Model wearing an artisanal top, dress and silk knee-high boots from Yuima Nakazato's Evoke couture collection—all woven with Brewed Protein blue filament.

"The beauty of Brewed Protein lies in its capacity to reproduce a variety of textiles."

Image courtesy of Spiber

Living Essence

The perfect marriage of nature and science, biofabrication is the latest sustainable fashion paradigm to know.

Words Kyla Zhao

Fashion has never shied away from taking inspiration from nature. Textile manufacturers and fashion designers Spiber in Japan, Mycl in Indonesia and Scarlett Yang from Hong Kong, however, are taking things one step further.

Using the very essence—the living cells—of organic matter such as mushrooms, they turn them at scale into the building blocks of a new material, one suitable for the construction of garments and accessories.

From research labs to runway shows, lab-grown fabrics might very well represent the future of fashion. Or at least, allow us to protect our planet and ensure there is still a future to look forward to.

SPIBER

Japanese start-up Spiber is now one of the world's premier textile manufacturers known for its sustainable innovations, but its origins are much humbler. It began as a PhD project at Keio University in 2007, when Junichi Sugahara and Kazuhide Sekiyama were studying spider silk and trying to distill the properties of one of the world's toughest materials.

The pair eventually succeeded in creating a synthetic replica. That venture laid the foundation for what would become Spiber's signature product, Brewed Protein, created from plant matter using the company's proprietary fermentation process. The beauty of this biomaterial lies in its capacity to reproduce a variety of textiles, including silk, leather, fur, cashmere and even resins such as tortoiseshell. Not only does this circumvent environmental concerns involved in the production of animal fibres, Brewed Protein's versatility also makes it suitable for diverse use, ranging from sportswear for The North Face to couture for Yuima Nakazato.

For his autumn/winter 2021 couture collection, Evoke, Nakazato used a Japanese jacquard technique to weave Brewed Protein filaments into Nishijin-ori textiles that shimmer beneath the light. Besides its shine, another feature of Spiber's material that attracted Nakazato is its ability to shrink in water.

He printed Brewed Protein onto fabric in barcode-like stripes based on the sound waves of whale songs. Once dipped in water, the cloth contracted most in the empty spaces between the stripes, changing shape according to Nakazato's stipulations—without involving scissors, needle or thread. In this blending of traditional craftsmanship with futuristic technologies lies just a sneak peek at what biofabrication can do for not only couture, but fashion at large.

MYCL

Adi Nugroho and Ronaldiaz Hartantyo first met at the School of Architecture in Bandung Technology Institute in 2012. In 2017, they co-founded biotechnology start-up Mycl, specialising in sustainable construction materials. Their main product is a composite based on mycelium, the fibrous root matter of mushrooms, which is sturdy and malleable like cement. Nugroho and Hartantyo soon realised that the properties of mycelium that make it suitable as a material for building skyscrapers can be repurposed into a material that can be worn on the human body.

Mycl entered the fashion industry in 2019 with Mylea, which produces one-eighth of the carbon footprint of conventional animal leathers or synthetic plastic leathers. From mushrooms grown by local farmers, mycelium matter is extracted and incubated until they are thick enough to be harvested. After undergoing anti-fungal and anti-bacterial treatment processes, the resulting leather alternative is ready for use by Mycl's fashion partners, such as Indonesian accessories brand Pala Nusantara, which has been making watch straps using Mylea since late 2018.

With its latest collaboration with Japanese streetwear brand—and 2018 LVMH Grand Prize winner—Doublet, Mycl has also defied industry expectations that plant-based leathers can never achieve a garment-appropriate level of skinfeel. Doublet designer Masayuki Ino was struck by the "raw power of life" in the mushroom leather, and decided to completely replace all animal leathers with Mylea in its spring 2022 menswear collection, My Way. Although working with such a novel textile can be challenging, Ino says: "It's not just the material that needs to constantly undergo improvement, but also us creators." Next on Ino's collaboration agenda with Mycl? Making a garment using Mylea that can eventually sprout real mushrooms while worn.

A simulated image of a dress from Yang's upcoming collection, Decimal.

Image courtesy of Scarlett Yang

Doublet replaced leather with Mylea in its spring 2022 menswear collection, crafting pieces such as this biker jacket.

SCARLETT YANG

While visiting textile mills in Japan in 2019, Scarlett Yang had a brainwave. What if the copious amounts of silkworm cocoons discarded after the silk had been extracted could be turned into textiles, much like the biomaterials she had studied as a fashion design student at Central Saint Martins?

Bemused by Yang's interest in rubbish, the mills agreed to ship the cocoon waste to her for free. Back in London, she boiled them down to extract the fibrous proteins, sericin. She combined them with algae extract to produce a liquid, which was then cast in 3D-printed moulds and left to solidify into a translucent textile.

Yang named her proprietary material Oriseri, after the Japanese words for 'folding silk'. From it, she constructed a dress for her graduate collection in 2020. While the garment looked hard like glass, the sericin's hydrophobicity gave it an unexpected fragility by causing it to quickly decompose upon contact with water. Within an hour of the photo shoot, which took place in the ocean, the model ended up completely nude, as Yang recounts with a scandalous lilt in her voice. Desire to shock aside, the dress's easy disintegration is also Yang's commentary on wasteful consumerism. The majority of clothes eventually end up in landfills, but at least her dress and any by-products could return almost instantly back to Mother Nature.

Now a first-year postgraduate at Imperial College London studying design engineering, Yang has employed Oriseri to create a new collection, Decimal, so named because she used computer algorithms to visualise each piece at an infinite number of temporal states along its decomposition process. To minimise thoughtless consumption, her collection consists of three full looks, which exist as digital renderings set for a virtual showcase later this year, with physical products to be produced only upon request.

For Yang, there is a special thrill in watching natural agents grow as they wish while employing digital tools to guide their growth. "Maybe 'guide'—this implication that Man can control nature—is an arrogant choice of word. But I think more so than at any other point in history, now is the best time to rethink our relationship with the natural world." ●