The might of mushrooms

From fashion to supplements and skincare, these humble fungi are having a moment, writes **Adriaane Pielou**

A Hermès handbag made from fungus? This year, the company announced that mycelium, the substance that mushrooms sprout from, which usually exists unseen, underground, in great threadlike webs, would be the main constituent of its latest bag, launching this winter. Surely Hermès, founded in 1837 and venerated for producing the most expensive, exquisitely crafted leather accessories in the world, wouldn't opt to use a substance you might assume too fragile to support much more than a tissue or two?

In the search for sustainable and ethical materials, potential alternatives to viscose, cotton and animal leathers have ranged from algae and cacti to banana leaves and pineapples. Mushrooms, too, have emerged triumphant from these trials. These seemingly humble members of the fungus family have been discovered to make a brilliant vegan substitute for animal leather – tough, durable and not fragile at all.

Among the fledgling companies saying "the future of fashion is fungi" is California's MycoWorks. Its patented Fine Mycelium, trademarked as Sylvania, will be used for the new Hermès bags. After three years' experimentation with reishi mushrooms and mycelium, on April 22 this year (Earth Day, fittingly), MycoWorks turned out its first sheets of amber-hued, genuinely leather-like Sylvania. It was dubbed a "milestone for the future of biomaterials" by co-founders Philip Ross and Sophia Wang. ▶

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It has been discovered that mushrooms and mycelium make a viable vegan substitute for animal leather that is tough, durable and, importantly, sustainable

▶ This "exemplar of a new generation of biotech materials" was passed to Hermès's tanners in France for finishing and then on to the maison's artisans for cutting and crafting. Those white-coated crasftmen are possibly this minute putting the final touches to the new bags, a version of the company's classic Victoria model.

"With Sylvania, Hermès is at the heart of what it has always been: innovation in the making," said Pierre-Alexis Dumas, Hermès's artistic director, when announcing the news.

Fresh from this triumph, mushrooms are now in the spotlight as never before, and are proving themselves impressively versatile. There are at least 14,000 different species. Given that some, such as shaggy ink cap, can push their way through asphalt, perhaps it shouldn't be a surprise to see mushrooms sauntering into the world of handbags and holdalls.

Some species are so strong that they're already being used as insulation, an alternative to Styrofoam and even as a building material. Thanks to their high vitamin, mineral, protein and fatty acid levels, mushrooms are also increasingly being acclaimed as potent skincare ingredients, health supplements and as an experimental but promising remedy for depression.

Although mushrooms have been used for millennia in Asia as a medicine as well as sustenance – with reishi revered in China as "the elixir of life" – in the West they have traditionally been viewed only as food. A food to be wary of, of course. Besides the most common – white agaricus or button mushrooms, plus shiitake, portobello, maitake, porcini, morels, pom pom, enoki, huitlacoche, cordyceps and turkey tail – few species are safe to eat. Some, such as Devil's Tooth, look so scarily otherworldly no one in their right mind would think of consuming them, but even some innocuous-looking species can be fatal.

In 1928, it was Scottish scientist Alexander Fleming's discovery of penicillin mould that sparked widespread scientific research into the fungi family. It's long been known that the mycelium from which mushrooms grow digests natural plant materials, from dead leaves and old logs to fallen trees, and, with the help of bacteria, turns them into soil. Only in the past 20 years, however, have technological advances allowed scientists to study fungi in depth, and begin to discover their astonishing versatility.

Oyster mushrooms, one of the most common varieties, are currently being used by the Amazon Mycrorenewal Project, for their newly discovered ability to digest oil contamination, such as Texaco's desecration in Ecuador.

Another species discovered in the Amazon has shown itself able to digest polyurethane plastic. Mushrooms that thrive on radioactive materials are being used to help clear up the site of Japan's Fukushima reactor disaster. Now, mushrooms are suddenly, well, mushrooming everywhere.

Crucially, they're generally relatively cheap and easy to grow, which means as a raw material they're available in almost limitless quantities. Mushroom production requires no pesticides or fertiliser. Anyone who wants to join the increasing number of enthusiasts worldwide growing mushrooms at home, many posting their endeavours on YouTube, need only a starter batch of spores or mycelium, trays or containers, and warm, dark conditions. Different types of spore feed on different materials, but some demand a diet of nothing more than wood shavings. After eight to 10 weeks, the mushrooms will be sprouting in slightly creepy-looking random clumps, needing only to be harvested by someone with a sharp pair of scissors before they are mashed, dried or reduced to a powder as required.

Hermès isn't the only fashion company exploring mushrooms as a textile. Stella McCartney, a vegetarian who has never worked with fur or leather, has been liaising with Bolt Threads from San Francisco, to use its mycelium-based Mylo to produce clothing and bags. Bella Hadid recently designed a line of mushroom-decorated T-shirts, and Iris Van Herpen, Daniel Del Core and Rahul Mishra all based their spring collections this year on fungi. The waiting list for an Eden Power Corp hat handmade in Transylvania from a single amadou mushroom is still growing, although when you look at its $490 price tag, you may wonder why.

Meanwhile online articles such as the International Journal of Microbiology's *Edible Mushrooms: Improving Human Health, and ScienceDirect's Medicinal Mushrooms* provide compelling information about mushrooms' nutritional and medicinal value. As a health supplement, a bestseller for specialists such as London's Nutri-Fungi is an extract of 100 per cent pure organic lion's mane mushroom, which sells for £22.95 for 75 grams.

The Organic Pharmacy's Phytonutrients + MSM, which contains shiitake mushrooms, has become increasingly popular as a boost for immunity, digestion and hair and nail growth. Brands using extracts of mushrooms – the best way to take a supplement – rather than mycelium, which has much less value, include Stonehenge, 5 Defenders and Host Defence, all selling on Amazon.

And as an ingredient in skincare, studies in the past few years have found that mushrooms can help to combat hyperpigmentation and inflammation, improve the skin barrier and boost antioxidant levels. As reishi and cordyceps, in particular, have long been part of the arsenal in traditional Chinese medicine, it is western adherents of the practice, such as the team behind Origins and its Mega Mushrooms anti-inflammatory range, based on chaga and reishi, that have been at the vanguard of promoting mushroom-based skincare.

Chaga is one of the most widely used species, a potent antioxidant shown to be three times more effective at fighting free radicals as açaí berries. Shiitake contains high levels of kojic acid, excellent at evening skin tone. Cordyceps is a good anti-inflammatory, effective in boosting collagen and elastin production. Reishi is especially good for sensitive skin as it improves barrier function. Turkey tail, or tramete versicolor mushrooms, with their high level of polysaccharide K, which helps to reduce inflammation, are powerful immune boosters. And tremella, also known as snow mushroom, rivals the darling of moisturisers, hyaluronic acid, in terms of how it plumps dehydrated skin, able to retain up to 500 times its weight in water.

It's not hard to become intrigued by mushrooms. One of the most enthusiastically reviewed books this year is all about fungi: *Entangled Life* by Merlin Sheldrake, whose very name sounds like a species of mushroom. To celebrate publication, he doused a copy in water, sprinkled it with paper-eating spores, and ate the mushrooms that soon sprouted from the cover.

That's a true enthusiast at work. But as one commenter wrote under a YouTube clip of a lecture by the world's leading mycologist, Paul Stamets, author of *Mycelium Running: How Mushrooms Can Help Save the World*: "Last week, mildly interested in mushrooms. This week, obsessed." ■

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