

Skeletons in the stream: A temporal study of in-stream leaf decomposition



J. Hopkins, G.W. Minshall, and R.J. Smith

Idaho State University

Inquiry Cycle

Teacher



Dis

dg

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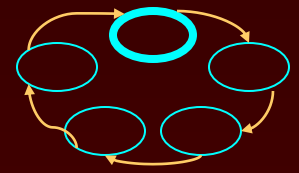


Create

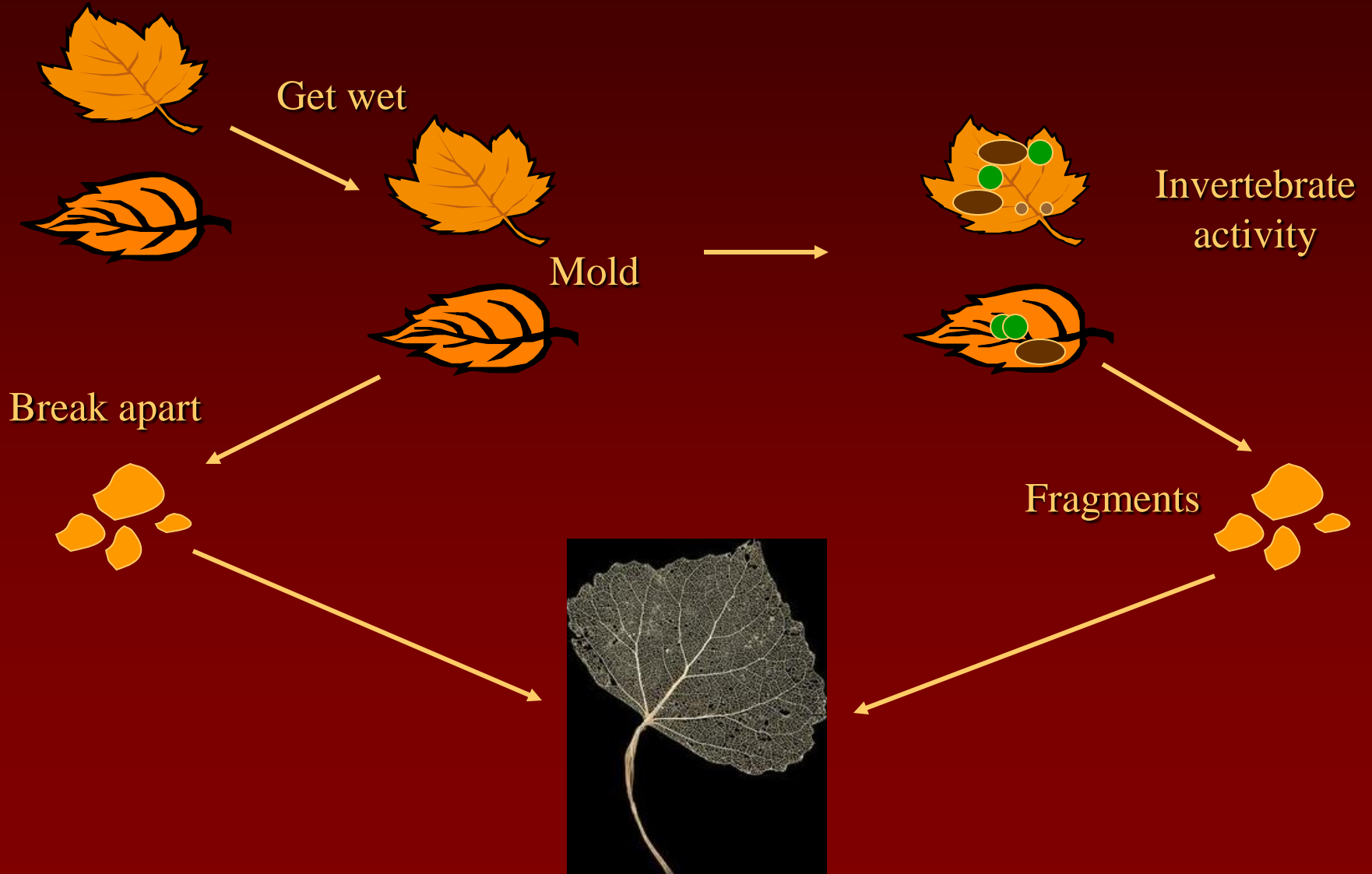
Investigate



Prior Knowledge

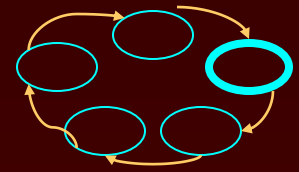


Leaves fall in

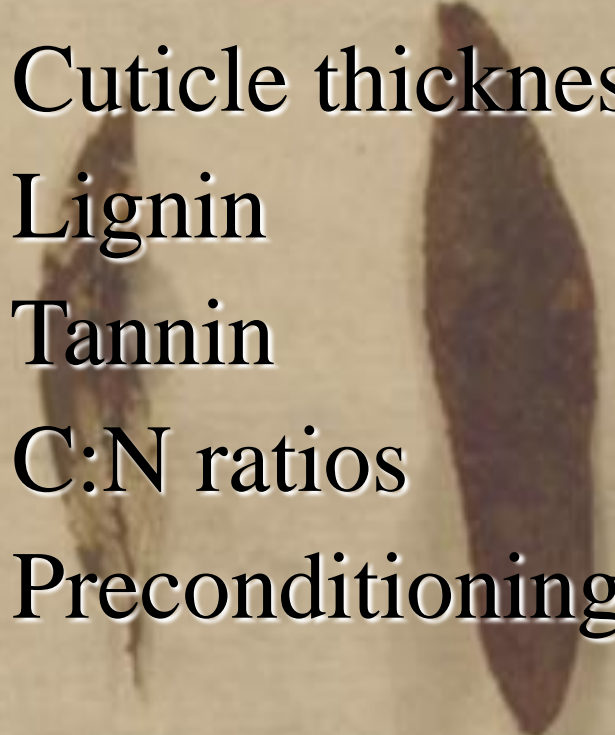
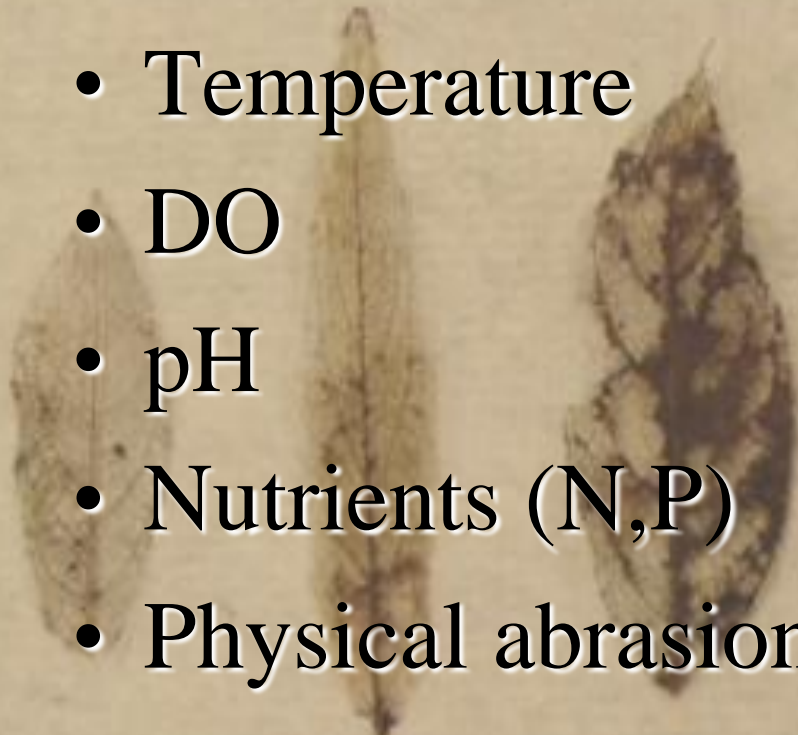


Decomposition Rates

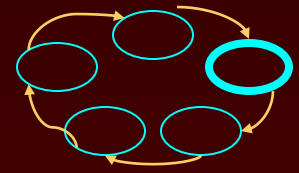
What influences decay rates?



- Temperature
- DO
- pH
- Nutrients (N,P)
- Physical abrasion
- Stream biota
- Cuticle thickness
- Lignin
- Tannin
- C:N ratios
- Preconditioning



Decomposition Rates



Fast

(>0.15%)

Alder

Dogwood

Basswood



Medium

(0.1 - 0.15%)

Maple

Hickory

Willow



Slow

(<0.1%)

Oak

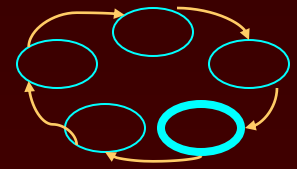
Conifers

Aspen



(Peterson and Cummins 1974)

Experimental Design



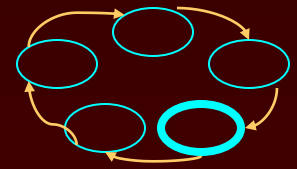
Independent

- Leaf type
- Time in stream
- Location in stream
- Presence / Absence of Invertebrates

Dependent

- Functional
 - Decay Rates
- Structural
 - Invertebrate metrics
 - Microbial community

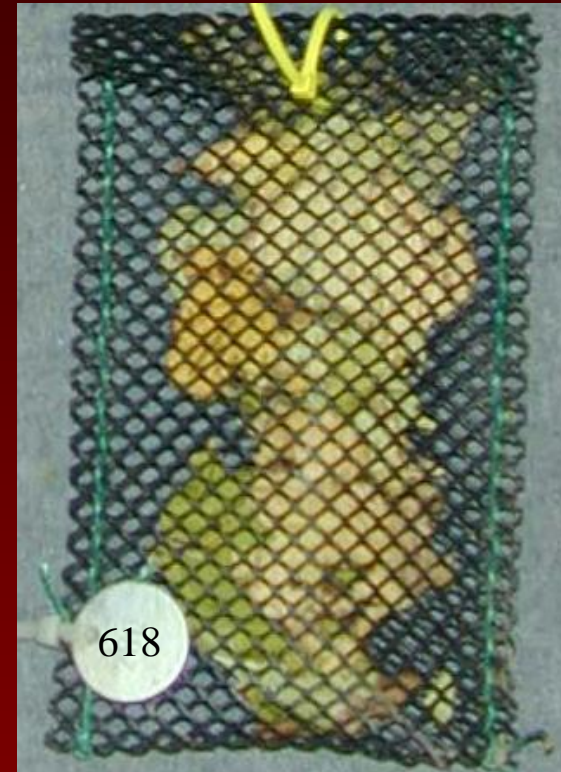
Experimental Design



12cm



Natural leaf pack

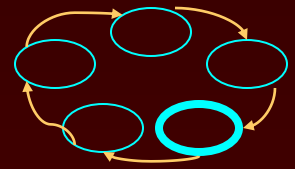


20cm

5mm mesh

Experimental leaf pack

Classroom Preparation

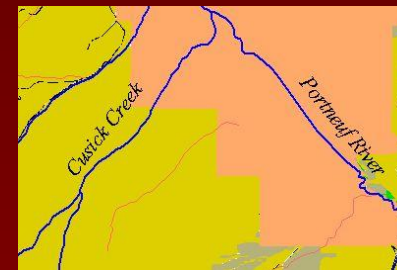


Materials

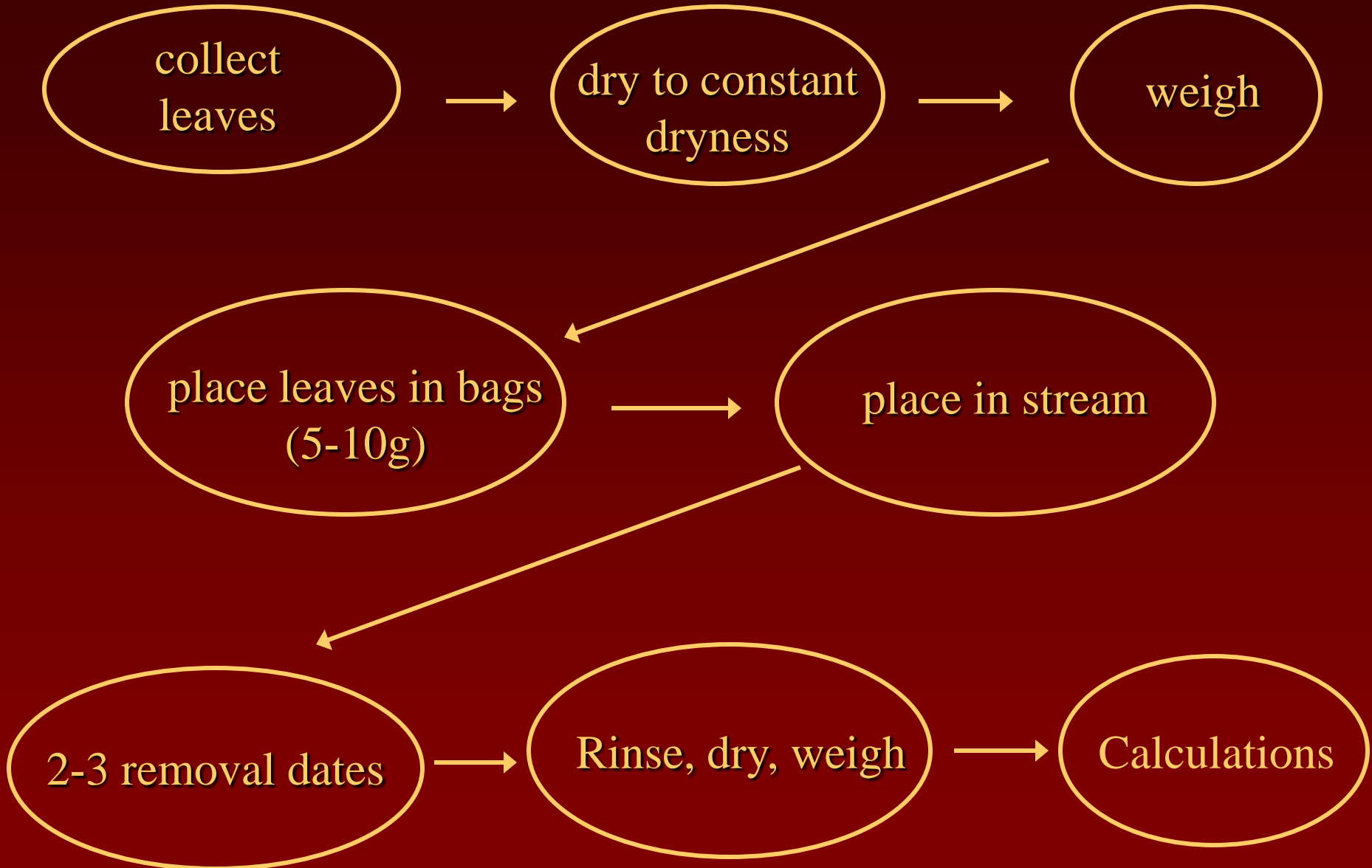
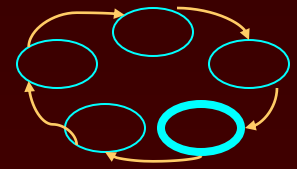
- Leaf Packs
- Drying area
- Temperature loggers

Field Preparation

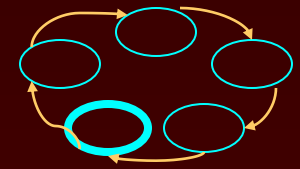
- Site identification
 - Accessibility
 - Land use maps



Methods



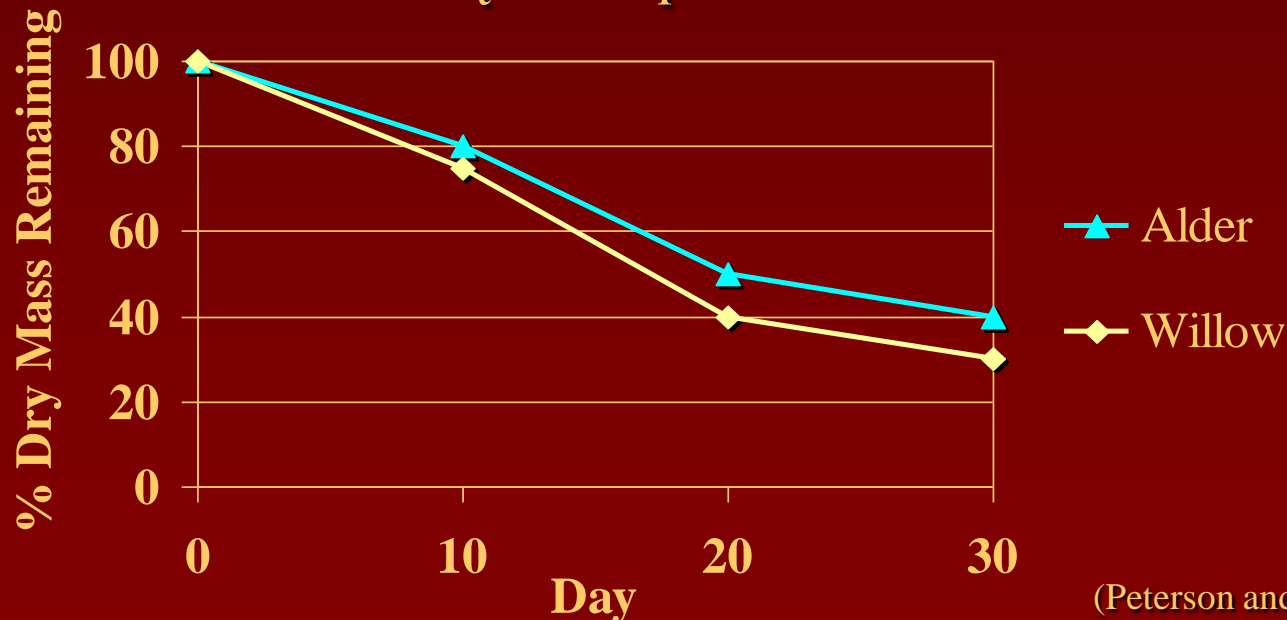
Calculations



- Mass lost (g)
- % remaining
- % lost
- Decay rate, k

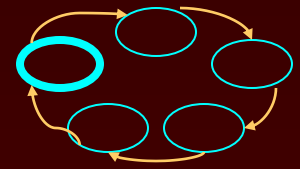


$$W_t = W_i e^{-kt}$$



(Peterson and Cummins 1974)

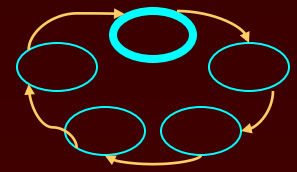
Reflection



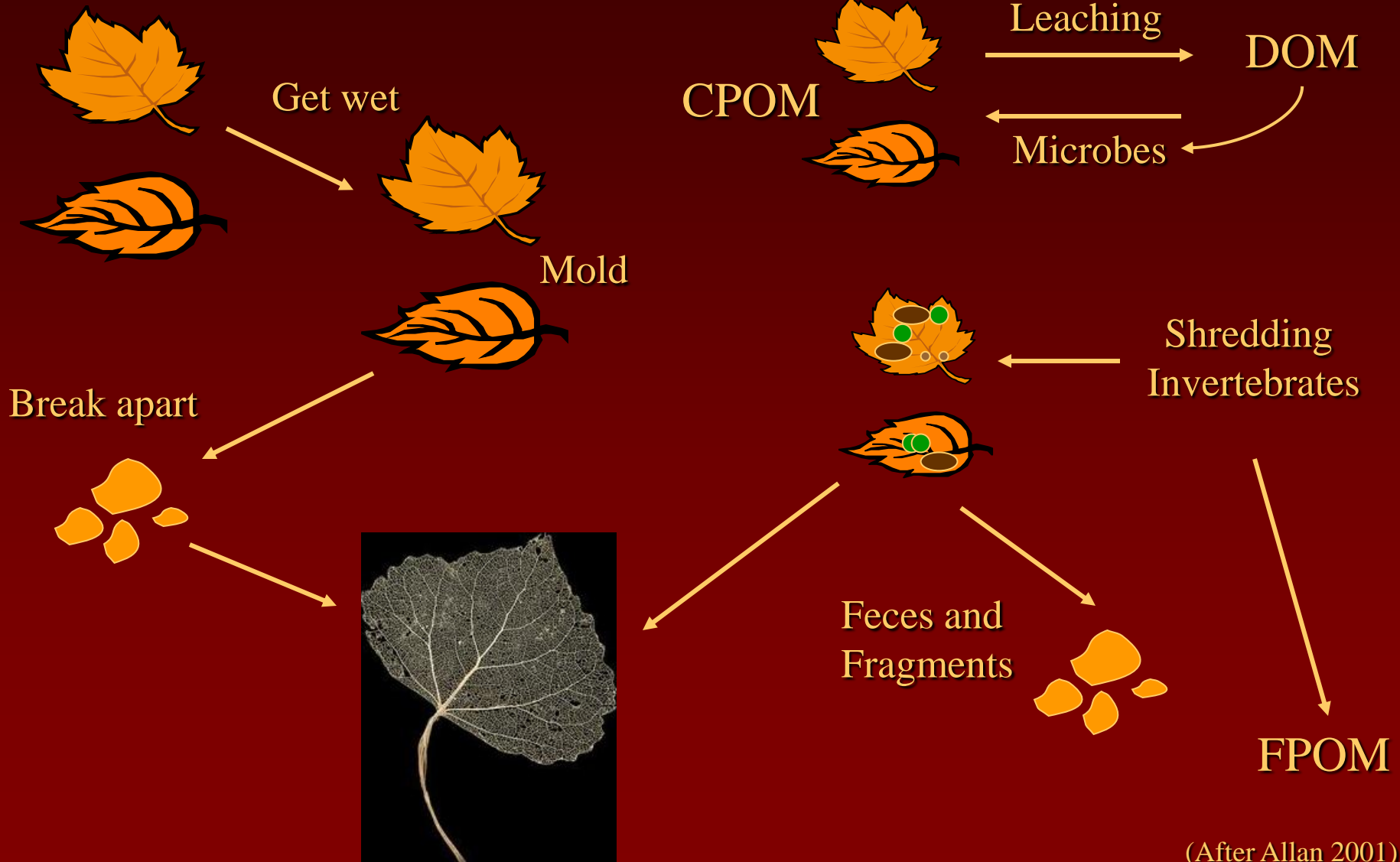
- Written report
- Explain results
- Put work in context
- Diagram



Prior Knowledge



Leaves fall in



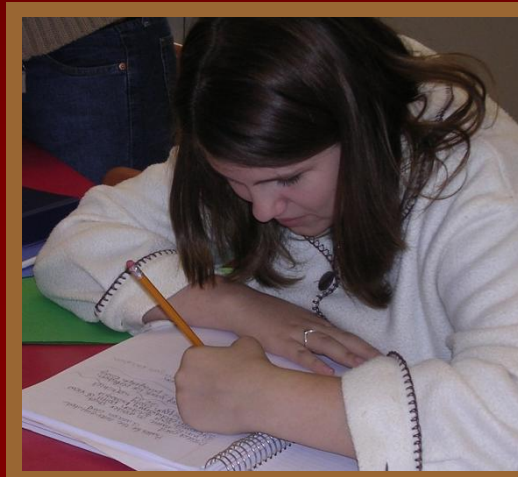
Fall 2004 Honors Biology

- 60 students
- Groups of 3
- 2 streams
- Flow rates
- Native vs. Exotic
- Miracle Grow
- 1 field trip
- 4 one-hour class sessions



Advantages

- Measures Ecosystem Function
 - Integrates biological, chemical, and physical
- Tactile
 - Live organisms, habitat
- Involvement in process of science



Acknowledgments

Stream Ecology Center

- Dr. Colden Baxter
- Amanda Rugenski
- Sara Owen



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Pocatello High School

- Eric Rude, biology teacher
- Honors biology students