



# Bug Nuggets

IS THE WORLD READY FOR SOY-GLAZED MEALWORMS?

By Daniel Fromson



IMAGE CREDIT: NISHANT CHOKSI

THE DINING-ROOM table was set with roses and silver candlesticks. At one end, near a grandfather clock, sat two plates of mealworm fried rice. “So, a small lunch,” said my host, Marian Peters. “Freshly prepared.” The inch-long larvae, flavored with garlic and soy sauce, reminded me in texture of delicate, nutty seedpods. “Mealworm is one of my favorites at the moment,” Peters told me, speaking of the larvae of the darkling beetle (*Tenebrio molitor Linnaeus*). When they’re fresh, she added, their exoskeletons don’t get stuck in your teeth.

Based near Amsterdam, Peters’s company, Bugs Originals, has put freeze-dried locusts and mealworms on the shelves at the 24 outlets of Sligro, the Dutch food wholesaler. It has also developed pesto-flavored “bugsnuggets” and chocolate-dipped “bugslibars”—chicken nuggets and muesli bars, respectively, infused with ground-up mealworms. Both, like Peters’s chicken-mealworm meatballs, await approval for sale across the European Union.

The company's goal is to get consumers to embrace bugs as an eco-friendly alternative to conventional meat. With worldwide demand for meat expected to nearly double by 2050, farm-raised crickets, locusts, and mealworms could provide comparable nutrition while using fewer natural resources than poultry or livestock. Crickets, for example, convert feed to body mass about twice as efficiently as pigs and five times as efficiently as cattle. Insects require less land and water—and measured per kilogram of edible mass, mealworms generate 10 to 100 times less greenhouse gas than pigs.

The Netherlands, already one of the world's top exporters of agricultural products, hopes to lead the world in the production of what environmentalists call "sustainable food," and the area around the small town of Wageningen, nicknamed "Food Valley," has one of the world's highest concentrations of food scientists. It is also home to a tropical entomologist named Arnold van Huis. In the lineup of head shots near the entrance of Wageningen University's gleaming new entomology department, he's the guy with a locust jutting from a corner of his lips. Van Huis has been lecturing on the merits of insect-eating, officially known as entomophagy, since 1996. "People have to know that it is safe," van Huis told me as we sat in his office. "They have to get the idea that it is not wrong."

Van Huis's ideas are not unique: scientists have made similar proposals since the 1970s, when fears of global famine surged. But Wageningen has received them with enthusiasm. In 2006, the town rechristened itself the "City of Insects" for a weeklong festival, which attempted to set the world record for simultaneous (and intentional) insect consumption (by 1,747 people). Marian Peters, who had worked in job-training programs for the unemployed, learned that year of van Huis's ideas and thought breeding insects could help support struggling Dutch farmers. She founded the Dutch Insect Breeders Association and began working with van Huis to bring bugs to market. The United Nations noticed: van Huis spent three months last year helping the UN Food and Agriculture Organization develop a policy to promote edible insects. And last April, the Dutch Ministry of Agriculture awarded van Huis's team nearly \$1.5 million to study insect-rearing and develop purified insect protein for use in processed foods.

Peters showed me one of the first test batches—a vacuum-sealed pouch of what looked like pinkish-brown shaved ice but was in fact mealworm protein—and she arranged for me to visit the warehouse where the larvae originated. (The same facility put the crunch in my fried rice.) Black plastic crates were stacked six feet high, filled with mealworms buried in their dinner (and bedding) of food-industry by products: wheat bran and carrot scraps. Local farmers haul away the leftover bedding and manure—sandy, nutrient-rich fertilizer.

Van Huis told me that purified insect protein is "the ultimate possibility," but that isolating it remains difficult. Protein is tightly bound to the exoskeletons, and his team needs to devise more-efficient separation methods. The current process is akin to making soup: food scientists puree the chilled but still living insects with an immersion mixer, pass the pulp through a sieve, and centrifuge what's left. Sometimes the proteins turn yellow or brown, though, or acquire a strong odor—from mushroomy to acidic or sulfurous. And the edible-insect industry as a whole faces another challenge: government regulations and quality standards do not exist. Peters is working to have bugs officially recognized as livestock. Right now, they are classified as agricultural waste.

Still, both Peters and van Huis say the most obvious potential barrier—disgust—has not been material. Van Huis estimates that 95 percent of people who attend his lectures try the customary mealworm quiche and other hors d'oeuvres, and Peters told me that after a talk last May, 120 people tasted and praised her full line of prototypes: “People really liked it, but they liked the muesli snack most.” The recipes for chicken nuggets and meatballs, which were “too salty,” have been tweaked. But the real reason for the bugslibar’s relative popularity suggests that insects could have an unexpected fan base: “Half the audience was vegetarian.”

Next, Peters wants to experiment with insect falafel and a dough for cooking and baking. And she and van Huis have begun work on an insect cookbook of their own, which, if all goes according to plan, will feature recipes from top European chefs. The hope is that dishes like rhubarb ice cream topped with locusts will find their rightful place on tables set with roses and candles.

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