Lingering Heavy Metal and Metalliods in the Allium cepa Root Tip and Bulb from the Animas and San Juan Riverbeds, After the 2015 Gold King Mine Spill

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Finding potential heavy metal and metalloid toxins in the Animas and San Juan riverbeds and onion bulb after the 2015 Gold King Mine Spill are crucial to the effects of the mitotic index of Allium cepa root tip. Initial tests on the mitotic index from the Animas and San Juan Rivers were conducted in 2015-2016. The hypothesis states that if the both Riverbeds, and onion bulb samples have potential heavy metals and metalloids, then the samples from both rivers will contain abbreviated cells, and a lower mitotic index. Water and riverbed samples were collected after the 2015 Gold King Mine Spill. Green onions were planted in each water and riverbed sample for one month. The onion root tips were then analyzed using a digital microscope at 400X for mitotic phases and cellular aberrations. Non-dividing and dividing cells were counted to measure the mitotic index. Onion bulbs exposed to the riverbed were tested for metals using Oxford ED-2000 Geology Majors + Traces XRF. The hypothesis was accepted; both riverbeds affected the mitotic index (0%) of the root tip with cellular aberrations. Onion bulbs in the XRF study had higher ppm concentrations of Zinc indicating cytotoxic effects on the mitotic index. The Animas Riverbed had high weight percentages of specific metal oxides, thus reducing the weight percent of common sand. The XRF Machine also found that the Animas River having higher concentrations of metalloids, while the San Juan Riverbed had higher weight percentages of sand because it had less specific metal oxides.

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