

Explore science across the University of Kansas campus (*\*seasonal items*).

Main loop (1.5 to 2 hours); Extended Loop (2.5 to 3 hours). Consult ku.edu for building hours.

## Main Loop

### 1. Dyche Hall – Ancient Seas & Scientists

**Look closely at the sides of the steps leading to the main entrance. This limestone formed in an ancient sea that used to covered Kansas.**

*Is that rice/wheat?* The small elongated shapes are fossilized single-celled marine organisms called fusulinids from the late Paleozoic (540-248 million years ago).

Q. Can you find other common fossils?



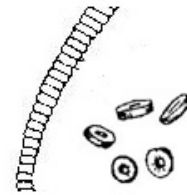
fusulinids



brachiopods



bryozoans



crinoids

**Look for names inside the arches on the south and east walls.**

*Charles Darwin.* British naturalist known for the foundation of evolutionary thought, e.g. common descent and natural selection.

*Edward Drinker Cope.* American paleontologist who discovered and named many extinct animals including *Camarasaurus* and *Dimetrodon*.

*Thomas Henry Huxley.* English biologist who studied many fossil groups including early humans and other primates. He was an outspoken advocate for Darwin's theory.

*Louis Agassiz.* Swiss biologist and geologist who proposed the idea that there had been an ice age when glaciers covered North America.

Q. Do you recognize the names Audubon and Gray? They are on the north wall that is covered by the addition to the building.

### 2. Kansas Union – College Chant

**Read about the origins of ‘Rock Chalk Jayhawk’ on the 1<sup>st</sup> floor near the bottom of the staircase.**

*Chalk rock?* Chalk is a kind of limestone found on Mount Oread and elsewhere in Kansas that is composed of the shells of tiny marine organisms called coccolithophores.

Q. Can you find any fossils in the limestone?

### 3. Smith Hall – Color and Light

**Find the stained glass window facing the statue.**

*Salty sizes.* Metal salts are added to melted sand to make colored glass (see table below of salts and resulting color). Particle size is important. For example, very small salt particles (nanoscale or 0.000000001 m) can reflect light differently so that gold makes a ruby red color.

Cadmium – Yellow	Cobalt – Blue/Violet	Iron – Green/Brown	Nickel – Violet
Carbon – Amber	Copper – Blue/Green/Red	Lead – Yellow	Selenium – Red
Chromite – Emerald Green	Gold – Red	Manganese – Purple	Sulfur – Yellow Amber

Q. What colors can you see in the window?

### 4. Spooner Hall – Beach Front Property

**Look at the rocks used in this building.**

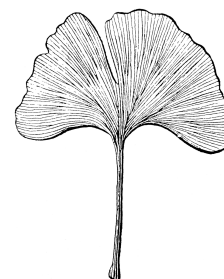
*It's sedimentary, my dear Watson.* Sedimentary rocks are formed by bits of material (e.g. rocks, shells) cemented together in layers. The light grey-ish rocks are limestone that formed in ancient warm shallow oceans. The red rocks are sandstone that formed in beach-like environments.

Q. Can you see any nearby buildings that use the same rock?

### 5. \*Watson Library Lawn – Tree History

**Look for a tree with fan-shaped leaves on either side of the stone entryway.**

*Jurassic Park.* Ginkgo trees date from around 200 million years ago during the Jurassic. The single living species, *Ginkgo biloba*, is named for its distinctive two-lobed leaves.



Q. What animals might have fed on ginkgoes many millions of years ago?

### 6. Bailey Hall – More than party balloons

**Bailey Hall is the former home of the chemistry department. Look for the plaque in the main entryway on the right.**

*Abundant yet rare.* While there is lots of helium in the universe, it is rare on Earth. In 1905, KU scientists discovered how to extract helium from natural gas. Helium gas is used as a coolant for cryogenics, particle colliders and medical equipment.

Q. Can you name any other gases?

## 7. \*Marvin Grove – Tree-riffic

### **Observe the diversity of trees.**

*Flowery.* Trees that have their ova or eggs surrounded by fruit, nuts or seeds are called angiosperms. Examples that can be found on campus include: cottonwood, birch, willow, oak and sycamore.

*Coney.* Trees that have their eggs or ova in modified leaves called cones are gymnosperms. Examples that can be found on campus include pine, spruce and juniper.

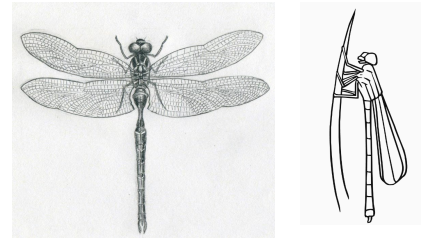
Q. How many angiosperms (fruit/seed trees) and gymnosperms (cone trees) can you find?

*Want more? Potter Lake scavenger hunts are available on the KU Natural History Museum website.*

## 8. Snow Hall – Potter Lake ‘Flies’

### **Find the ‘Dragonflies of Potter Lake’ display near the east door entrance (next to Strong Hall).**

*Wing it.* Dragonflies and damselflies are related, but distinct insect groups. At rest, dragonflies hold their wings out to the side (left), while damselflies fold them over their back (right).



Their young, known as nymphs, also look different. Dragonfly nymphs have wide bodies, large eyes and three short ‘tails’; Damselflies have narrow bodies and three oar-shaped ‘tails’.

Q. Can you find adults and nymphs of these groups? Climb to the 7<sup>th</sup> floor for a view of campus.

## 9. Lindley Hall – Paleontology, Pressure and Planets

### **Look at the roof and imagine a large telescope.**

*Planetary connection.* There used to be an observatory on top of this building named for KU researcher Clyde Tombaugh who discovered Pluto (now a dwarf planet). The dome that protected the telescope is still visible on the roof.

Q. Can you name the eight planets in our solar system?

### **Enter through the east doors. Check out the giant quartz in the stairwell between floors 3 and 4.**

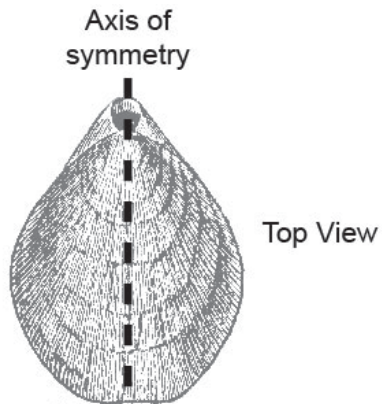
*Crystals.* Quartz is a well-known and abundant mineral. It occurs in many forms and colors.

Q. Can you find quartz in any rocks on display in this building?

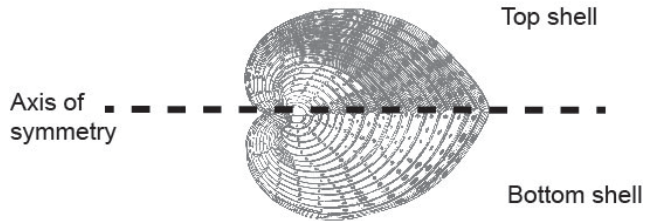
### **Look for the ‘Common Paleozoic Fossils of Kansas’ display on floor 3, near the east stairwell.**

*Shelled symmetry.* Brachiopods (Brachiopoda) and clams (Pelecypoda) are shelled animals that look similar, but are only distantly related.

Brachiopod shells are symmetrical from side to side – the left and right sides of each shell are a mirror image of each other.



Clam shells are symmetrical from top to bottom – the top and bottom shells are a mirror image of each other.



Q. Can you tell them apart?

### **Go to the Diamond Case (outside room 316)**

*Under pressure.* Coal and diamonds form from carbon deposits (ancient swamps) that have been buried and put under extreme pressure.

*Kimberlite pipes.* Diamonds form deep in the earth. Magma (liquid rock) carrying bits of diamond-filled rocks move to the surface through channels called pipes.

Q. Can you think of other words associated with magma?

### 10. Haworth Hall – Collections Legacy

**From the main entrance on Sunnyside Ave, look to your left for a display on the “Old Collection”.**

*Museum origins.* Professor Francis Snow started an insect collection at KU in 1870. This material, along with other collections, eventually became the basis for the Natural History Museum.

Q. What differences do you notice between the larvae and adults of beetles and butterflies?

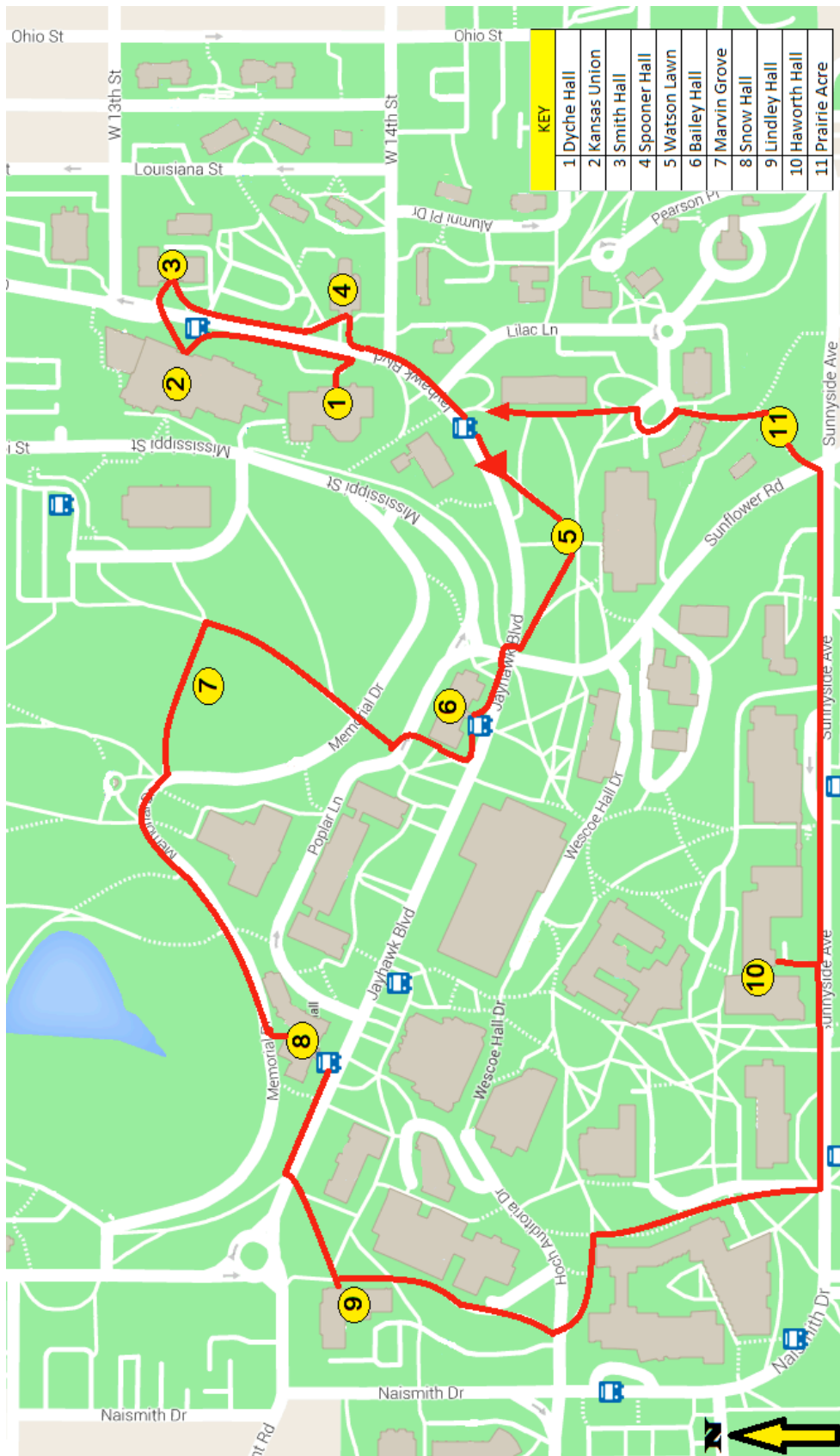
### 11. \*Prairie Acre – Grasses and Grasshoppers

**Explore the native plant and wildlife area.**

*Prairie preservation.* The ‘Prairie Acre’ (actually ½ acre) was set-aside in the 1930s to preserve untouched native prairie plant life. While no longer pristine, many native prairie grasses and other plants can still be found, along with plenty of insects.

Q. What kinds of diversity do you see in these plants (e.g. shape, size, color)? Can you find any dragonflies or damselflies?

# Main Loop Map



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Explore even more science across the KU campus (\**seasonal items*).

Main loop (1.5 to 2 hours); Extended Loop (2.5 to 3 hours). Consult ku.edu for building hours.

## Extended Loop

### 12. \*Baehr Audio Reader Center Sensory Garden – Sensational

**Follow Fambrough Dr/West 11<sup>th</sup> St to the blue sign for ‘Kansas Public Radio, Audio-Reader Center’ and continue to the brick building at the end of the road. The garden is on the right.**

**Use your senses to explore the garden.**

*Watch, sniff, listen.* Humans senses include sight, hearing, taste, smell, touch. Some animals have specialized senses such as echolocation (e.g. bats, dolphins) and the ability to detect electrical fields made by other animals (e.g. sharks, salamanders, platypus).

Q. What do you smell, hear, see and feel in the garden?

### 13. \*Rain Garden – Drip, Drip, Drip

**Look for the garden in front of Ambler Student Recreation Fitness Center on Schwegler Dr.**

*Water recovery and beyond.* Native plants absorb rainwater to reduce runoff into storm drains, help to refill aquifers and reduce flooding, as well as provide habitat for wildlife.

*Location, location, location.* Rain garden designs need to follow the varying height or topography of landscape, and are often kidney shaped around the highest point.

Q. Using the information panel, can you find all the plants that should be in bloom?

### 14. Booth Family Hall of Athletics/Allen Fieldhouse – Stretch and Shout

**On the other side of Naismith Drive is Allen Fieldhouse Dr.**

**In the Fieldhouse, Shout out ‘ROCK CHALK JAYHAWK!’**

*Surfaces matter.* Sound bounces around and echoes because of hard rather than padded bleachers and a low ceiling. Other stadiums use high domed ceilings and other materials to absorb sound.

Q. How might sound behave in other spaces such as at home or outside?

### **Booth Family Hall of Athletics**

*Spread your wings.* Measure and compare your ‘wingspan’.

Q. How does your arm span relate to you height?

## 15. Visitor Center – Kansas Creature

**Look up when you enter the lobby.**

*Pteranodon*. Pterosaurs or flying ancient reptiles are related to, but are not dinosaurs. This is a copy of a specimen on display at the KU Natural History Museum (see photo), and is one of two state fossils.



Q. Can you identify the body parts that form the wings?

## 16. Pioneer Cemetery – Lawrence’s Original Cemetery

**Follow West 19th St or Irving Hill Rd to Constant Ave on West Campus. There is a small parking area for the cemetery.**

**Look for Bleeding Kansas, Civil War and Quantrill’s Raid markers.**

*Long history.* This cemetery dates back to 1855 and was originally known as the Oread Cemetery. KU took over responsibility for maintaining this area during campus expansion in the 1950s.

Q. What types of rock were used for headstones and other markers? What insects and other animals do you see?

## 17. Pharmacy School – Biological Laboratory

**Follow Becker Dr to the pharmacy building.**

**Enter through the main entrance, which is the 2<sup>nd</sup> floor. Explore the Natural Medicine display in the right corner of the pharmacy museum.**

*Plant pesticides.* Caffeine, nicotine and other substances that evolved in plants deter pests.

Q. What plant products do you recognize?



18. \*School of Pharmacy Medicinal Plant Garden – Antibacterial, Asthma and Arthritis

**Exit the pharmacy building at the back (south side) on the 1<sup>st</sup> floor.**

**Explore the medicinal plant garden.**

*Milkweeds, marsh-mallow and mint – oh my!* The pharmacy garden has information on more than 70 species of medicinal plants, many of which are native to Kansas.

Q. What plants do you recognize? What pollinators do you observe?

*Want more? KU's Native Medicinal Plant Research Garden located at the Field Station north of Lawrence is open to the public year-round.*

19. \*Butterfly/Pollinator Garden – Monarchs and Medicine

**Follow the path around to the right to the garden. Look for the Monarch Waystation sign.**

**Explore the pollinator garden (southwest of Foley Hall).**

*Pollinators.* The Monarch Watch butterfly garden is part of a long running program at KU that focuses on education, conservation and research related to Monarch butterflies and other important pollinators.

Q. What do you notice about the colors and patterns on butterflies? What plants are also found in the pharmacy garden?

**Extended Loop Map**

