Radiocesium-bearing microparticles cause a large variation in $^{137}$Cs concentration in the aquatic insect, *Stenopsyche marmorata*, in the Ota River, Fukushima, Japan

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Radiocesium-bearing microparticles (CsMPs), which are insoluble, Cs-bearing, silicate glass particles, have been found in terrestrial and freshwater environments after the TEPCO’s Fukushima Daiichi Nuclear Power Plant (FDNPP) accident in Japan. Few studies have investigated the distribution of CsMPs in freshwater ecosystems and their uptake by aquatic organisms. In this study, we determined the uptake of CsMPs by aquatic insects in the Ota River in Fukushima. Although aquatic insects are usually measured for radioactivity in bulk samples of several tens of insects, we investigated the variability of $^{137}$Cs concentration in individual aquatic insects, and the influence of CsMPs on them. Measurement of $^{137}$Cs concentrations in detritivorous caddisfly (Stenopsyche marmorata) larvae and carnivorous dragonfly larvae showed that 3 of 47 caddisfly larvae had considerably higher radioactivity, whereas no such outliers were observed in dragonfly larvae. These caddisfly larvae were confirmed to contain the CsMPs emitted from Unit 2 of the FDNPP, using a scanning electron microscope and radioactivity measurements after isolation of the CsMPs. CsMPs were also found in potential food sources of caddisfly larvae, such as periphyton and drifting particulate organic matter, indicating that larvae may ingest CsMPs along with food particles of similar size. Our study demonstrated that CsMPs could be taken up by aquatic insects and possibly by the fish consuming them. The existence of CsMPs can result in sporadic, extremely high $^{137}$Cs concentrations, and large variations in samples, and consequently obscure the actual transfer and temporal trends of $^{137}$Cs in freshwater ecosystems.