

Ant cuticles provide a useful basis for reflection

Phthalates are often called plasticizers. They are a group of phthalic acid esters mainly used to make plastics more flexible and harder to break. We can find them in polyvinyl chloride plastics, used for example to manufacture packaging films and sheets, garden hoses, drip chambers and blood storage containers for intravenous therapies, medical tubing, child care articles, and inflatable toys.

Some phthalates are also used as dissolving agents for other substances. They are found in thousands of products, including adhesives, detergents, lubricating oils, automotive plastics, plastic clothes such as raincoats, personal care products, and cosmetics such as soaps, shampoos, hair sprays, and nail polishes.

Phthalates are associated with a multitude of applications; they are high volume chemicals and unfortunately, ubiquitous environmental contaminants [Zota et al. 2014, 2016]. This means phthalates occur everywhere and simultaneously. It also means worldwide exposure to phthalates, usually accompanied by health problems.

Do we really think that phthalates can be found virtually everywhere? Do we really believe phthalate traces occur in very distant, isolated areas? There can be no doubt that long-range transport can play an important role in the transfer of organic contaminants to very remote areas. Phthalates have been found in antarctic [Cincinelli et al. 2005] as well as arctic [Xie et al. 2007] aquatic environments. Yes, phthalates are everywhere. It has clearly been demonstrated by the meta-analysis of environmental contaminations carried out by Bergé et al. [2013], that phthalates are ubiquitous, environmental contaminants.

We are all exposed to phthalates via ingestion, inhalation, and skin contact throughout our entire lives, and even during the intrauterine life phases. Dermal contact and inhalative intake are considered major routes of exposure to phthalates found in hygiene products such as soap, shampoo, and conditioners. By contrast, oral exposures predominate when phthalates are used as plasticizers. Furthermore, non-dietary ingestion can be an important exposure route for patients undergoing medical treatment.

Recently, my attention was drawn by the striking title “Ant cuticles: a trap for atmospheric contaminants”. Professor Alain Lenoir from the Université François Rabelais in Tours, France, wondered why ubiquitous phthalates (and other contaminants) are found on ant cuticles. Phthalates are not covalently bound in the plastic matrix and so, are easily liberated to end up in watercourses, soil and sediments, the atmosphere and ultimately, the biota. As a result of their lipophilic character, they accumulate in the food chain.

Lenoir et al. [2012, 2014] evidenced the fact that phthalates from the atmosphere are present in ant cuticles. Phthalates are also found inside ant bodies and seem to be concentrated in the body fat rather than other tissues. This suggests that they might be absorbed by the ant cuticle and internalized through

self-grooming and in the end, sequestered in adipocytes owing to their highly lipophilic nature. A more detailed study to better understand the process of phthalate internalization is being carried out. It is now thought that phthalates are internally absorbed without cuticular bioaccumulation. The results so far obtained by professor Lenoir and his team confirm that terrestrial arthropods like ants capture, absorb, and degrade phthalates.

If phthalates are metabolized by terrestrial arthropods, and more particularly by ants, that would suggest they are biologically active compounds [Cu villier-Hot et al. 2014]. Moreover, ants could possibly contribute to the removal of phthalates from the local environment [Lenoir et al. 2014]. Where people turn a blind eye to rubbish, tiny animals come and clean it up. This sounds great. It can however never be an argument to justify a “laisser-faire” attitude. If we cannot change the past, we can at least learn from it.



Ants are called “ecosystem engineers” and can be regarded as bioindicators of ecosystem health [Lenoir et al. 2014]. A bioindicator is any biological species or group of species whose function, population, or status can reveal the environmental quality. Ants have a clear message for us: they tell us the environment is contaminated with phthalates, and they tell us it is highly likely that we have phthalates in our body, since we live in this very same environment.

The French journalist Fabrice Nicolino provides us with a completely different, but very alarming story. Phthalates exist everywhere. They occur in the Arctic and in the Antarctic; they are also found in inaccessible deserts. Ants randomly taken from the wild — in France, Greece, Spain, Hungary, Egypt and Burkina Faso — are all contaminated with phthalates. The environmental contamination in pristine, poorly developed areas is likely to be dominated by pollution from the outside.

Fabrice Nicolino [2014] depicts another compelling story that has raised many eyebrows. On May 7, 2013, the online journal maliba.com mentioned that little Malian girls are pubescent at an ever earlier stage in their lives. Little is known about the origin of the problem, but the ongoing studies increasingly point towards chemical pollution. Local teachers estimate that ~25 % of the girls under the age of twelve years are concerned. Worst of all is that these early maturing girls are in high demand in the capital’s discos and brothels.

Does this bring discredit to phthalates? Phthalates are known to be endocrine disrupting chemicals with considerable adverse health effects. Everywhere in the world ants accumulate the substance in their cuticles.

Though at this stage no firm scientific proof can be found that would establish a causative link between exposure to phthalates and early female puberty, why wait until tomorrow; why not take action now?

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Leo Goeyens

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