



**Figure 3.** Because there is actually very little mercury in most natural waters, scientists have to use extreme measures when sampling for mercury to avoid sample contamination from their hands and clothing. This entails the use of lint-free suits, plastic gloves, hoods, and stringently cleaned sampling equipment.

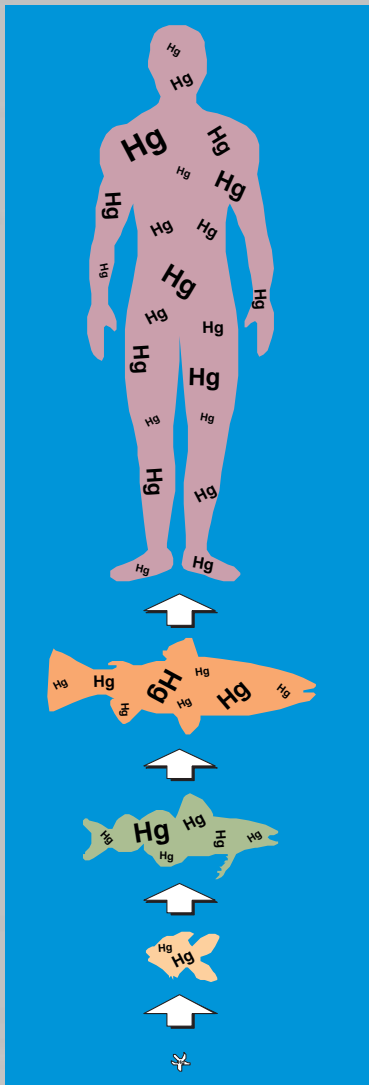
### What are the human health effects of mercury toxicity?

Humans generally uptake mercury in two ways: (1) as methylmercury ( $\text{CH}_3\text{Hg}^+$ ) from fish consumption, or (2) by breathing vaporous mercury ( $\text{Hg}^0$ ) emitted from various sources such as metallic mercury, dental amalgams, and ambient air. Our bodies are much more adapted for reducing the potential toxicity effects from vaporous mercury, so health effects from this source are relatively rare. Methylmercury, on the other hand, affects the central nervous system, and in severe cases irreversibly damages areas of the brain (fig. 5). The most well documented cases of severe methylmercury poisoning are from Minamata Bay, Japan in 1956 (industrial release of methylmercury) and in Iraq in 1971 (wheat treated with a methylmercury fungicide). In each case, hundreds of people died, and thousands were affected, many with permanent damage. In milder cases of mercury poisoning, adults complain of reductions in motor skills and dulled senses of touch, taste, and sight. These

milder effects are generally reversible if exposure to mercury is halted. Unborn children are at greatest risk from low-level exposure to methylmercury. Recent research suggests that prenatal effects occur at intake levels 5-10 times lower than that of adults. If these results are confirmed, a substantial fraction of unborn children would be at risk.

### Mercury Cycling in the Environment

Mercury can take a myriad of pathways through the environment. Figure 6 shows a schematic drawing of mercury cycling in an aquatic ecosystem. With the exception of isolated cases of known point sources, the ultimate source of mercury to most aquatic ecosystems is deposition from the atmosphere, primarily associated with rainfall. As depicted in this figure, atmospheric deposition contains the three principal forms of mercury, although the majority is as inorganic mercury ( $\text{Hg}^{2+}$ , ionic mercury). Once in surface water, mercury enters a complex cycle in which one form can be converted to another. It can be brought to the sediments by particle



**Figure 4.** Mercury (Hg) biomagnifies from the bottom to the top of the food chain. Even at very low input rates to aquatic ecosystems that are remote from point sources, biomagnification effects can result in mercury levels of toxicological concern.

### MERCURY HEALTH EFFECTS



- ❑ Deteriorates nervous system
- ❑ Impairs hearing, speech, vision and gait
- ❑ Causes involuntary muscle movements
- ❑ Corrodes skin and mucous membranes
- ❑ Causes chewing and swallowing to become difficult

**Figure 5.** All forms of mercury are toxic to humans, but methylmercury is especially of concern because our bodies have a less well developed defense mechanism against this toxin. Effects on the nervous system are the most prevalent in humans.