

CAVE BIOLOGY

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INVENTORY AND MONITORING BIOTA

- CAVE LIFE IS AN INDICATOR OF CAVE HEALTH.
- NUMBER OF DIFFERENT SPECIES AND POPULATION ESTIMATES CAN BE USED TO MONITOR MANAGEMENT EFFORTS.
- INFORMATION FROM INVENTORIES CAN BE USED TO MONITOR GROUND WATER QUALITY & SURFACE USE IMPACTS TO GROUND WATER AND CAVES ECOSYSTEMS.

MORE REASONS TO INVENTORY CAVE BIOTA...

- PROVIDES BASELINE INFORMATION FOR FUTURE RESEARCH
- CAVE MAY CONTAIN T & E OR RARE SPECIES
- CAVE LIFE ADDS TO CAVE SIGNIFICANCE
- VIEWING CAVE LIFE ADDS TO THE CAVING EXPERIENCE

CAVE ZONATION

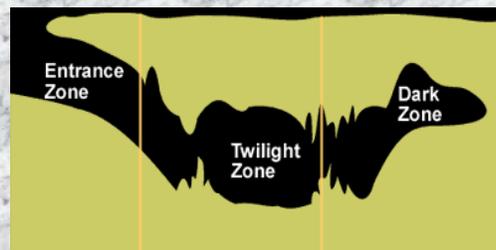
**CAVES CAN BE DIVIDED INTO CLIMATIC ZONES TO
BETTER UNDERSTAND CAVE HABITATS**

➤ ENTRANCE ZONES

➤ TWILIGHT ZONES

➤ VARIABLE TEMPERATURE ZONES

➤ CONSTANT TEMPERATURE ZONES



ENTRANCE ZONE

CONDITIONS VARY



TWILIGHT ZONE

CONDITIONS MAY VARY WITH SEASON



VARIABLE TEMPERATURE ZONE
USUALLY TOTAL DARKNESS, SEASONAL CHANGES
ARE GREATLY REDUCED
TEMP ↓, HUMIDITY ↑



CONSTANT TEMPERATURE ZONE
AREA OF TOTAL DARKNESS WITH NEARLY
CONSTANT TEMPERATURE AND HUMIDITY



CAVE LIFE

♣ ACCIDENTALS

♣ TROGLOXENES

♣ TROGLOPHILES

♣ TROGLOBITES



ACCIDENTALS

GENERALLY SURFACE DWELLING SPECIES WHICH FALL INTO CAVES OR SOMEHOW WANDER IN

♣ EXAMPLES
INCLUDE MICE,
SNAKES, RATS,
AND FROGS



SPECIES ADAPTATION

MOST ARE PRE-ADAPTED, RELICS OF SURFACE SPECIES, AND HAVE BEEN ISOLATED FOR THOUSANDS OF YEARS

- **PHYSICAL STRUCTURE CHANGES**
- **METABOLISM BETTER ADJUSTED TO NUTRIENT POOR ENVIRONMENT**
- **LIFE HISTORY CHANGES FROM SURFACE DWELLING COUSINS.**
- **SENSORY STRUCTURES OFTEN ARE MORE DEVELOPED, EX: ANTENNAE, OLFACTORY ORGANS, VIBRATION RECEPTORS**

TROGLOXENES

ANIMALS ENTER CAVES BUT RETURN TO SURFACE FOR CERTAIN LIFE REQUIREMENTS

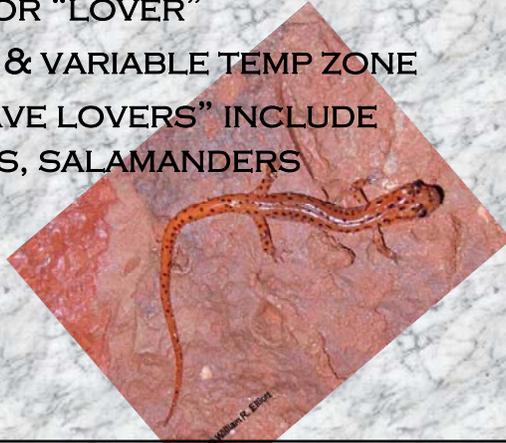
- **TROG: GREEK FOR "CAVE" OR "HOLE"**
- **XENES: GREEK FOR "VISITOR"**
- **FOUND IN ENTRANCE, TWILIGHT OR VARIABLE TEMP. ZONE**
- **EXAMPLES INCLUDE BATS, BIRDS, PORCUPINES, HARVESTMEN**



TROGLOPHILES

**SPECIES GO THROUGH THEIR ENTIRE LIFE CYCLE
WITHIN CAVES OR ON THE SURFACE**

- TROG: GREEK FOR “CAVE” OR “HOLE”
- PHILES: GREEK FOR “LOVER”
- PREFER TWILIGHT & VARIABLE TEMP ZONE
- EXAMPLES OF “CAVE LOVERS” INCLUDE SPIDERS, CRICKETS, SALAMANDERS



TROGLOBITES

SPECIES LIVE FULL TIME IN CAVES

- TROG: GREEK FOR “CAVE” OR “HOLE”
- BITES: GREEK FOR “DWELLER”
- FOUND PRIMARILY IN CONSTANT TEMP. ZONE
- EXAMPLES INCLUDE BLIND CAVE FISH



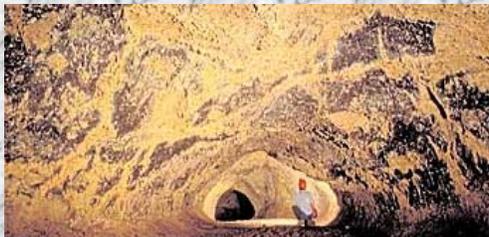
DECOMPOSERS

- EXAMPLES INCLUDE FUNGUS, BACTERIA, AND MICRO-ORGANISMS



SLIME MOLDS

- THIN, FRAGILE COATINGS COVERING MANY LAVA TUBES AND OTHER CAVES WALLS
- COLORFUL PATCHES ARE COLONIES OF BACTERIA WHICH ARE HYDROPHOBIC
- REPELLED BY BACTERIA, WATER BEADS UP AND GLITTERS ON THESE GROWTHS



**DURING THE REVOLUTION AND CIVIL WARS,
THERE WAS A BLACK POWDER SHORTAGE.
CAVE SOILS SUPPLIED SALT PETER FORMED
BY MICROORGANISMS.**



Salt Peter Vat, Tennessee

FOOD CHAINS FOUND IN CAVES

🦋 CLOSED SYSTEMS

**RELY ON CHEMOAUTOTROPHIC
BACTERIA WHICH BREAK MINERALS
DOWN INTO A FOOD SOURCE FOR
CAVE-DWELLING ANIMALS**

🦋 OPEN SYSTEMS

**BASED ON ORGANIC MATERIAL BEING
TRANSPORTED INTO CAVE**

SPECIES SENSITIVITY

- HIGHLY SUSCEPTIBLE TO:
 - CHANGES IN THE CAVE CLIMATE.
 - DISTURBANCE BY HUMANS.
 - CHANGES IN ENERGY INPUT, AND
 - CHANGES TO POPULATION DYNAMICS



INVENTORYING CAVE SPECIES

How

- OBSERVATION
- ASPIRATION
- PIT TRAPS
- AQUATIC TRAPS
- FILTER NETS
- MIST NETS
- COLLECTING (PRO/CON?)
- HISTORIC RECORD
- IDENTIFICATION
- MAPPING & CHECK LIST

WHERE

- GUANO
- DEAD ANIMALS
- WET AREAS
- PLANT ROOTS
- POOLS
- NEST
- MUD
- FUNGUS
- ORGANIC MATTER
- ON OTHER ANIMALS

CAVE FAUNA OBSERVATION & COLLECTION INFORMATION SHEET

CAVE: _____ COUNTY: _____ STATE: _____
 LOCATION (FROM NEAREST SURVEY MARKER OR MAP LOCATION): _____

TIME: _____ DATE: _____ COLLECTOR: _____

LIST EACH DIFFERENT SPECIES OBSERVED OR COLLECTED AT THIS LOCATION, INCLUDE NUMBERS OBSERVED OR COLLECTED, INCLUDE VILE #.

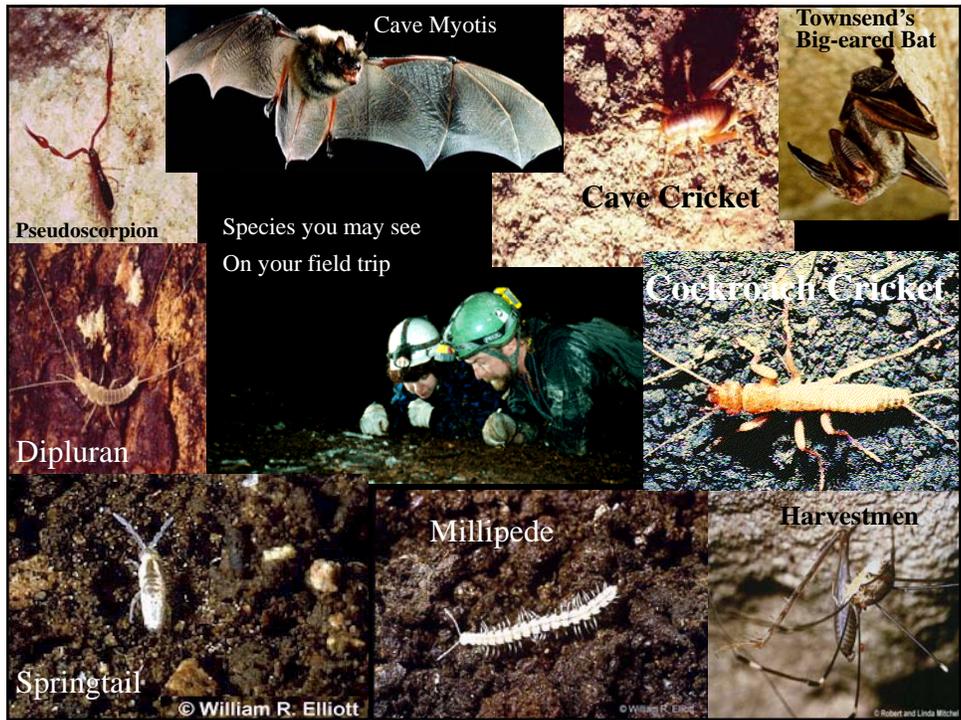
1. _____ 4. _____
 2. _____ 5. _____
 3. _____ 6. _____

ZONE: ENTRANCE () () () TWILIGHT () () ()
 TOTAL DARKNESS () () () OTHER () () () _____

CHECK WHERE APPROPRIATE, ADD WORDING AS NEEDED

MICRO-HABITAT:	EDAPHIC CONDITIONS:
<input type="checkbox"/> ON CAVE WALL <input type="checkbox"/> ON CAVE FLOOR <input type="checkbox"/> IN CRACK IN WALL <input type="checkbox"/> ON DECAYING WOOD <input type="checkbox"/> UNDER DECAYING WOOD <input type="checkbox"/> ON BAT GUANO <input type="checkbox"/> ON CRICKET GUANO <input type="checkbox"/> ON _____ SCAT <input type="checkbox"/> IN POOL OF WATER <input type="checkbox"/> IN SLOW MOVING STREAM <input type="checkbox"/> ON CAVE WALL <input type="checkbox"/> ON CAVE CEILING <input type="checkbox"/> TAKEN IN FLIGHT <input type="checkbox"/> ON DAMP BAND <input type="checkbox"/> WEB ASSOCIATION <input type="checkbox"/> UNDER ROCK <input type="checkbox"/> ON DEAD _____	SOIL TYPE: <input type="checkbox"/> SILT <input type="checkbox"/> CLAY <input type="checkbox"/> FINE SAND <input type="checkbox"/> COARSE SAND <input type="checkbox"/> GRAVEL <input type="checkbox"/> ROCK <input type="checkbox"/> HUMUS, ORGANIC DEBRIS <input type="checkbox"/> MUD <input type="checkbox"/> ROCK _____
THERMAL CONDITIONS: AIR TEMPERATURE <input type="checkbox"/> F/C OUTSIDE TEMP. <input type="checkbox"/> F/C CAVE FLOOR/PASSAGE <input type="checkbox"/> F/C CAVE CEILING SUBSTRATE: <input type="checkbox"/> F/C WATER TEMP. <input type="checkbox"/> F/C SOIL TEMP. <input type="checkbox"/> F/C SOIL _____ DEEP RELATIVE HUMIDITY: () () () _____ HOW/WHERE MEASURED () _____	SOIL MOISTURE: <input type="checkbox"/> POWER DRY <input type="checkbox"/> NO DUST <input type="checkbox"/> DAMP TO TOUCH <input type="checkbox"/> VISIBLE MOISTURE <input type="checkbox"/> EDGE OF WATER _____
STREAM BED CONDITIONS: <input type="checkbox"/> DRY <input type="checkbox"/> DAMP <input type="checkbox"/> STANDING WATER <input type="checkbox"/> FLOWING WATER <input type="checkbox"/> SPRINGS DRY/WET <input type="checkbox"/> POOL SIZE _____ SQ.FT. BOTTOM TYPE: <input type="checkbox"/> DEEP <input type="checkbox"/> ROCKY <input type="checkbox"/> UNKNOWN <input type="checkbox"/> MUDDY <input type="checkbox"/> SAND _____	

NOTES: _____



CAVE ENVIRONMENT

- CONSTANT TEMP & HUMIDITY
- LOW ENERGY INPUT
 - SCARCITY OF FOOD
- MAINLY DECOMPOSER COMMUNITY
- CYCLICAL PULSES OF FOOD

MAJOR FOOD SOURCES

- CAVE CRICKET GUANO
- BAT GUANO
- PLANT DETRITUS — INCLUDING PLANT ROOTS
- FECES OF OTHER SPECIES USING THE CAVE