TEACHING SCIENTIFIC PROCESS USING PHENOTYPIC ABNORMALITIES IN FROGS: UPDATING A CASE STUDY

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Purpose: Update case study, organize existing pedagogical resources, and create new teaching resources.

Background:
- Middle school children discovered leopard frogs (Rana pipiens) during 1995 with a high rate of phenotypic abnormality, sparking scientific debate on causation
- Abnormalities encountered: missing digits/limbs, extra digits/limbs, skin webblings, bony triangles, misshapen eyes/tails
- Competing Hypotheses: 1) Chemical Contaminants 2) Parasites 3) UV light 4) Predation 5) Combination 6) Localized-Effects
- Current literature suggests using case study to teach experimental design, the biology of frogs, and the environmental sensitivity of amphibians
- Case study demonstrates ability to teach non-linear scientific process and nature of science
- Contains instances of scientific discourse, interacting with scientific community, and scientific fads

Figure 2: Timeline showing the first publication of emerging competing hypotheses since the initial abnormality discovery.

Figure 3: Primary literature articles focused on frogs over time. Frog* publications were binned by “chytrid”, “deform* or malform*” or “abnorm*”, and “Minnesota or MN”. The dashed line indicates the discovery of frogs with a high rate of phenotypic abnormality in a Minnesota pond.

Our Contribution:
- Updated review of the current scientific understanding
- Collection of existing lesson plans/resources, divided into separate tables
  - Informally published resources
  - Formally published resources
  - Recommended supplementary source material
- Our perspective on how this case study could be useful beyond how it has been used historically
- Tentative publication of this paper, including an additional activity.

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References:
http://www.calliforniaeeps.com/itfl/frogdeformities.html

Figure 1: Flowchart visualizing potential pedagogical pathways.