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## GRUB

*Eating bugs to save the planet.*

BY DANA GOODYEAR

Florence Dunkel, an entomologist at Montana State University, lives in a red saltbox house at the edge of the woods outside Bozeman, with her husband, Bob, whose nickname for her is Ladybug, and, until recently, with Gertrude, a fine-limbed grass-green katydid she rescued from an airplane. The walls of her kitchen are covered with pictures of her eight grandchildren, who call her Oma, or, in the case of one grandson, the Beetle Oma. In a bay window overlooking a vegetable garden, dried flowers hang next to a stained-glass dragonfly.

One freezing night at the end of February, Dunkel, who is petite, with fluffy gray curls and rosebud lips, was puttering around her kitchen, a large pair of glasses suspended from a sparkly chain around her neck and an apron tied at her waist. She pulled out her old Betty Crocker recipe binder—she has had it since 1962—and put on her glasses. She opened it to a page, yellow with use, for chocolate-chip Toll House cookies. Like many cooks, Dunkel likes to make a recipe her own. Betty Crocker called for half a cup of chopped walnuts. In the margin, in a loopy hand—the penmanship of a girl who grew up on a farm in Wisconsin in the nineteen-fifties—Dunkel had suggested a substitution: “or fresh roasted crickets.”

The crickets were presenting something of a problem. Her usual supplier, in California, had run out of large ones, and instead had sent her a thousand live pinheads—babies—which she’d had to supplement with a hundred and twenty-five expensive subadults from PetSmart. Before checking her recipe, Dunkel had picked up a pinhead. “I’ve never used these for food,” she said, kneading it between her index finger and thumb, a chef inspecting an unfamiliar piece of meat. “I’m not even sure I’ll take the head off.” She’d decided to put the pinheads in the freezer to kill them—another of her nicknames, inspired by her work as an insect patholo-

gist, is Dr. Death—and set the oven to 225 degrees for the PetSmart subadults.

“Meanwhile, we need to get the wax worms separated,” she said. They were for “land shrimp cocktail,” which Dunkel would serve to her Insects and Human Society class the next day, accompanied by cocktail sauce made by Bob, using horseradish from their garden. “They’re going to want to wander as they get warm.” She opened a plastic container secured with red tape that read “WORMS ALIVE” and dumped the worms—the larvae of the wax moth, which were plump and white and had come from a bait shop in Minnesota—onto a brown plate. They were covered in cedar shavings. My job was to separate the worms from the shavings, picking out the black ones (blackness is a sign of necrosis) and dismantling the cocoons of the ones that had started to pupate, while making sure none got away. The worms were chubby and firm, with the springiness of clementine segments. They swayed deliriously, testing the air. I got to work sorting, desilking, herding.

“Oh! I can smell the crickets now,” Dunkel said, as the aroma of toasted nuts filled the kitchen. She took them out of the oven, and started to pull off the ovipositors and the legs, which can stick in the throat. When I finished with the wax worms, she said, “The next species we’re going to deal with is *Tenebrio molitor*, which is a beetle. We’re going to wash them, and then we’re going to fry them in butter.” She handed me a container full of bran and beetle larvae—skinny, crusty, yellowish—commonly known as mealworms. I shook the mixture through a sieve; as I rinsed off the last of the bran, the worms clung to the side like sailors on a capsized ship. Dunkel dumped them in a buttery frying pan, where they hissed and squirmed before going suddenly still. They smelled of wild mushrooms, and tasted, spooned hot into my hand, like sunflower seeds.

Dunkel stayed up baking until three. The next day, at Insects and Human Society, she had her students do a honey tasting, reminding them that honey is, of course, the vomit of a bee. Then Ky-Phuong Luong, the T.A., stirred a wok full of vegetables and soy-marinated crickets, and Dunkel passed a plate of fritters with yellowish wax worms protruding from their centers. “We left out the bacon,” she said, smiling sweetly. The students talked about ethnocentrism (eighty per cent of the world eats insects with pleasure), sustainability, and the earth’s diminishing resources. After a while, they started, tentatively, to eat. A young man in a green wool ski cap said that he would be more enthusiastic if he had some beer to wash the insects down. Standing before a plate of brownies fortified with a mash of the sautéed mealworms, he said despondently, “This is the future! You’ll eat worms and like it. You gotta eat *something*.”

Insects were among the original specialty foods in the American gourmet marketplace—inspired, impractical provocations that, like runway styles in retail clothing, drove the sales of more basic goods. In the early nineteen-forties, Max Ries, a German-Jewish textile manufacturer, came to Chicago and established himself as a purveyor of imported cheese to an American public that was beginning to be fascinated by exotic food. Ries was slim and dashing; he wore handmade suits and twirled his cigars. Alongside tinned tiger and elephant meat—culled from zoos and sold at department stores—he presented “French-fried ants” from Venezuela and baby bees from Japan, conversation pieces that lent glamour to his company, Reese Finer Foods, which actually made its money selling canned water chestnuts, artichoke hearts, and baby corn. Like fashionistas, gourmets have a sense of theatre. Excluded from the first Fancy Food Show, at the Sheraton-Astor, in New York, in 1955, Ries hired a limousine to shuttle buyers to a nearby hotel, where he had set up his own show, exhibiting only Reese products. (After that, the New Yorkers relented and gave him a booth, which became a mainstay.) When Reese had overstock of its Spooky Foods gift set—chocolate-covered ants, roasted butterflies, barbecue bees—it hired Bela Lugosi to appear in his Drac-

ula costume with the product, which promptly sold out.

Insects—part delicacy, part gag—are chic again. Once a staple on “Fear Factor,” they were featured on “Top Chef Masters” this season. (The winning dish: tempura-fried crickets with sunchoke-carrot purée and blood-orange vinaigrette.) At John Rivera Sedlar’s ambitious Latin restaurant Rivera, in Los Angeles, where the tasting menu includes Atlantic Cod in the Spirit of New World Discoveries, the cocktail list features the Donaji, a fourteen-dollar drink named after a Zapotec princess, which is made with artisanal Oaxacan mescal and house-made grasshopper salt. (On its own, the salt tastes like Jane’s Crazy Mixed-Up Salt, crushed Bac-Os, and fish-food flakes; the bartender recommends it as a rub for grilled meat.)

Bricia Lopez supplies the bugs for Sedlar’s drinks; at Guelagueta, the Oaxacan restaurant that her parents opened in Los Angeles in 1994, she serves a scrumptious plate of *chapulines a la Mexicana*—grasshoppers sautéed with onions, jalapeños, and tomatoes, and topped with avocado and Oaxacan string cheese. Lopez, who is twenty-six and a glamorous fixture of the L.A. food scene, says that more and more Anglo hipsters are coming in to order them. “Eating grasshoppers is a thing you do here,” she said. “Like, ‘Oh, my God, I ate a grasshopper, woo.’” She went on, “There’s more of a cool factor involved. It’s not just ‘Let’s go get a burrito.’ It’s ‘Let’s get a mole’ or ‘Let’s get a grasshopper.’”

The current vogue reflects not only the American obsession with novelty and the upper-middle-class hunger for authenticity but also deep anxiety about the meat we already eat—which is its own kind of fashion. José Andrés, who this year won the James Beard Foundation’s Outstanding Chef award, makes a very popular *chapulín* taco—sautéed shallots, deglazed

in tequila; chipotle paste; and Oaxacan grasshoppers, in a hand-made tortilla—at his Washington, D.C., restaurant Oyamel. He sees bug-eating as both a gastronomic experience (he recommends the mouthfeel of a small, young, crispy *chapulín*) and a matter of survival. “We need to feed humanity in a sustainable way,” he says. “Those who know how to produce protein will have an edge over ev-

chronic hunger—the journal *Science* published a special issue on “food security,” and included a piece on entomophagy, the unappealing name by which insect-eating properly goes. Acknowledging that the notion might be “unappetizing to many,” the editors wrote: “The quest for food security may require us all to reconsider our eating habits, particularly in view of the energy consumption and environmental costs that sustain those habits.”

From an ecological perspective, insects have a lot to recommend them. They are renowned for their small “foodprint”; being cold-blooded, they are about four times as efficient at converting feed to meat as are cattle, which waste energy keeping themselves warm. Ounce for ounce, many have the same amount of protein as beef—fried grasshoppers have three times as much—and are rich in micronutrients like iron and zinc. Genetically, they are so distant from humans that there is little likelihood of diseases jumping species, as swine flu did. They are natural recyclers, capable of eating old cardboard, manure, and by-products from food manufacturing. And insect husbandry is humane: bugs like teeming, and thrive in filthy, crowded conditions.

In December, a group of scientists at Wageningen University, in the Netherlands, published a paper concluding that insects reared for human consumption produce significantly lower quantities of greenhouse gases than do cattle and pigs. “This study therefore indicates that insects could serve as a more environmentally friendly alternative for the production of animal protein,” the paper said. One of its authors was Arnold van Huis, an entomologist who is working to establish a market for insect-based products in the Netherlands, with funding from the Dutch government; the agriculture ministry recently gave him a million euros to



For entomophagists, insects—or “mini-livestock”—are an efficient and tasty source of animal protein. Photographs by Hans Gissingier.

eryone else. World War Three will be over control of water and food, and the insects may be an answer.”

Demographers have projected that by 2050 the world’s population will have increased to nine billion, and the demand for meat will grow with it, particularly in dense, industrializing countries like China and India. Last year—a year in which, according to the United Nations, nearly a billion people suffered from

research insect husbandry. “We have a food crisis, especially a meat crisis, and people are starting to realize that we need alternatives, and insects are just an excellent alternative,” van Huis said.

On a trip to Africa, in 1995, when van Huis was on sabbatical, he travelled to a dozen countries, interviewing locals about their relationship with insects.

Half the people he spoke with talked about eating them, and he finally overcame their reluctance—born of centuries of colonial opprobrium—to share some with him. “I had termites, which were roasted, and they were excellent,” he said. When he got home, he offered a bag of termites to Marcel Dicke, the head of his department—he liked them—and the two started a popular lecture series that addressed insects’ potential as a food source. After van Huis and Dicke organized an insect festival that drew twenty thousand people, they were approached by several mealworm and cricket farmers who had been serving the pet-food industry but were interested in diversifying. “We know that Western peoples have some difficulties psychologically with ingesting insects, so we are looking at some ways of introducing them into food so that people will no longer recognize them,” van Huis said. Insect flour was one option. “Another possibility is that you can grind insects and make them into a hot dog or a fish stick,” he said. Together, van Huis and Dicke have helped get mealworms and processed snacks like Bugs Nuggets into the Dutch grocery chain Sligro.

The Dutch are, for reasons of geography, especially concerned about the effects of global warming; they are also progressive when it comes to food development. But entrepreneurs in the United States are starting to explore edible insects, too. Matthew Krisiloff, who just finished his freshman year at the University of Chi-

cago, recently started a company called Entom Foods, which is working on de-shelling insects using pressurization technology—trade secret—in the hope of selling the meat in cutlet form. “The problem is the *ick* factor—the eyes, the wings, the legs,” he said. “It’s not as simple as hiding it in a bug nugget. People won’t accept it beyond the novelty. When you think of a

problem that Westerners have with them. “Maybe we should stop telling people they’re eating insects,” he said. “If you say it’s mealworms, it makes people think of ringworm. So stop saying ‘worm.’ If we use the Latin names, say it’s a *Tenebrio quiche*, it sounds much more fancy, and it’s part of the marketing.” (There’s a precedent for this: in the nineteenth century,

English members of the Society for the Propagation of Horse Flesh as an Article of Food had French chefs prepare banquets of the meat they called *chevaline*.) The other option, Dicke said, is to cover the bugs in chocolate, because people will eat anything covered in chocolate.

The practice of ethical entomophagy started haphazardly. In 1974, Gene DeFoliart, who was the chair of entomology at the University of Wisconsin, was asked by a colleague to recommend someone who could talk about edible insects as part of a symposium on unconventional protein sources. Then, as now, entomology was more concerned with insect eradication than cultivation, and, not finding a willing participant, DeFoliart decided to take on the project himself. He began his talk—and the paper he eventually published—with a startling statement: “C. F. Hodge (1911) calculated that a pair of houseflies beginning operations in April could produce enough flies, if all survived, to cover the earth forty-seven feet deep by August,” he said. “If one can reverse for a moment the usual focus on insects as enemies of man, Hodge’s layer of flies represents an impressive pile of animal protein.”

DeFoliart envisioned a place for edible insects as a luxury item. The larvae of the wax moth (*Galleria mellonella*) seemed to him to be poised to become the next escargot, which in the late eighties represented a three-hundred-million-dollar-a-year business in the United States. “Given



In Oaxaca, grasshoppers are popular snacks, but shrimp are shunned.

chicken you think of a chicken breast, not the eyes, wings, and beak. We’re trying to do the same thing with insects, create a stepping-stone, so that when you get a bug nugget you think of the bug steak, not the whole animal.” If he can overcome some of the technical challenges—like the fact that insect protein does not take the form of muscle, but is, as he put it, “goopy”—he plans to have a product out next year.

In Dicke’s opinion, simply changing the language surrounding food insects could go a long way toward solving the

a choice, New York diners looking for adventure and willing to pay \$22 for half a roasted free-range chicken accompanied by a large pile of shoestring potatoes might well prefer a smaller pile of *Galleria* at the same price," he wrote. He and a handful of colleagues, including Dunkel, began to study and promote the potential of what they called "mini-livestock," and, in *The Food Insects Newsletter*, they reported the results of nutritional analyses and assessed the efficiency of insects like crickets—the most delectable of which, entomophagists are fond of pointing out, belong to the genus *Gryllus*.

In December, a group of DeFoliart's disciples gathered at a resort in San Diego for a symposium on entomophagy at the annual conference of the Entomological Society of America. Because there is no significant funding available for entomophagy research, it has never been taken seriously by most professional entomologists. Dunkel, who in her half century in academia has many times heard colleagues discourage interested graduate students, often finds herself at odds with others in her field. It was a relief, then, to be among the like-minded. "Your soap-moth-pupae chutney—I'll never forget how that tasted!" she said, introducing a colleague from the Insectarium, in Montreal, which holds a bug banquet every other year. The entomophagists hoped to capitalize on the momentum they perceived. "We don't have to be the kooky, nerdy entomologists who eat bugs because we're crazy," an entomologist from the University of Georgia said. "Twenty years ago, sushi was the *eww* factor; you did not see sushi in grocery stores. Now it's the cultural norm."

At the conference, Dunkel talked about her frustration working in West Africa, where for decades European and American entomologists, through programs like U.S.A.I.D. and British Locust Control, have killed grasshoppers and locusts, which are complete proteins, in order to preserve the incomplete proteins in millet, wheat, barley, sorghum, and maize. Her field work in Mali focusses on the role of grasshoppers in the diets of children, who, for cultural reasons, do not eat chicken or eggs. Grasshoppers contain essential amino acids and serve as a crucial buffer against kwashiorkor, a protein deficiency that impedes physical and neurological development. In the village where Dunkel

works, kwashiorkor is on the rise; in recent years, nearby fields have been planted with cotton, and pesticide use has intensified. Mothers now warn their children not to collect the grasshoppers, which they rightly fear may be contaminated.

Mainly, the entomophagists bemoaned the prejudice against insects. "In our minds, they're associated with filth," Heather Looy, a psychologist who has studied food aversions, said over dinner after the symposium. "They go dirty places, but so do fungi, and we eat those all the time. And you don't want to know about crabs and shrimp and lobster." Crabs, shrimp, and lobster are, like insects, arthropods—but instead of eating fresh lettuces and flowers, as many insects do, they scavenge debris from the ocean floor.

This injustice—lobster is a delicacy, while vegetarian crustaceans like wood lice are unfit for civilized man—is a centerpiece of the literature of entomophagy. "Why Not Eat Insects?," an 1885 manifesto by Vincent M. Holt, which is the founding document of the movement, expounds upon the vile habits of the insects of the sea. "The lobster, a creature consumed in incredible quantities at all the highest tables in the land, is such a foul feeder that, for its sure capture, the experienced fisherman will bait his lobster-pot with putrid flesh or fish which is too far gone even to attract a crab," he writes.

Holt's compelling, if Swiftian, argument addresses the food problems of his day—"What a pleasant change from the labourer's unvarying meal of bread, lard, and bacon, or bread and lard without bacon, would be a good dish of fried cockchafers or grasshoppers"—but he is innocent of the nuances of food marketing. Among the sample menus he supplies are offerings like Boiled Neck of Mutton with Wire-worm Sauce and Moths on Toast. At dinner in San Diego, it occurred to me that this naïveté had carried down. I was sitting next to Lou Sorkin, a forensic entomologist at the American Museum of Natural History who is also an expert on bedbugs, probably the most loathed insect in the United States today. He had arrived at his latest culinary discovery, he said, while experimenting with mediums for preserving maggots collected from murdered corpses. Realizing that citrus juice

might denature proteins as effectively as a chemical solution, and might be more readily available in the field, he soaked large sarcophagid maggots in baths of grapefruit, lemon, lime, and pomelo juice, and voila! Maggot ceviche. "It's a little chewy," he said. "But tasty."

Food preferences are highly local, often irrational, and defining: a Frenchman is a frog because he considers their legs food and the person who calls him one does not. In Santa María Atzompa, a community in Oaxaca where grasshoppers toasted with garlic, chile, and lime are a favorite treat, locals have traditionally found shrimp repulsive. "They would say 'some people' eat it, meaning 'the coastal people,'" Ramona Pérez, an anthropologist at San Diego State University, says. When she made scampi for a family there, she told me, they were appalled; the mother, who usually cooked with her, refused to help, and the daughters wouldn't eat. The coast is less than a hundred miles away.

Most of the world eats bugs. Australian Aborigines like witchetty grubs, which, according to the authors of "Man Eating Bugs," taste like "nut-flavored scrambled eggs and mild mozzarella, wrapped in a phyllo dough pastry." *Tenebrio molitor* is factory-farmed in China; in Venezuela, children roast tarantulas. Besides, as any bug-eater will tell you, we are all already eating bugs, whether we mean to or not. According to the F.D.A., which publishes a handbook on "defect levels" acceptable in processed food, frozen or canned spinach is not considered contaminated until it has fifty aphids, thrips, or mites per hundred grams. Peanut butter is allowed to have thirty insect fragments per hundred grams, and chocolate is O.K. up to sixty. In each case, the significance of the contamination is given as "aesthetic."

In fresh vegetables, insects are inevitable. The other day, cleaning some lettuce, I was surprised by an emerald-green pentagon with antennae: a stink-bug. I got rid of it immediately. But daintiness about insects has true consequences. As Tom Turpin, an entomologist at Purdue University, said, "Attitudes in this country result in more pesticide use, because we're scared



about an aphid wing in our spinach.”

The antipathy that Europeans and their descendants display toward eating insects is stubborn, and mysterious. Insect consumption is in our cultural heritage. The Romans ate beetle grubs reared on flour and wine; ancient Greeks ate grasshoppers. Leviticus, by some interpretations, permits the eating of locusts, grasshoppers, and crickets. (The rest are unkosher.) The manna eaten by Moses on his way out of Egypt is widely believed to have been honeydew, the sweet excrement of scale insects.

Contemporary Westerners tend to associate insects with filth, death, and decay, and, because some insects feed on flesh, their consumption is often seen as cannibalism by proxy. Holt takes pains to stress that the insects he recommends for eating—caterpillars, grasshoppers, slugs—are pure of this taint. “My insects are all vegetable feeders, clean, palatable, wholesome, and decidedly more particular in their feeding than ourselves,” he writes. “While I am confident that they will never condescend to eat *us*, I am equally confident that, on finding out how good they are, we shall some day right gladly cook and eat *them*.”

In the overcoming of resistance to certain foods, Frederick J. Simoons, the author of the classic text on food taboos “Eat Not This Flesh,” says, timing is everything. He cites Emperor Meiji’s consumption of beef—a Buddhist sacrilege—as the dawn of Japan’s embrace of the West. Noritoshi Kanai, the eighty-eight-year-old president of Mutual Trading Company, which imports gold flakes and matsutake essence to sell to high-end sushi restaurants like Masa and Nobu, introduced sushi to the United States in the nineteen-sixties. Because sushi is raw and handled without gloves in front of the customer, everyone told him that the American public would never accept it. The convergence of three factors, he says, changed their minds: the food pyramid, which emphasized fish; the rise of the Japanese car; and “Shogun.”

Promoters of entomophagy may face a bigger obstacle. Unlike sushi, which was seen as an incredible form of an edible substance, most Westerners view insects as inappropriate for eating—the psychological equivalent of wood or paper—or dangerous, like cleaning fluid. (Insect-eaters,

correspondingly, are seen as suspect, other, and possibly inhuman, an idea reinforced by countless mass-culture images, including most science fiction.) Some object to the form in which insects are presented—entire—though lobsters, mussels, oysters, clams, and even, increasingly, in this age of whole-animal cookery, pigs come to the table intact. Others locate their disgust in the fact that one has to eat the chitinous exoskeleton, but the same is true for soft-shell crab, which is rarely considered barbarous to eat.

Morphology might be at the root of the problem, however. Processing insects is labor-intensive, and they are not exactly filling. One would have to eat about a thousand grasshoppers to equal the amount of protein in a twelve-ounce steak. According to Larry Peterman, the owner of HotLix, a company that sells tequila-flavored lollipops with mealworms in them and Sour Cream & Onion Crick-ettes (“the other Green Meat”), processed crickets cost hundreds of dollars a pound. Unlike those found in the tropics, European bugs do not grow big enough to make good food, so there is no culinary tradition, and therefore no infrastructure, to support the practice. Tom Turpin told me, “If there were insects out there the size of pigs, I guarantee you we’d be eating them.”

The next stinkbug I came across I ate. It was lightly fried, and presented on a slice of apple, whose flavor it is said to resemble. (I found it a touch medicinal.) This was in a one-story white clapboard house in the West Adams neighborhood of Los Angeles, with a skateboard half-pipe in the back yard, which had been rented by Daniella Martin and Dave Gracer, two advocates of entomophagy. Martin had reserved the place under false pretenses. “We told them we were scientists,” Martin said, giggling. In fact, Martin, who used to be an Internet game-show host, writes a blog called “Girl Meets Bug”; she and Gracer, an English instructor who travels the country lectur-

ing on entomophagy and has been writing an epic poem about insects for the past fourteen years, were in town to compete in a cookery competition at the Natural History Museum’s annual bug fair.

Martin, who is thirty-four, with a heart-shaped face and a telegenic smile, stood at the counter in the small kitchen pulling embryonic drones—bee brood—from honeycomb. They were for bee patties, part of a “Bee L T” sandwich she was going to enter in the competition. But, finding them irresistible, she fried up a few to snack on. “It tastes like bacon,” she said rapturously. “I’m going to eat the whole plate unless someone gets in there.” I did: the drones, dripping in butter and lightly coated with honey from their cells, were fatty and a little bit sweet, and, like everything chitinous, left me with a disturbing aftertaste of dried shrimp.

Gracer opened the freezer and inspected his bugs: housefly pupae, cicadas, and, his favorite, ninety-dollar-a-pound katydid from Uganda. “They’re very rich, almost buttery,” he said. “They almost taste as if they’ve gone around the bend.”

“Dave, where’s the tailless whip scorpion?” Martin said, and Gracer produced an elegantly armored black creature with a foreleg like a calligraphy flourish. “I’m thinking about doing a tempura type of fry and a spicy mayonnaise,” Martin, who also worked for a number of years in a Japanese restaurant, said. First, she flash-fried it to soften the exoskeleton, and then she dipped it in tempura batter. To her knowledge, no one had ever before eaten a tailless whip scorpion. “All right, people, let’s make history,” she said, using a pair of chopsticks to lower it back into the pan, where it sizzled violently.

When the scorpion was finished, she put it on a plate, and she and Gracer sat down on a couch to feast on what looked like far too much bug for me, and yet not nearly enough to satisfy hunger. Gracer pulled off a pincer. “There’s something—that white stuff—that’s meat!” he cried, pointing to a speck of flesh. “That’s meat!” Martin repeated excitedly, and exhorted him to try it. He tasted; she tasted. “Fish,” Gracer said. “It has the consistency of fish.” Martin split a leg apart and nibbled. In a few bites, they had eaten all there was. “That was really good,” she said.

The following morning, in a tent on the front lawn of the Natural History Museum, Gracer faced Zack (the Cajun



Bug Chef) Lemann, an established bug cooker from New Orleans, who dazzled the judges—most of them children—with his “odonate hors d’oeuvres,” fried wild-caught dragonflies served on sautéed mushrooms with Dijon-soy butter. (Children are often seen as the great hope of entomophagy, because of their openness to new foods, but even they are not without prejudices. Gracer, who presented stinkbug-and-kale salad, had neglected to account for the fact that kids don’t like kale.) A five-year-old approached Lemann afterward. “Excuse me, can I eat a dragonfly?” he said. Lemann cooked one for him. The boy picked the batter off, to reveal a wing as elaborately paned as a cathedral window, and then bit into it: his first bug. His little brother, who was three, came over and asked for a bite. “Good,” he pronounced.

“Who’s going to eat the head?” their mother asked.

“I will,” the five-year-old said. “Once somebody licks the mustard off.”

The last round of the day matched Martin against Gracer. He was making Ugandan-katydid-and-grilled-cheese sandwiches. Drawing on her Japanese-restaurant experience, Martin decided to make a spider roll, using a rose-haired tarantula. She held up the spider and burned off its hair with a lighter, and then removed its abdomen. “The problem with eating an actual spider roll, made with crab, is that they’re bottom feeders,” she said. “This spider probably ate only crickets, which ate only grass.” She whipped up a sauce and added a few slices of cucumber, and then presented her dish to the judges, warning them brightly to “be very careful of the fangs!”

A young girl with curly hair lunged eagerly at the plate. “If it’s in sushi, I’ll eat it,” she said. When she had tried a piece, she declared, “It’s sushi. With spiders. It’s awesome.”

Four-fifths of the animal species on earth are insects, and yet food insects are not particularly easy to find. Home cooks can call Fred Rhyme, of Rainbow Mealworms, who provided the Madagascar hissing cockroaches for “Fear Factor.” He sells more than a billion worms a year; the sign at the edge of his farm, a conglomeration of twenty-three trailers, shotgun houses, and former machine shops in South Los Angeles, says, “Wel-



“Seriously, who is it?”

come to Worm City, Compton, Cal., 90220½. Population: 990,000,000.” The farm supplies six hundred thousand worms a week to the San Diego Zoo. “It’s mostly animals we feed,” Rhyme’s wife, Betty, who is the company’s president, told me. “The people are something of an oddity.”

For the do-it-yourself set, there are rearing and grinding kits, invented by Rosanna Yau, a designer in San Francisco, who has sold insect snacks at the San Francisco Underground Market. The business card for her Web site, [minilivestock.org](http://minilivestock.org), has a packet of dried mealworms attached to the back, and a warning to those with shellfish allergies not to consume them: insects and shellfish are such close cousins that the allergy tends to extend to both.

Most edible insects, though, are wild-harvested and highly seasonal, and not U.S.D.A.-approved. Until a citation from the health department prompted them to set up a certified facility in Oaxaca, the Lopezzes got the *chapulines* they served at Guelagueta from friends and relatives, who packed them in their carry-ons when they visited from Mexico.

Consider the immature *Liometopum apiculatum*, exquisitely subtle, palest beige-pink, knobably as a seed pearl, with

a current market price of seventy dollars a pound. A delicacy since Aztec times—they were used as tribute to Moctezuma—they are still a prized ingredient in high-end Mexico City restaurants, where they appear on the menu as *escamoles*; they are also known, colloquially, as Mexican caviar, or ant eggs.

Like humans, *Liometopum apiculatum* ants are opportunists; they will eat anything they can overpower, and, because they do not sting, they tear their prey to shreds. (They are also ranchers, tending flocks of aphids and defending them from lady beetles, in exchange for the aphids’ surplus honeydew.) They burrow under boulders or at the base of trees, and live in colonies of up to fifty thousand members. Traditionally, they were hunted only by experienced *escamoleros*, but, according to Julieta Ramos-Elorduy, a biologist who studies food insects at the National Autonomous University of Mexico, their desirability has invited poachers, who overharvest and destroy the nests. The ants, which are most readily available in the state of Hidalgo, are also found in the southwestern United States. High prices have inspired North American foragers to get in on the business. “Recently at San Juan market in Mexico City, monopolizers informed us

that small airplanes loaded with tons of the product arrived from the United States and sold it to the highest bidders," Ramos-Elorduy wrote in a 2006 paper.

You can't really buy *escamoles* in America. Joe Raffa, the head chef at Oyamel, who gets his *chapulines* sent from Oaxaca in kilo bags ("It all sounds very covert and druglike," he said), has scoured D.C. markets for them without success, though once, on a tip from a lady who overheard him complaining to his barber about their unavailability, he discovered some frozen Thai ant larvae (labelled as "puffed rice") in an Asian grocery store in Virginia. Raffa's boss, José Andrés, told me that he considers *escamoles* a delicacy, and if he could get them he'd put them on the menu at Minibar, his acclaimed six-seat restaurant in Washington, D.C.

In April, I called Laurent Quenioux, a French-born chef based in Los Angeles, who was a semifinalist for a 2011 award from the James Beard Foundation and is the only chef I know of in this country who has *escamoles* on the menu. He was trying to get some to serve at Starry Kitchen, where he was going to be chef-in-residence for the summer. "Basically, you need to smuggle them," he said. His connection, a Mexican living near Hidalgo who brought the eggs in Styrofoam cups in his carry-on luggage, didn't work anymore; the last two times Quenioux had placed an order, he'd prepaid, only to have his shipment confiscated by customs at LAX.

A week before the soft launch of Quenioux's residency at Starry Kitchen, I heard that he had a line on some *escamoles*. He knew a guy who knew a guy who would bring them across the border from Tijuana; we simply had to drive down to a meeting place on the U.S. side and escort them back. We set a time, and I went to a street corner in Pasadena, where Quenioux lives; when I arrived, a red Toyota Corolla was waiting. The window came down partway, and I heard someone call my name.

Quenioux is a gentle person, with huge, pale-green eyes, a bald-shaved head, a set of prayer beads around his wrist, and the endearingly antisocial habit of seeing everything he encounters as potential food: the deer near Mt. Wilson, which he hunts with a bow and arrow; the purple blossoms of the jacaranda trees; a neighbor's chicken, which he killed and cooked

when it came into his yard. (Usually, he finds chicken disgusting, and eats it only when he's home in France.) Certain laws just don't make sense to him, like the one that prohibits him from serving a dessert made from chocolate hot-boxed with pot smoke. "What's one gram of marijuana, just to have the smoke infuse the chocolate?" he said. Last year, when his restaurant Bistro LQ was picketed for serving foie gras, he was unperturbed; he says that when the ban on foie gras goes into effect next year in California, he will serve it anyway. "We are known to be a little bit rebellious," he told me. "They can fine me every day."

It is the same with *escamoles*. "We do it for the culinary adventure," he said. He has made blinis with ant eggs and caviar, and a three-egg dish of *escamoles*, quail eggs, and salmon roe. He has fantasized about making an *escamole* quiche, and, using just the albumen that drains out when the eggs are frozen, meringue. His signature dish is a corn tortilla resting on a nasturtium leaf and topped with *escamoles* sautéed in butter with epazote, shallots, and serrano chilis, served with a shot of Mexican beer and a lime gel. Insects are, to him, like any other ingredient: a challenge and an opportunity. "Let's do gastronomy with bugs," he said. "Let's make something delicious."

Quenioux talked about *escamoles* all the way down south—their delicate eggy qualities, their wildness, their unexpected appearance ("condensed milk with little pebbles in it"), the responsibility he feels to train the American palate to accept them. "The insects will be the solution to feed all those masses, but how do you get insects on the daily table in America?" he said. "In the last twenty years, we grew here in America from iceberg lettuce to baby frisée, so the time is now."

After a few hours, we arrived at a strip mall and parked in front of a drugstore, then walked toward the meeting place, a restaurant, where the *escamoles* had been entrusted to a woman named Nadia. "O.K., let's go talk to Nadia," Quenioux said, getting out of the car. "I've got the cash."

The front door to the restaurant was open, and an old man with a drooping mustache was mopping the floor. "Hola, señor," Quenioux said. The old man pointed to a Dutch door, which led to the kitchen. Quenioux stuck his head in, and

eventually Nadia, a young woman wearing a dirty chef's coat and a white apron, appeared. "You come for the *escamoles*?" she said. "O.K., I get for you." She returned a minute later with a plastic shopping bag containing a large ziplock filled with half a kilo of frozen product. Quenioux handed her a hundred-dollar bill.

Getting back in the car, Quenioux opened the bag to examine the goods, a pale-orange slush, scattered with clumps of oblong ant babies. "Ooh!" he squealed. "We got the loot!"

A week later, he was at Starry Kitchen, a lunch counter downtown owned by Nguyen and Thi Tran, who until recently ran it as an underground supper club out of their apartment. Nguyen was bounding around the kitchen, talking about his role in getting the *escamoles*, which Quenioux was going to serve as an *amuse-bouche*. "I called everyone, from Laos, Cambodia, Thailand—all the sources I know got caught," he said. He was thrilled about the air of the forbidden which the dish would confer. "It's going to be a great note to start on—not even the taste, just them knowing it was smuggled and it's ant eggs," he said.

To complement a menu full of Asian flavors—teriyaki rabbit meatballs in miso broth, veal sweetbreads with shishito peppers and yuzu—Quenioux had decided to prepare the *escamoles* with Thai basil and serve them with Sapporo. "These are very spicy," he said, placing an ample green nasturtium leaf on a plate. "I foraged them from my garden this morning." There was a light sheen of sweat on his forehead.

Just before the service, the waiters started to panic. "What am I telling them?" one asked. "I can't just go up to them and say it's ant eggs."

"Tell them it's very exotic, and traditional in Mexico City," the sous-chef said.

"This is an *amuse* from the chef," a waiter said, presenting me with the dish, a composition as spare and earthy as a Japanese garden. "It's smuggled-in ant eggs." I rolled the leaf around the tortilla and bit: peppery nasturtium, warm, sweet tortilla, and then the light pop of *escamoles* bursting like tiny corn kernels. A whiff of dirt, a sluice of beer, and that was it. They were gone by night's end. ♦

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#### NEWYORKER.COM/VIDEO

Dana Goodyear on cooking insects.