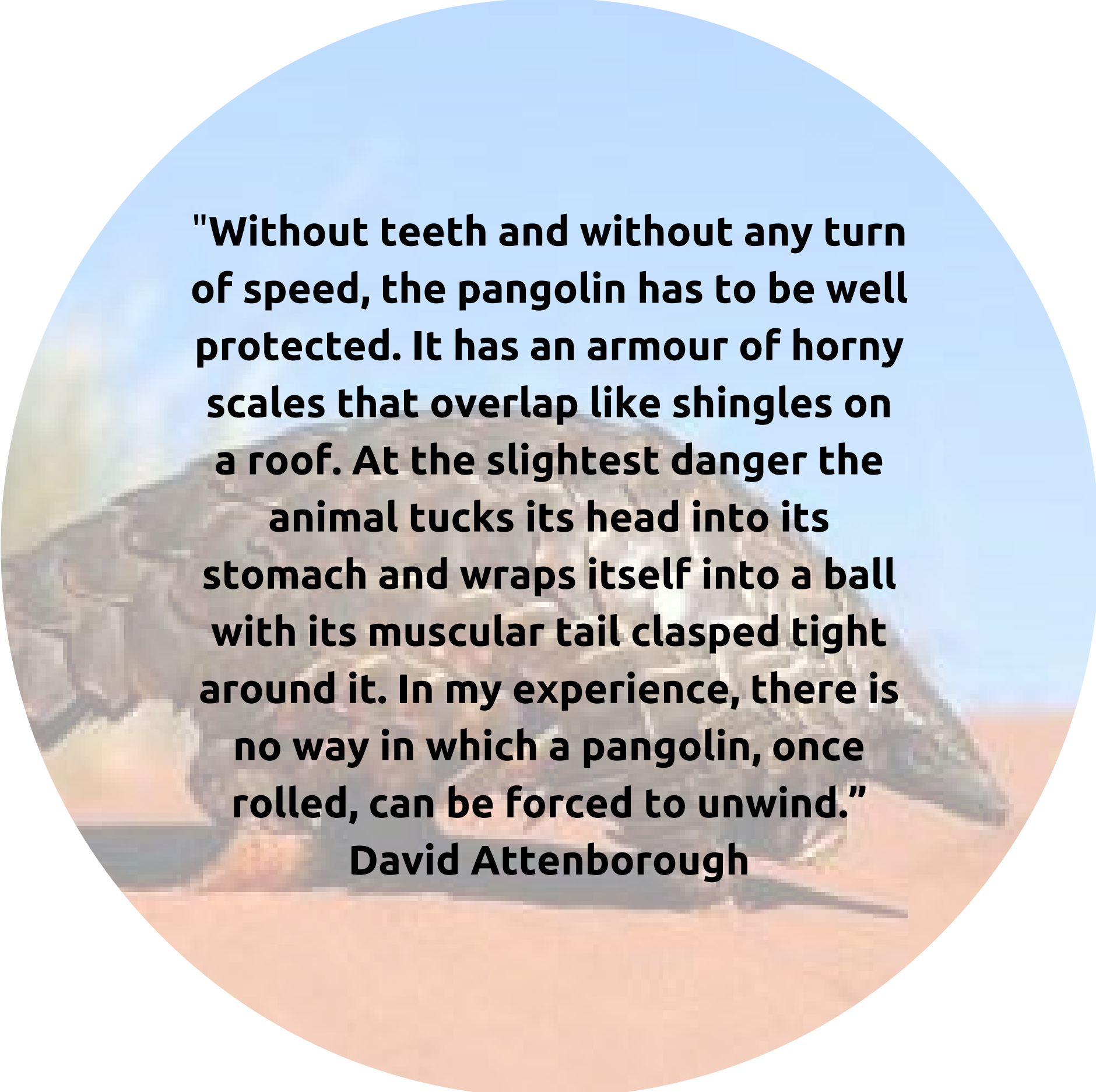




BIOMIMICRY ACTIVITY




BIOMIMICRY ACTIVITY

A circular image showing a pangolin in its natural habitat, with its body covered in overlapping, scaly armor. The pangolin is positioned in the center of the circle, facing right. The background is a soft-focus natural setting with a blue sky and reddish-brown ground.

"Without teeth and without any turn of speed, the pangolin has to be well protected. It has an armour of horny scales that overlap like shingles on a roof. At the slightest danger the animal tucks its head into its stomach and wraps itself into a ball with its muscular tail clasped tight around it. In my experience, there is no way in which a pangolin, once rolled, can be forced to unwind."

David Attenborough

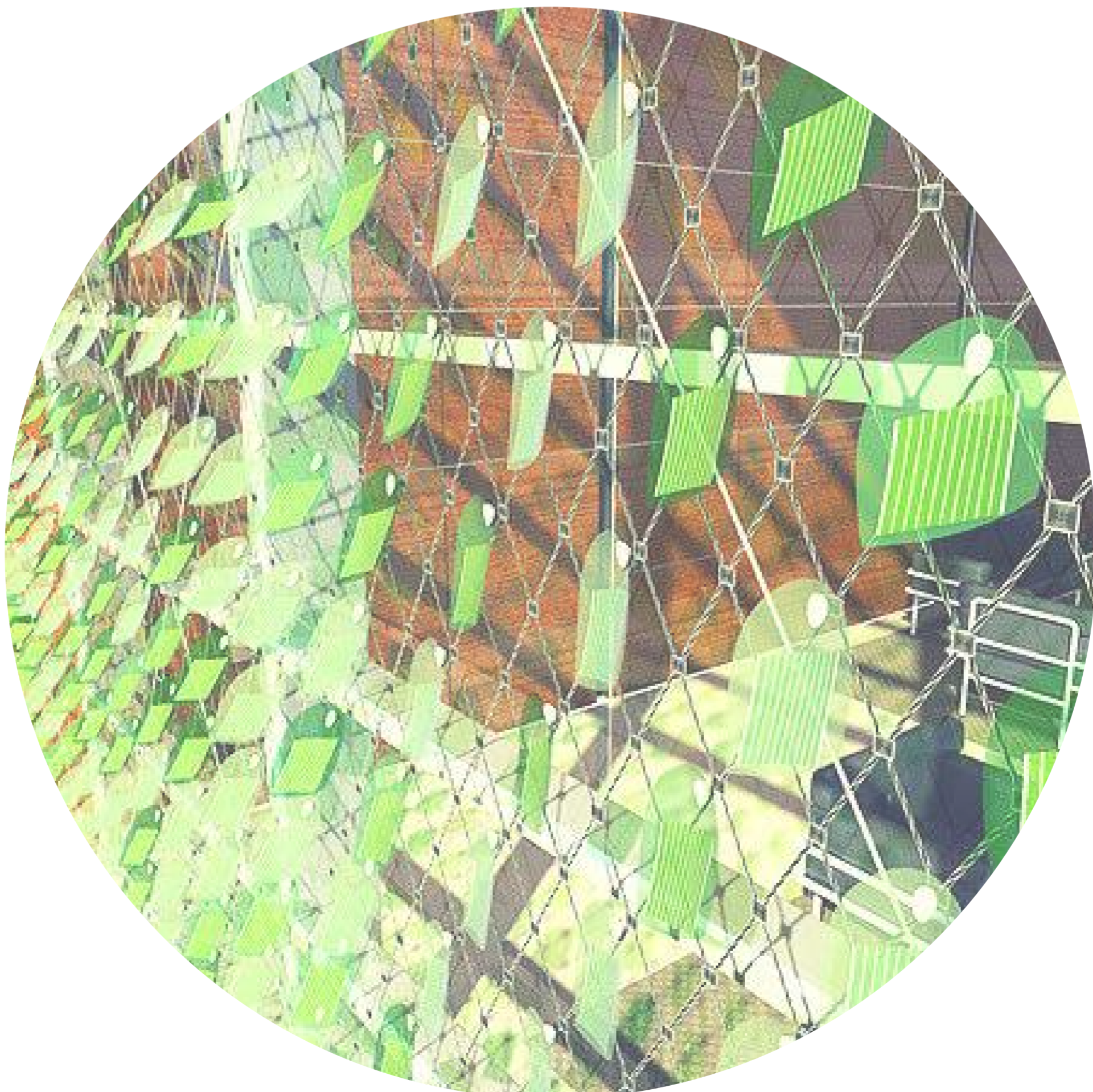
A circular image showing a dark-colored backpack with a unique design of overlapping, scale-like panels. The backpack is shown from a three-quarter view, highlighting its texture and structure. The background is a light, neutral color.

Designed by **Cyclus**, this backpack has overlapping scales like the pangolin animal. This makes it more durable, having a longer life, and protects what's inside. The material is made of recycled tubes from trucks which would otherwise go to waste!



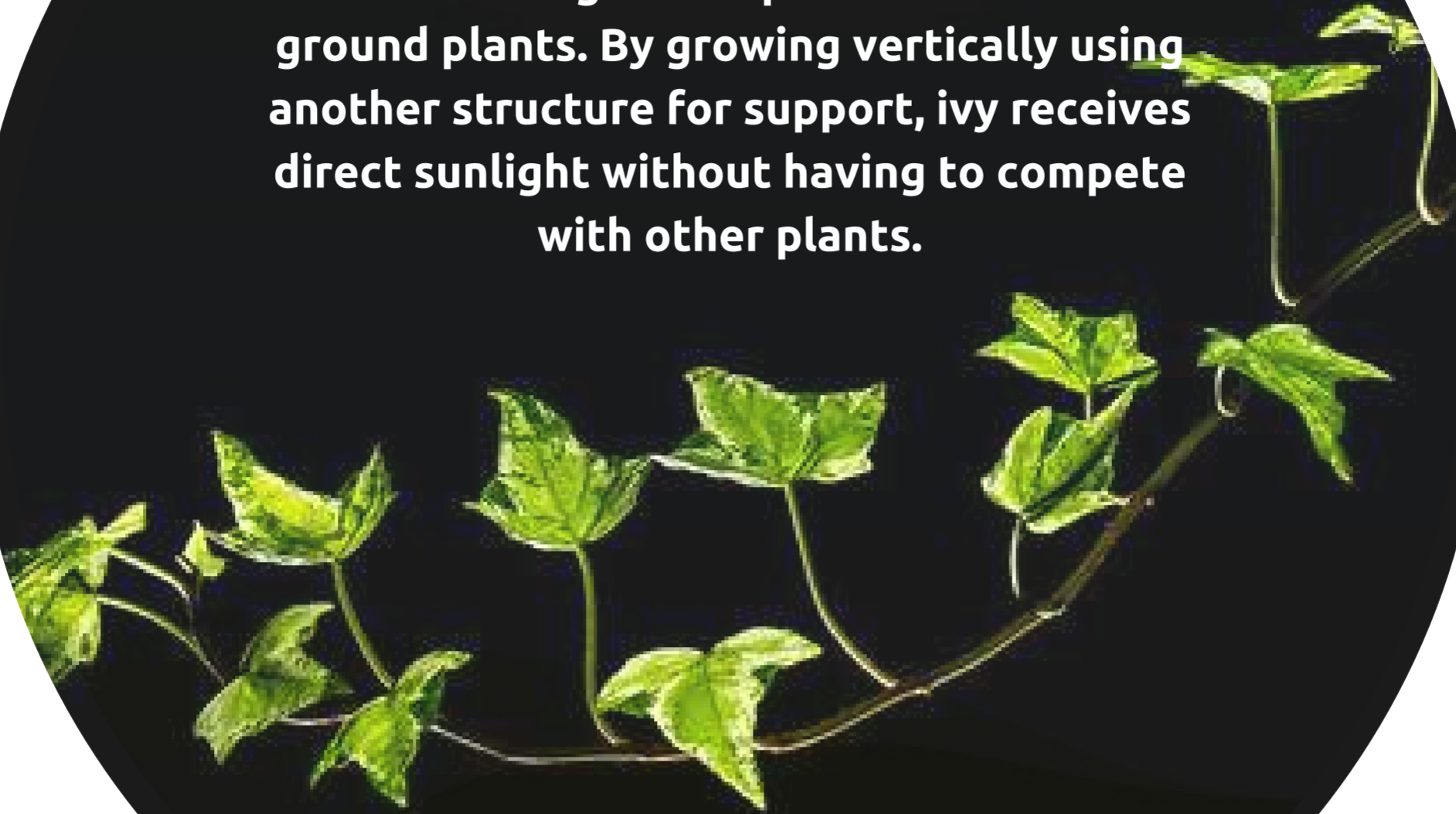


BIOMIMICRY ACTIVITY



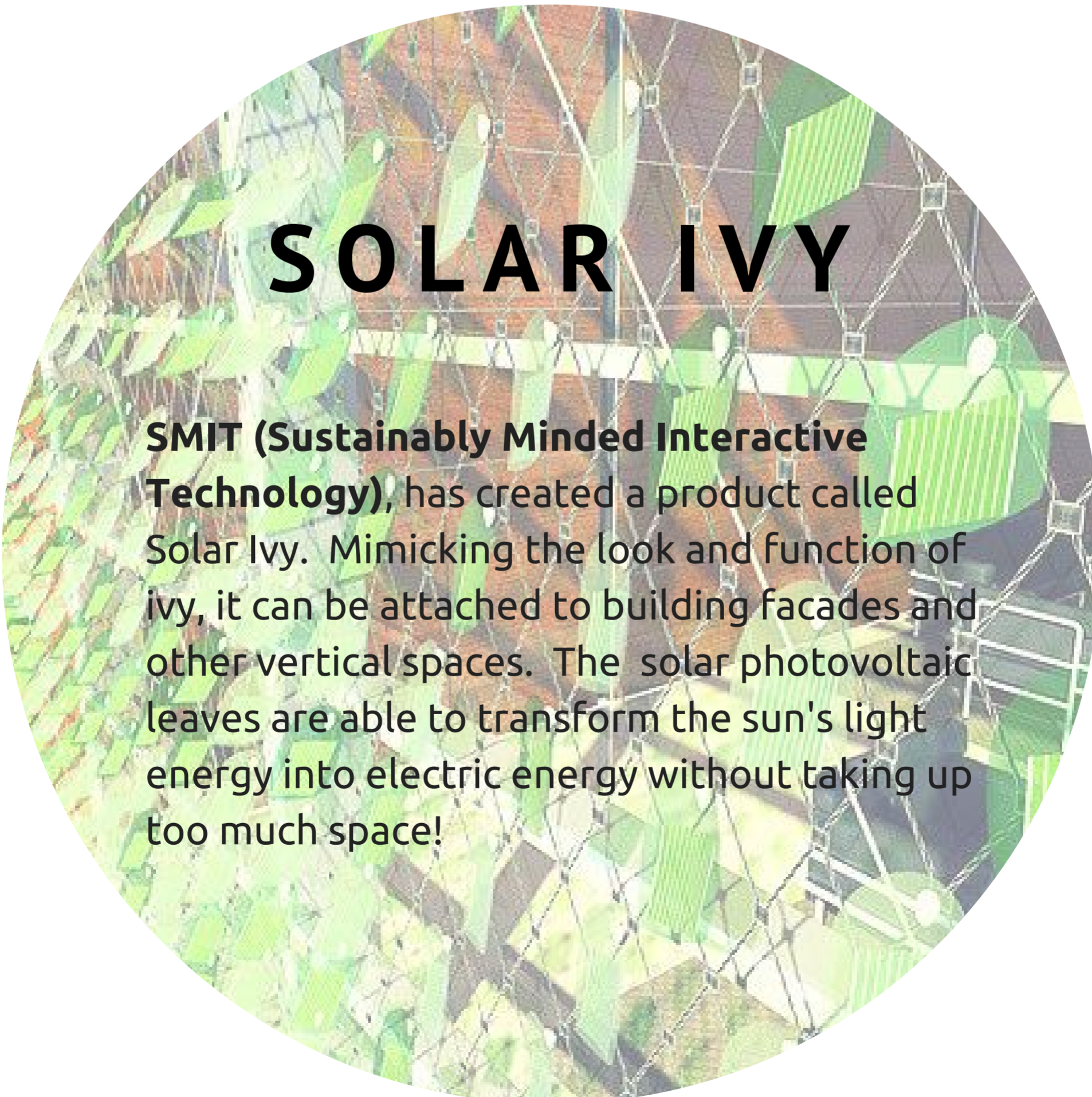
BIOMIMICRY ACTIVITY

As many ground plants compete for food sources, ivy has found a niche that allows it to get enough sunlight and nutrients without having to compete with its fellow ground plants. By growing vertically using another structure for support, ivy receives direct sunlight without having to compete with other plants.



SOLAR IVY

SMIT (Sustainably Minded Interactive Technology), has created a product called Solar Ivy. Mimicking the look and function of ivy, it can be attached to building facades and other vertical spaces. The solar photovoltaic leaves are able to transform the sun's light energy into electric energy without taking up too much space!





BIOMIMICRY ACTIVITY



BIOMIMICRY ACTIVITY



Mushrooms often grow on logs and strongly bond the wood chips together as they grow.



Ecovative Design created this product to replace plastic packaging with something that will biodegrade naturally (right in your compost bin!) This packaging is made from mushrooms as they bond together well to hold a form. Mushrooms are easy and quick to grow, and don't create any waste at the end!





BIOMIMICRY ACTIVITY



BIOMIMICRY ACTIVITY



**Butterflies don't take baths!
Instead, nano-scale (extremely
small) structures on their wings
repel water and most dirt is
carried away by water.**



**A company in Switzerland,
Schoeller Technologies, has
created a fabric called
NanoSphere that is inspired by
the water-repellant qualities of
butterfly wings. The material is
self-cleaning, dirt and water-
repellant.**

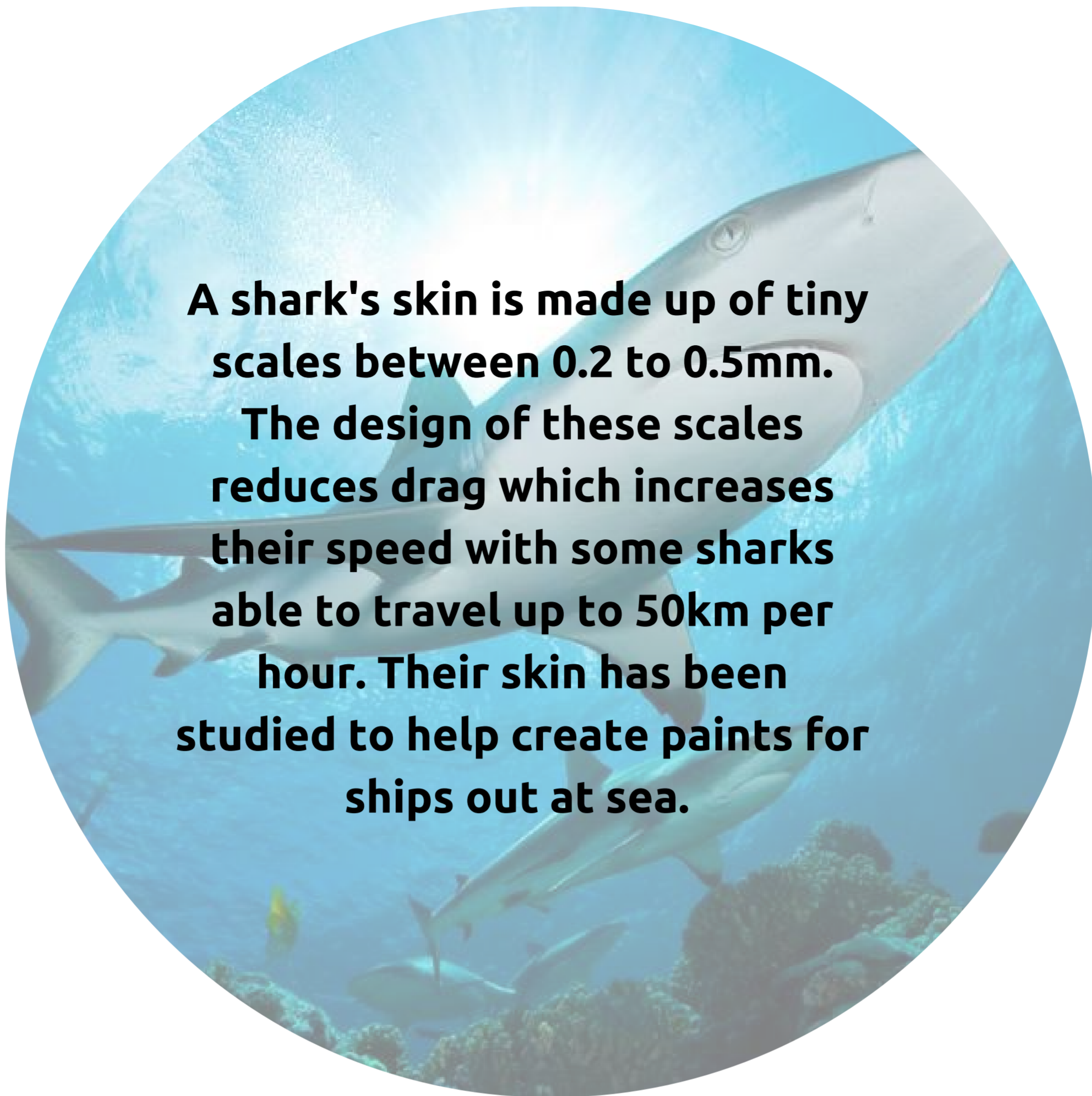




BIOMIMICRY ACTIVITY



BIOMIMICRY ACTIVITY



A shark's skin is made up of tiny scales between 0.2 to 0.5mm.

The design of these scales reduces drag which increases their speed with some sharks able to travel up to 50km per hour. Their skin has been studied to help create paints for ships out at sea.

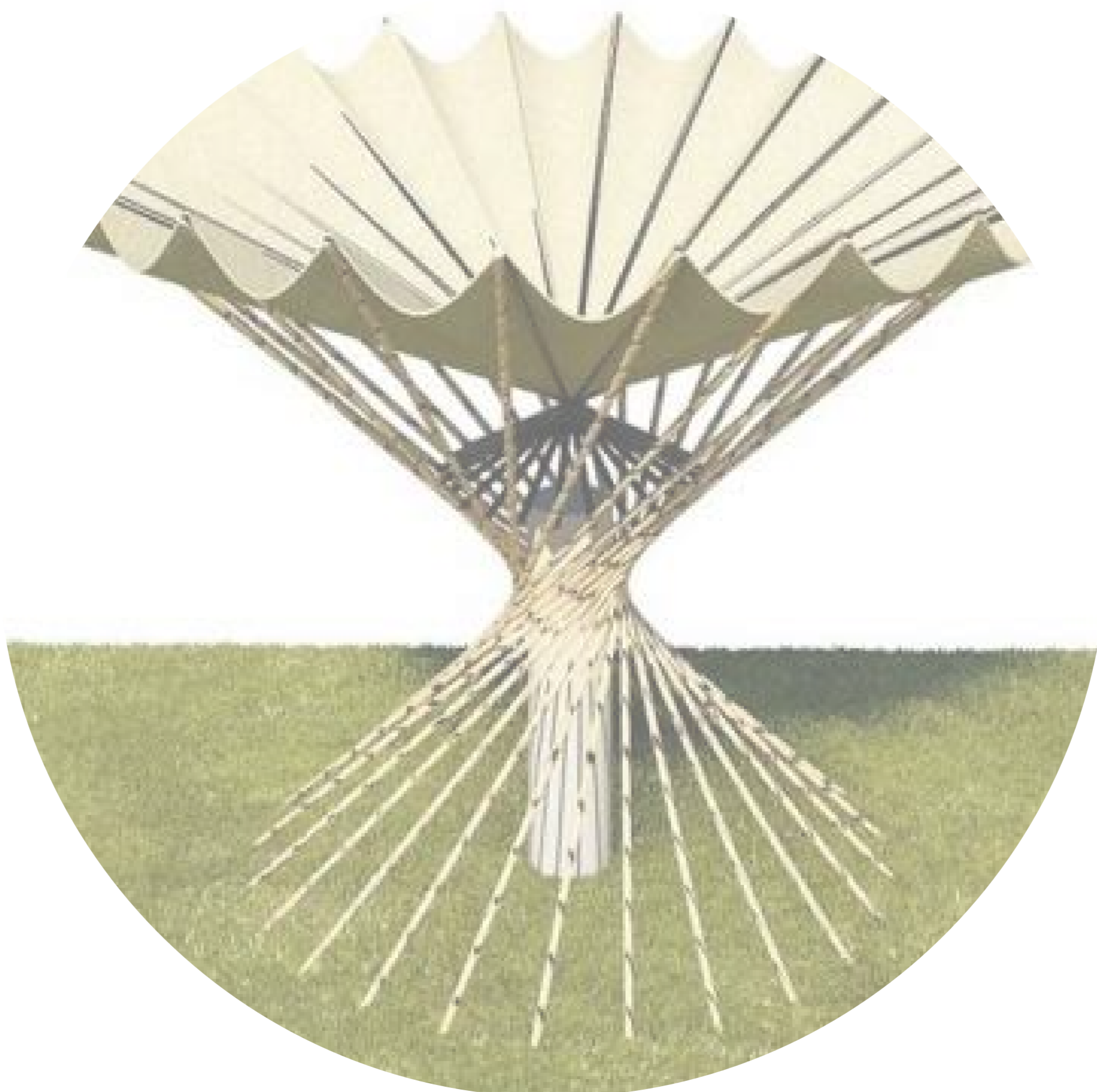


A type of paint has been developed that is particularly useful for ships at sea. It is based on the low resistance texture of shark skin, and can function under extreme pressure. It is long-lasting, resistant to sun damage and can withstand temperature changes.





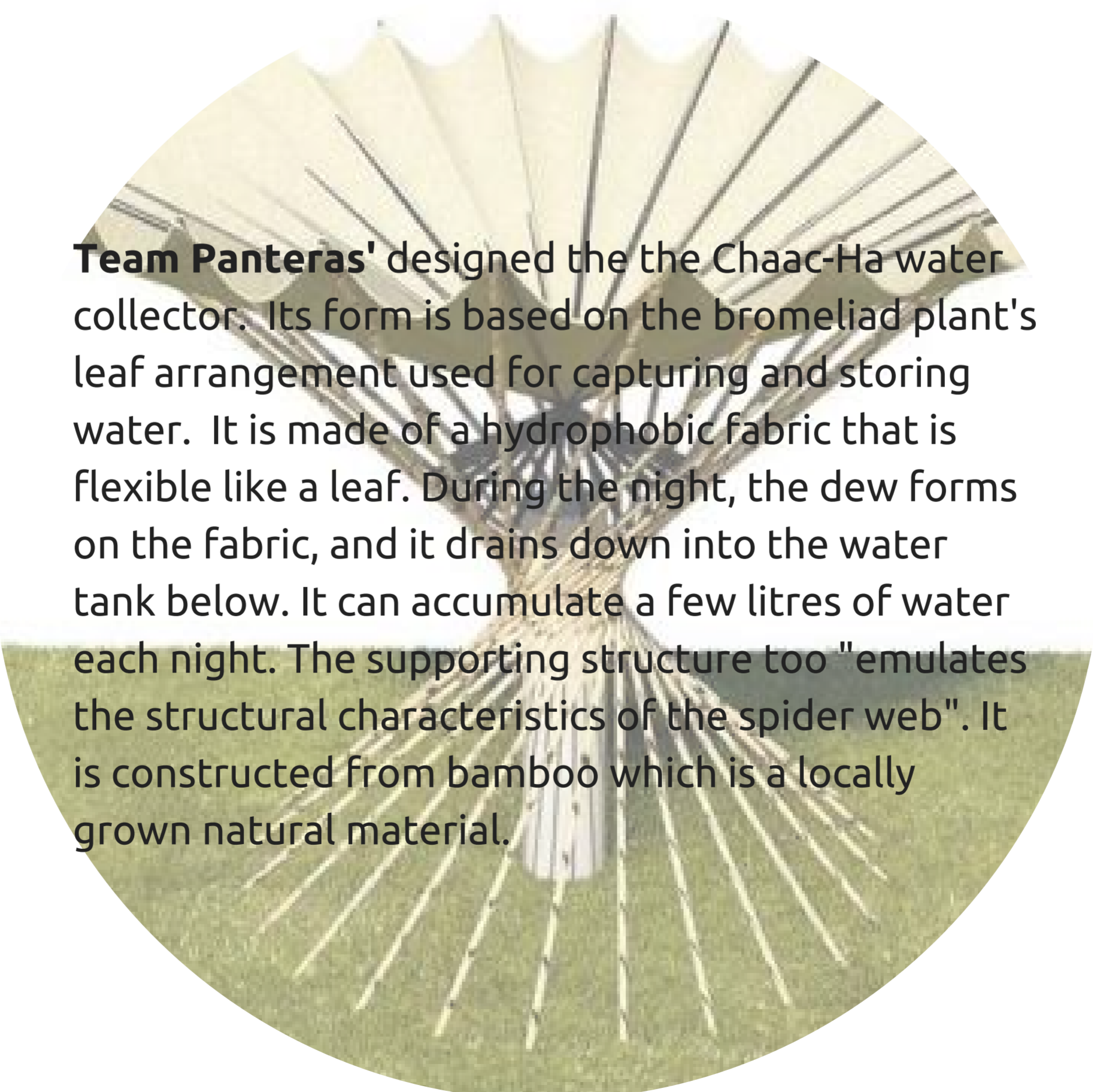
BIOMIMICRY ACTIVITY



BIOMIMICRY ACTIVITY



The bromeliad plant has leaves arranged in a circular form to collect water. There is also a structure at the base of the plant, called trichomes, that serve to store water



Team Panteras' designed the the Chaac-Ha water collector. Its form is based on the bromeliad plant's leaf arrangement used for capturing and storing water. It is made of a hydrophobic fabric that is flexible like a leaf. During the night, the dew forms on the fabric, and it drains down into the water tank below. It can accumulate a few litres of water each night. The supporting structure too "emulates the structural characteristics of the spider web". It is constructed from bamboo which is a locally grown natural material.

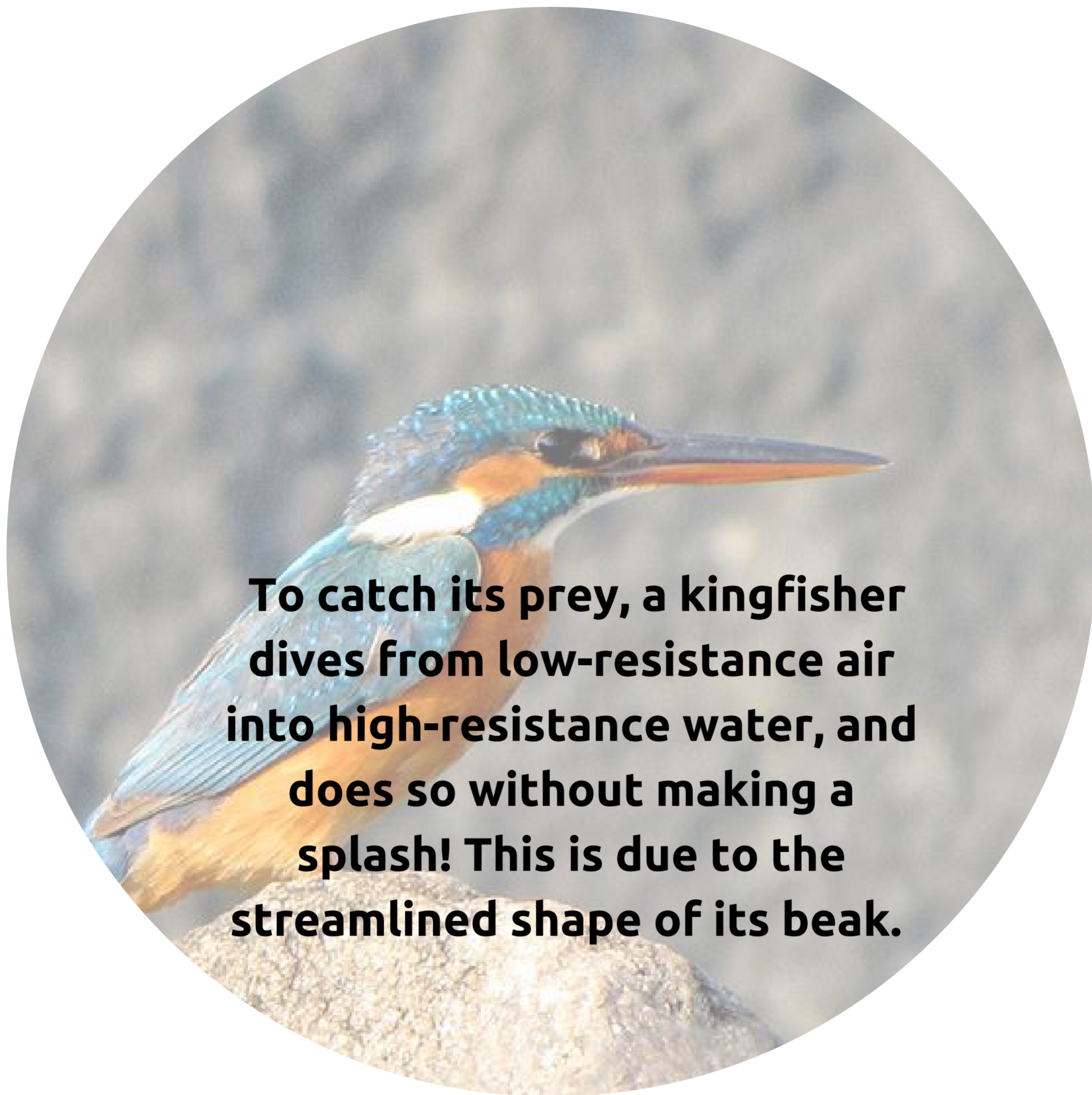




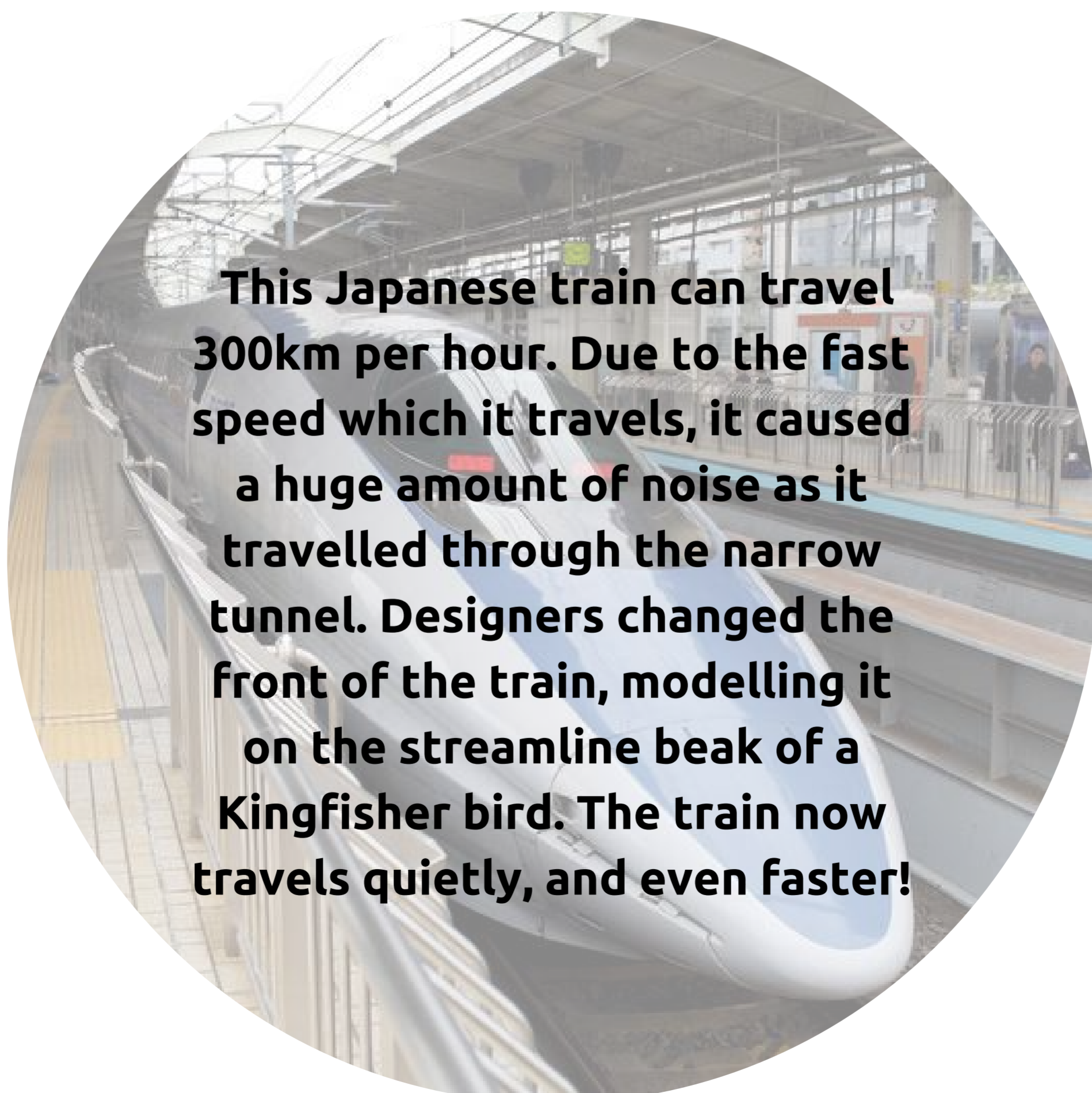
BIOMIMICRY ACTIVITY



BIOMIMICRY ACTIVITY



To catch its prey, a kingfisher dives from low-resistance air into high-resistance water, and does so without making a splash! This is due to the streamlined shape of its beak.



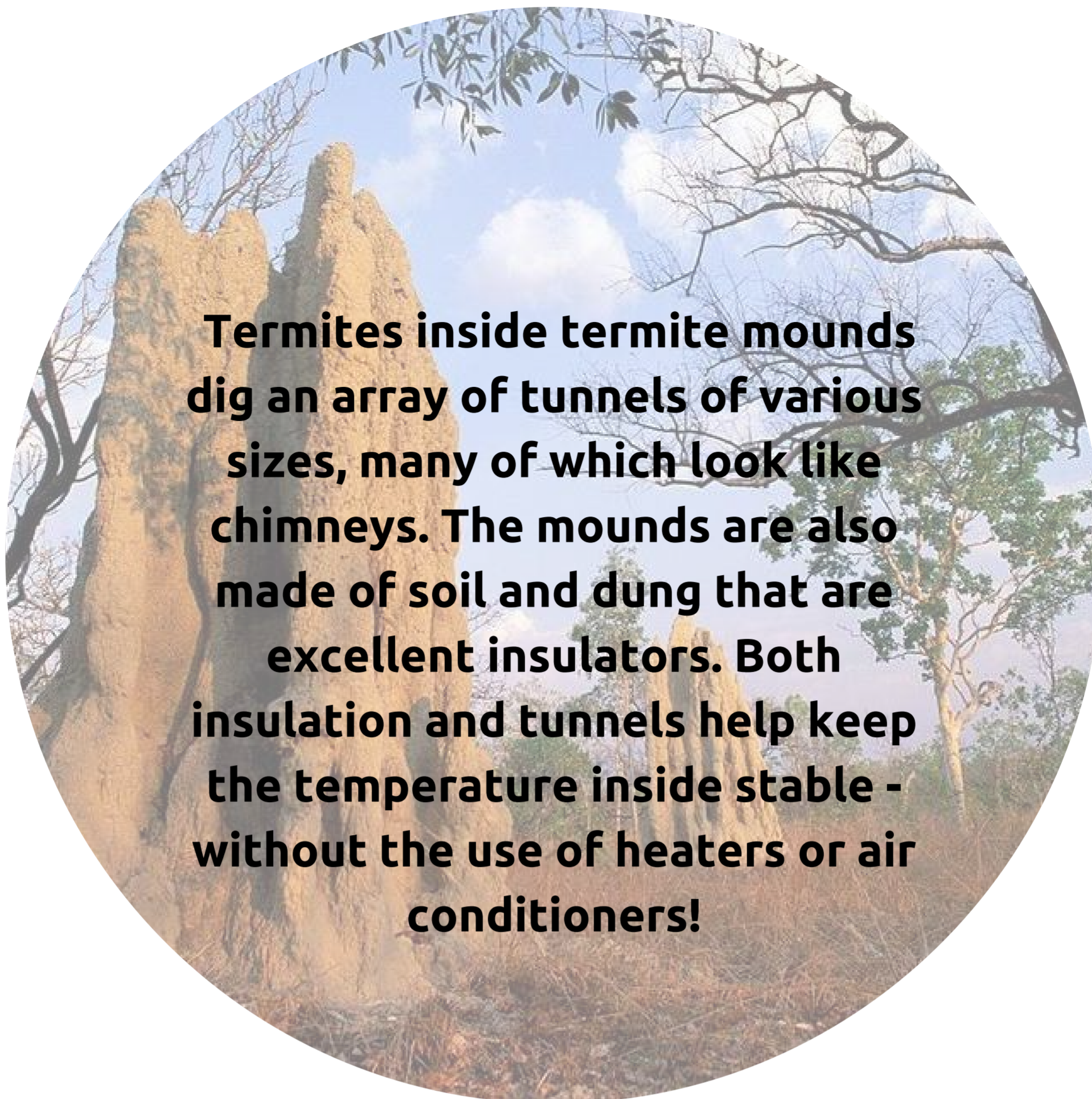
This Japanese train can travel 300km per hour. Due to the fast speed which it travels, it caused a huge amount of noise as it travelled through the narrow tunnel. Designers changed the front of the train, modelling it on the streamline beak of a Kingfisher bird. The train now travels quietly, and even faster!



BIOMIMICRY ACTIVITY



BIOMIMICRY ACTIVITY



Termites inside termite mounds dig an array of tunnels of various sizes, many of which look like chimneys. The mounds are also made of soil and dung that are excellent insulators. Both insulation and tunnels help keep the temperature inside stable - without the use of heaters or air conditioners!



The Eastgate Centre in Zimbabwe is unlike other buildings. It requires only 10% the amount of electricity as other buildings of its size. Alongside using the sun's light, it controls heating and cooling the way termite mounds do - through chimneys for ventilation along the side.



BIOMIMICRY CASE STUDY

SUSTAINABLE ISSUE: FASHION & TEXTILES

- The production and processing of materials entails sustainability considerations around land degradation and resource extraction.
- Fabric processing, including the printing and dyeing of textiles and the application of finishes, also use significant quantities of water, energy and chemicals, and produces substantial amounts of effluent.
- Garment production waste can be both pre- and post- consumer. Pre-consumer waste includes by-products from fibre, fabric and garment production. Post-consumer waste includes clothing and household textile waste to landfill.

PANGOLIN BACKPACK

"Without teeth and without any turn of speed, the pangolin has to be well protected. It has an armour of horny scales that overlap like shingles on a roof. At the slightest danger the animal tucks its head into its stomach and wraps itself into a ball with its muscular tail clasped tight around it. In my experience, there is no way in which a pangolin, once rolled, can be forced to unwind."
David Attenborough

Designed by **Cyclus**, the Pangolin backpack is a day pack that has overlapping scales like the pangolin. This makes it more durable, having a longer life, and protects contents better than a cloth pack. Instead of using zippers, it's kept closed using magnets. In addition to lasting longer, the material is made of recycled tubes from trucks which reduces the need for, and consequent impact, of extracting and producing resources for new materials.

BIOMIMICRY CASE STUDY

SUSTAINABLE ISSUE: ENERGY IN THE URBAN ENVIRONMENT

- Currently 73% of our electric energy in Australia is supplied by burning coal, a fossil fuel that when combusted releases carbon emissions into the atmosphere.
- Solar panels are a source of clean renewable energy but they take up a lot of space. This is not always functional in dense urban environments where competition for access to direct sunlight can be challenging.

As many ground plants vie for coveted food sources, ivy has found a niche that allows it to get enough sunlight and nutrients without having to compete with its fellow ground plants. By growing vertically using another structure for support, ivy receives direct sunlight without having to compete with other plants.


SOLAR IVY

A Brooklyn-based firm, **SMIT (Sustainably Minded Interactive Technology)**, has created a product called Solar Ivy. Mimicking the look and function of ivy, this mimic has wind and solar power generating photovoltaic leaves that can be attached to building facades and other vertical spaces. Solar Ivy system has a modular design allowing for many types of customisation, including leaf color, spacing, orientation, and photovoltaic type. Each 4 foot by 7 foot strip of the GROW system generates 85 Watts of solar power, producing renewable energy while also helping provide shade for buildings that can potentially reduce heating & cooling costs for the consumer.

BIOMIMICRY CASE STUDY

SUSTAINABLE ISSUE: POLYSTERENE PACKAGING

- Polysterene and other plastic packaging is derived from crude oil which is a non-renewable fossil fuel.
- The burning of fossil fuels to make plastic releases CO2 which is a greenhouse gas.
- Polysterene packaging is a single-use product that is generally not recyclable. It is not known how long it takes a polysterene material to break down in landfill.
- Packaging often ends up in our waterways and ecosystem. It can travel long distances and harm wildlife upon ingestion.



Eben Bayer and Gavin McIntyre were fascinated by mushrooms growing on wood chips, and observing how the fungal mycelium strongly bonded the wood chips together.



MUSHROOM PACKAGING


Ecovative Design has re-envisioned our relationship with waste, whereby waste becomes a resource. Their product involves a biodegradable cycle where they grow a natural material to replace plastic packaging, and instead of the material being disposed of in landfill, it can break down naturally in compost. Growing fungi is far less energy intensive than producing polystyrene and the designers recognised that the function of industrial resins in plastic, which has polluting impacts, could also be avoided. As well as countering the environmental impact of conventional polystyrene foams, this invention creates a whole new paradigm where composite materials are literally grown, then biodegraded, harnessing the incredible efficiency of nature.

BIOMIMICRY CASE STUDY

SUSTAINABLE ISSUE: ACCESS TO FRESHWATER

- Freshwater is one of our most precious resources. While nearly 70% of the earth is covered in water, only 2.5% is fresh water and only 1% is accessible for human use.
- Water scarcity affects over 40% of the global population. Over 1.7 billion people are currently living in river basins where water use exceeds replenishment.
- Approximately 70% of all water abstracted from rivers, lakes and aquifers is used for irrigation, highlighting the link between access to freshwater and food security

Sourced from the United Nations Sustainable Development Goals, 2017



Designers were inspired by the form and function of bromeliads. The plant's foliage arrangement serves to collect water and the structures called trichomes that are found in the epidermis of the plant, serve to store water.



CHAAC HA WATER COLLECTOR

Team Panteras' award-winning design, the Chaac-Ha water collector, is a sustainable solution to water catchment. Its form is based on the bromeliad's foliage arrangement and emulates the plants method for capturing and storing water. The collector is made of a hydrophobic fabric that's also bacteria-resistant and flexible. During the night, the dew forms on the fabric, and its inclination will head the water to the tank. It can accumulate a few litres of water each night. The supporting structure too "emulates the structural characteristics of the spider web". Specifically it is based on the radial distribution system of forces of the spider web, and is constructed from bamboo which is a locally grown natural material.