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The Wild West of Edible Insects

In the back of a small restaurant in New York City, a woman leaned over her plate of guacamole, peered through the glasses perched far down her nose and complained that she couldn't see any bugs.

"Do you want to take the abdomen?" asked Lauren Weidner with a smile, offering her a chip with an ant poking out through the avocado mush.

These women were eating the first course of a bug banquet hosted at a Mexican restaurant called Black Ant. The festivities took place one night in November; the aim was to make people more comfortable with insects as a food source. Before the event was over, adventurous diners sampled grasshopper crusted shrimps with mango salsa, chicken enchiladas with black ant mole, corn epazote stew with grasshoppers and warm agave worms. They also listened to a lecture by John Durant, author of "The Paleo Manifesto," who talked about the science of disgust. While green tobacco hornworms as big as a kneecap crawled over audience member's legs, Durant said humans are hardwired to avoid creepy crawlies like insects because they could carry disease.

This might be why the prospect of chewing on a nice juicy mealworm doesn't sound appetizing to the American. Even though 2 billion people worldwide eat insects regularly in Africa, Asia and South America, the U.S. is just in the beginning stages of building an industry for edible insects.

In 2013, the U.N. issued a report recommending dietary consumption of insects for the sake of the planet. The report stresses the benefits of insects being cold blooded. Because they don't need food to keep their bodies warm they require less feed to make the same amount of meat. "This means that crickets are twice as efficient in converting feed to meat as chicken," says the report titled "Edible Insects: Future prospects for food and feed security", "at least four times more efficient than pigs, and 12 times more efficient than cattle." The report also points out that in addition to being easier on our crop stores, pound for pound many of these insects have the same amount — or more — protein than cows, pigs or chickens.

The U.N. insect report was downloaded over 2 million times in the first 24 hours. Since then, several restaurants in the U.S. have been trying to entice customers with all sorts of insect creations from cocktails garnished with scorpions to burgers with grasshopper patties. But so far only a brave few have hopped on board with these culinary innovations. In order for insects to have an impact the general public has to get over its revulsion for bugs and get hungry. With a global population expected to reach 9 billion by 2050 we might not be able to afford to be so fussy.

The new insect industry has many challenges. Some businesses are betting the western palate just needs a slight adjustment before we're all chowing down on bugs. With the development of new cricket powders that look just like unbleached flour, they're hoping we won't even notice we're eating insects. As more companies experiment with insect products supply can't meet demand. So the few farms and cricket mill start-ups struggle to ramp up production. Looming over all these issues is an unclear regulatory system that could stomp out any of these operations as soon as they start getting big.

Psychological Hurdles

At the bar before the Bug Banquet, Durant ordered jalapeno margaritas for himself and Gabi Lewis. Lewis first heard about Durant while he was a student at Brown University. He was trying out the paleo diet, which restricts any foods a caveman couldn't find: dairy, breads, refined sugars.

Cocktails in hand, both seem like actors you might see guest star in *New Girl*. Durant had shaggy brown hair down to his shoulders and he balanced out the leather jacket he usually sports with a smile like a kid swinging on the monkey bars — which he recommends as part of the paleo lifestyle. Lewis speaks with a Scottish accent and wore a tight gray sweater that showed off his days of competitive powerlifting.

“We bring new hires here now,” said Lewis. “We make an adventure platter of grasshoppers, based on the menu and we force them to eat the whole thing.”

Lewis first reached out to Durant before he launched his cricket protein bar company, Exo, in April of 2013 with his roommate from Brown, Greg Sewitz. Lewis wanted help developing an edible insect product for a Western audience. The winning idea they came up with also had the benefit of a world-renowned chef Kyle Connaughton. He helped create flavors for them like peanut butter and jelly, or blueberry vanilla. But there’s another reason Sewitz and Lewis have sold more than 200,000 bars, and according to a press release have raised over a million dollars in funding before either of the young entrepreneurs have turned 30. When you bite into an Exo bar you can’t tell you’re eating bugs.

Masking insects in food products is just one of the ways researchers and businesses are finding to rebrand the bug. Nutritionally, they are high in protein and fiber, low in fat. They have the potential to be less harmful to our climate than pigs, cows or chickens because they convert feed into protein so much better. At the same time they have potential to be a protein source vegetarians or vegans could get behind since insects don’t feel pain in the same way.

“No example is known to us of an insect showing protective behavior towards injured body parts, such as by limping after leg injury or declining to feed or mate because of general abdominal injuries,” says a review from the Dept. of Entomology out of the University of Queensland titled “Do Insects Feel Pain? – A Biological View”. They only have a reflexive response to pain, so the question of suffering is minimized. Besides, many times they are chilled until their body just shuts down. With all these benefits some people are still simply grossed out over the prospect of actually eating them.

This is where young entrepreneurs have stepped in to hide the crunchy exoskeleton and greasy inside of insects in reimagined snacks. Like Exo, the founders of Six Foods turned their backs on the fast track to high-powered jobs in the corporate world to form an insect food company. Based out of Boston, these recent Harvard graduates uses the chip, a food that Americans eat almost unconsciously to hide crickets in what they call Chirps. Companies employing this masking strategy will give you only part of the story of the edible insect industry. They simply want us to first, hear about their products, second, try them, third brag to our friends about how socially conscious we’re being and finally, not think about what’s going into those bars. But to explore the burgeoning bug eating industry we have to look at where all this cricket powder is going to come from for companies like Six Foods and Exo if they keep expanding?

Production

It was unusually dark at 5:47 pm just outside Penn Station in New York City about a month after the bug banquet event at Black Ant. Tourists were huddled under the taxi waiting built akimbo to the road with a sickly green roof protecting them from the rain. The impermeable material is split up into sections in line with the clear plastic siding so it looks like a giant caterpillar with a bunch of soggy people in its belly. Across the street, a man holding a leather briefcase stands alone under the roof of a dark parking garage, a straw fedora hiding his eyes makes him seem out of place. Inside the case are samples of a specially milled cricket powder that was developed with funding from the U.S. Department of Agriculture and no one knows yet how much the secret process is worth.

“Maybe 50 million dollars,” joked Dr. Aaron T. Dossey, the man with the case full of powder who invented the milling process. He had just arrived in New York after setting up new factories in New Jersey to try and meet the exploding demand of the new bug market with his company All Things Bugs. They are the primary supplier of cricket powder for Exo, another protein bar called Chapul, Six Foods as well as various other smaller projects.

Dossey calls himself a recovering academic. As a postdoc researcher at the University of Florida Dept. of Chemistry and Molecular Biology, Dossey was looking into a research grant for food nutrition research and was disappointed that he couldn't apply as a postdoc. He'd have to be a professor to be eligible as a principal investigator. He figured out that as a business owner he could sidestep that technicality and he received a grant from the USDA. So he started his business in Gainesville working out of his apartment experimenting with making protein bars at first with a \$20 blender. But he realized there was no one really making the materials yet he said, “I thought, maybe I can just be the ingredient guy.” Soon he was sending samples for analysis to the University of Nebraska, whose nickname appropriately used to be the bug eaters, after the insect loving bats of the Midwest plains. Eventually honing a process for milling a cricket powder that didn't need to be roasted, had a distinctive color, aroma, and was incredibly fine. Now Dossey has such a demand for his powder that he's running out of crickets to mill.

“The demand is close to 7 times what we're capable of producing,” said Kevin Bachhuber founder of Big Cricket Farms. Bachhuber's company is only one of few farms growing insects for human consumption. Dossey said he recently bought Big Cricket Farms 1,000 pounds of organic feed just so they can ramp up production to supply his powder milling. All Things Bugs is also getting supplies from Armstrong Farms in Louisiana, which has already raised around 17,000 pounds of whole crickets that was milled into around 5,000 pounds of cricket powder. Dossey said he's under pressure from Exo to step it up. He's hoping to get over 20,000 pounds of crickets from Armstrong Farms in February.

Regulation

Right around the corner from stalwart restaurant establishments like La Esquina and Balthazaar in lower Manhattan was a hip up comer on the dining scene called Antojeria la Popular. Gillian Todd, the manager of Antojeria la Popular, said they got a lot of attention for serving bug dishes like the Grass-Whopper, a burger made out of grasshoppers. According to Todd, The New York Department of Health and Mental Hygiene stopped them from serving insects because their supply was all from Mexico.

“We were receiving them from a reliable source,” said Todd. Antojeria ended up closing shortly after.

So far the rules and regulations for insect consumption in the U.S. are fairly vague. The U.S. Food and Drug Administration leaves most of the enforcement of food safety to local organizations like the NY dept. of health. When questioned about insects at Antojeria, the dept. of health said they have no rules set up for edible insects. Some businesses said they've been given guidelines by regulators to only get their insects from North American farms, others say they can only be from a farm that raises them for human consumption. Bachhuber said Big Cricket Farms is now being regulated by the local agency in Ohio that is set up for seafood and shellfish. Businesses don't know when they might get shut down out of the blue like Antojeria without standardized rules from the FDA. “I asked them for steps one through 10,” said Dossey. “That's just not how it works.”

Dossey said the real savior for the insect industry would Generally Recognized as Safe, or GRAS, designations by the FDA. If certain insects received GRAS designation then there wouldn't be any confusion about what could or couldn't be used. Bigger factories are weary about processing foods that don't have a GRAS designation because they could lose their food grade status.

Without that status the consumer has no idea what's being mixed in with their food. "The last thing you want is a bit of dog food in your Clif Bar," said Dossey.

For the same reason the FDA won't step in to regulate a product at a local farmer's market they aren't making a fuss about insects yet: it's too small fry. But if it became a huge industry where tons of products were being transported across state lines then the FDA could shut down an insect business without formal approval. The problem is an application for GRAS designation costs around \$250,000 and requires a proposal with extensive research outlining a food's safety. Although many studies have shown the safety of edible insects there are still practices that need to be evaluated.

One of the most promising aspects of edible insects is their ability to eat many of our waste products. Some of which aren't edible by humans because they have harmful levels of toxins like heavy metals. The science isn't out yet on how much of these toxins the insects keep in their bodies after they eat the waste. So whether we'll be able to recycle using bugs that we can eat is still a mystery.

However, entomologists don't really seem concerned with pathogens from bugs crossing over into the human population. They are so far away from us genetically that there isn't much of a chance for a swine or avian flu like situation. Bugs also don't really seem to carry bacteria like Ecoli or Salmonella very well according to accelerated shelf life tests done by Medallion Labs for All Things Bugs. During these tests they put some of Dossey's cricket powder in airtight containers and some half opened containers and put them in what they call the "hot box," which is a chamber with a high humidity. So the chamber makes a week of spoiling in the "hot box" equal to a month. After 24 weeks in the chamber Dossey said he thought the smell had actually improved.

Even though these initial tests showed the cricket powder wouldn't spoil easily, they still pasteurize their product just to be safe. He said after you kill off all the microbes the only thing you have to worry about is allergies, which labeling takes care of.

Exoskeletons are actually fairly similar to crustacean's shells like shrimp. So if you have a shellfish allergy, researchers are recommending that you not eat insects. And because we don't know how much insects carry of their feed into our bodies when we eat them, you should make sure that the bugs had a gluten free diet if you have an allergy.

Since insects can be preserved well because they carry so little fat and oil, Dossey suggested maybe his product would actually get better with age. "I've played with the idea of making a cheese," he said.

Even with the global support of the UN the insect industry in the U.S. has many hurdles. Businesses that could be shut down for not complying with vague rules might get more investment with official approval. Then they would need to fit insects into a lot more tacos, chips, bars, restaurants or wherever they can sneak in bugs. But once there are enough to go around can the industry perform its final trick and make us actually want to eat insects? With 1 billion chronically hungry people worldwide, they're gambling we might need to.