

Most people we have met are curious and working with biomimicry means that you are constantly learning new things about nature. As an adult, you play a significant role in igniting an interest in nature. The book shows you different ways to invite children to develop a love and curiosity for nature. A love that hopefully lasts a lifetime.



## **Explore the secret of our planet and marvel at the beauty of nature in a new deeper way**

Biomimicry means that children can admire a ladybird and not only see how beautiful it is and how useful it is because it eats aphids, but also discover how it can inspire ideas for unfolding a spaceship or packaging things. This is exactly how a biomimicrist is thinking. Instead of admiring the ladybird, attention is focused on ideas, for example, how a spaceship can unfold in space based on observations of how ladybirds unfold their wings.



## **About the book**

### *Biomimicry with Theo & Tuva: Nature Spotting Inspires Wild Ideas*

The book contains 10 short chapters with an introduction where Theo and Tuva observe something exciting in nature. Each small chapter continues with some interesting observations, facts and a little curiosity about the animal or plant. The last section in each chapter inspires creative thinking.

Biomimicry stimulates the imagination and inspires children to see nature as a place of both adventure and play, where you can also discover nature's secrets. It is a way to creatively explore the functions of animals and plants in their specific ecosystem and go on a journey of discovery into nature's source of ideas.

The book offers a chance to move learning out into nature, to bring observation home, and devise solutions using nature as a starting point. Let children share their ideas with the world!

# Dandelions

There is great interest in dandelions and blowing the seeds away is a particularly popular activity. To capitalize on children's fascination, a project with dandelions fits perfectly during the spring or summer.

Read the chapter ***Let the ideas fly*** about dandelions in the book *Biomimicry with Theo & Tuva: Nature Spotting Inspires Wild Ideas*



In the introduction, the children, Theo and Tuva, observe something exciting about dandelions. For younger children, it is enough to read this short one introduction and then they can pick dandelions in different phases and take a closer look at the plants interesting life cycle.

The chapter continues with some interesting observations, facts and trivia about the plant. The last part of the chapter inspires creative thinking and problem solving.

### **On an adventure with dandelion seeds**

In the book, you can read about how the wind carries dandelion seeds away on adventures. To be able to float away, the right number of flight hairs is required. The flight hairs look like a small brush, and they act like a parachute.

- Ask the child to think about how dandelions spread their seeds.
- Use a magnifying glass and let the child count the small fly hairs. Between 90 to 110 flight hairs are ideal for them to soar away with a small seed.
- Make a list of things that might be important to spread.



It is important to plant trees that help improve the climate. However, it is difficult to access and plant trees in some places. One idea inspired by dandelion seeds is to build a tree planting machine. Our tree planting machine can transport seeds or small seedlings to places that are difficult to reach.

You can build different tree planting machines and compare how far and or how long they can float with packing.

- Explore why some float better.

Trees absorb the greenhouse gas carbon dioxide. This provides a perfect opportunity to discuss climate change and climate compensation.

## Nature does not waste resources

Dandelions have a taproot, and they have round, hollow stems with a flower basket on each stem. The hollow stem contains sap canals with white milky sap. When it dries the sap turns into brown spots.



**Ask the child:**

- Why is the stem hollow?
- Why don't dandelions try to fill the stem?

The dandelion does not need a filled stem, it is stable anyway. Nature does not waste material. Using strength only where it is needed saves resources and building materials.

- Let the child test how stable the stem is and then think about other things that are stable even though they are hollow, for example pipes.
- The child can draw and build models of houses that are strong, tall and can withstand strong winds.

The house must be built with as little material as possible.



Show a picture of John Hancock, a skyscraper built by Fazlur Khan where the structure is on the outside. Something that makes it more stable. The John Hancock skyscraper was inspired by strangler figs that grow in rainforests.

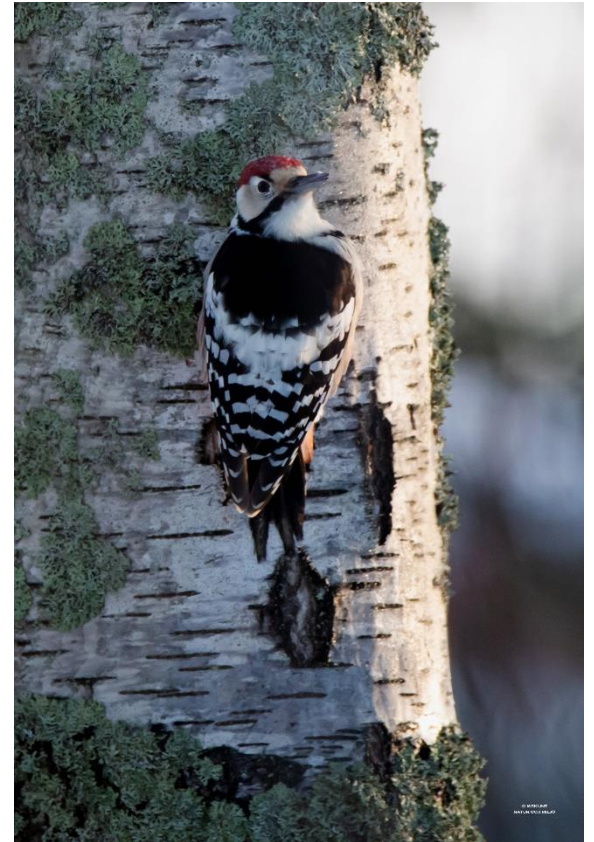


Today, very tall skyscrapers are built where they neglect to use a skeleton of steel inside to make it more stable. Instead, concrete with holes is used, or I- or H-beam systems that are stable and manufactured with minimal material waste.

## The closer you look, the more you see!

There are several animals that are easy to study. One of the "easiest" animals if you are out in the woods are ants, flies or mosquitoes. Other animals can be a little harder to see in the wild, but sometimes if you stand still, animals can get really close. It is unbelievable rewarding to look for answers to the secret world of animals and plants. A tiny ant lives a complicated life, and they can lift up to 50 times their own weight.

Some animals are incredibly difficult to see in nature, for example otters. However, there are great videos where children can closely study the behaviour of animals and plants. Our nature experiences are enriched by knowledge.



**Explore every corner of nature - together!**



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