EFFECTS OF HEAVY METALS ON AMPHIBIANS

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OVERVIEW

- Defining Heavy Metals
- How they hurt Amphibian Populations
- Studies:
  - Effects of heavy metal mining on amphibians in Central Europe
  - Effects of Silver Valley mining in Idaho on spotted frogs
  - Effects of Mercury on black-bellied salamanders throughout the Southern Appalachian Mountains
- Conclusion
- References

WHAT ARE HEAVY METALS & HOW DO THEY EFFECT AMPHIBIANS

Defining Heavy Metals

- Heavy metals are typically considered chromium, cobalt, nickel, copper, zinc, arsenic, selenium, silver, cadmium, antimong, mercury, thallium, and lead.
- We are using the term “heavy metals” as the toxic level of the previously listed chemical elements. (Appenroth, 2010)

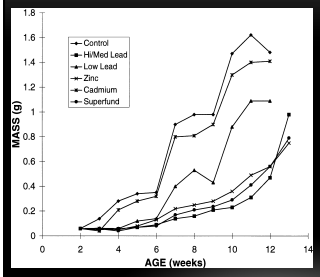
How Heavy Metals Effect Amphibians

- Heavy metals cause abnormal levels of chemicals, which cause the development and growth of a given species to be irregular.
- Heavy metals can be absorbed through the amphibians permeable skin, ingested, or inhaled.
- Mining heavy metals often leads to contamination of the water or soil and a loss of viable habitat. (Adlassnig, 2013)

EFFECTS OF MINING IN CENTRAL EUROPE

- Causes loss of habitat
- No amphibians found at majority of sites including 16 rock heaps were *Salamandra salamandra* is normally found. (Adlassnig, 2013)
- Amphibians only found at 8 of the 24 mines. Never found near tailings and appeared to avoid acidic drainage. (Adlassnig, 2013)

MINING IN SILVER VALLEY IDAHO: EFFECTS ON SPOTTED FROGS



Studies Showed Three Major Causes of Mortality

- Heavy metals killed the tadpoles that were in high levels of zinc and cadmium within a few weeks. (Lefcort,1998)
- Delayed metamorphosis was experienced with tadpoles with presence of copper or zinc. Can lead to mortality for species using temporary bodies of water. (Lefcort, 1998)
- Loss or reduction of antipredatory behavior in tadpoles. Medium levels of lead and zinc. (Lefcort,1998)

EFFECTS OF COAL MINING ON WHITETOP MOUNTAIN AMPHIBIANS

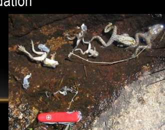
- Main source of contamination atmospheric deposition
  - The high levels of mercury are brought in from wind, precipitation and cloud vapor. (Hamed, 2014)
  - Lead and mercury levels were higher on the northwestern slopes which is were the predominant wind came from 50.9% of the time.(Hamed, 2014)

EFFECTS OF COAL MINING ON SOUTHERN APPALACHIAN MOUNTAIN AMPHIBIANS

- Mercury contamination compared to other Apex Species
  - *Desmognathus quadramaculatus* THg levels were 4.5-15.3 times higher in the museum collection(Hamed, 2014)
  - Higher levels than the American Alligators collected from down in Texas in a contaminated site. (Hamed, 2014)
  - Over twice as high as Bullfrogs from Caddo Lake another contaminated site. (Hamed, 2014)

CONCLUSION

- Amphibian decline is due to many reasons, but non-greater than heavy metals.
  - Results in loss of habitat through mining and contaminated streams.
  - Reduction in correct chemical balance which results in:
    - Loss of important genetic information
      - Correct metamorphic timing
    - Loss or reduction in the ability to avoid predation
    - Reduction in ability to fight of disease



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QUESTIONS????????