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# Ant Study Deepens Concern About Plastic Additives

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Science

PARIS — About five years ago, Alain Lenoir, a researcher at François Rabelais University in Tours, France, was studying the biochemical process by which ants differentiate between friends and foes.

Scientists had come to understand that the insects used their antennae to sense the makeup of the hydrocarbons of other ants' cuticles. Using chemical analyses like gas chromatography, Dr. Lenoir had begun focusing in particular on hydrocarbons on Lasius niger, the common black ant.

Dr. Lenoir, who has been studying ants since 1968, found something unexpected: in addition to the hydrocarbons, the analysis was consistently revealing the presence of plastic additives called phthalates, and not just in a few specimens – all of them.

Other scientists had reported such findings, he said, but he had brushed off the presence of those chemicals as contamination that occurred in the lab.

Intrigued, Dr. Lenoir, today an emeritus professor, decided to follow up with a new study. The results, published in last month's issue of Science of the Total Environment, an academic journal, confirmed what he had already come to fear.

All of the ants that he and his team studied were contaminated with phthalates, regardless of where the insects originated. For example, the chemical made up as much as 0.59 percent of the substances on the cuticles of ants that had just been collected in a field near Tours.

In another experiment, Dr. Lenoir's team kept the ants in the laboratory in an open plastic box that contained no phthalates. Nonetheless, the amount of the chemicals on the ants' cuticles actually increased – indicating that the phthalates were present in the air and stuck to the ants' cuticles. (The quantity of phthalates on the cuticles of ants in closed boxes did not increase).

Phthalate esters, http://phthalates.americanchemistry.com">according to the American Chemistry Council, belong to "a family of compounds whose primary use is as a vinyl softener. They are colorless, odorless liquids that do not evaporate readily."

The chemicals, also known as plasticizers, are almost inescapable, so essential is their use in the modern economy, appearing in everything from toys to construction materials and cosmetics. For example, the chemistry council notes, it was the addition of a phthalate known as DEHP to polyvinyl chloride – normally a brittle plastic – that made possible the blood bag that we know today, which brought about a revolution in blood storage and delivery.

Unfortunately, there are serious concerns about their health effects, as phthalates are thought to be endocrine disruptors, chemicals that alter the way animal hormones operate. Phthalates are not bound chemically to the plastics to which they are added and enter the environment naturally as the plastic deteriorates with age.

Laboratory testing has shown that pretty much everyone has some degree of phthalates in their bodies. We are exposed to the chemicals regularly, the Centers for Disease Control says, http://www.cdc.gov/biomonitoring/Phthalates_FactSheet.html">says, by eating and drinking food that has been in contact with containers and products containing phthalates and by breathing in air that contains phthalate vapors or dust contaminated with phthalate particles.

After entering the human body, the chemicals are quickly broken down into metabolites and passed out the through the urine. But the C.D.C. notes that exposure to DEHP has caused adverse effects in laboratory animals, with the development of the male reproductive system in young animals raising the biggest concerns.

In the absence of certainty on the effects on humans, it said, “precautions should be taken to limit the exposure of the developing male to DEHP.”

In 2009, researchers at Mount Sinai Medical Center reported finding evidence suggesting that the chemicals may also contribute to obesity in girls.

“Phthlates are everywhere in the atmosphere,” Dr. Lenoir said in an interview. Some of the contamination of the ants in the open boxes certainly must have come from other plastics in the laboratory, he added, though that would have also been the case in people’s houses, where plastics are everywhere.

To test the universality of their experience, the scientists also tested ants from places including Hungary, Spain, Morocco, Spain, Greece, Burkina Faso and Egypt. In all of those places, the ants – which had not had direct contact with plastic – tested positive for the presence of phthalates, although in some cases only in trace amounts.

And it wasn’t just the ants, the French researchers found. They also tested wood crickets and honeybees, with the same result.

The long-term effects of phthalate contamination on ants is not known. But Dr. Lenoir said he had observed that the fecundity of queen ants appeared to decrease when phthalates were placed on their abdomens, and that he planned to investigate that idea further.