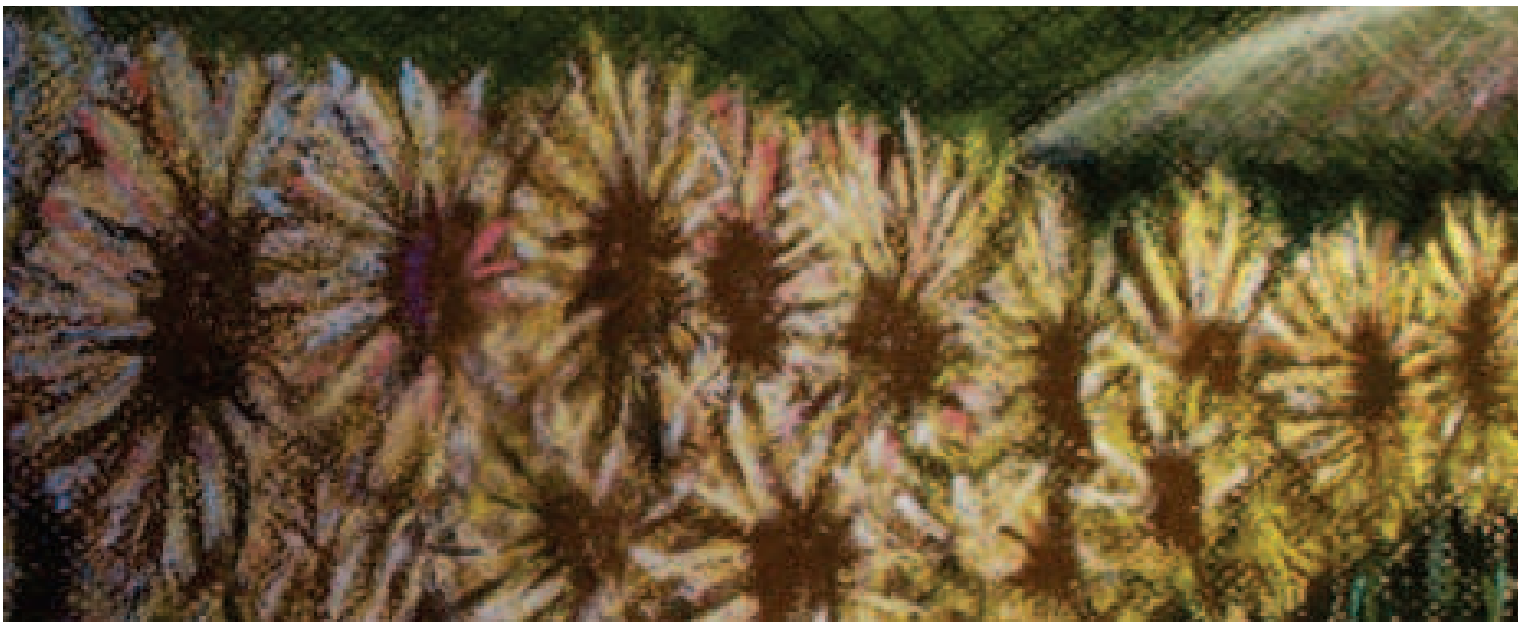




The Loren Eiseley Reader Teacher's Guide

A publication of the Loren Eiseley Society

www.eiseley.org



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Teacher's Guide

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The following educators and scholars contributed to this teacher’s guide:

Michael W. Antrim
Ray Boice
Dr. Tom Bragg
Dr. Bing Chen
James Cook
Deb Derrick
Steve Eggerly
Dr. George Englemann
Jeff Lacey

Cover art by Aaron Franco

Cover design by Jeff Lacey

This teacher’s guide was compiled by Jeff Lacey. A secondary English teacher, Jeff Lacey earned his M.Ed. at the University of Arizona, and his M.A. in English at the University of Nebraska-Lincoln. He is currently on the board of the Loren Eiseley Society as the Educational Outreach Coordinator.



*“ . . .as if we still might seek
a road unchosen yet, another dream.”*

Who is Loren Eiseley?

Loren Eiseley was a Nebraska naturalist and philosopher who grew up in the pre-Depression years of the 1920's in Lincoln, Nebraska. In his youth, he wandered through marshes and sewers, explored sunflower forests, filled fish tanks with muck and mire from a frozen pond to see what might emerge, and played dice in an abandoned house near his home. He became fascinated by the mammoth bones he saw on a visit to the state museum, and soon set up a museum of his own discoveries. As a university student, he hunted fossils in the rich bone beds of western Nebraska and eastern Wyoming. These experiences would inspire the essays and poems that he wrote about the mysteries of nature and humankind's relationship to the natural world.

A celebrated scholar and writer, Eiseley spent most of his professional career as a Benjamin Franklin Professor of History and Science at the University of Pennsylvania. The Bloomberg Review declared, "There can be no question that Loren Eiseley maintains a place of eminence among nature writers."

Why introduce the works of Loren Eiseley to secondary students?

Secondary students should be introduced to the works of Loren Eiseley because Eiseley is an important 20th century scientific and literary figure; his emphasis on understanding and connecting with the natural world of both the present and the past is of paramount importance today; his themes, especially his ruminations on time and man's place in natural and anthropological history, are universal; his prose is an excellent resource for understanding the elements and intricacies of nonfiction literature and good writing.



Where do his works fit in the curriculum?

Although Eiseley consistently thought of himself as an outcast (" . . . I repeat I am a fugitive," he writes in the essay "The Gold Wheel". "I was born one."), Eiseley's ideas and powerful prose are a perfect fit for students of science, literature, and history, both natural and anthropological. His writing provides profound insight into the workings of the natural world and man's relationship to that world, and his unique literary style is rich ground for students of literature.

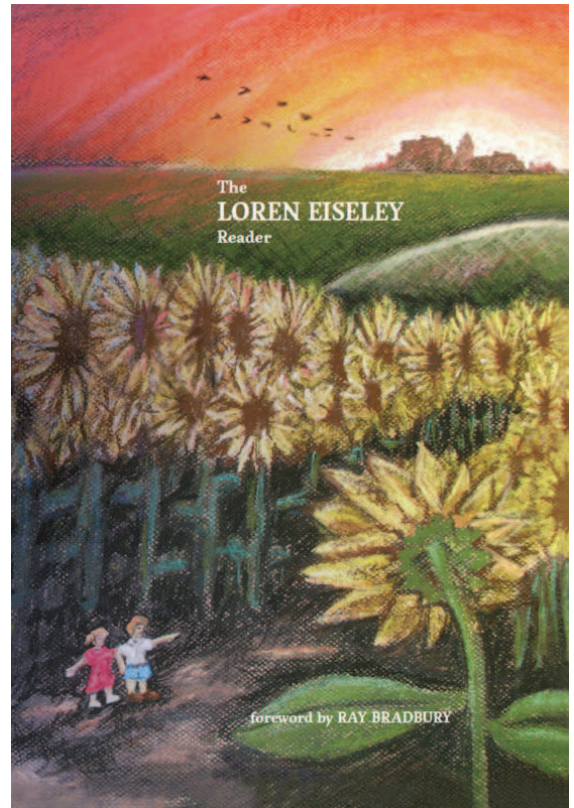
The lessons here are intended to be flexible. Every lesson description includes the state standards for Nebraska that the lesson could be aligned with.

About this guide

The lessons in this guide should be considered resources for any teacher interested in teaching the works of Loren Eiseley to elementary and secondary students, particularly in conjunction with the works found in *The Loren Eiseley Reader*.

The lessons included are intended to be flexible. They can be split into multiple pieces or changed or elaborated upon in order to satisfy the requirements and needs of the class and its curriculum.

The lessons were also designed to address a variety of teaching strategies, including varied writing assignments, quizzes, homework assignments, small group discussion, large group discussion, and research opportunities. Any related handouts or student materials can be found immediately after the lesson notes.



A Note On Style

Some of the assignments included in this teacher’s guide ask students to write “in the style of Loren Eiseley.” What does this mean? Here is a description of Eiseley’s style:

- Loren Eiseley’s work is known for its richness and the beauty of his language and metaphors;
- for his ability to portray the long, slow passage of time and the meaning of the past in the present;
- for his ability to describe well the relationships among all living things;
- for the way he articulates his concern about the future.

In this guide, there is an exercise that asks students to explore these principles of Eiseley’s style.

Lesson

Loren Eiseley Biography/Web Explore

Created by Jeff Lacey

SUBJECTS: ENGLISH/SCIENCE/SOCIAL STUDIES

PROJECT OVERVIEW:

This activity is intended to be an introduction to Loren Eiseley and his writings.

This activity asks students to practice research skills by exploring the website of the Loren Eiseley Society and the Website “The Man from the Sunflower Forest” for biographical and thematic information about Eiseley.

Finally, this activity is meant to provide material for a discussion about some of Eiseley’s themes and the historical context in which he worked.

SUGGESTED GRADE LEVELS: 7-12

POSSIBLE STANDARDS:

Nebraska-English

LA 8/12.4.1 Multiple Literacies: students will research, synthesize, evaluate and communicate information in a variety of media formats (textual, visual and digital).

Nebraska-Social Studies

8/12.1.13 By the end of 12th grade, students will develop skills for historical analysis.

INSTRUCTIONAL OBJECTIVES:

- 1.To introduce students to the works of the writer and scholar Loren Eiseley
- 2.To have students practice researching and evaluating information in a variety of media formats.



REQUIRED MATERIALS:

The required materials for this project are more intensive than most of the materials in this guide: this activity requires access to a computer and the internet, and the ability to navigate those resources successfully.

SUGGESTED PROJECT SEQUENCE:

This project is ideal for either small group or large group discussion.

Some terms may need to be discussed in advance if working with younger students. For example, the terms 'naturalist' and 'anthropologist' are used, and the word 'theme' is used.

Finally, here is a small pool of questions to possibly ask during discussion of the web explore:

- What questions do you have about Loren Eiseley? Is there anything you read that you didn't understand?
- What can you relate to in Eiseley's biography? What can't you relate to?
- Why did you choose the quote?
- What themes/big ideas does the quote suggest? What is Eiseley thinking about?
- Eiseley was a scientist. How are writing and science related?

Loren Eiseley
Introductory Web Explore

Directions: Go to www.eiseley.org and the website The Man From the Sunflower Forest to answer the following questions. The sections in bold can be found across the menu at the top of the main page.

Loren Eiseley Society Homepage

Homepage

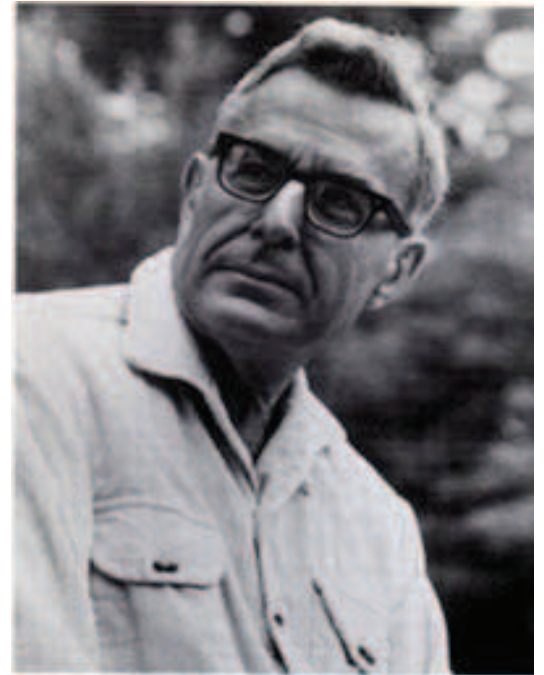
1. Write down the pullquote on the right hand side of the web page, and put the quote in your own words.

Biography

2. Describe in your own words the place where Eiseley grew up (paras 2 and 3). How do you think this effected his decision to become a naturalist and anthropologist?

3. In your own words, describe Eiseley's childhood.

4. FUN FACT: What was the maiden name of Eiseley's wife?



“I was fifty years old when
my youth ended . . .

“The Last Magician” p.188

5.What was the title of his first book, and what ‘ability’ was he celebrated for with its publication?

6.When did Loren Eiseley pass away?

Bibliography

Write down the names of at least 4 of Eiseley’s works.

Directions: Now, go to the website named The Man from the Sunflower Forest (you can find this under “Biography: Links” on the menu at the top of the page) and do the following activities:

Readings

Choose three of the sections under ‘Readings’, and below, write down a quote from each that you find interesting. Be prepared to share it with the class.

Quote #1)

Quote #2)

Quote #3)

Lesson

Understanding Eiseley's Style/"The Flow of the River"

Created by Jeff Lacey

SUBJECT: ENGLISH/LANGUAGE ARTS

PROJECT OVERVIEW:

The following activity asks students to read Eiseley's essay "The Flow of the River" and then to investigate his unique writing style.

SUGGESTED GRADE LEVELS: 9-12

POSSIBLE STANDARDS:

English-Nebraska

Reading 12.1.6c Analyze the function and critique the effects of the author's use of stylistic and literary devices (e.g. allusion, symbolism, irony, foreshadowing, flashback metaphor, personification, epiphany, oxymoron, dialect, tone, mood, transitional devices.)

INSTRUCTIONAL OBJECTIVES:

1. To understand what is meant by 'literary style.'
2. To be able to identify elements of literary style in a text.
3. To understand some of the traits that make Eiseley's writing unique.

"In the waste fields strung with
barbed wire where the thistles
grow over hidden mine fields
there exists a curious freedom."

"The Gold Wheel"

p. 59

MATERIALS REQUIRED:

A copy of the essay "The Flow of the River" from *The Loren Eiseley Reader* and the handout accompanying this lesson plan.

A SUGGESTED PROJECT SEQUENCE:

After reading the essay "The Flow of the River", reading the introduction to the handout "Style: The Flow of the River" is recommended to begin the lesson.

This activity can be done individually, in pairs, or in small groups, and would be a helpful way to begin a discussion about style. This activity (or a some version of it) should probably come before any activity that asks students to write "in the style of Eiseley."

Style: "The Flow of the River"

Introduction

One of the things Loren Eiseley was known for was his unique writing style. But what is writing style?

Style in writing is defined as, "the manner of expression of a particular writer, produced by choice of words, grammatical structures, use of literary devices, and all the possible uses of language."

Sounds complicated, but think about it this way: it's *how* you do something vs. *what* you do. In writing, it is as easy as the contrast between these two sentences:

"There was sand on everything." VS. "Flying sand as light as powder coated every exposed object like snow."

The subjects are the same, but how they are written about is very different. That is style.

Here is a brief list of the ways Eiseley's writing was considered unique:

- Loren Eiseley's work is known for its richness and the **beauty of his language and metaphors**;
- for his **ability to portray the long, slow passage of time** and the meaning of the past in the present;
- for his **portrayal of the relationships** among all living things;
- for the way he articulates his **concern about the future**.

DIRECTIONS: In the questions that follow, each of these points has been isolated, and an example of the point from Eiseley's writings has been placed in the box. You need to go back into the essay "The Flow of the River," find examples of each element of Eiseley's style, and write the example underneath the box. There are many examples of each element throughout.

1. "The beauty of his language and metaphors."

"Fire, as we have learned to our cost, has an insatiable hunger to be fed."

"The Last Neanderthal" p. 131

Write your example here:

2. “The ability to portray the long, slow passage of time.”

“Sometime, sitting there in the mountain sunshine above prairie dog town, I could imagine the attraction of that open world after the fern forest damp or the croaking gloom of carboniferous swamps. There by a tree root I could almost make him out, that shabby little Paleocene rat, eternal tramp and world wanderer, father of all mankind. He ruffled his coat in the sun and hopped forward for a seed. It was to be a long time before he would be seen on the grass again, but he was trying to make up his mind. For good or ill there was to be one more chance, but that chance was fifty million years away.”

“The Slit” p. 10

Write your example here:

3. “For his portrayal of the relationships between all living things.”

“The borders of our worlds had shifted. It was the fog that had done it. That crow, and I knew him well, never under normal circumstances flew low near men. He had been lost all right, but it was more than that. He had thought he was high up, and when he encountered me looming gigantically through the fog, he had perceived a ghastly and, to the crow mind, unnatural sight. He had seen a man walking on air, desecrating the very heart of the crow kingdom, a harbinger of the most profound evil a crow mind could conceive of—air-walking men. The encounter, he must have thought, had taken place a hundred feet above ground.”

“The Judgement of Birds” p. 45

Write your example here:

4. "For his ability to articulate his concern for the future."

"As an anthropologist I know that we exist in the morning twilight of humanity and pray that we may survive its noon. "

"Prologue from Invisible Pyramid" p. 1-2

Write your example here:

5. Find another example of any one of the above points and write it below.

Lesson

Evolution of Angiosperms/"How Flowers Changed the World"

Created by Michael W. Antrim

SUBJECT: SCIENCE/BIOLOGY

PROJECT OVERVIEW:

The following six page study guide presents questions relating to the Eiseley essay, "How Flowers Changed the World" (from *The Immense Journey*, published in 1957). The goal of this study guide is to help the student develop a better understanding and appreciation for the significance of the evolution of the angiosperms. Most biology textbooks will cover this material, but by taking advantage of the lively account of this subject matter by Eiseley, students may find it more intriguing and significant.

SUGGESTED GRADE LEVELS: 9-12

INSTRUCTIONAL OBJECTIVES:

1. Describe the reproductive advances of gymnosperms in comparison to mosses and ferns.
2. Describe the reproductive advances of angiosperms in comparison to gymnosperms.
3. Place the following in the correct evolutionary sequence, from oldest to most recent: gymnosperms, ferns, algae, angiosperms.
4. Describe the adaptations of the following plant parts: pollen, seeds, fruits.
5. Explain the impact of the flowering plants on the animal kingdom.

"The truth is, however, that there is nothing very 'normal' about nature. Once upon a time, there were no flowers at all."

"How Flowers Changed the World"

p. 28

POSSIBLE STANDARDS:

Science-Nebraska

8.5.2 By the end of eighth grade, students will develop an understanding of the earth's history.

8.4.5 By the end of eighth grade, students will develop an understanding of diversity and adaptation of organisms.

12.4.3 By the end of twelfth grade, students will develop an understanding of the theory of evolution.

12.4.4 By the end of twelfth grade, students will develop an understanding of the interdependence of organisms.

12.5.3 By the end of twelfth grade, students will develop a scientific understanding of the origin of the earth system.

MATERIALS REQUIRED:

The essay “How Flowers Changed the World” from *The Loren Eiseley Reader*, and the accompanying study guide. Other references, including a biology text and a geologic time line, may be necessary for this lesson.

PROJECT SEQUENCE:

This study guide may be used by the teacher as he/she leads a class discussion, or it may be used directly by students working individually or in groups.

NOTES FOR THE TEACHER:

It is interesting to note that plant fossils found in Nebraska figure prominently in the origin of the flowering plants. An outstanding reference to these fossils can be found in the August 1994 issue of *Museum Notes* (published by the University of Nebraska State Museum). This issue is titled, “The Abominable Mystery of The First Flowers: Clues from Nebraska and Kansas,” and is written by M.R. Bolick and R.K. Pabian. The Nebraska State Museum indeed features Nebraska fossils that represent perhaps the earliest angiosperms.

“How Flowers Changed the World”: A Study Guide

Background: “How Flowers Changed the World” is an essay from Loren Eiseley’s most popular book, *The Immense Journey*.

Directions: After reading this essay, answer the following questions. You will also need to have access to a biology textbook and a geologic time line.

Introduction

1. Eiseley states that observers from the far side of our solar system could have perceived only one change in the whole history of the planet Earth. Describe this change and explain what would have been responsible for it.
2. What is Eiseley referring to when he notes the wandering fingers of green?
3. What was the soundless, violent explosion that Eiseley refers to?
4. Why could this be referred to as an explosion?

“The truth is, however, that there is nothing very ‘normal’ about nature. Once upon a time, there were no flowers at all.”

“How Flowers Changed the World”

p. 28

First Land Plants

1. What type of plants were the first to appear on land?
2. Eiseley notes that these plants clung of necessity to swamps and watercourses and did not move to drier areas. Why were these plants not successful on drier land?
3. In these earlier land plants, how were sperm transferred from one plant to another?
4. Name the geologic era and period when the first land plants emerged? How many millions of years ago was this? What were the dominant land animals during this geologic time?

Animal Life

1. Eiseley describes the animal life in the Age of Reptiles (Mesozoic) using the following terms and phrases: “...*a sleepier world...Tyrannosaurus...would stalk mindlessly... ..grave sleepwalking intentness....a world in slow motion...*”

According to Eiseley, what type of metabolism did these animals have that justified these descriptions? (note: today, dinosaur metabolism is a hotly debated issue; consider researching this issue further!)

2. Give a more thorough discussion of this type of metabolism. (use other resource material)

3. A high metabolic rate and the maintenance of a constant body temperature are characteristics of _____. Biologists use the term *homeothermic* to describe this type of metabolism. Why is this a more appropriate term?
4. What two groups (classes) of vertebrates have this type of metabolism?
5. According to Eiseley, what are some of the advantages of this type of metabolism.
6. Eiseley describes two demands for this type of metabolism. What are they?
7. Eiseley notes that the appearance of the flowering plants parallels the rise of birds and mammals. How did the rise of flowering plants affect the success of birds and mammals?

The Gymnosperms

1. What are some present-day examples of gymnosperms?
2. Name the geologic era and period when the first gymnosperms emerged? How many millions of years ago was this? Name some animals that lived during this time.

3. The sperm of these plants are contained in pollen grains. Eiseley notes that, because of this adaptation, the march over drier regions could be extended. Why did pollen allow these plants to be more successful than the earliest land plants?

4. Gymnosperms also were among the first group of plants to have seeds. A seed contains a young plant (embryo) and some nourishment (food source) for the young plant (see diagram of seed). What advantages does the seed give to the survival of the offspring.

5. Describe and sketch the life cycle of a gymnosperm. Include in your description the following: male cone, female cone, pollen, sperm, egg, seed. (use other resource material).

Angiosperms--the flowering plants

1. According to the geologic time line, when did the flowering plants first arise?

2. What animals were dominate during this period, when the flowering plants arose? Were mammals and birds very successful at this time?

3. Describe the dominate plant life on earth when the flowering plants first arose. (What is Eiseley referring to when he states that all is “stiff, formal, upright and green, monotonously green”?)

4. What was the source of the explosion that occurred in the Eiseley living room?

5. In addition to flowers, angiosperms have fruits. A fruit is a structure that covers the seed. The word angiosperm actually means _____ seed . What does the term gymnosperm mean? (use alternate resource)

6. The fruit is an important adaptation because it helps disperse (transport) the seed. Why is this an important adaptation to a plant species? (note the Eiseley statement, A plant, a fixed, rooted thing, immobilized in a single spot, had devised a way of propelling its offspring across open space.)

7. Were the wistaria pods in the Eiseley living room fruits? Why?

8. List several other fruits and means of seed dispersal that Eiseley thought of after discovering the exploded wistaria pod. (note: all all fruits edible?)

9. Using a biology textbook, sketch a diagram of a typical flower and label the following: anthers, pistil, ovary, petals, sepals. Under the diagram, state the function of the anthers, pistil, and ovary. Answer the following: (a) where do the seed form? (b) where does the fruit form? (c) what is the difference between pollination and fertilization?

10. Where the first flowering plants probably pollinated by wind or insects?

11. What is the advantage of insect pollination over wind pollination?

12. Eiseley states that the older (non-flowering) plants began to fade away under this unequal contest. Why did he refer to this as an unequal contest?

13. What are the three sources of food that come from flowering plants. How did these affect the success of warm-blooded animals that have high metabolism?

14. The term coevolution refers to the joint change of two interacting species. How does this apply to insects and flowering plants? (Include one example from the essay)

15. Grasses are flowering plants. Do grass flowers have large, colorful petals? How are grass flowers pollinated? Using examples from the essay, explain how the advent of grasses affected animal life on earth.

16. In the last paragraph of the essay, Eiseley states that, "The weight of a petal has changed the face of the world and made it ours." In your own words, write one paragraph summary of how flowers have indeed changed the world.

Lesson
**Seed Dispersal and Seed Germination/
What Can You Germinate?**

(This lesson can be used as an extension of Evolution of Angiosperms/"How Flowers Changed the World")

SUBJECT: SCIENCE-botany

PROJECT OVERVIEW:

This project is a lab investigation about the diversity of seeds in the soil. This lesson is meant to develop an understanding of biodiversity, have students design and conduct a scientific investigation, and apply species classification/identification skills.

SUGGESTED GRADE LEVELS: 6-8. This lesson could also be used in 4-5, depending on the level of sophistication.

POSSIBLE STANDARDS:

Science-Nebraska

"Science as Inquiry" Standard (Nebr Dept of Ed, 8.2), as well as other specific standards:

4.2.1 students will use models to understand concepts.

6.3.2 students will know that plants and animals have unique structures that provide for their needs and enable them to live in different environments.

12.4.4 students will investigate the structural, functional and behavioral adaptations of living organisms to the environment in which they live, including how food/energy is obtained, and unique survival mechanisms.

Connection to Eiseley:

This activity relates to the "soundless explosion" (Reader, pg 28) and also where Eiseley talks about the dispersal of the seeds, stating, "They were travelers" (Reader, pgs 32, 34).

INSTRUCTIONAL OBJECTIVES:

1. Investigate the number of seeds in the soil.
2. Investigate the number of viable seeds in a seedbank.

MATERIALS REQUIRED:

- shoes/boots with ruts in soles
- old newspapers or paper towels
- small containers, e.g., plastic margarine tubs, etc. (1 container per student)
- water
- potting soil and plant pots (1 pot per student)
- plant identification guide

SUGGESTED RESOURCES:

Web-based:

- <http://plants.usda.gov/>
- <http://arboretum.unl.edu/florasearch/>
- <http://www.iowalivingroadway.com/NativePlants.asp>
- <http://www.missouriplants.com/http://teachplants.okstate.edu/>
- <http://www.seedimages.com/seed-identification/seed-identification.html>
- <http://www.oardc.ohio-state.edu/seedid/>

Books

The Loren Eiseley Society. *The Loren Eiseley Reader*. Lincoln: Infusionmedia Publishing Inc., 2009. <http://www.eiseley.org>

Stubbendieck, James L., Mitchell J. Coffin, and Lori M. Landholt. *Weeds of the Great Plains*. Lincoln: Nebraska Department of Agriculture, 2003.

Kaul, Robert B., David M. Sutherland, and Steven B. Rolfsmeier. *The Flora of Nebraska*. Lincoln: UNL School of Natural Resources, 2006 <http://nebraskamaps.unl.edu>

Runkel, Sylvan T., and Dean M. Roosa. *Wildflowers of the Tallgrass Prairie: the upper midwest*. Ames: Iowa State University Press, 1989.

Martin, Alexander C. and William D. Barkley. *Seed Identification Manual*. Blackburn Press, 2000.

Local field guides

PROPOSED PROJECT SEQUENCE:

Have students wear shoes or boots with corrugations or cleats in their soles take them for a walk in an area with moist soil.

1. Have students wear shoes or boots with ruts in their soles. Take the students for a walk in an area with moist soil.
2. Return from your walk. Have the students remove the caked-on soil from their shoes/boots. Placing newspapers or paper towels under the shoes will reduce the mess.

Have the students separate their soil samples into two piles. One pile to be used in #3-#6 below. The other pile to be used with #7-#8 below.

3. Students place their soil samples in individual small containers, e.g., margarine tubs or other plastic containers. Moisten the sample with a small amount of water. Let the moistened (muddy) mixture sit overnight.

4. Add the soil mixture to some potting soil and place in a plant pot. Make sure each student clearly identifies his/her pot.

5. Observe what grows in the pots over the next few weeks. Have students mark on a calendar the dates of germination.

6. Have students identify the plants or classify them by appearance and compare germination rates.

COMPARISON

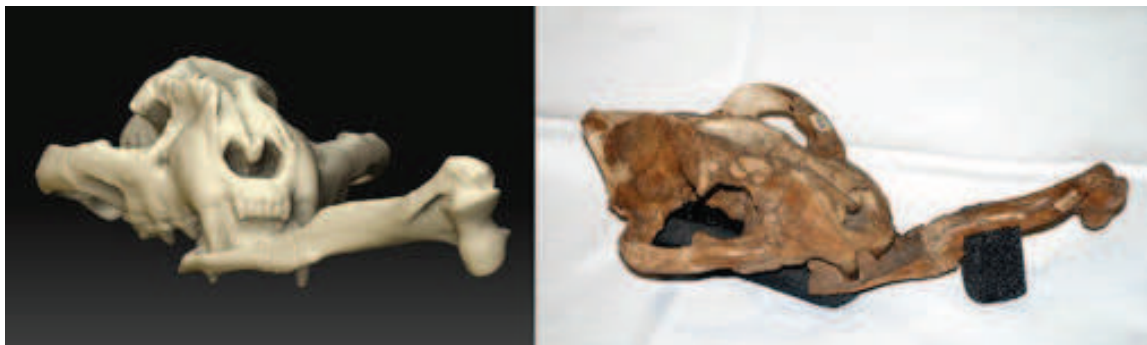
7. As a comparison with germination, have the students take their second soil sample and leave it out to dry. After drying, have students break up the dry soil and remove any seeds they find. They may need a magnifier or dissecting microscope to assist in finding very small seeds.

8. Can they identify the seeds? Compare any identified seeds to the identification of the plants that germinated.

Lesson

Creative Writing Activity/ "THE INNOCENT ASSASSINS"

Created by Michael W. Antrim



SUBJECT: ENGLISH-CREATIVE WRITING PROJECT

PROJECT OVERVIEW:

Although Loren Eiseley is best known for his prose, he also wrote several volumes of poetry. Perhaps his best-known [poem](#) is "[The Innocent Assassins](#)", found in a book by the same name. The poem relates to an experience of Eiseley when he was part of the Nebraska State Museum bone hunting team on a dig in the Wildcat Ridge area near Bayard, Nebraska in 1932.

The famous fossil discovered by Eiseley and others on this dig, is of the skull of a sabertooth cat, whose fang is locked in the leg of another sabertooth. It is all that remains of a 25 million year old cat fight! Today, the fossil can be seen at the Nebraska State Museum, and a postcard of the fossil is sold at the museum. The postcard is from a photograph from "The Cellars of Time" by *NEBRASKAland Magazine*.

The resources that follow this description can be used for any of the accompanying creative writing exercises after carefully reading the poem "The Innocent Assassins".

SUGGESTED GRADE LEVELS: 7-12

POSSIBLE STANDARDS:

Nebraska-English

12.2.1. Students will apply the writing process to plan, draft, revise, edit, and publish writing using correct spelling, grammar, punctuation, and other standard conventions appropriate for grade level.

12.2.2 Writing Genres: students will write or a variety of purposes and audiences in multiple genres.

INSTRUCTIONAL OBJECTIVES:

- 1.To introduce students to the works of the writer and scholar Loren Eiseley
- 2.To have students creatively exploring some of the themes Loren Eiseley worked with.

MATERIALS REQUIRED:

A copy of the poem “The Innocent Assassins” from *The Loren Eiseley Reader* and this lesson plan.

Other materials depend on the selected activity. Possibly, the accompanying handout can be used during idea generation.

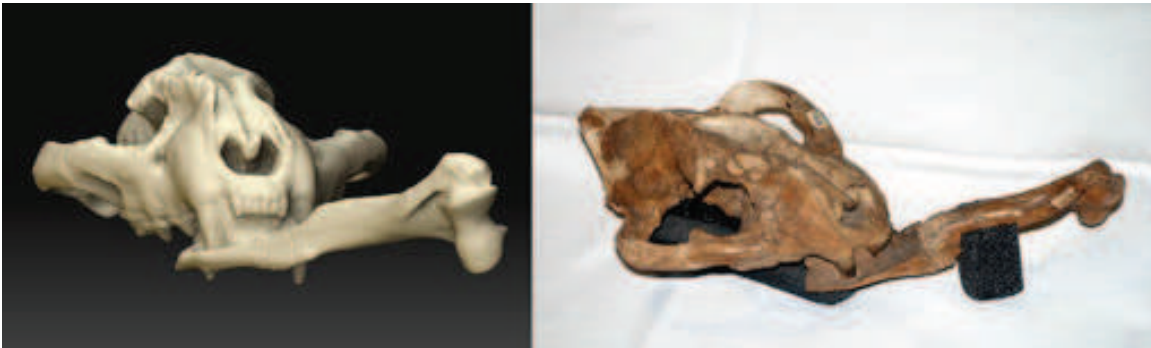
SUGGESTED PROJECT SEQUENCE:

After carefully reading the poem “The Innocent Assassins”, the class can undertake any of these activities:

- Show students the postcard of the famous sabertooth cat fossil (with fangs embedded in the leg of another sabertooth). Have the students produce a creative narrative in which, in an Eiseley style, they describe the scene and tell a story of this 25 million year old catfight.
- Bring in interesting fossils, or show pictures of fossils (especially skulls) and have students write their own poems or stories about the animal.
- Art project: Have students draw the scene of the 25 million year old catfight. And Describe in 50-75 words the decisions they made when creating the work.

There are also online visual resources at the Loren Eiseley Society website www.loreneiseley.org. Click on ‘curriculum.’

THE LOREN EISELEY READER
TEACHER'S GUIDE



On the left, a digital model of the actual sabretooth skull and bone Eiseley found; on the right, the actual skull. Notice how the teeth are sunk deep into the bone.



<http://www.nps.gov/hafo/naturescience/sabertooth-cat.htm>



"The Innocent Assassins" as depicted in an original 2007 oil painting by artist Jan Vriessen (recommended by Dr. Kirk Johnson, Denver Museum of Nature & Science). Concept for oil painting, posters and postcards by: Ray Boice of the Fossil Freeway (member LES, Gering, Nebraska).

Freewrite

The Loren Eiseley Reader Teacher's Guide
"Innocent Assassins" (Annotated)

Annotated by Steve Eggerling

The Innocent Assassins

Once in the sun-fierce badlands of the west in that strange country of volcanic ash and cones¹, runneled² by rains, cut into purgatorial³ shapes, where nothing grows, no seeds spring, no beast moves, we found a sabertooth⁴, most ancient cat, far down in all those cellars⁵ of dead time. What was it made the mystery there? We dug until the full length of the striking saber showed beautiful as Toledo steel⁶, the fine serrations⁷ still present along the blade, a masterpiece of murderous art conceived by those same forces that heaved mountains up from the flat bottoms of Cretaceous⁸ seas.

Attentive in a little silent group we squatted there. This was no ordinary death, though forty million years lay between us and that most gaping snarl. Deep-driven to the root a fractured scapula⁹

- 1 **cones:** Anything shaped like a cone: sawdust piled up in a great cone; the cone of a volcano, an ice cream cone, a solid having a circular base and sides that slope evenly to a point.
- 2 **runneled:** A small channel, a small stream of water.
- 3 **purgatorial:** Removing or purging sin; expiatory; purgatorial rites . Serving to purify of sin; expiatory.
- 4 **sabertooth:** Any of several extinct members of the cat family felidae from the Oligocene to Pleistocene epochs, having greatly elongated, saberlike upper canine teeth. Short legs; dog-like feet.
- 5 **cellars:** An underground room or story.
- 6 **Toledo steel:** Toledo, Spain is known for making swords and sabers that are especially hard and of superior quality.
- 7 **serrations:** A series or set of teeth or notches.
- 8 **Cretaceous:** From 140 million to 65 million years ago, characterized by the greatest development and subsequent extinction of dinosaurs and the advent of flowering plants and modern insects.
- 9 **scapula:** Either of two flat, triangular bones, each forming the back part of a shoulder in humans; shoulder blade.

hung on the mighty saber undetached¹⁰; two beasts had died in mortal¹¹ combat, for the bone had never been released; there was no chance this cat had ever used its fangs¹² again or eaten—died there, in short, though others of its kind grew larger, larger, suddenly were gone while the great darkness went about its task, mountains thrust up, mountains worn down, till this lost battle was exposed to eyes the stalking sabertooths had never seen.

Pure nature had devised such weapons, struck deep in the night, endured immortally¹³ death, ambush, terror, by these, her innocents whose lives revolved on this, whose brains were formed only to strike and strike, beget¹⁴ their kind, and go to strike again.

There were the great teeth snarling in the clay, the bony crests that had once held the muscles for this deed,

perfect as yesterday.

I looked a little while, admiring how

that marvelous weapon had been so designed

in unknown darkness, where the genes¹⁵ create

as if they planned it so.

I wondered why

10 **undetached:** Not attached; separated.

11 **mortal:** Deadly or implacable; relentless: causing or liable to cause death; fatal.

12 **fangs:** One of long, sharp, hollow or grooved teeth of a venomous snake by which poison is injected. A tooth resembling a sabertooth.

13 **immortally:** Not mortal; not liable or subject to death; undying.

14 **beget:** To cause; produce as an effect: to cause to exist or occur; produce.

15 **genes:** The basic physical unit of heredity; a linear sequence of nucleotides along a segment of DNA that provides the coded instructions for synthesis of RNA, which, when translated into protein leads to the expression of hereditary character. A male given name, form of EUGENE. a portion of a DNA molecule that serves as the basic unit of heredity. genes control the characteristics that an offspring will have by transmitting information in the sequence of nucleotides on short sections of DNA.

such perfect fury had been swept away, while man,
wide-roaming dark assassin¹⁶ of his kind,
had sprung up in the wake
of such perfected instruments as these.
They lived long eras¹⁷ out, while we
in all this newborn world of our own violence show
uncertainties¹⁸, and hopes unfostered¹⁹ when
the cat's sheer leap wrenched with his killing skill
his very self from life.

On these lost hills that mark the rise of brain,
I weep perversely²⁰ for the beauty gone.
I weep for man who knows this antique²¹ trace
but is not guiltless,
is not born with fangs,
has doubts,
suppresses them as though he knew
nature had other thoughts, inchoate²², dim²³,
but that the grandeur of great cats attracted him-
envy, perhaps, by a weak creature²⁴ forced to borrow

16 **assassin**: A murderer.

17 **eras**: A period of time marked by distinctive character, events, etc.: a major division of geologic time composed of a number of periods.

18 **uncertainties**: Not for sure, not sure to happen.

19 **unfostered**: Not to bring up, raise or rear, not to care for.

20 **perversely**: Willfully determined or disposed to go opposite to what is expected or desired; contrary. Persistent or obstinate in what is wrong. Turned away from or rejecting what is right, good, or proper; wicked or corrupt. Contumacious, disobedient. Stubborn, headstrong. evil, bad, sinful.

21 **antique**: Of or belonging to the past; not modern. Any work of art, piece of furniture, decorative object, or the like, created or produced in a former period, or according to U.S. customs laws, 100 years before date of purchase.

22 **inchoate**: Not yet completed or fully developed; rudimentary. Just begin; incipient. Not organized; lacking order.

23 **dim**: Lacking in brightness: a dim room. Emitting only a small amount of light; lacking keenness or vigor.

24 **creature**: An animal, the creatures of the woods and fields; an animate being.

tools from the earth, growing, in them, most cunning²⁵
upon an outworn²⁶ path.

I see us still upon that hilltop, gathered like ancient²⁷ men
who, weaponless, detach
from an old weathered skull a blade whose form reshaped in flint²⁸
could lift death up from earth's inanimate²⁹ core
and hurl it at the heart. Whatever else would bring
cold scientists to murmur³⁰ over what they saw?
We are all atavists³¹ and yet sometimes we seem
wrapped in wild innocence like sabertooths, as if we still might seek
a road unchosen³² yet, another dream.

The Innocent Assassins by Loren Eiseley
published by Charles Scribner's Sons, New York, 1973.

NEBRASKA STATE HISTORICAL SOCIETY April 1997

25 **cunning**: Sly, crafty, deceiving.

26 **outworn**: Out of date, outmoded, or obsolete: worn-out, as clothes.

27 **ancient**: Dating from a remote period; of great age: a very old or aged person, esp. if venerable or patriarchal.

28 **flint**: A hard stone, a form of silica resembling chalcedony but more opaque, less pure, and less lustrous. A chunk of this used as a primitive tool or as the core from which such a tool was struck. A small piece of metal, usually an iron alloy, used to produce a spark to ignite the fuel in a cigarette lighter.

29 **inanimate**: Not animate; lifeless.

30 **murmur**: A low, continuous sound, as of a brook, the wind, or trees, or of low, indistinct voices. To speak in a low tone or indistinctly.

31 **atavists**: The reappearance in an individual of characteristics of some remote ancestor that have been absent in intervening generations. Reversion to an earlier type; throwback.

32 **unchosen**: Not chosen. Not picked.

The Loren Eiseley Reader Teacher's Guide
"Innocent Assassins" (Annotated)

Annotated by Steve Eggerling

The Innocent Assassins (Preface)

As is readily observable, these are the poems of a bone hunter and a naturalist, or at least those themes are predominant in the book. Some have called me Gothic in my tastes. Others have chosen to regard me as a Platonist, a mystic, a concealed Christian, a midnight optimist. Like most poets I am probably all these things by turns, or such speculations are read into me by those who are pursuing some night path of their own.

As the spokesman in the poem, "Deep in the Grotto," I merely answer that I have been many things. One observation I may perhaps be permitted, Robert Louis Stevenson once remarked that some landscapes cry out for a story. W. H. Hudson found it so of the South American pampas. Though he immigrated in his young manhood to London, his best work continued to revolve about South American themes, Charles Dickens, though he achieved wealth and comfort, was haunted by "the cold, wet, shelterless streets of London." Thoreau never escaped the canopy of the great eastern forest.

I, by contrast, was born on the Great Plains and was drawn almost mesmerically³³ into its rougher margins, the Wild Cat Hills and the Badlands, where bone hunting was a way of life. Few outside the profession of paleontology³⁴ realize that the eroded areas called "Mauvaisaises Terres"³⁵ on the maps of the old voyageurs³⁶ contain the finest Tertiary³⁷ fossil beds to be found anywhere in the world. Most of our knowledge of the successive

33 **mesmerically**: Compelling; fascinating.

34 **paleontology**: The science of the forms of life existing in former geologic periods, as represented by their fossils.

35 "**Mauvaisaises Terres**": The "Bad Land" in French. This ground has many deep canyons and bluffs so it is bad to travel over.

36 **voyageurs**: A person who is an expert woodsman, boatman, and guide in remote regions, esp. one employed by fur companies to transport supplies to and from their distant stations.

37 **Tertiary**: Noting or pertaining to the period forming the earlier part of the Cenozoic era, occurring from 65 million to 2 million years ago. Characterized by the development and proliferation of mammals.

American faunas³⁸ is derived from excavations³⁹ in those sterile⁴⁰, sun-washed regions. As a young man engaged in such work, my mind was imprinted⁴¹ by the visible evidence of time and change of enormous⁴² magnitude⁴³. To me time was never a textbook abstraction⁴⁴. Its remnants lay openly about me in arroyos⁴⁵, in the teetering⁴⁶, eroded pinnacles⁴⁷ of Toadstool Park, or farther north in the dinosaur⁴⁸ beds of Wyoming. Finally, through some strange mental osmosis⁴⁹ these extinct, fragmented⁵⁰ creatures merged with and became part of my own identity.

Certainly in body and mind we have been many things, but the story is not fantasy. It lies written in exposed rock and strewn across old tablelands. To me, who, through the vicissitudes of youth, was drawn early into that haunted country, it was impossible not to leave a personal record beyond what was shipped and, for all I know, may still be lying in its stone matrix in museum basements. I was one of the bone hunters, but I was also

38 **faunas**: The animals of a given region or period considered as a whole. A treatise on the animals of a given region or period.

39 **excavations**: To make a hole, to dig out of a earth.

40 **sterile**: Free from living germs or microorganisms; aseptic: incapable of producing offspring; not reproducing. offspring. Barren; not producing vegetation: noting a plant in which reproductive structures fail to develop.

41 **imprinted**: A mark made by pressure; a mark or figure impressed or printed on something. Any impression or impressed effect.

42 **enormous**: Greatly exceeding the common size, extent, etc.; huge; immense: outrageous or atrocious.

43 **magnitude**: Size; extent; dimensions: greatness of size or amount. Moral greatness.

44 **abstraction**: An impractical idea; something visionary and unrealistic. Absent-mindedness; inattention.

45 **arroyos**: A small steep-sided watercourse or or gulch with a nearly flat floor; usually dry except after heavy rains.

46 **teetering**: To move unsteadily. To ride a seesaw; teeter totter. A seesaw; motion; wobble.

47 **pinnacles**: A lofty peak. Any pointed, towering part or formation, as of rock.

48 **dinosaur**: Any chiefly terrestrial, herbivorous or carnivorous reptile of the extinct orders saurischia and ornithischia, from the Mesozoic era, certain species of which are the largest known land animals.

49 **osmosis**: The diffusion of fluids through membranes or porous partitions.

50 **fragmented**: A broken part, off or detached.

something else, a fugitive assuming the animal masks of many ages. How this occurred I am not sufficiently articulate to explain. Perhaps I came closest to doing so in my previous book, *Notes of an Alchemist*, when I said:

The wind has stolen my coat away,
my thoughts are becoming animals.
In this suddenly absurd landscape I find myself
laughing, laughing.

An alienated creature does not laugh, but a midnight optimist, even a fugitive, might; nor does a complete melancholic say, “the earth pleases me.” This, too, is part of the record.

LOREN EISELEY

Credits:

***The Innocent Assassins* by Loren Eiseley**

published by Charles Scribner’s Sons, New York, 1973
republished by NEBRASKA STATE HISTORICAL SOCIETY April 1997

Preface by Loren Eiseley

pp. 11-12 from *The Innocent Assassins*

Definitions and footnotes courtesy of:

- Ray and Ann Boice
- Penny Businga (ESU 13)
- Dictionary.com

Lesson

Object Meditation Essay/ "The Gold Wheel"

Created by Jeff Lacey

SUBJECTS: ENGLISH/SCIENCE/SOCIAL STUDIES

PROJECT OVERVIEW:

This lesson is essentially a writing prompt that asks students to take an object and explore its origins and/or its connection to the writer. It can be used in conjunction with Eiseley's poem "The Innocent Assassins" or any of his essays in which he explores and imagines the natural and/or anthropological history of an artifact, fossil or otherwise.

Suggestion for reading: description of the gold wheel in "The Gold Wheel".

SUGGESTED GRADE LEVELS: 9-12

POSSIBLE STANDARDS:

Science-Nebraska

12.4.4 By the end of twelfth grade, students will develop an understanding of the interdependence of organisms.

English—Nebraska

12.2.1. Students will apply the writing process to plan, draft, revise, edit, and publish writing using correct spelling, grammar, punctuation, and other standard conventions appropriate for grade level.

12.2.2 Writing Genres: students will write or a variety of purposes and audiences in multiple genres.

Social Studies-Nebraska

12.2.11 By the end of 12th grade, students will demonstrate historical research and geographical skills.

12.1.13 By the end of 12th grade, students will develop skills for historical analysis.

INSTRUCTIONAL OBJECTIVES:

1. To have students synthesize concepts and make connections between themselves and the world

*Once in the sun-fierce badlands of the west
in that strange country of volcanic ash and cones,
runneled by rains, cut into purgatorial shapes,
where nothing grows, no seeds spring, no beast moves,
we found a sabretooth, most ancient cat,
far down in all those cellars of dead time.
What was it made the mystery there?*

*from "The Innocent Assassins"
p. 53*

around them.

2. To have students to write in a variety of genres.
3. To have students practice precise word choice.

MATERIALS REQUIRED: an appropriate object, teacher-defined and student selected; *The Loren Eiseley Reader*; the accompanying handout.

A POSSIBLE PROJECT SEQUENCE:

After a brief informal introduction to the project, the class could read one of the previously recommended selections from *The Loren Eiseley Reader*. Afterwards, the students read the assignment sheet accompanying this lesson, followed whole class idea-generation activities. For example, the instructor could choose an object that the class could then explore according to the suggestions on the handout.

What was it made the mystery there?
Object Meditation Essay Assignment

Directions: Choose an object (natural or otherwise) and articulate both its individual history and its relationship to you.

This essay may require research on your part, although it doesn't have to.

Directions: First, choose an artifact. It could be an object with personal significance to you or your family, a natural object that you've found (including fossils, interesting rocks), or even something provided by your teacher.

“One frosty night in early fall I turned up a gold wheel. It was not gold really, but I pretended it was.”

“The Gold Wheel” p. 63

Then, give a thorough description of the object.

After that, consider writing about these things:

- What is your relationship to the artifact? What personal experiences does it remind you of?
- Where did the artifact come from originally?
- Consider the age of the artifact, and write about what it has 'lived' through. What kinds of things has it potentially seen?
- Where might the object end up in ten years? In fifty? In a century?
- What lessons have you learned from the object?

Format

Your essay should be _____ pages long.

Your essay should be _____.

Your essay is due on _____.

Lesson

An Introduction to Loren Eiseley-The Author's Perspective

SUBJECTS: ENGLISH/SCIENCE/SOCIAL STUDIES

PROJECT OVERVIEW:

These lessons are meant to serve as introductions to the life and writings of Loren Eiseley through Internet and video resources.



SUGGESTED GRADE LEVEL: 12th. Could also be used with a Grade 11 Honors or AP course.

POSSIBLE STANDARDS:

COMPREHENSION: Students will extract and construct meaning using prior knowledge, applying text information, and monitoring comprehension while reading grade-level text.

LA 12.1.6.a Evaluate the meaning, reliability, and validity of the text considering author's purpose perspective, and information from additional sources.

LA 12.1.6.g Analyze, evaluate, and make inferences based on the characteristics of narrative and informational genres and provide evidence from the text to support understanding.

LA 12.1.6.h Critique the effects of historical, cultural, political, and biographical influences in a variety of genres.

LA 12.1.6.o Respond to text verbally, in writing, or artistically.

WRITING: Students will apply the writing process to plan, draft, revise, edit and publish writing using correct spelling, grammar, punctuation, and other standard conventions appropriate for grade level.

MULTIPLE LITERACIES: Students will research, synthesize, evaluate and communicate information in a variety of media and formats (textual, visual, and digital).

LA 12.4.1.a Select and use multiple resources to answer questions and defend conclusions using valid information (e.g., print, subscription databases, web resources).

INSTRUCTIONAL OBJECTIVES:

1) Students will learn about the life and work of Nebraska-born literary naturalist Loren Eiseley.

2) Students will respond to multimedia presentations through class discussions and through writing.

3) Students will gain knowledge of historical events relating to places in Nebraska about which Loren Eiseley wrote.

4) Students will gain an understanding of the cultural and social influences on Eiseley's writing.

MATERIALS REQUIRED:

- *The Loren Eiseley Reader* – Published by The Loren Eiseley Society, 2009. Classroom copies available for loan from the Loren Eiseley Society (contact Dr. Bing Chen through the Loren Eiseley Society's website, www.eiseley.org) or from your ESU. Teacher's copy available at no cost.
- "Reflections of a Bonehunter" – 1994 NETV documentary on Eiseley's life and writing. A 60-minute DVD is available for loan from the Loren Eiseley Society. A shorter 24-minute version of the DVD can be viewed and downloaded from the LES web site (www.eiseley.org). [Note: the 24-minute version is currently on the "members only" portion of the web site; it will be made public by spring 2010.]
- Loren Eiseley Biography, <http://www.eiseley.org/biography.php>
- Loren Eiseley Wikipedia site, http://en.wikipedia.org/wiki/Loren_Eiseley
- Computers with Internet capabilities
- DVD player
- Flip chart and easel or white board
- Timeline template: can be downloaded free from <http://www.office.microsoft.com/en-us/templates/TC010162661033.aspx>

SUGGESTED ADDITIONAL RESOURCES:

Books

Fox at the Wood's Edge by Gale Christianson (optional teacher resource book for biographical information on Eiseley)

Internet sites

Bonehunter transcript from NETV:

http://www.netnebraska.org/extras/nextexit/ghosts/bone_03.html

Loren Eiseley's reflections on the Depression (from "Reflections of a Bonehunter" DVD):

<http://www.netnebraska.org/extras/nebraskastories>

YouTube videos

Next Exit – Bone Hunter (length: 3:46 minutes). Edited excerpt from the 1994 NETV production of "Reflections of a Bonehunter."

Other sites:

Heritage Room of Nebraska Authors – Has Eiseley artifacts, photos and other memorabilia. At the Bennett Martin Public Library, 136 South 14th Street, Lincoln. Phone: (402) 441-8516. Open Tuesdays-Fridays, 12-3 and Sundays 2-5.

PROJECT SEQUENCE:

1. Have students watch the 24- or 60-minute NETV production of "Reflections of a Bonehunter" and take notes on the events, people and places that influenced Eiseley's life and writing.
2. Distribute copies of Eiseley's biography from *The Loren Eiseley Reader* (pp. xv-xvii) to each student. Have them use these pages, along with their notes from the film, in the subsequent small group activity.
3. Get the students together in small groups to discuss the following:
 - What life events influenced Eiseley's personal development in his childhood years? How do you think these events may have influenced his development as a writer?
 - According to the film and biographical material found in *The Loren Eiseley Reader*, what are some of the major historical events that occurred in Eiseley's childhood, and how might they have influenced Eiseley's life and writing?
 - Who were some of the major influences in Eiseley's life, and how did they shape his development as a writer?
 - What are some of the places that influenced Eiseley's life? How might these places have influenced Eiseley's development as a writer and what he wrote about?
 - During what time period was Eiseley writing and publishing? What do we know about this time period that can help in understanding what Eiseley wrote? How did Eiseley become a success?
4. Representatives from each group should report out what was found. The teacher records on a flip chart and students should take notes.

5. Assignments:
 - Have groups expand their lists developed in class by accessing additional biographical material on Eiseley available at <http://www.eiseley.org/biography.php> and http://en.wikipedia.org/wiki/Loren_Eiseley and photos in *The Loren Eiseley Reader* on pages 205-215.
 - Have students access the Internet to research significant historical and political events that took place during Eiseley's life. Students should be able to list at least 12 events and the time period during which they took place.
6. Get small groups together to discuss any additional information found through the homework assignment. Representatives from each group then report any additional findings, with the teacher recording the information on a flip chart.
7. Have students work on individual computers to construct two timeline templates: one timeline of critical events in Loren Eiseley's life and another timeline of critical events in history during Eiseley's life.
8. Optional: the teacher can print the two timelines on overhead transparency and overlay them on an overhead projector in order to illustrate the intersection of personal and historical events in Eiseley's life.
9. Response writing: Have students write a two-page essay on at least three critical personal and historical events in their own lives and how these events have influenced their own development as a person and as a writer.
10. Optional class or individual activity: visit the Heritage Room of Nebraska authors at the Bennett Martin Public Library in Lincoln to see Eiseley artifacts and memorabilia on display.

Lesson

Tales Told by Fossils/ Fossils as Evidence of the History of Life



SUBJECT: SCIENCE – Evolution, Fossil Record

PROJECT OVERVIEW:

Lab investigation of form, function and adaptation using Loren Eiseley's "The Innocent Assassins" as a starting point.

This lesson could have students:

- Develop an understanding of diversity.
- Identify questions and form hypotheses that can be examined through scientific investigations.
- Design and conduct a scientific investigation.
- Investigate the unique structures of fossil organisms.

SUGGESTED GRADE LEVELS: 6-8. This lesson could also be adapted to other grade levels, depending on level of sophistication.

POSSIBLE STANDARDS:

Science-Nebraska

"Science as Inquiry" Standard (Nebr Dept of Ed, 8.2), as well as other specific standards:

4.2.1 students will use models to understand concepts.

6.3.2 students will know that plants and animals have unique structures that provide for their needs and enable them to live in different environments.

12.4.4 students will investigate the structural, functional and behavioral adaptations of living organisms to the environment in which they live, including how food/energy is obtained, and unique survival mechanisms.

INSTRUCTIONAL OBJECTIVES:

1. Investigate adaptation of fossil organisms.
2. Understand the relationship between form and function.

3. Understand the fossil record as a record of the history of life.
4. Understand the logic of historical inference.

MATERIALS REQUIRED:

Varies with activity involved. Replica of the sabertooth specimen referred to in “The Innocent Assassins.”

SUGGESTED RESOURCES:

Web-based resources:

<http://www.ucmp.berkeley.edu/mammal/carnivora/sabretooth.html>
<http://www.enchantedlearning.com/subjects/mammals/smilodon/>
<http://www.sciencedaily.com/releases/2004/01/040113081137.htm>
<http://www.sciencedaily.com/releases/2007/10/071001172812.htm>

Books

The Loren Eiseley Society. *The Loren Eiseley Reader*. Lincoln: Infusionmedia Publishing Inc., 2009. <http://www.eiseley.org>

Kurten, Bjorn. *The Innocent Assassins*. New York: Columbia University Press, 1991.

Carroll, Robert. *Vertebrate Paleontology and Evolution*. Freeman, 1990.

PROPOSED PROJECT SEQUENCE:

After introducing the students to the poem “The Innocent Assassins”, any of these activities could be undertaken.

1. Have students examine the skull of the sabertooth and make observations of features they find striking or remarkable. They should make some notes describing what they see.
2. Explain that what they have been examining is a replica of a fossil found in western Nebraska. Lead the students in a discussion of what they think they can or would like to find out about the animal represented by the fossil. Get them to develop questions that could be investigated and make a list of the questions that are proposed.

DISCUSSION (oral contribution): If they don’t come up spontaneously, some questions that would be useful to explore could be introduced to the discussion:

How did an animal like this make a living, especially, how might it have used the large, sabertoothed canines?

Are there other animals with saber teeth like this? As fossils? Still living?

Why are sabertooth cats like this extinct?

One saber of this individual is imbedded in the bone of another animal (depending on the level of the group and what resources you have available, you may wish to tell them it is the upper arm bone of another sabertooth or let them figure that out for themselves). What happened here? What is the story behind this fossil occurrence?

3. Break the class up into smaller groups of 3 or 4 to research the questions generated in discussion. Assign each group one question (one question could be given to 2 or more groups if the class is large). Have each group examine the question assigned to them and come up with a method and kinds of evidence that could help them answer it.

4. Each research group of students should record their proposed method of study and the type of evidence they wish to seek. Within the limits of the resources available to them, they should proceed with the proposed research to try to answer the question. Resources available to the students could include: the fossil replica, which students could take turns reexamining for further details; online resources; books available in the classroom; the teacher could have important information or other resource materials that can be made available if asked for.

Possible Research Topics

The function of sabertoothed canines – some lines of investigation that students might pursue for this question include:

- analyzing the characteristics of the saber tooth itself, sharp point, sharp, serrated edge, long with a narrow cross section, and considering what actions it would be capable of

- examine the rest of the skeleton as represented by the specimen or in online or other sources, to see if it offers any additional clues to the capabilities and likely life characteristics, such as diet

- compare them to living animals with similar characteristics (if there are any)
- compare them to human made tools that are similar in form and have a known function

- see if others have investigated this question and made their results available by publication

The diversity of sabertooths – students will have to rely on online resources, books and/or teacher-provided materials to pursue this question. Some information they could look for would include:

- How many different kinds of sabertoothed animals are known? (The genus level is most likely to yield comparable data from different sources.) Note: the Wikipedia resource is useful for this, as is Carroll's book.

- Where and when did each live, and how closely are they related to one another and to other groups of animals?

- With this information they can consider the relative success of the sabertooth adaptation

Extinction of the sabertooths – students may wish to consider the question of how particular species of sabertooth became extinct either because of or in spite of such an impressive adaptation. Another approach would be to try to explain why there are no modern animals that have the sabertooth adaptation.

Sabertooth CSI – explaining how this particular sabertooth died and became part of the fossil record will require that the students think about how its tooth got imbedded in another animal's bone.

It will be important for them to know that it is the bone of another sabertooth and that it is an upper arm bone (humerus). With illustrations of skeletons, they can work out the orientation of the 2 animals. At some point they can be given a picture of the artist's interpretation of the scene.

They may wish to consider why animals of the same species are entangled in this way, and why they remained so. Eiseley's poem offers part of an explanation.

What evidence and observations support whatever interpretation they come up with?

5. When each group has taken their research as far as resources or time allows, the students in that group should prepare a report on what they have discovered, the information, their conclusions concerning the initial question and recommendations for further work.

6. Each group will present their report to the whole class, and the class should discuss the results of the individual reports as well as the connections between topics investigated by different groups.

The Loren Eiseley Reader Teacher's Guide
Glossary for “Innocent Assassins” Video
Created by Ray Boice

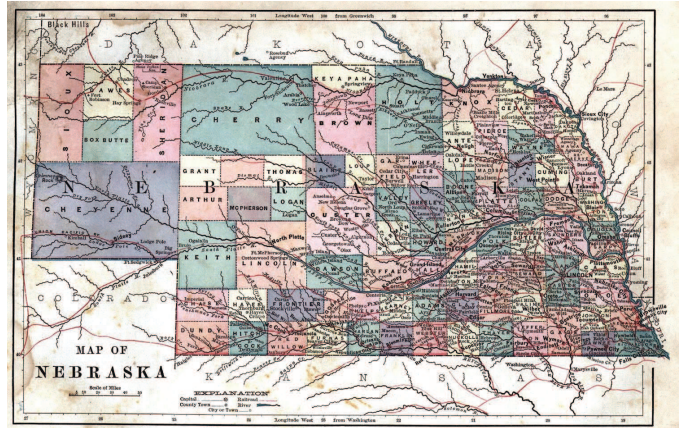
Glossary of Terms for Loren Eiseley Video Innocent Assasins	
Term	Meaning
cones	Anything shaped liked a cone: sawdust piled up in a great cone; the cone of a volcano, an ice Cream cone, a solid having a circular base and sides that slope evenly to a point
runneled	A small channel, a small stream of water.
purgatorial	Removing or purging sin; expiatory; purgatorial rites . Serving to purify of sin; expiatory.
sabertooth	Any of several extinct members of the cat family felidae from the oligocene to pleistocene epochs, having greatly elongated, saberlike upper canine teeth. False sabertoothed tigers. Short legs; dog -like feet.
cellars	An underground room or story.
Toledo steel	Toledo, Spain is known for making swords and sabers that are especially hard and of superior quality.
serrations	A series or set of teeth or notches.
Cretaceous	From 140 millon to 65 million years ago, characterized by the greatest development and subsequent extinction of dinosaurs and the advent of flowering plants and modern insects.
scapula	Either of two flat , triangular bones, each forming the back part of a shoulder in humans; shoulder blade.
undetached	Not attached; separated;
mortal	Deadly or implacable; relentless: causing or liable to cause death; fatal: One of long , sharp, hollow or grooved teeth of a venomous snake by which poison is injected.
fangs	A tooth resembling a sabertooth.
immortality	Not mortal; not liable or subject to death; undying:
beget	To cause ; produce as an effect: to cause to exist or occur; produce:
genes	The basic physical unit of heredity; a linear sequence of nucleotides along a segment of DNA that provides the coded instructions for synthesis of RNA, which, when translated into protein leads to the expression of hereditary character. A male given name, form of EUGENE. a portion of a DNA molecule that serves as the basic unit of herdity. genes control the characteristics that an offspring will have by transmitting information in the sequence of nucleotides on short sections of DNA.
assassin	A murderer.
eras	A period of time marked by distinctive character , events, etc : a major division of geologic time composed of a number of periods.
uncertainties	Not for sure, not sure to happen.
unfostered	Not to bring up, raise or rear, not to care for.
perversely	Willfully determined or disposed to go opposite to what is expected or desired; contrary. Persistent or obstinate in what is wrong. Turned away from or rejecting what is right, good, or proper; wicked or crrupt. Contumacious, disobedient. Stubborn, headstong. evil, bad, sinful.
antique	Of or belonging to the past; not modern . Any work of art, piece of furniture, decorative object, or the like, created or produced in a former period, or according to U.S. customs laws, 100 years before date of purchase.

inchoate	Not yet completed or fully developed; rudimentary. Just begin; incipient. Not organized; lacking order:
dim	Lacking in brightness: a dim room. Emitting only a small amount of light; lacking keenness or vigor.
creature	An animal, the creatures of the woods and fields; an animate being.
cunning	Sly, crafty, deceiving.
outworn	Out of date, outmoded, or obsolete: worn-out, as clothes.
ancient	Dating from a remote period; of great age: a very old or aged person, esp. if venerable or patriarchal.
flint	A hard stone, a form of silica resembling chalcedony but more opaque, less pure, and less lustrous. A chunk of this used as a primitive tool or as the core from which such a tool was struck. A small piece of metal, usually an iron alloy, used to produce a spark to ignite the fuel in a cigarette lighter.
inanimate	Not animate; lifeless.
murmur	A low, continuous sound, as of a brook, the wind, or trees, or of low, indistinct voices. To speak in a low tone or indistinctly.
atavists	The reappearance in an individual of characteristics of some remote ancestor that have been absent in intervening generations. Reversion to an earlier type; throwback.
unchosen	Not chosen. Not picked.
mesmerically	Compelling; fascinating.
paleontology	The science of the forms of life existing in former geologic periods, as represented by their fossils.
<i>Mauvaises Terres</i>	The "Bad Land" in French. This ground has many deep canyons and bluffs so it is bad to travel over.
voyageurs	A person who is an expert woodsman, boatman, and guide in remote regions, esp. one employed by fur companies to transport supplies to and from their distant stations.
Tertiary	Noting or pertaining to the period forming the earlier part of the Cenozoic era, occurring from 65 million to 2 million years ago. Characterized by the development and proliferation of mammals.
faunas	the animals of a given region or period considered as a whole. A treatise on the animals of a given region or period.
excavations	To make a hole, to dig out of a earth.
sterile	Free from living germs or microorganisms; aseptic: incapable of producing offspring; not reproducing. offspring. Barren; not producing vegetation: noting a plant in which reproductive structures fail to develop.
imprinted	A mark made by pressure; a mark or figure impressed or printed on something. Any impression or impressed effect.
enormous	Greatly exceeding the common size, extent, etc.; huge; immense: outrageous or atrocious.
magnitude	Size; extent; dimensions: greatness of size or amount. Moral greatness.
abstraction	An impractical idea; something visionary and unrealistic. Absent-mindedness; inattention.
arroyos	A small steep-sided watercourse or gulch with a nearly flat floor; usually dry except after heavy rains.
teetering	To move unsteadily. To ride a seesaw; teetertotter. A seesaw; motion; wobble.

pinnacles	A lofty peak. Any pointed, towering part or formation, as of rock.
dinosaur	Any chiefly terrestrial ,herbivorous or carnivorous reptile of the extinct orders saurischia and ornithischia, from the Mesozoic era, certain species of which are the largest known land animals.
osmosis	The diffusion of fluids through membranes or porous partitions.
fragmented	A broken part, off or detached:

Lesson

Loren Eiseley's Nebraska: Place-Based Lessons in Language Arts and Sciences



SUBJECTS: SCIENCE/ENGLISH

PROJECT OVERVIEW:

Students will read one or more of four non-fiction essays in *The Loren Eiseley Reader* that are based in Nebraska: “The Flow of the River,” “The Running Man,” “The Letter,” and “The Last Neanderthal.” They will do individual and class activities that include working with vocabulary sheets, discussing and interpreting the essay(s) in class, writing response essays, and multi-media projects. Depending on time constraints and students’ interest, other activities are listed below for each of the essays.

SUGGESTED GRADE LEVEL: 12th (could also be used with a Grade 11 Honors or AP course). Could also be used in grades 9-11, depending on level of sophistication

CONNECTION TO THE CURRICULUM: These lessons meet several curricular goals in writing, literature, communication, and technology, and integrates other disciplines such as biology, history, and geology into the language arts curriculum. Language arts areas include essay, non-fiction literature, photography, and technology (digital camera, Internet, PowerPoint, etc.)

POSSIBLE STANDARDS:

COMPREHENSION: Students will extract and construct meaning using prior knowledge, applying text information, and monitoring comprehension while reading grade-level text.

LA 12.1.6.a Evaluate the meaning, reliability, and validity of the text considering author’s purpose perspective, and information from additional sources.

LA 12.1.6.g Analyze, evaluate, and make inferences based on the characteristics of narrative and informational genres and provide evidence from the text to support understanding.

LA 12.1.6.h Critique the effects of historical, cultural, political, and biographical influences in a variety of genres.

LA 12.1.6.1 Build and activate prior knowledge in order to clarify text, deepen understanding, and make connections while reading.

LA 12.1.6.o Respond to text verbally, in writing, or artistically.

WRITING: Students will apply the writing process to plan, draft, revise, edit and publish writing using correct spelling, grammar, punctuation, and other standard conventions appropriate for grade level.

LA 12.2.1. Students will apply the writing process to plan, draft, revise, edit, and publish writing using correct spelling, grammar, punctuation, and other standard conventions appropriate for grade level.

LA 12.2.2 Writing Genres: students will write or a variety of purposes and audiences in multiple genres.

MULTIPLE LITERACIES: Students will research, synthesize, evaluate and communicate information in a variety of media and formats (textual, visual, and digital).

LA 12.4.1.a Select and use multiple resources to answer questions and defend conclusions using valid information (e.g., print, subscription databases, web resources).

LA 12.4.1.b Demonstrate ethical and legal use of information by citing sources using prescribed formats and tools (e.g., online citation assistance, publication guidelines).

LA 12.4.1.f Gather and share information and opinions as a result of communication with others (e.g., video/audio chat, interview, podcast, multi-media presentations).

Science-Nebraska

“Science as Inquiry” Standard (Nebr Dept of Ed, 8.2), as well as other specific standards:

6.3.2 students will know that plants and animals have unique structures that provide for their needs and enable them to live in different environments.

12.4.4 students will investigate the structural, functional and behavioral adaptations of living organisms to the environment in which they live, including how food/energy is obtained, and unique survival mechanisms.

INSTRUCTIONAL OBJECTIVES (Note: these objectives depend on the instructional activities selected):

- 1) Students will learn about the life and work of Nebraska-born literary naturalist Loren Eiseley.
- 2) Students will respond to literature read in discussion groups and through writing.
- 3) Students will learn how to use mind mapping to analyze and interpret Loren Eiseley's essays.
- 4) Students will gain scientific knowledge and knowledge of historical events relating to places in Nebraska about which Loren Eiseley wrote.
- 5) Students will learn and practice research, data collection and presentation skills.
- 6) Students will learn how to generate questions for interviewing and how to interview.
- 7) Students will apply technology skills through use of software programs to create a final product.
- 8) Students will learn how to make oral presentations that consider audience, purpose and information.

MATERIALS REQUIRED:

- *The Loren Eiseley Reader* – Published by The Loren Eiseley Society, 2009. Classroom copies available for loan from the Loren Eiseley Society (contact Dr. Bing Chen through the Loren Eiseley Society's website, www.eiseley.org) or from your ESU. Teacher's copy available at no cost.
- "Reflections of a Bonehunter" – 1994 NETV documentary on Eiseley's life and writing. A 60-minute DVD is available for loan from the Loren Eiseley Society. A shorter 24-minute version of the DVD can be viewed and downloaded from the LES web site (www.eiseley.org). [Note: the 24-minute version is currently on the "members only" portion of the web site; it will be made public by spring 2010.]
- Computers with Internet capabilities
- DVD player
- Digital camera(s)
- Scanner
- Printer

SUGGESTED ADDITIONAL RESOURCES:

Books

Fox at the Wood's Edge by Gale Christianson (optional teacher resource book for biographical information on Eiseley)

Walden by Henry David Thoreau

Platte River Road by Don Welch

Mind Maps for Kids: An Introduction by Tony Buzan – available on *Amazon.com*

Internet sites

The Loren Eiseley Society:

<http://www.eiseley.org>

Loren Eiseley Wikipedia site:

http://en.wikipedia.org/wiki/Loren_Eiseley

Bonehunter transcript from NETV:

http://www.netnebraska.org/extras/nextexit/ghosts/bone_03.html

Loren Eiseley's reflections on the Depression (from "Reflections of a Bonehunter" DVD):

<http://www.netnebraska.org/extras/nebraskastories>

Where I'm From Poem Template:

<http://www.swva.net/fred1st/wif.htm>

Essay Writing Strategies: Using Mind-Maps as a Tool:

<http://www.brighthub.com/education/homework-tips/articles/36418.aspx>

Sample Essay Mind Map:

<http://www.jcu.edu.au/office/tld/learningskills/mindmap/sampleessay.html>

UNL State Museum, Division of Anthropology and Nebraska Archaeological Survey (there is a photo gallery from a 10-week excavation project at a prehistoric hamlet near Loup City):

<http://www.museum.unl.edu/research/anthropology/anthro.html>

You Tube videos

Archaeology: Science and Historic Preservation (length: 7:58 minutes). Video on the nature of archaeology as it pertains to both scientific inquiry and historic preservation.

Next Exit – Bone Hunter (length: 3:46 minutes). Edited excerpt from the 1994 NETV production of “Reflections of a Bonehunter.”

Wildcat Hills Nebraska State Recreation Area (length: 0:45 minutes).

Wildcat Hills SRA – Nebraska State Park (length: 1:14 minutes). Short video produced by Nebraska Game and Parks Commission that shows the Wildcat Hills landscape and Wildcat Hills Nature Center exhibits.