Health&Science

Waste Not
Can old food really be repurposed?

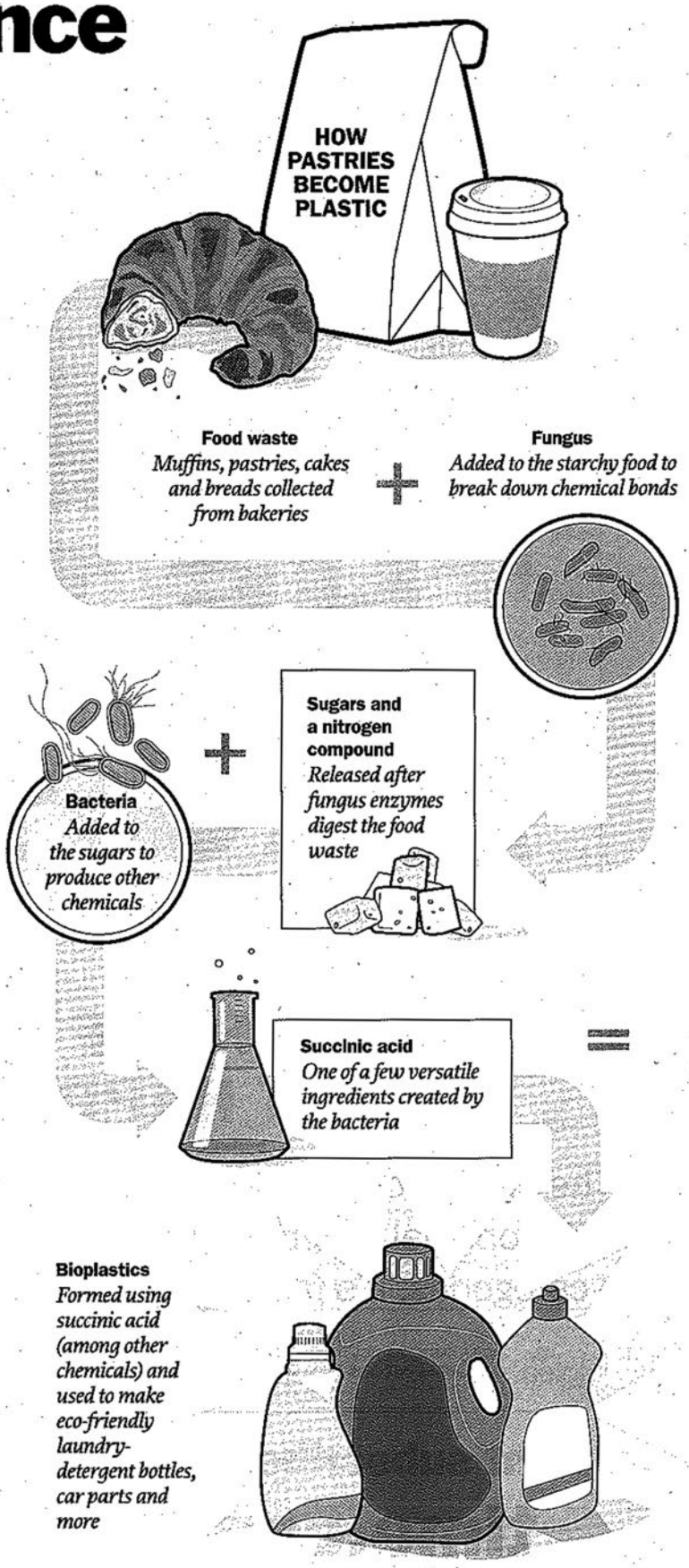
By Alice Park

NEARLY 1.5 BILLION TONS. THAT'S HOW MUCH spoiled and uneaten food people around the world throw out each year. In the U.S., roughly 40% of the food supply is wasted, according to the Natural Resources Defense Council (NRDC). But that kind of trash could soon become a lot more useful.

Building on efforts to turn grains and even human waste into biofuels and other valuable chemicals, Carol Lin, a biochemical engineer at the City University of Hong Kong, is developing a new kind of biorefinery. To head off a crisis at Hong Kong's landfills—they're going to be full within five years—she and her team, in partnership with Starbucks and a number of recycling groups, are converting organic food waste (think old pastries, bread and coffee grounds) into succinic acid. That chemical is a key component of biodegradable plastics, and is used in everything from laundry-detergent bottles to food additives to car parts.

The implications for the environment are huge. Succinic acid is currently made from petrochemicals in a process that leaves a harmful carbon footprint, and the U.S. Department of Energy has listed the chemical as one of a dozen that could be made more responsibly through bio-based processes. Although Lin's program is still in the pilot phase, companies in Europe, Asia and the U.S. are launching similar efforts to turn wasted food into a potentially valuable commodity. Lin is confident that the cost of the processing—it doesn't require any specialized tools—will make it a viable method for producing the acid.

She faces plenty of hurdles. Because food waste isn't as easy to transport (unlike petroleum, it starts to rot), researchers are still figuring out how to set up hygienic ways to process it quickly. Then there's the issue of scale: in her lab, Lin generates 81 kg of succinic acid from each ton of food waste she processes—a tiny fraction of the 44,000 tons manufacturers demand each year. But, says Allen Hershkowitz of NRDC, it's essential to keep trying. "No single undertaking is going to address all the waste we generate." But if this one can make good use of your stale muffin, that's a big step in the right direction.



Source: Carol Lin, City University of Hong Kong

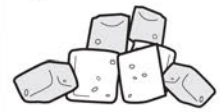
HOW PASTRIES BECOME PLASTIC

Start with food waste
Muffins, pastries, cakes and breads destined for the garbage are collected

Add fungi
Enzymes made by the fungi break down the chemical bonds in the starchy food

Ferment with bacteria
Fermentation produces chemicals like...

Release sugars
The pastries are reduced to simple sugars



Succinic Acid
It's an industrial raw material that can be made in crystal form

Combine with other chemicals

Bioplastic Bottles
These products aren't as harmful to the environment as other plastics and won't add to landfill waste