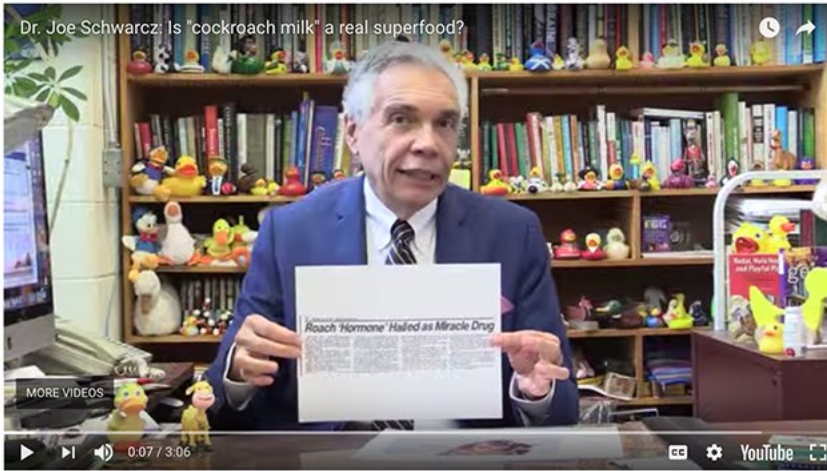


The Right Chemistry: Cockroach milk a 'superfood'?

It's not a prank, but any suggestion that the crystals represent a viable alternative to dairy milk for people is a very, very big stretch.

JOE SCHWARCZ, SPECIAL TO THE MONTREAL GAZETTE Updated: October 12, 2018



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Back in 1981, entomologist Josef Gregor called a press conference to announce a remarkable discovery. He had bred a novel species of cockroach from which he managed to extract a hormone that, when incorporated into a pill, exhibited amazing properties. It cured conditions ranging from acne and allergies to asthma and arthritis! "Roach hormone hailed as miracle drug" crowed headlines. Some 175 newspapers went on to feature testimonials attesting to the wonders of the hormone pills.

Subsequently, Gregor was invited to appear on various television programs where he described that cockroaches were impervious to radiation and that in addition to its curative properties for a plethora of ailments, his pills would offer protection against radiation exposure. It all sounded great, but there was one tiny little problem. There was no Josef Gregor, and there was no cockroach hormone! Gregor was actually Joey Skaggs, a teacher at New York's School of Visual Arts, who relished pulling off hoaxes to show how the media could be duped into reporting nonsensical stories because of a failure to fact-check. And that was decades before the current wave of publicity about "fake news!"

Recalling the "cockroach hormone" episode, I figured a prankster must have been at work when the headline, "Scientists Think Cockroach Milk Could Be the Next Superfood," recently scooted across the internet. Obviously, fact-checking was in order. While the headline was typical click-bait, it was actually spawned by legitimate research.

In 2016, a paper in the Journal of the International Union of Crystallography reported some intriguing research about the unique "Pacific Beetle" cockroach (*Diploptera punctate*). Why unique? Because it is viviparous, meaning the females give birth to live offspring. The term derives from the Latin "vivus" for "alive," and "parere," meaning "to bring forth" or "to bear."

While common in mammals, viviparity in insects is rare. The Pacific Beetle cockroach does, however, reproduce in this fashion and is of interest to scientists because the embryos get their nutrients from tiny crystals that form from a fluid they absorb from the mother roach. These crystals can be isolated and have been creatively dubbed "cockroach milk" by publicity seeking headline writers.

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The researchers' intent was to study the specific composition and folding pattern of the proteins found in the crystals, since such crystals are rare in living species. They discovered that the proteins were attached to sugars and fats and were extremely tightly packed in the crystalline lattice. A single crystal was estimated to contain three times as many calories as an equivalent mass of dairy milk. Its proteins contained all the essential amino acids and incorporated the necessary fats and carbohydrates needed by a growing embryo. This led to claims that the crystals were a "complete food." Yes, they obviously are for the quickly growing cockroach embryos, but any suggestion that they represent a viable alternative to dairy milk for people is a very, very big stretch.

To start with, milking cows is a lot easier than "milking" cockroaches, and given that some 1,000 roaches have to be sacrificed to get 100 grams of crystals, "cockroach milk" does not appear to be an economical source of nutrients. There are attempts to isolate the genes responsible for the production of this nourishing liquid, with hopes of insertion into the genome of yeast cells that would then crank out the "milk," potentially for human use. Safety would of course have to be addressed.

It should be pointed out that in no way did the researchers claim any sort of "superfood" status for the crystals. That was a media invention. "Superfood" is a marketing, not a scientific term. It is generally accepted as referring to foods that claim to offer an advantage in maintaining health, often based on some sort of study in which animals exhibited a benefit when fed amounts that on a weight per weight basis are greater than can ever be consumed by humans.

The list of "superfoods" seems endless, ranging from common foods like berries, kale, fish, coconut oil, chocolates, bone broth, beetroot, oats, pomegranate juice and avocado to the esoteric like chia seeds, goji berries, microalgae, mangosteen and seaweed. There is nothing wrong with eating these, but the concept of single foods making significant contributions to health is flawed. While there are no superfoods, there are good diets and poor diets. Loading up on fresh produce and curbing processed foods is the way to go.

As far as cockroaches go, you can be awed by their ability to survive radiation and to go for weeks without food or water. The male's knack of attracting females from long distances by wafting his pheromones into the air is also impressive. So is the fact that 100,000 roaches can descend from a single pair within a year.

Amazing creatures, indeed, but don't wait for their "milk" to appear in your grocery store.

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