

Heavy metal is bad for you

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I don't have a problem with Metallica, Iron Maiden or even Ozzy Osbourne. It's the original heavy metal villains, the chemical elements that inhabit the nether regions of the periodic table, that I'd prefer to keep out of my bloodstream. But in our industrialised world, that's becoming ever harder.

We've managed to liberally spill these unhappy by-products of our machine culture all over the planet with some rather detrimental effects. Two of the nastier members of the clan - lead and mercury - have been in the news lately.

Journalists **Kevin Drum** and **George Monbiot** have summarised intriguing research which suggests a causal link between lead pollution and violent crime. This disturbing relationship is the result of the now largely abandoned use of lead in paints and petrol.

Chemical analyses of the growth rings of trees chronicle the story of the lead we've spewed into the air. When tetraethyl lead was introduced as a performance-enhancing additive to petrol in the early 20th Century, levels in tree rings started to rise. As the unhealthy side-effects became apparent and the practice was phased out beginning in the 1970s, measured values **peaked and then declined**. But we're still dealing with the legacy.

While excessive lead exposure can result in gastrointestinal, cardiovascular and kidney problems as well as many other ailments in the general population, children are most at risk, even at low levels. For them lead poisoning can cause learning disabilities, growth impairments and behavioural issues including ADHD, aggressiveness and violence.

Studies have shown that in many areas, violent crime peaked about 20 years after lead pollution was at its worst as those who were poisoned by it in infancy reached maturity.

Efforts to remove lead from paints and petrol, though too late for many, were certainly effective. Which is not to say that lead pollution is a thing of the past. The **Blacksmith Institute** ranks lead-acid battery recycling and lead smelting as the first and second most significant global pollution problems, potentially affecting over 150 sites and as many as 3.5 million people in developing countries.

In the case of mercury we've only just begun to clean up our mess with a legally binding, **albeit flawed**, UN treaty to reign in the pollution.

From Victorian England's famous mad hatters to well-documented pollution events at Minamata in Japan and Cato Ridge in KwaZulu-Natal, it's not as though we haven't known about the problem for a long time. Better late than never, I suppose.

According to the **latest figures** from the United Nations Environment Programme (UNEP), artisanal small-scale gold mining is now the largest single contributor of mercury pollution in the world, accounting for around 37% of anthropogenic emissions in 2010. Next are fossil fuel combustion, predominantly by coal-fired power plants, metal and cement production, waste incineration and others.

After it's emitted into the atmosphere, where it spreads around the globe, mercury (which is also released by natural sources such as volcanoes, hot springs and erosion) is oxidised, deposited on the earth's surface and converted into toxic methyl mercury (MeHg) by bacteria. MeHg is bio-available, meaning that it's absorbed into the bodies of animals that ingest it, and accumulates especially in the marine food chain with apex predators like tuna, swordfish, sharks, seals, beluga whales and polar bears ending up most contaminated.

Humans predominantly absorb mercury by eating fish and seafood - **in the US**, this accounts for 90% of all MeHg exposure, 40% of which just from tuna. From there a sorry litany of health defects, from brain damage to blindness, ensues. **In the EU**, as many as 2 million babies are born with long-term IQ deficits every year as a result of mercury poisoning.

Although the extent and impact of mercury pollution have not been exhaustively investigated in South Africa, we are certainly part of the problem. Our coal-burning power plants alone are estimated to emit **39.4 tons of mercury per year** - not an insubstantial portion of UNEP's estimate for annual global emissions (1960 tonnes).

Makes me wonder exactly how much mercury pollution I caused by turning on my PC this morning to write this article. One thing's certain though: guitar-based hard rock has caused nowhere near as much damage to the planet as lead, mercury and the other toxic escapees from civilisation's smokestack.

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