



WETUMPKA IMPACT CRATER Discovery VISITOR CENTER



3 Exhibit Hall Student Activities and Education Approaches

TABLE OF CONTENTS



1. Docent Responsibilities

ACTIVITIES TO ENGAGE STUDENTS:

2. The Feldman Approach To Art Criticism | Art Criticism & Writing

4. Aesthetic Scanning: Harry S. Broudy | Art Criticism

5. Dispositional Approach: David N. Perkins | Art Criticism

7. Back To Back-Seattle Art Museum | Communication

8. Perception Games | Theatre & Perception

10. Color Memory Game | Art & Perception

17. Perception Games | Theatre & Perception

18. Adjective Cards Game | English & Perception

23. Personal Response Game

29. Taking A Closer Look | Writing & Art

37. Pictorial Pastiche | Art

38. Cretaceous Frottage | Art

41. Cretaceous Creature Accordion Book | Art And Bookmaking

42. Cretaceous Agamographs | Art

54. Five Step | Poetry

55. Seven Step | Poetry

56. I Wish #1 | Art & Poetry

58. I Wish #2 | Art & Poetry

60. Impressionistic Poetry | Poetry

60. Tense Verse | Poetry

61. Haiku And Tanka Poetry | Art & Poetry

63. Clerihew Poetry | Poetry

64. Concrete Poetry | Poetry

65. Parting Activity - Dinosaur Dance Video (15 Minutes) | Dance

66. Illustrating Cretaceous Environment, Life & Meteor Impact Events | Art

67. Folded Card Layout | Art

69. Postcard Layout (2 Pages- Front & Back) | Art

72. Horizontal 8.5" X 11" Frame Page For Illustrations | Art

73. Vertical 8.5" X 11" Frame Page For Illustrations | Art



TABLE OF CONTENTS CONTINUED

- 74. Cretaceous Art Trading Cards: Finish The Picture | Art
- 86. Cretaceous Art Mini-Works | Art
- 88. Dino Zentangles | Art
- 98. Cretaceous Angiosperms | Art
- 99. Dino Prints For Youth #1 | Art
- 101. Dino Prints For Youth #2 | Art
- 106. Dino Prints (Stamping) For Young Children | Art
- 108. Paper Pterodactyl Puppet | Art
- 111. Exploding Box | Art
- 117. Crater Word Find | English Vocabulary
- 121. Crater Geology Glossary | English Vocabulary



The Wetumpka Impact Crater and the Cretaceous Period
An Integration of Visual Art, Paleontology and Geologic History
Docent Responsibilities:



1. Pre-education about the Wetumpka Impact Crater and the Cretaceous period.
2. Become familiar with the Power Point presentations and other information on the website (wetumpkacraterart.org) and in the Discovery Center & Alleyway.
 1. Wetumpka Crater
 2. Cretaceous Marine Life
 3. Cretaceous Dinosaurs
 4. Cretaceous Plant Life
 5. Impact Effects: Tsunami, Earthquake, Flash Fires
 6. Meteorites, Asteroids, Comets
 7. Inland Sea and Barrier Islands
 8. Fossils
 9. The Rise of Mammals
 10. Sedimentary Formations & Geology
 11. Flying Reptiles and Bird-Like Dinosaurs
 12. Cretaceous Insects
 13. Story Boards
 14. Self Guided Tour Booklet
 15. Discovery Center Videos
 16. Discovery Center Supplemental Material Package
3. Become familiar with the collection & artists work:
 - Karen Carr, New Mexico: paleoartist
 - Jerry Armstrong, Georgia: cosmic artist
 - Jonathon Hughes, Thailand: paleoartist
 - Asher Elbein, Texas: artist
 - Hope Brannon, Alabama: artist
 - Barry Chrietzberg, Alabama: photographer
 - Shirley Esco, Alabama: artist
 - Brooks Barrow, Alabama: sculptor
4. Read and understand the Docent Handbook and other docent materials.
5. Be prepared;
 - A. Create Your Docent Scripts
 - B. Conduct Impromptu Tours and Answer Questions for Visitors
 - C. Attend to and Engage with Visitors
 - D. Spread the Word: Upcoming Events & Lectures.
 - E. Conduct Scheduled Tours: Adults or Students
 - F. Short Docent Talk Featuring Specific Works in the Collection
 - G. Story Boards- include info in your tour
 - H. Engage Students through Museum Activities:
 - Studio Workshop: Hands-On Activities for School Age Students
(Small Groups - 45 minutes) - Visual Art Activity



STRATEGIES FOR ENGAGING STUDENTS WITH ARTWORK

Our techniques of engagement with the artwork combine approaches advocated by scholars and educators such as Harry S. Broudy, David N. Perkins and Edmund Burke Feldman.

THE FELDMAN APPROACH TO ART CRITICISM

Feldman's well-known strategy, which he terms the critical performance, is summarized below. He separates art criticism into four distinct steps of involvement to be taken before one makes his final judgment. These are the four:

1. Description
2. Analysis
3. Interpretation
4. Judgment

When these stages are complete, the viewer will have a critical identification of the work.

1. DESCRIPTION--Attending To What We See.

Your objective is to motivate the students to become actively involved with naming and discovering what is actually visible in the work of art being criticized. Working together, all students have an opportunity to participate in the discussion. Neutrality is important as this stage is really a listing of what is seen. Individuals notice different features of the same art object, so through sharing these recognitions, we really begin seeing the same artwork. The descriptive stage thus serves to help us see the full picture, to slow us down rather than jumping to conclusions and deciding too quickly the value and meaning of a work of art.

Descriptive Areas For Discussion

Representational Works of Art:

1. Identify (name) what is represented or depicted--people, buildings, chairs, trees, horses, fish, flowers, etc.
2. Identify the elements of art--line, shape, color, texture, form, space, value (light and dark).

Abstract or Non-Representational Works of Art:

1. Identify the elements of art included in the work--line, shape, color, texture, form, space and value.
2. Use descriptive words such as vertical, round, oval, smooth, dark, bright, and so on.

Technical Process:

Identify the way or ways the work of art seems to have been made, the tools needed to execute the work, what the artist did to achieve the texture, the medium used, etc. Again, describe the effect or results of the technical processes on the lines, shapes, colors, forms, values.



2. ANALYSIS--Observing the Relationships Of What We See.

In the formal analysis of a work of art, we describe the relationships of what we have noticed, become aware of, inventoried and discovered during the descriptive stage of art criticism. At this point, the students will have a basis for their discussion of what the forms do to each other, how they influence each other, how they affect one another. We never see the parts of a work of art in isolation. We always see them in relationship to each other as these parts form the whole of the work of art.

Look with your students for:

- a. Compositional direction of the related visual elements: Why did the artist arrange the objects and/or elements as he/she did? How is the relationship of these forms affected by their location? What would happen to the meaning of the work of art if you changed the placement of these objects and/or elements? Would the work of art still have visual balance? Would all the important objects or elements demand all of your attention, leaving you to disregard the rest of the work?
- b. Size relationships: Shapes are not seen in isolation but in pairs, groups, or clusters. Which are larger? Which are smaller? Comparative size gives information about importance. Size relationships often give a painting more or less spatial depth. What is the importance of the size relationship in the painting you are criticizing? Would these shapes have the same importance if their size were altered? How would the feeling of the idea communicated be affected by such a change?
- c. Color and value: Note the relationships of colors and values. Are the colors of related shapes similar to or different from each other? Do they vary slightly or contrast strongly? Value relationships can indicate importance or set a mood. Is a color area lighter or darker than a nearby area? Are colors different but values similar?
- d. Textural and surface relationships: Compare and contrast the textural qualities (real or implied). Do areas appear rough, smooth, encrusted, slick, crisp, old? Surface qualities convey emotional messages to us.
- e. Space and volume relationships: What sort of implied space does the artist create by using perspective, size, color, or light-and-shadow relationships? Does the implied space seem open, endless? Or is it limited, enclosed, flat? Examine the shapes of the empty spaces--the negative shapes--as well as the positive forms or volumes. Consideration of the negative spaces is especially important in discussing a sculpture. Look for signs of openness or density, clarity or obscurity, darkness or light, and flatness or depth in the overall treatment of space.

When you have completed these first two steps, you will have accomplished the following goals or purposes.

- You encourage as complete an examination of the object as it is possible for the viewer to make.
- You slow down the viewer's tendency to jump to conclusions.
- You help build skills in observation and vocabulary --skills that are vital for understanding the visual arts as well as for general personal development.
- You accumulate the visual facts that will form the basis for critical interpretation.



- You help facilitate a discussion about which features of the art object constitute the subject of interpretation and judgment.

INTERPRETATION--Giving Meaning To Works of Art.

Interpretation is the stage of art criticism in which you give expression to your natural desire to respond to an experience as completely as possible. What is needed at this stage, interpretation, is our intelligence, sensitivity and courage. We should not be afraid of making incorrect interpretation. That interpretation can be changed and adjusted until it fits the visual facts. There is no harm in being wrong! It is difficult to be correct on the first try. It can only be bad or wrong if you ignore the visual facts. Feldman states: "A critical interpretation is a statement about a work of art that enables the visual observations we have made to fit together and make sense. In other words, what single, large idea or concept seems to sum up or unify all the separate traits of the work?" We use words to describe the objects, and now we use words to describe ideas that explain the sensations and feelings we have in the presence of a work of art. We cannot figure out the artist's original intent, but we can interpret the meaning by summing up all the facts previously noted and/or discussed in the descriptive and analytical stages of art criticism. It is important to remember that no one is an absolute authority about the meaning or value of any work of art--neither the critic nor the artist. Critical interpretations will not be the same for all times and places. According to Feldman, "Your interpretation and judgment are to be based on what you have seen and felt in the work--not on what someone says about it. You are judging images, not words."

The best interpretation would be one that:

Makes sense out of the largest body of visual evidence drawn from a work of art.

Makes the most meaningful connections between that work of art and the lives of the people who are looking at it.

4. JUDGMENT--Evaluation (Deciding About the Quality of an Art Object)

When a work is good, a critic is saying, in effect, that it has the power to satisfy or please many viewers for a long time. This is a matter of appraising the aesthetic merit of a work relative to other comparable works. The aim is to assess quality, not personal preference. In calling for judgement, Feldman emphatically wants not preferences but appraisals of quality. This step is not usually appropriate for students.

AESTHETIC SCANNING

Harry S. Broudy describes a similar process called "aesthetic scanning."

He suggests:

- first looking for sensory properties like shapes, lines, etc.
- then formal properties, meaning how the elements fit together to achieve unity
- then expressive properties such as meaning, feeling, etc.
- and then technical properties such as medium, technique, etc.
- these strategies focus on specific characteristics of art and organize the looking process in terms of those characteristics.



DISPOSITIONAL APPROACH

David N. Perkins documents this strategy which emphasizes the broad principles of critical thinking. He advocates a rich, intelligent encounter with the artwork rather than a purely formal analysis of it. He doesn't necessarily advocate reaching a value judgment about the work. Judgement comes easily to the viewer and should be slowed to be a point of departure rather than a place of arrival. Unlike the formal analysis process, the experience can wind down whenever the viewer wants it to, rather than having to continue through all of the formal analysis steps with each artwork. His strategy includes the following:

- **Giving looking time.** This means simply looking, keeping engaged and giving the work a chance to show itself. Words mark and underscore perceptions. So asking the viewer to list one thing they see will ground the looking and the group responses will encourage some to see new things that they would not have discovered on their own. Questions and perceptions will emerge.
- **Draw upon common knowledge and the personal experiences of the viewers.** Looking away and then looking back encourages the viewer to see things that were not initially noticed. Making the looking broad and adventurous. This means looking for what awaits the viewer in works of art – features meant to be seen. Also look for what hides – the technical devices that help the work to achieve its intended impact.
- **What's going on in the artwork?** Is there an event/story? Look for surprises, a startling color, an odd object, an unexpected relationship. Where and how does the work surprise you, in big ways or in little ways?
- **Look for mood and personality.** What mood or personality does the work project? Strong moods or personalities often shine through abstract works, landscapes or still lives as well as those showing people or animals.
- **Look for symbolism and meaning.** Does the artist have a message? What might it be? Look for motion. Many works depict motion directly and vividly – running horses, a bird in flight. Others do not represent action, but the lines, the texture, and spatial form, carry a powerful message of motion anyway.
- **Look for capturing a time or place.** Look for cultural and historical connections at the appropriate level of personal experience. Look for specific technical dimensions such as how the colors relate, how the major shapes are balanced or unbalanced. Look for the big things, the small things, details.
- What features of the work look really hard to do? What features appear easy but might actually be hard?

The questions are open-ended so they can be tailored to the work and the viewer. Making the looking clear and deep. This involves insight into the essential message, logic or expression of the piece. Insights into the work may take the form



simply of realizing fully in one's experience its expressive power to move us, or recognizing its subtle technical means. Insights can concern the whole work or just an aspect.

- Go back to something that was a surprise. Why did the artist do that? Just to be provocative? Was there a message? How does it fit into the whole work?
- Go back to something that interested the viewer such as a sense of motion, an emotion. Ask, how did the artist get that effect? And why – how does it contribute to the whole work?
- Look for something puzzling and try to unravel the puzzle. Make mental changes. Ask if you changed a color, a material, removed an object what would it be and what would be the impact on the work?
- Look at how the work engages your visions and thinking. How does the artist's use of color, form, line, composition cause you to react in a specific way? Compare the work with another. What are the similarities? What are the differences? Ask what questions to viewers have about the work to help them articulate their line of reasoning and possible resolutions. If you wish to interpret the work, ask the viewers to put into words what they take the message to be.
- Have the viewers look for evidence in the work to support their theories. This creates a well-evidenced conclusion of the work and the individual viewer's experience of it.

With respect to starting by giving looking time, Perkins states if you do not give looking time at the beginning, you are not giving the work a chance to speak for itself. You are jumping in with categories and questions that may preempt what the work wants to tell you.

If you move directly into analyses and interpretations, your push toward clarity and depth may come at the cost of a broader seeing of the work, from different angles, through the lenses of different categories.

He believes that sometimes not knowing much about an artwork makes it easier to see the kinds of thinking questions that need to be asked – about options, evidence and alternative interpretations. Sometimes knowing more tends to focus the questions toward a particular “right” answer.

These strategies may be mixed and applied where most appropriate as long as the questions: are based on the objects, are grounded in the student's levels of experience and interests, invite sustained involvement by slowing the looking process so that viewers do not immediately jump to interpretation and judgment, and welcome mindful reflection and active personal connection making.



GALLERY GAMES

BACK to BACK – Communication Activity from the Seattle Art Museum

Objective: Languages of art: what are they and how do they communicate?

Duration: 10 - 15 minutes

Supplies: Paper, pencils, clipboards

ACTIVITIES

Participants are asked to choose a partner, and sit back-to-back on the floor.

One person from each pair verbally describes an artwork they can easily see to his/her partner.

The partner draws an image based upon the verbal description. He/she can ask questions, but may not look at the artwork.

End the talking after 3 - 5 minutes. Quickly have the partners switch roles. Give them 3 - 5 minutes.

Discuss, first among themselves. Tell them to compare their drawing to the artwork. Then have a group discussion.

Try to get responses from everyone. Suggested questions for the group: Was it easier to draw or to describe? Did it matter which you did first?

What kinds of words did you use to describe the artwork? Squares, triangles, circles. Upper left corner. Middle. Line moves from center to top right. Circle sags down. Dark behind head. Shadows. Hand fits inside box.

Summarize: As they give these words, you respond with the appropriate art term.

REASONING

↔ Begins to relieve any inhibitions arising from being in a gallery, without losing control over the group.

↔ The back-to-back position limits partner from seeing the artwork being described. Translates visual information into verbal information.

↔ Translates verbal (conceptual) information back into visual (perceptual) information. Questions let the describer know what information is needed.

↔ Quick tempo raises the energy level of the group.

↔ Satisfy their curiosities. The discussion serves to assess the activity's experience. Listen to their reactions as an indication of how to lead the group discussion.

↔ Are they more comfortable with verbal or visual communication? Giving or receiving information?

↔ Begin to equate their vocabulary with art terminology: shapes, composition, direction, size, color.

↔ Acknowledging their feedback helps them see the correlation. They realize they've been using art terms all along.



PERCEPTION GAMES

In recent years, art museums have adapted theater techniques and other creative activities for use in interpretive museum tours. These techniques are usually referred to as perception or gallery games. These activities combine game techniques, improvisational theater, and certain forms of role playing using the questioning process to help teach visual perception. Perception games help students involve their mental, physical, and perceptual skills as they become physically involved in observing. Through perception games, objects come to life: individuals in a painting might carry on a dialogue; an abstract painting might come to life by assuming smells and sounds; or a still life of foods might be consumed as children savor the tastes and smells.

Perception games are designed to help students develop an awareness and sensitivity to the various interpretations of a work of art. They provide children with a focus or reason for observing an exhibit or collection on their own. Too often children are rushed from one artwork to another, and they become lost in the mass of information and facts being thrown at them. Perception games can help to develop a transition from one gallery or object to the next, thereby relating the various parts of the learning experience and developing the theme of the tour.

SUGGESTED PERCEPTION GAMES

1. Role playing:

Role playing can range from recreating a conversation or meeting between two people to spending the day exploring a sculpture or landscape. If working with portraits, the students could discuss a meeting with the sitter, an afternoon they spent together, or everything they “know” about the sitter from looking at the work. If working with sculpture, the students can pretend to become very small and climb onto the work. Then they can “explore” the work with their eyes, discussing the textures, shapes, colors, and lines they are experiencing as they climb. What do they see from the top? How did they climb up on the sculpture? With landscapes, the students can describe a pretend day they spent in the setting or describe the time of day depicted in a work.

2. Portrait Quiz:

One student assumes the identity of the animal in a painting and the other students ask him questions about himself.

3. The Sound Button:

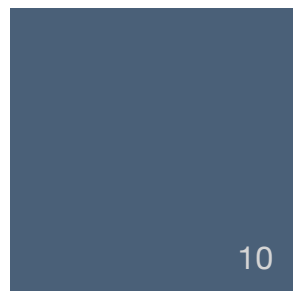
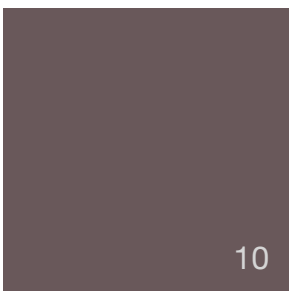
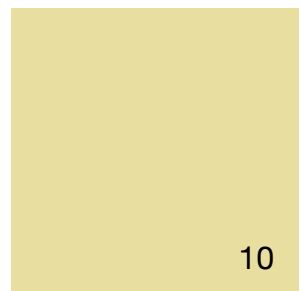
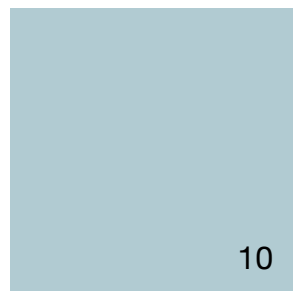
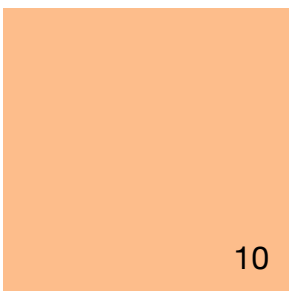
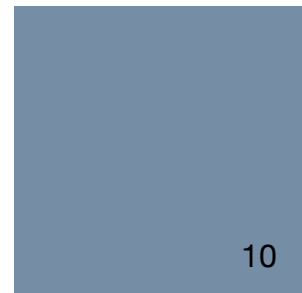
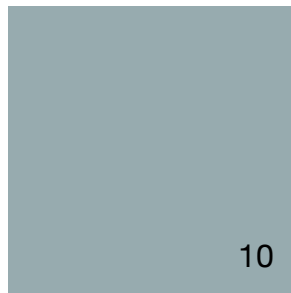
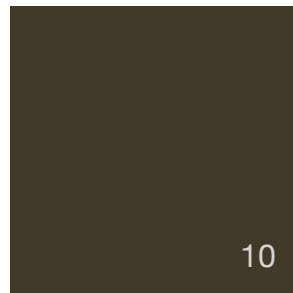
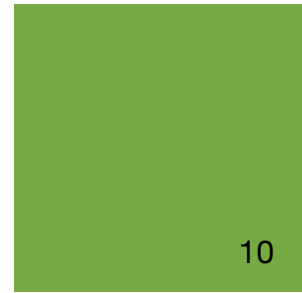
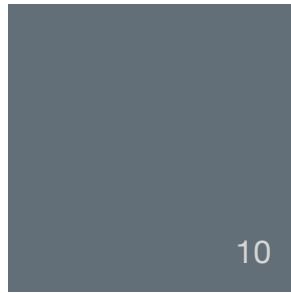
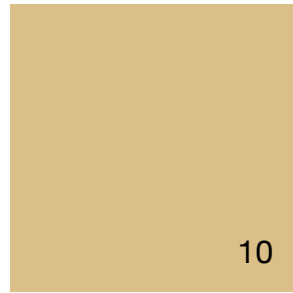
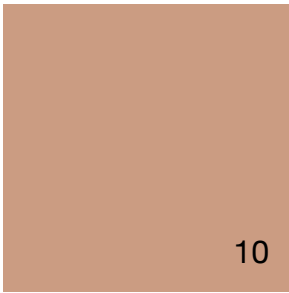
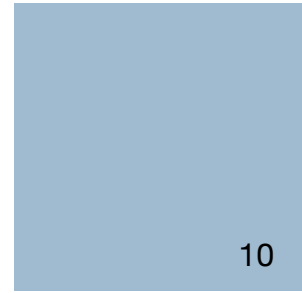
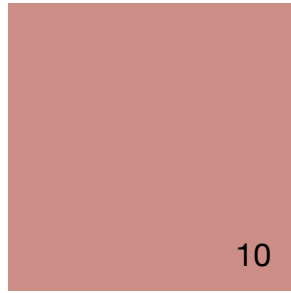
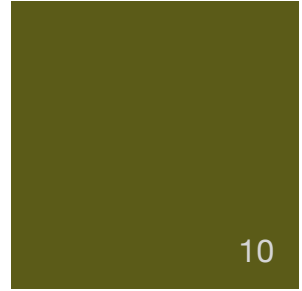
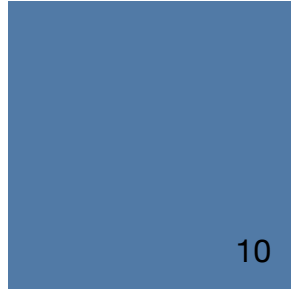
Most works can be classified as quiet or noisy, depending on the elements in the work and the mood evoked by them. Pretend to turn on a sound button next to a work and have the students make the noises they would hear if the work could make a noise. Be sure to ask why the students made a certain noise. With older students have them choose a song, fast or slow, to accompany a work.



4. **Create a Story:**
Have the students examine a work and imagine that they are in the work. Have them talk about what is happening and how as individuals in the work they feel about being there. Ask them what event took place just before the work was done and what they feel will happen immediately after the event shown. To ensure that everyone participates, the docent starts the story and then goes around the group with everyone contributing one idea. **Docent records the conversation/story.**
5. **Line Tracing:**
Have the students trace lines in a work in the air with their hands or with strings. Give them commands of things to make their lines perform: walk, sleep, run up a hill, etc. This helps the students to think of active versus quiet lines and to think about the mood of a work.
6. **Rubberman:**
This is a sculptural “reproduction” game which takes the students through the decision-making process of creating. One person is chosen as Rubberman and stands before the group, limp but not rigid. Then each of the group makes a single quick adjustment to the figure. Rubberman holds the pose precisely where placed. The goal is to reproduce the artwork exactly.
7. **Hide and Seek:**
Ask children to imagine they are small enough to hide in an artwork. Ask them where they would hide. Why? What would they see from their hiding place?
8. **The Whip:**
Form a circle around an object and have each child mention one thing he sees or notices about the object. If a child pauses or does not have an answer, say “pass” and go on to the next child. After circling the “whip” a few times with obvious answers they will begin focusing on more subtle details.
9. **I Spy:**
Have students find one detail in an object that they think no one else will find. Ask them to make up a clue about the detail using the phrase, “ I spy something _____.” The other students should guess the object and the work it is found in.
10. **Color Memory Game:**
Have your group focus on the colors in a work for fifteen to thirty seconds. Then ask them to turn around and select the colors they saw from **color swatches** (you will need several shades of each color). After they have decided, have them turn around and check their selections. You could also ask your group to create names for the colors, such as “juicy-grape purple” or “fire-engine red” for the colors they have selected. ***See pages 10-16 for art templates.



Karen Carr, Australian Museum Plant Community, Digital Painting, 42" w x 46" h, Geologic Period: Cretaceous





Explosion & Initial Crater Excavation,
Hope Brannon, Mixed Media



11



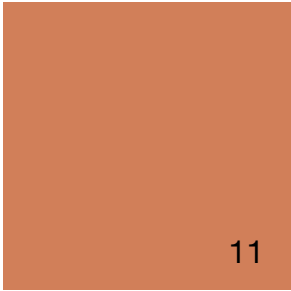
11



11



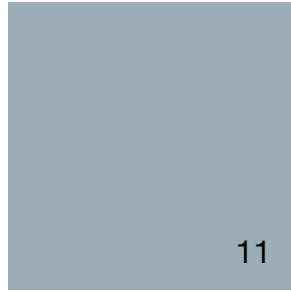
11



11



11



11



11



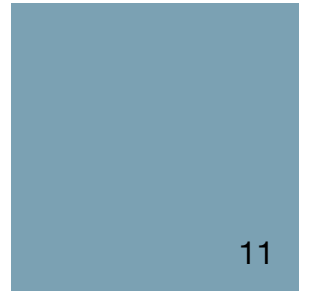
11



11



11



11



11



11



11



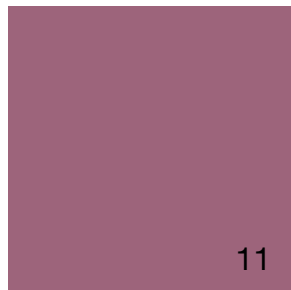
11



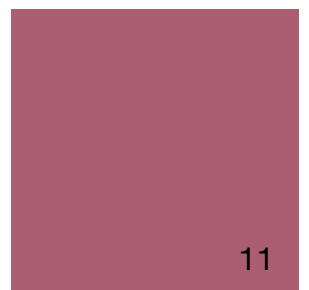
11



11



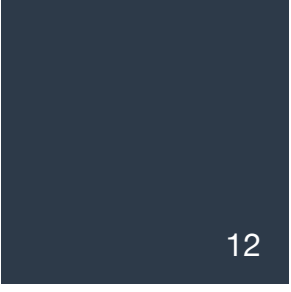
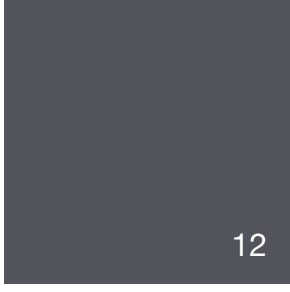
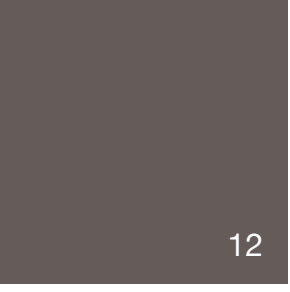
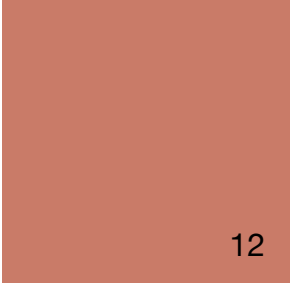
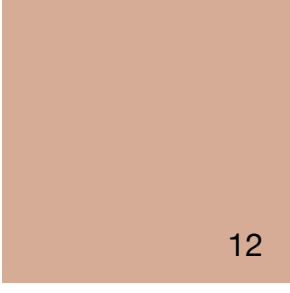
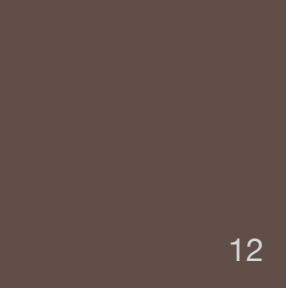
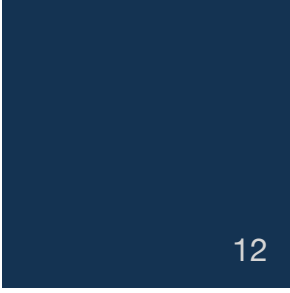
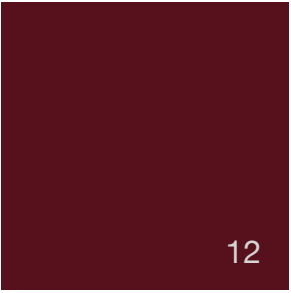
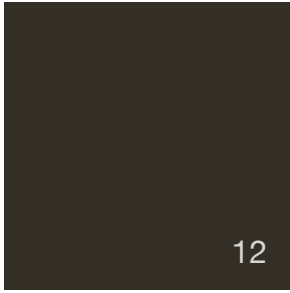
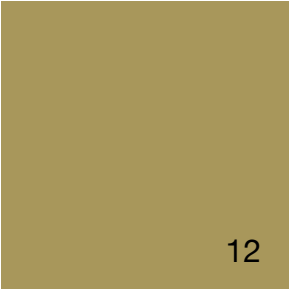
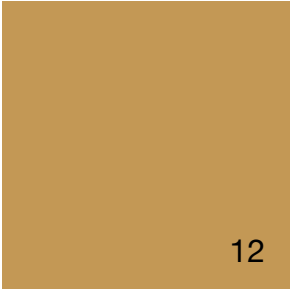
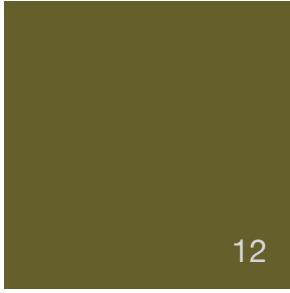
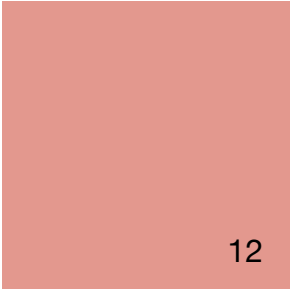
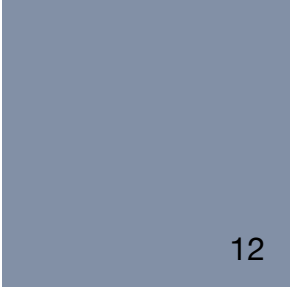
11



11

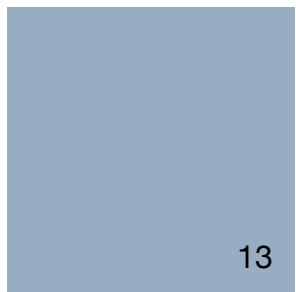
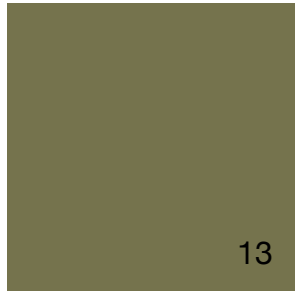
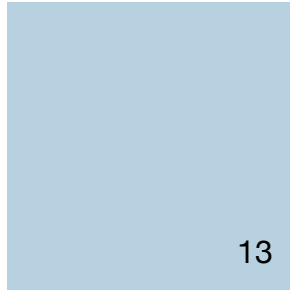
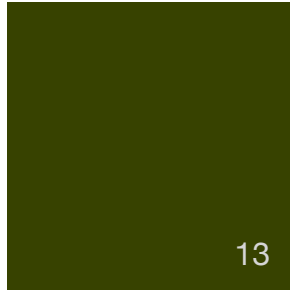
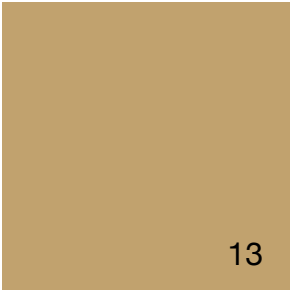
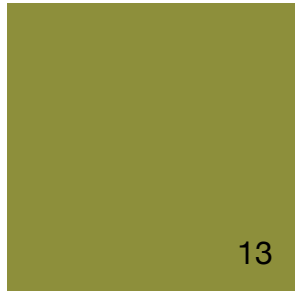


Meteorite Crashes Into Ocean
Jerry Armstrong,
Acrylic Painting, 2005

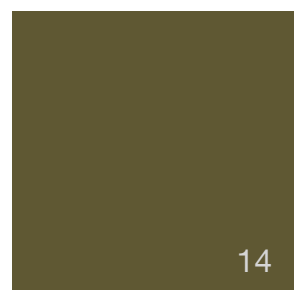
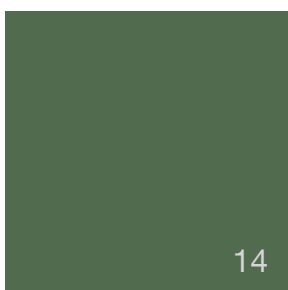
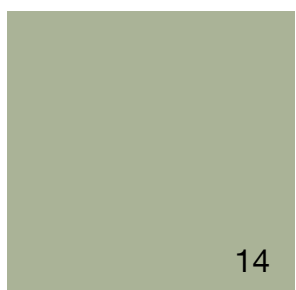
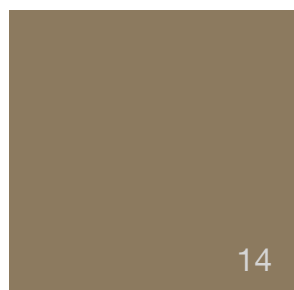
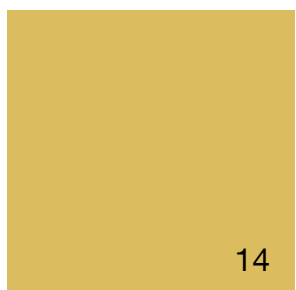
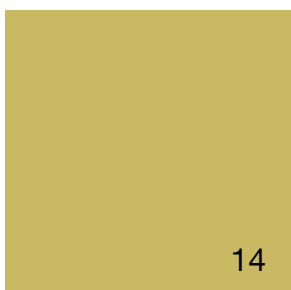
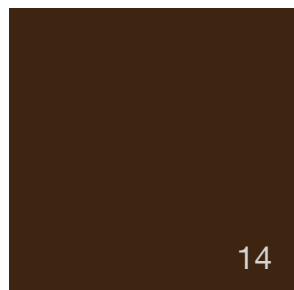
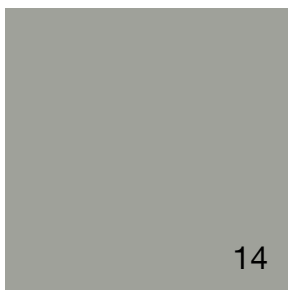
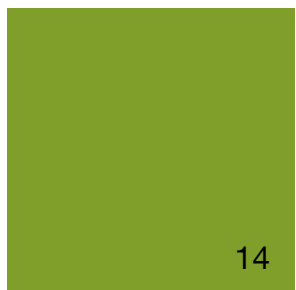
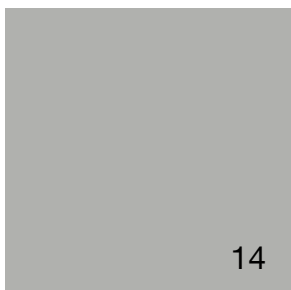
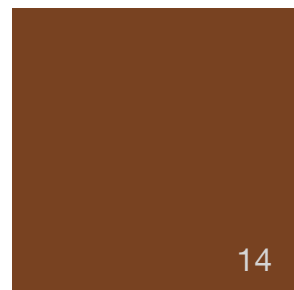
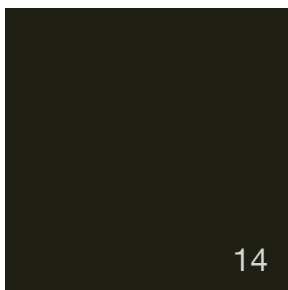
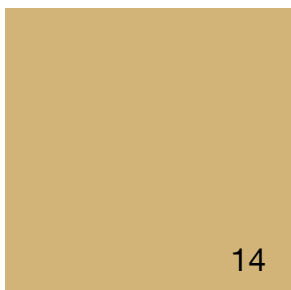
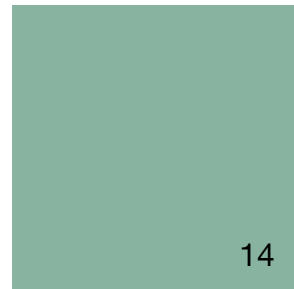
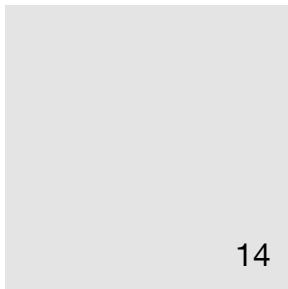




Eroded Crater Interior Today "The Cliffs":
Barry Chrietzberg, Photograph

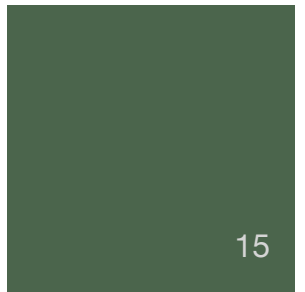
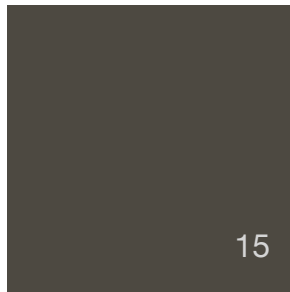
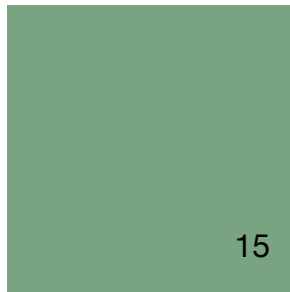
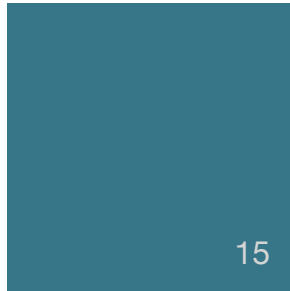
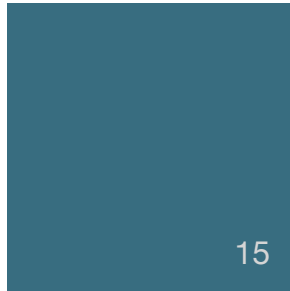
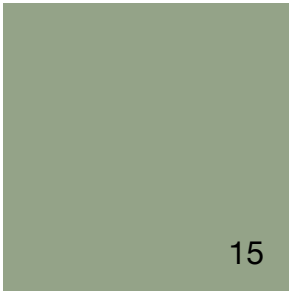
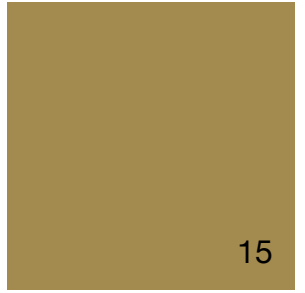
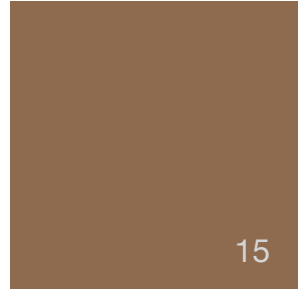
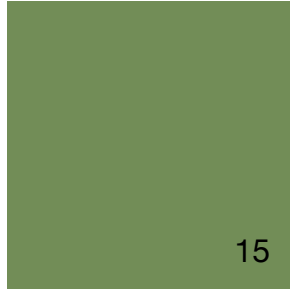
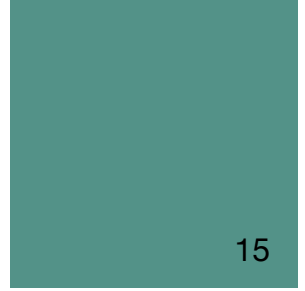
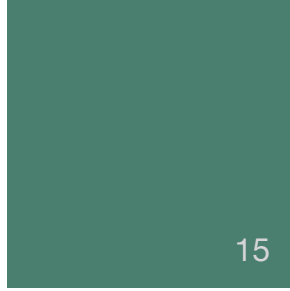


Karen Carr
Digital Painting
72" w x 23" h
Geologic Period: Cretaceous
Cretaceous Coastal Environment



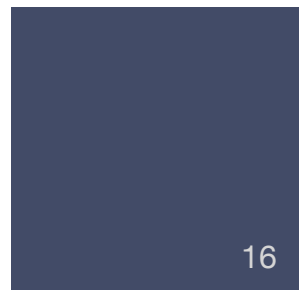
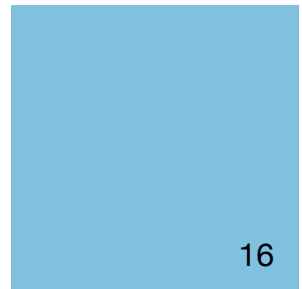
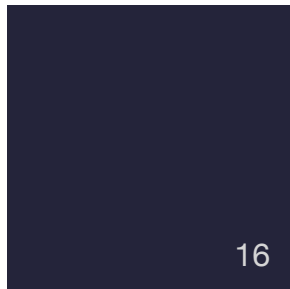
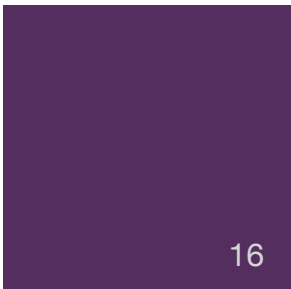
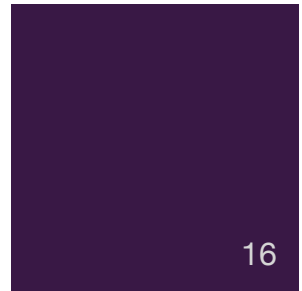
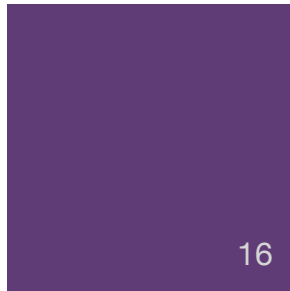
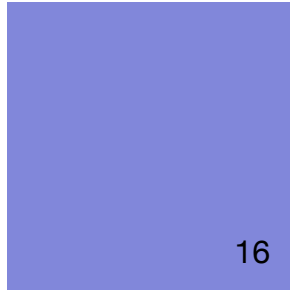
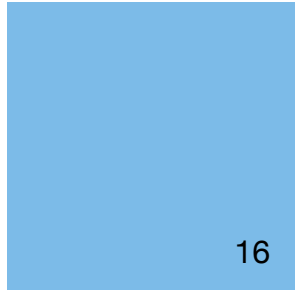
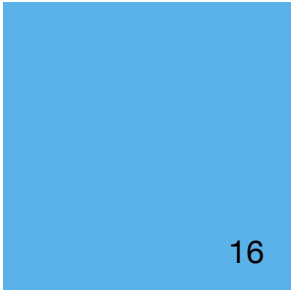
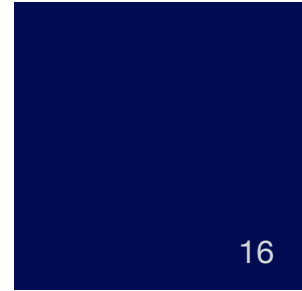
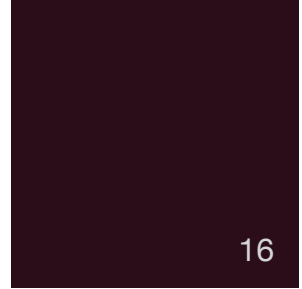
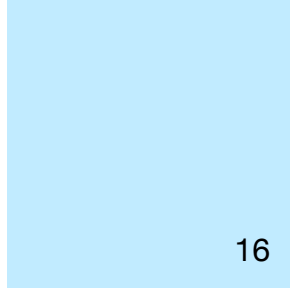
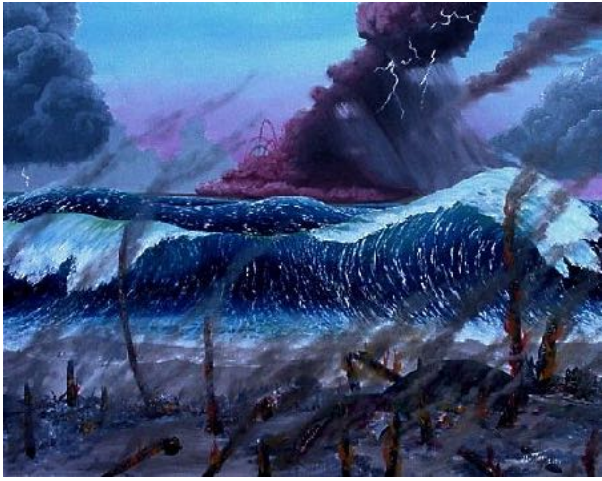


Hope Brannon
Time Capsule: Cretaceous Period
Marine Environment, 2015
Oil on Shaped Canvas





Tsunami Approaches Land
Jerry Armstrong,
Acrylic Painting, 2005





11. Presto-Chango:

This game increases visual sensitivity, heightens awareness, and is a good preparatory activity before any museum experience. First tell the students to look at you closely. You are going to change three things about yourself, and they are going to guess what they are. Turn around and make the changes. Let the students figure out what has been changed. Then let them pair up and try it with each other.

12. Snapshots:

This simple exercise can be used as part of a warm up or as a technique for a fresh viewing of pictures, especially big abstract works. Stand before a painting, print or sculpture. Close your eyes and cover them with your hands. Wait. Take a quick, one second big-eyed peek. Close and cover eyes again. Look at the painting inside your eyelids. Or before entering a gallery containing a work you want to use, have the students close their eyes and link hands. Lead the “blind” kids to a painting and arrange them before it. Peek. Close. Peek. Close. Have them take turns reporting whatever they may recall either at random or competitively. Each person tells one thing.

13. Clue:

One child picks out a work of art, keeping its identity secret. Then he or she gives clues to the identity of the work, and the other children try to guess the correct painting or sculpture. After the work is guessed or the detectives give up, a new leader picks a work. (Perhaps the volunteer leader can pick out the first, to show the rules.) Clues may refer to the pictorial content of the work itself, or they may refer to the mood or feelings or associations. Again, narrowing the limits provokes imagination, rather than vice versa.

14. Five Senses:

Ask students to put themselves in the painting and imagine what they would see. Ask them what they would hear, such as splashing waves, men yelling, wind. Can they smell anything, like sweaty bodies, fish? Smell and taste go together. Can they taste anything, perhaps salt water, damp wind? If they touch something such as the water, how would it feel? Cold, slimy, warm, fresh?

15. Adjective Cards:

Hand each student a **card with an adjective** on it. Instruct each person to look around the gallery and find a painting that could be described by that particular word. Give each student a turn to explain why he or she made that particular selection. ***See pages 18-22 for printable cards below.



Adjective

brave

Which painting or object could be described by this word? Why?

1



Adjective

calm

Which painting or object could be described by this word? Why?

2



Adjective

aggressive

Which painting or object could be described by this word? Why?

3



Adjective

angry

Which painting or object could be described by this word? Why?

4



Adjective

combative

Which painting or object could be described by this word? Why?

5



Adjective

creepy

Which painting or object could be described by this word? Why?

6



Adjective

dangerous

Which painting or object could be described by this word? Why?

7



Adjective

energetic

Which painting or object could be described by this word? Why?

8



Adjective

fierce

Which painting or object could be described by this word? Why?

9



Adjective

frantic

Which painting or object could be described by this word? Why?

10



Adjective

gleaming

Which painting or object could be described by this word? Why?

11



Adjective

grumpy

Which painting or object could be described by this word? Why?

12



Adjective

hungry

Which painting or object could be described by this word? Why?

13



Adjective

lonely

Which painting or object could be described by this word? Why?

14



Adjective

magnificent

Which painting or object could be described by this word? Why?

15



Adjective

panicky

Which painting or object could be described by this word? Why?

16



Adjective

powerful

Which painting or object could be described by this word? Why?

17



Adjective

scary

Which painting or object could be described by this word? Why?

18



Adjective

ugly

Which painting or object could be described by this word? Why?

19



Adjective

angry

Which painting or object could be described by this word? Why?

20



Adjective

chilling

Which painting or object could be described by this word? Why?

21



Adjective

distressing

Which painting or object could be described by this word? Why?

22



Adjective

exciting

Which painting or object could be described by this word? Why?

23



Adjective

spellbinding

Which painting or object could be described by this word? Why?

24



Adjective

fragile

Which painting or object could be described by this word? Why?

25



Adjective

colossal

Which painting or object could be described by this word? Why?

26



Adjective

tranquil

Which painting or object could be described by this word? Why?

27



Adjective

strange

Which painting or object could be described by this word? Why?

28



Adjective

prickly

Which painting or object could be described by this word? Why?

29



Adjective

mysterious

Which painting or object could be described by this word? Why?

30



Adjective

peaceful

Which painting or object could be described by this word? Why?

31



Adjective

gentle

Which painting or object could be described by this word? Why?

32



Adjective

intimidating

Which painting or object could be described by this word? Why?

33



Adjective

beautiful

Which painting or object could be described by this word? Why?

34



Adjective

clumsy

Which painting or object could be described by this word? Why?

35



Adjective

massive

Which painting or object could be described by this word? Why?

36



Adjective

thundering

Which painting or object could be described by this word? Why?

37



Adjective

lazy

Which painting or object could be described by this word? Why?

38



Adjective

ferocious

Which painting or object could be described by this word? Why?

39



Adjective

misty

Which painting or object could be described by this word? Why?

40

PERSONAL RESPONSE GAME



The Personal Response activity can be used as a final engagement with the artwork as it requires personal judgment that requires a higher level of thinking than just indicating whether the viewer likes or doesn't like the work.

Sample Cards are in the docent office (set of 20)

1. Which artwork would you most like to step into and become a part of? Why?
2. When you leave the museum, which artwork will you remember most? Why?
3. Which artwork would you prefer to have hanging in your house? Which room? Why?
4. Which artwork would you most like to have a chance to talk to the artist so that you could find out more about it? What questions would you ask?
5. Which artwork would your closest family member choose to have hanging in his/her room? Why?
6. Find a work of art that reminds you of something from our world today. . . Think about the connections. What are they?
7. Find a work of art that your grandmother might have chosen for her home. . . . Think about the reasons for this choice. What are they?
8. Find an image of an animal you would like to meet. . . . How might your conversation go?
9. Find a work of art that has something to tell you about life during the Cretaceous period. Look closely, and listen for the message.
10. Find the work of art that is most like you. What qualities do you have in common?
11. Find an object that, for you, is about BEAUTY! Why do you think so?
12. Find a work of art that you might choose to share with a friend. Imagine their reactions . . .
13. Find an image of an animal and imagine what its life would have been like. What would it be like if you lived in its world?
14. Find a work of art that has something to say about the environment. If it could talk, what would it say?
15. Find a work of art that has something to say about some aspect of a family or community. Why did you choose this work?
16. Find a work of art that has something to say about the differences between the modern world and the time of dinosaurs. What are the differences? Are some things similar?
17. Find a work of art that best describes the Cretaceous world for you. Notice your thoughts and feelings as you look. . . . How is it different or like your world?
18. Which Cretaceous animal is your favorite? Why? What do you know about it?
19. Find an ocean environment. Look closely and think about swimming in the Cretaceous ocean. What would it be like?
20. Find a painting that you think is either scary or happy. Why did you choose the painting?

After the cards are placed on the floor under the selected pieces, the leader directs a discussion in which students are prompted to provide reasons for their views/choices. ***See pages 24-28 for printable cards.



Which artwork would you most like to step into and become a part of? Why? What do you think you would discover?

1



When you leave the Discovery Center, which artwork will you remember most? Why?

2



Which artwork would you prefer to have hanging in your house? Which room? Why?

3



Which artwork would you most like to have a chance to talk to the artist about- so that you could find out more about it? What questions would you ask?

4



Which artwork would your closest family member choose to have hanging in his/her room? Why?

5



Find a work of art that reminds you of something from our world today. . .Think about the connections. What are they?

6



Find a work of art that your grandmother might have chosen for her home. . . . Think about the reasons for this choice. What are they?

7



Find an image of an animal you would like to meet. . . . How might your conversation go?

8



Find a work of art that has something to tell you about life during the Cretaceous period. Look closely, and listen for the message. What did you learn?

9



Find the work of art that is most like you. What qualities do you have in common?

10



Find an object that, for you, is about BEAUTY! Why do you think so?

11



Find a work of art that you might choose to share with a friend. Imagine their reactions . . . What would your friend say?

12



Find an image of an animal and imagine what its life would have been like. What would it be like if you lived in its world?

13



Find a work of art that has something to say about the Cretaceous environment. If it could talk, what would it say?

14



Find a work of art that has something to say about some aspect of a family or community. Why did you choose this work?

15



Find a work of art that has something to say about the differences between the modern world and the time of dinosaurs. What are the differences? Are some things similar?

16



Find a work of art that best describes the Cretaceous world for you. Notice your thoughts and feelings as you look. . . . How is it different or like your world?

17



Which Cretaceous animal is your favorite? Why? What do you know about it? How would you describe it?

18



Find an ocean environment. Look closely and think about swimming in the Cretaceous ocean. What would it be like?

19



Find a painting that you think is either scary or happy. Why did you choose the painting?

20



TAKING A CLOSER LOOK

1. DESCRIBE

- A. Choose a work of art to look at closely. Look at it quietly for 60 seconds. Then... Without looking back, list what you saw:

- B. Look again. Correct your list. What else do you see now that you missed the first time?

- C. Sketch a miniature drawing of this art object:



D. What materials did the artist use? What tools did s/he use?

E. How many different colors can you see? What names would you give the colors?

F. How many different kinds of lines can you find?

G. What words would you use to describe them?



H. How would you describe the object's texture?

I. How many different textures can you find?

J. Why did the artist use different textures?

K. How would you describe the object's overall shape?

L. How many different shapes exist within the overall shape?



2. ANALYZE

A. This work of art is mostly (check one):

___ Three-dimensional

___ Flat

B. On your sketch, mark where the focus of attention is in this art object.

C. How has the artist drawn your eye to this spot?

D. Why is this spot important?

E. Which of the design elements is most important in this work of art -- line, shape, texture, or color? Why?



F. How is the surface of this object decorated? What tools and materials were used to create this decoration?

G. What visual elements were used to create the decoration?

H. Where -- if at all -- does the artist use pattern on the object? Draw the repeating part of the pattern in the space below:



3. INTERPRET

I. What images -- if any -- does the object represent?

J. What is the purpose of this work of art? Imagine (then research) what the person who made this object was/is like?

K. If you were a reporter interviewing the art, what questions would you ask?

4. EVALUATE

A. How do you think the artist felt about this object?



B. Why do you think the artist created this work?

C. How are the artist's personal beliefs or values revealed?

D. How easy is this work of art to understand?

E. What else would you like to know?



F. Is this a work of art you would like to own?

Why or Why not?

G. If you would not like to own this art work, why do you think it is in this collection?

*** Make good notes. When you are back in your classroom you will write a report or story about the work of art or object.

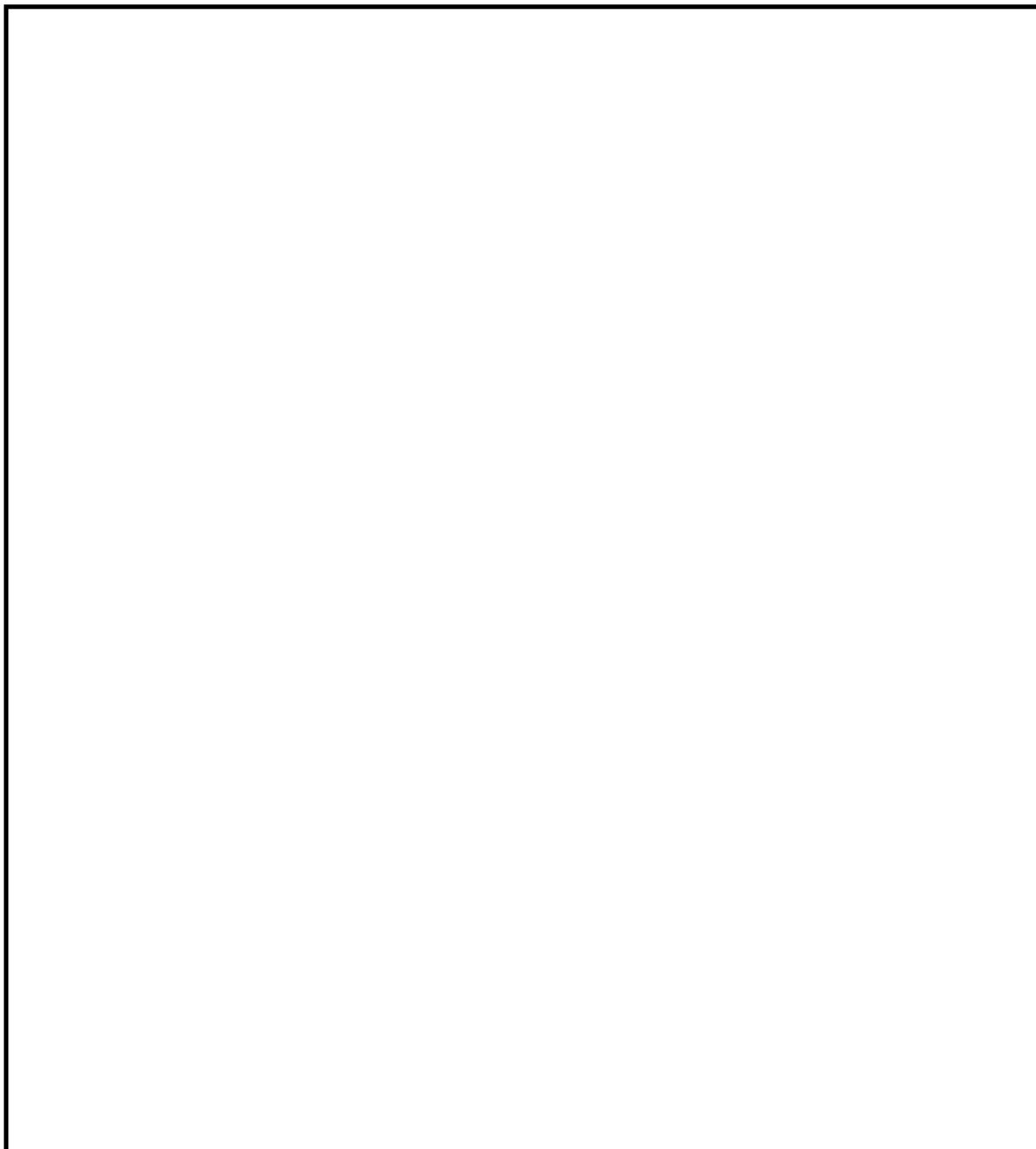




PICTORIAL PASTICHE

Choose ONE art element (shape, design, color, subject, texture, line, etc.) that you like from THREE of the paintings, photographs or drawings in this room.

Create your own image below using these THREE elements you found in the different artworks.



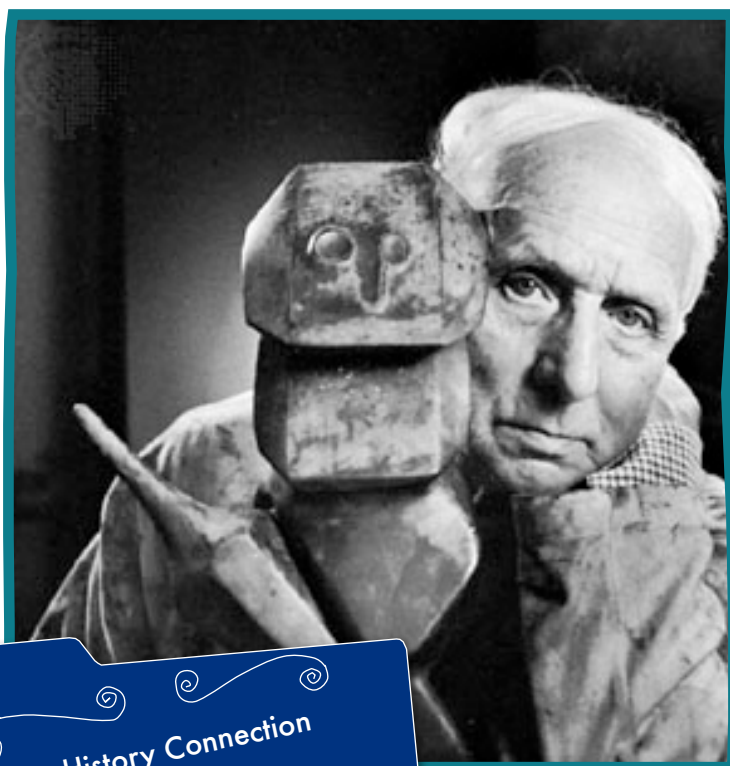
ENGAGING STUDENTS | ACTIVITY | PICTORIAL PASTICHE



CRETACEOUS FROTTAGE

Frottage

Seeing means usually you open your eyes and you look to the outside world. You can see another way: you close your eyes and you see into the inner world. I believe the best to do is to have one eye closed and to look inside. With the other eye, you have it fixed on reality, what is going on in the world. If you can make a kind of a synthesis of these two important worlds you come to a result which can be considered a synthesis of the objective and subjective life ... Max Ernst



Art History Connection
Max Ernst

Art Element: TEXTURE

Visual Texture: We can only see it.

Tactile Texture: We can feel it.



CRETACEOUS GLUE LINE DRAWINGS FOR CRAYON RUBBINGS



CRETACEOUS FROTTAGE

How Did Max Ernst Discover Frottage?

Max Ernst started using the frottage technique in his work in 1925. As some might still recall from their childhood days, this technique involves laying a piece of paper on a structured surface and making a rubbing of its texture with a pencil. By his own admission, Max Ernst discovered this technique for himself on the rainy afternoon of August 10, 1925, when he observed a washed-out wooden floor in a hotel on the French Atlantic coast. The floor's structure inspired him to place a piece of paper on the floorboards and then transfer its textures to the sheet with graphite.



Aside from wood boards, he also utilized textures from leaves, bark, thread, straw, textiles, netting, and dried paint as the starting point of his frottages. He regularly shifted the paper while rubbing. In 1925 he put together a selection of thirty-four frottages for the portfolio "Histoire naturelle", which he exhibited and published.

The patterns and forms that became visible turned into independent and unique landscapes, objects and creatures that had to be found and, if necessary, highlighted with a pencil. This is how Max Ernst developed a technique called "frottage", which he would often make use of later on and also adapt to oil painting.



What common materials could you rub to create a frottage?

Plexiglass

Wood

Bark

A piece of rough paper

Leaves

Your desk top at school

Dried glue line drawings

Textured Fabrics

A FROTTAGE CAN ALSO BE CALLED A RUBBING!

In **frottage** the artist takes a pastel, crayon or pencil or other drawing tool and makes a **rubbing** over a textured surface. The drawing can be left as it is or used as the basis for further refinement. While seeming similar to brass rubbing and other forms of rubbing intended to reproduce an existing subject, and in fact sometimes being used as an alternate term for it, frottage can also be a chance act and random in nature.



CRETACEOUS FROTTAGE USING PRE-MADE, GLUE-LINE PLATES

Discovery Center Activity: How to Make the Best Rubbings

1. Step one: gather all the materials you need to make rubbings: dry glue Cretaceous plates, mid-weight paper, Crayola crayons, etc.
2. Place the piece of clean paper over the dry glue plate. For little kids, it helps to secure the paper and plate with bits of tape so that it doesn't move around. This will help their prints stay nice and crisp.
3. Next, remove the crayon wrapper and break the crayon in half. use the flat side of the crayon (not the tip) to rub across the surface of the paper. Press down hard. Soon you will start to see your art emerge. You can rub softly at first and then increase in intensity if you don't see the image appearing on the paper. (You could use a couple of colors for this step.)
4. Once you can see the entire texture and shape through the paper, hold it up and take a look. Do you see how the textures show through into your colorful rubbing?
5. Once your rubbing is complete you could color it with soft pastels, watercolor, more crayons... or just leave it as a line rubbing.
6. See frottage and accordion book technique demonstration videos at wetumpkacraterart.org on the docents & guides page - (Under the LEARN tab.)



About Max Ernst

Born April 2, 1891, Brühl, Germany —
Died April 1, 1976, Paris, France

- Max Ernst was a German painter, sculptor, one of the leading advocates of irrationality in art, and an originator of the Automatism movement of Surrealism. His youthful interests were psychiatry and philosophy, but he abandoned his studies at the University of Bonn for painting.
- After serving in the German army during World War I, Ernst was converted to Dada, a nihilistic art movement, and formed a group of Dada artists in Cologne; with the artist-poet Jean Arp, he edited journals and created a scandal by staging a Dada exhibit in a public rest room. More important, however, were his Dada collages and photomontages, such as “Here Everything Is Still Floating” (1920), a startlingly illogical composition made from cutout photographs of insects, fish, and anatomical drawings ingeniously arranged to suggest the multiple identity of the things depicted.
- In 1922 Ernst moved to Paris, where, two years later, he became a founding member of the Surrealists, a group of artists and writers whose work grew out of fantasies evoked from the unconscious. To stimulate the flow of imagery from his unconscious mind, Ernst began in 1925 to use the techniques of frottage (pencil rubbings of such things as wood grain, fabric, or leaves) and decalcomania (the technique of transferring paint from one surface to another by pressing the two surfaces together). Contemplating the accidental patterns and textures resulting from these techniques, he allowed free association to suggest images he subsequently used in a series of drawings (“Histoire naturelle,” 1926) and in many paintings such as “The Great Forest” (1927) and “The Temptation of St. Anthony” (1945). These vast, swamp-like landscapes stem ultimately from the tradition of nature mysticism of the German Romantics.
- After 1934 Ernst’s activities centered increasingly on sculpture, using improvised techniques in this medium just as he had in painting.
- At the outbreak of World War II, Ernst moved to the United States, where he joined his third wife, the collector and gallery owner Peggy Guggenheim, and his son, the American painter Jimmy Ernst. While living on Long Island, N.Y., and after 1946 in Sedona, Ariz. (with his fourth wife, the American painter Dorothea Tanning), he concentrated on such sculptures as “The King Playing with the Queen” (1944), which shows African influence. After his return to France in 1949, his work became less experimental: he spent much time perfecting his modeling technique in traditional sculptural materials.

HOW TO MAKE A CRETACEOUS CREATURE ACCORDION BOOK



These are the steps we walk through when we make accordion books with kids:

1. Start with a long strip of paper
 2. Fold it in half, matching up the corners of each end of the strip.
 3. Press the paper flat with the palm of your hand. Make a crease along the folded end of the strip
 4. From the side your paper should be in the shape of the letter “V,” for “Valley.”
 5. Fold down one side of the “V,” back down towards your first fold. Press it flat with your palm and fingers.
 6. Fold down the other side of the “V,” back down towards your first fold. Press it flat with your palm and fingers.
 7. From the side, your paper should be in the shape of an “M,” for “Mountain.”
- Now you have an 8-page accordion book!

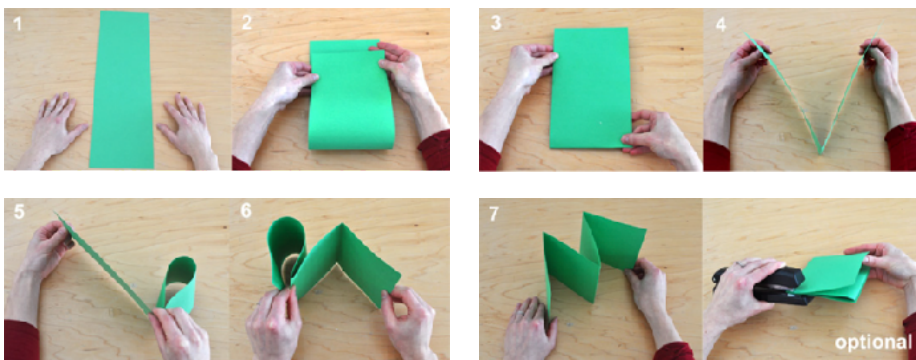
Optional: Staple your accordion book along the edge to create pages that turn. This style is called a pamphlet book.

For kids just learning to fold, starting with a small strip of paper (not larger than 4.5” x 12”) helps them keep control of the paper. **We also have printable templates with lines.**

Experienced folders might experiment size/dimensions of the paper to see how they effect the shape and size of the book.

In addition to being a fast means to story-making, accordion book-making is also a great way to learn about the $\frac{1}{2}$ and $\frac{1}{4}$ (and even $\frac{1}{8}$ fractions).

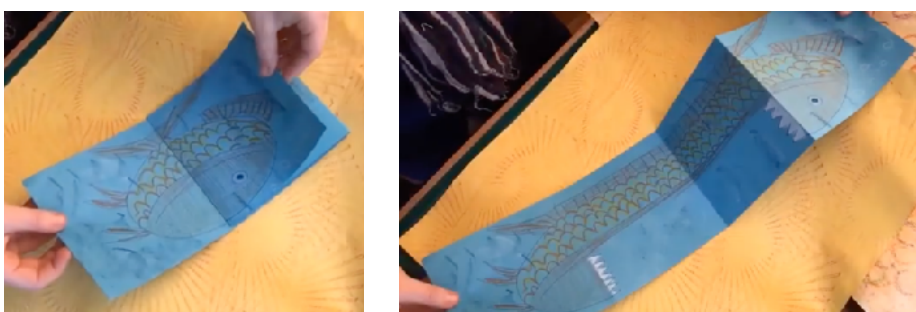
See frottage and accordion book technique demonstration videos at wetumpkacraterart.org on the docents & guides page - (Under the LEARN tab.) We also have a printable Accordion Book Template for your convenience.

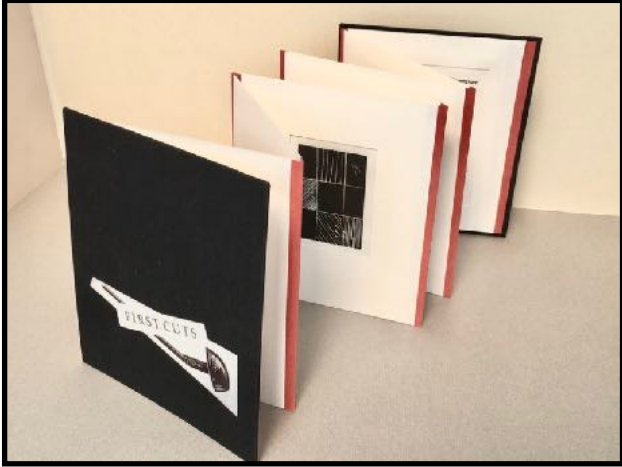


This could be an art, writing, geology or science activity.

It is really the docents choice according to his/her focus during the student tour and the stated goals of the school or teacher.

OR MAKE A SURPRISE ACCORDION BOOK



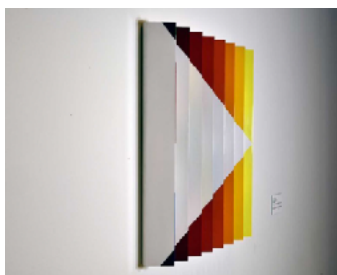




GET INSPIRED BY YAACOV AGAM



front view



left view



right view

Yaacov Agam (Israeli, born 1928), Paris, 1980, acrylic on aluminum mounted on board; 30 1/8 × 33 1/4 × 4 inches (Frame, white acrylic and plywood mounting board: 38 × 41 × 1 inch). Gift of the Estate of Gladys M. Rubinstein, 2014.101a-b.

The Israeli artist **Yaacov Agam** is an early pioneer of the Kinetic Art movement, which refers to art that is set in motion or has appearance of movement, and was generally created between the 1920s and 1970s. Agam also advanced Op Art, an important development in painting internationally, in which the use of geometric forms and patterns created optical effects. This artist is known for his optical and kinetic art. To create his agamographs, he used “lenticular printing.”

As one interacts with Paris, the viewer experiences shapes, lines, and colors changing within the piece. The colors and patterns of the work emerge and disappear depending on one’s viewpoint—moving from one side or the other reveals two different images—one black-and-white, and the other color. Standing directly in front of the work results in yet a third set of colors and patterns.

Agamographs

Make your own Agamograph inspired by the work of artist Yaacov Agam. Learn about Op Art and Kinetic Art and create the illusion of movement through a three-dimensional relief.

What is Op Art?

Op Art is short for Optical Art—and refers to the way we see. Artists use shapes, colors and patterns to create illusions—something that appears different than what it is. Op Art typically utilizes geometric shapes and contrasting colors to challenge visual perception, either with hidden images or by making things appear as if they in motion.

What is Kinetic Art?

Kinetic Art involves motion. Some artists create works that operate mechanically or move with air currents, while others encourage viewers to move in different positions to experience the full visual effect of their work.

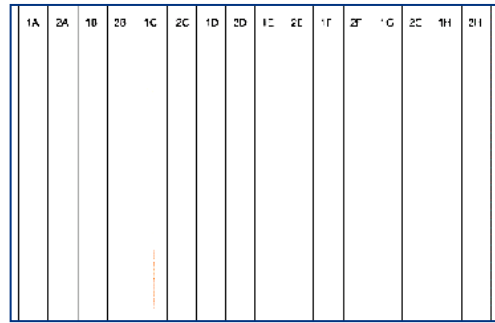
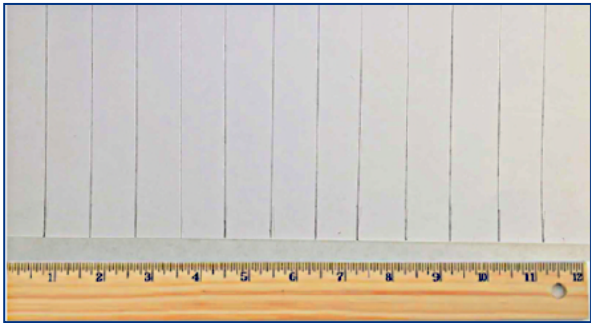


Supplies:

- Pencil
- Coloring tools of your choice (markers, pencils, crayons, paints, etc.)
- Two sheets of paper the same size and one larger that is the same length as the two combined)
- Ruler
- Glue
- Tape
- Scissors
- Instructions

Step 1

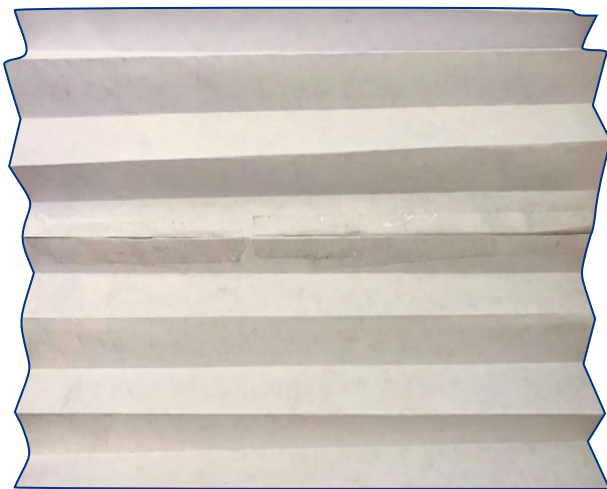
Using two sheets of 8.5 x 11 white paper and a pencil, evenly measure and mark lines at the top and bottom of the long edge of the paper (horizontally). Connect the top and bottom marks with a ruler to create guidelines for folding. Or use the template we have created.



Step 2

Fold the paper along the lines in a fan or accordion fold; fold back and forth across the length of the paper so it stacks on top of itself.

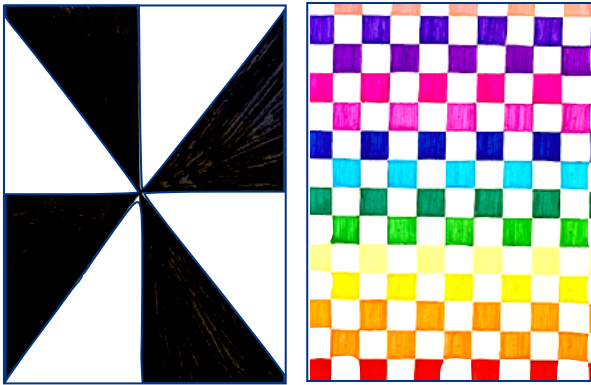
Tip: Fold along the lines first to create a crease, then go back and fold in the opposite direction, like a fan. Unfold and lay it on a flat surface. **Repeat the same sequences on the front of the folded sheets of paper alternating folds with the corresponding numbers. Use A sequence for the left sides of the folds, and B sequence for the right sides of the folds. Our template has these already printed for you.**





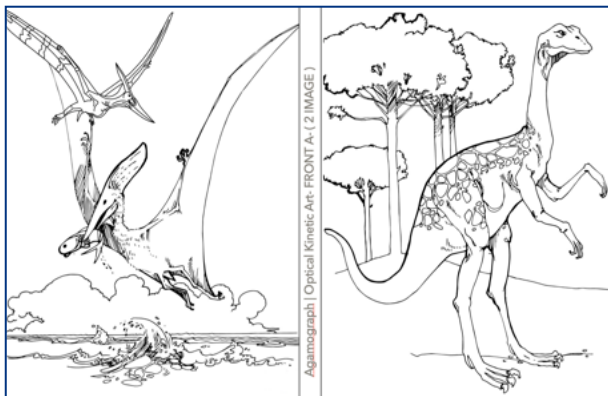
Step 3

On new sheets of paper, sketch out two different designs. Or use the templates we have created. Be sure to add color! You might consider exploring a theme with similar or contrasting images, such as opposite seasons (summer and winter) or different shapes (geometric and organic) or two different color schemes (such as warm and cool or primary and secondary.)

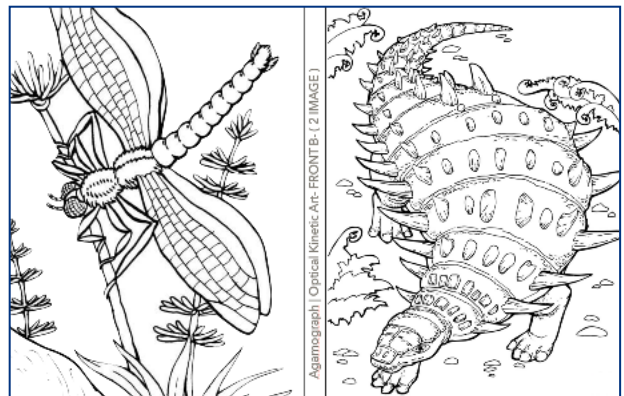


***NOTE:** Students will be making a work that has subject matter related to the Cretaceous period or meteor impact events like the options below.

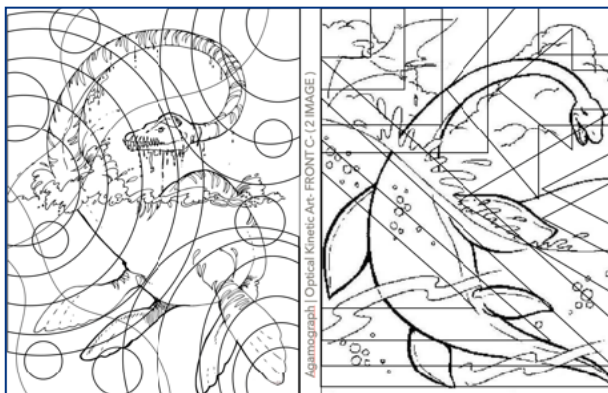
Option A: Opposites Color Scheme



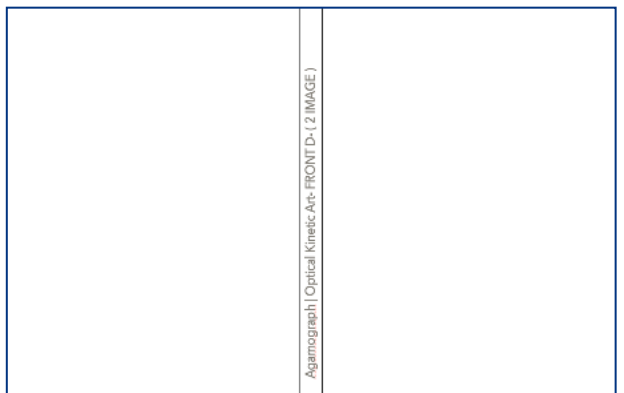
Option B: Concentric Lines & Opposites Color Scheme



Option C: Circular and Angular Overlay & Opposites Color Scheme



Option D: Draw your own & Opposites Color Scheme

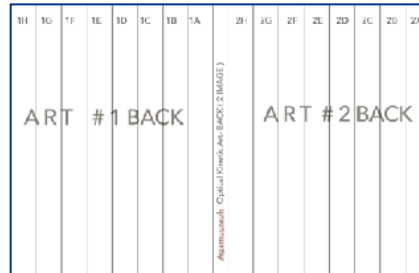
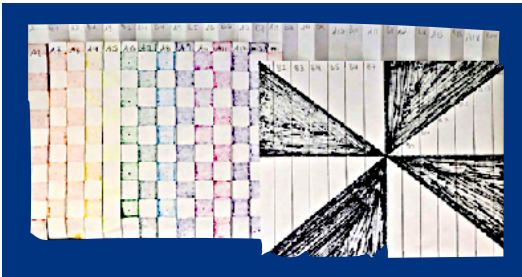




Step 4

Once you have completed your drawings, measure and mark on the backside using the same width as your larger folded paper. Our template has these already printed for you.

Tip: Rather than re-measuring, you can align your drawings to the creases of your folded paper, mark the top and bottom with a pencil, and then use a ruler to connect the lines. On the back of each drawing, label the sections between the folds in order: A1, A2, A3, etc. for one, and B1, B2, B3, etc. for the other. Our template has these already printed for you.



Step 5

Carefully cut your first drawing into strips along the measured lines. As you do so, lay out the pieces right side up on your folded paper with the matching numbers. This will ensure that your drawing is in the correct order. Glue your strips to the folded piece of paper. Repeat this process with your second drawing.

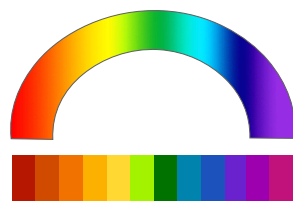
•Tip: Once the glue has dried, you might need to re-fold the creases so that they are more pronounced.



Step 6

Glue the finished work to a backing.

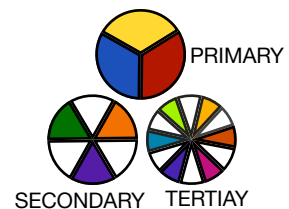
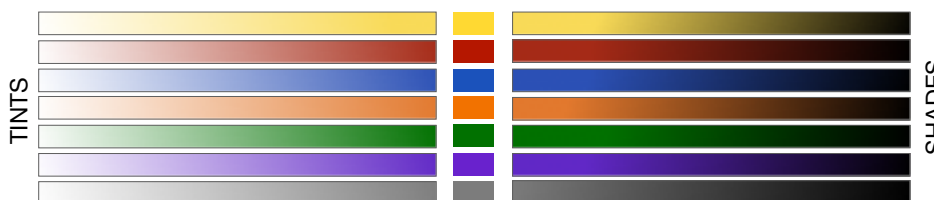
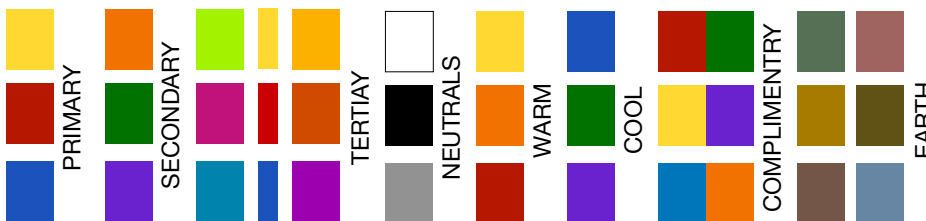
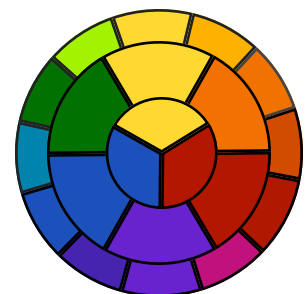
Watch a video about making and constructing Agamographs: techniques & demonstration at wetumpkacraterart.org on the docents & guides page - (Under the LEARN tab.)

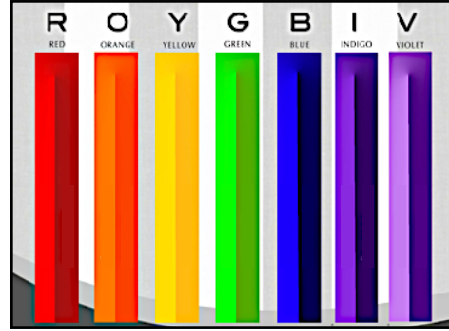
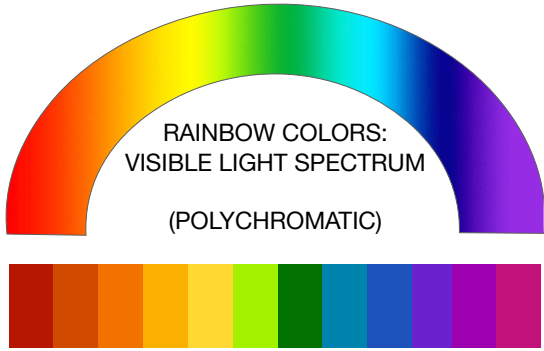


RAINBOW COLORS:
VISIBLE LIGHT SPECTRUM

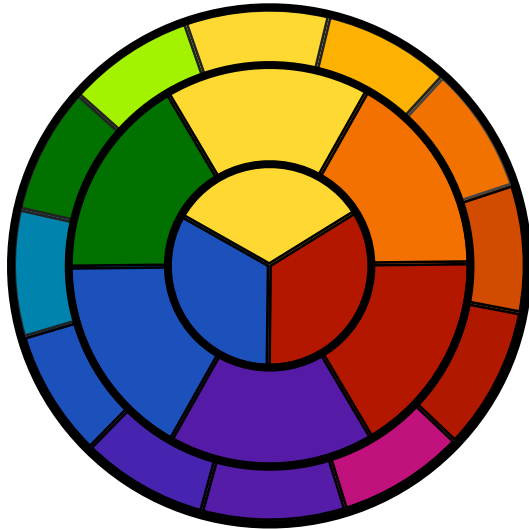


COLOR WHEEL

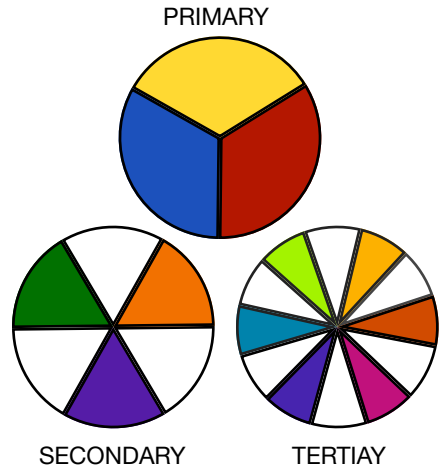




COLOR THEORY



COLOR WHEEL



| | | | | | | | | | |
|----------------|------------------|--|--|-----------------|-----------------|-------------|-------------|---------------------|--------------|
| | | | | | | | | | |
| PRIMARY | SECONDARY | | | TERTIARY | NEUTRALS | WARM | COOL | COMPLIMENTRY | EARTH |
| | | | | | | | | | |

| | | |
|--------------|--|---------------|
| TINTS | | SHADES |
| | | |

SPLIT COMPLIMENTRY

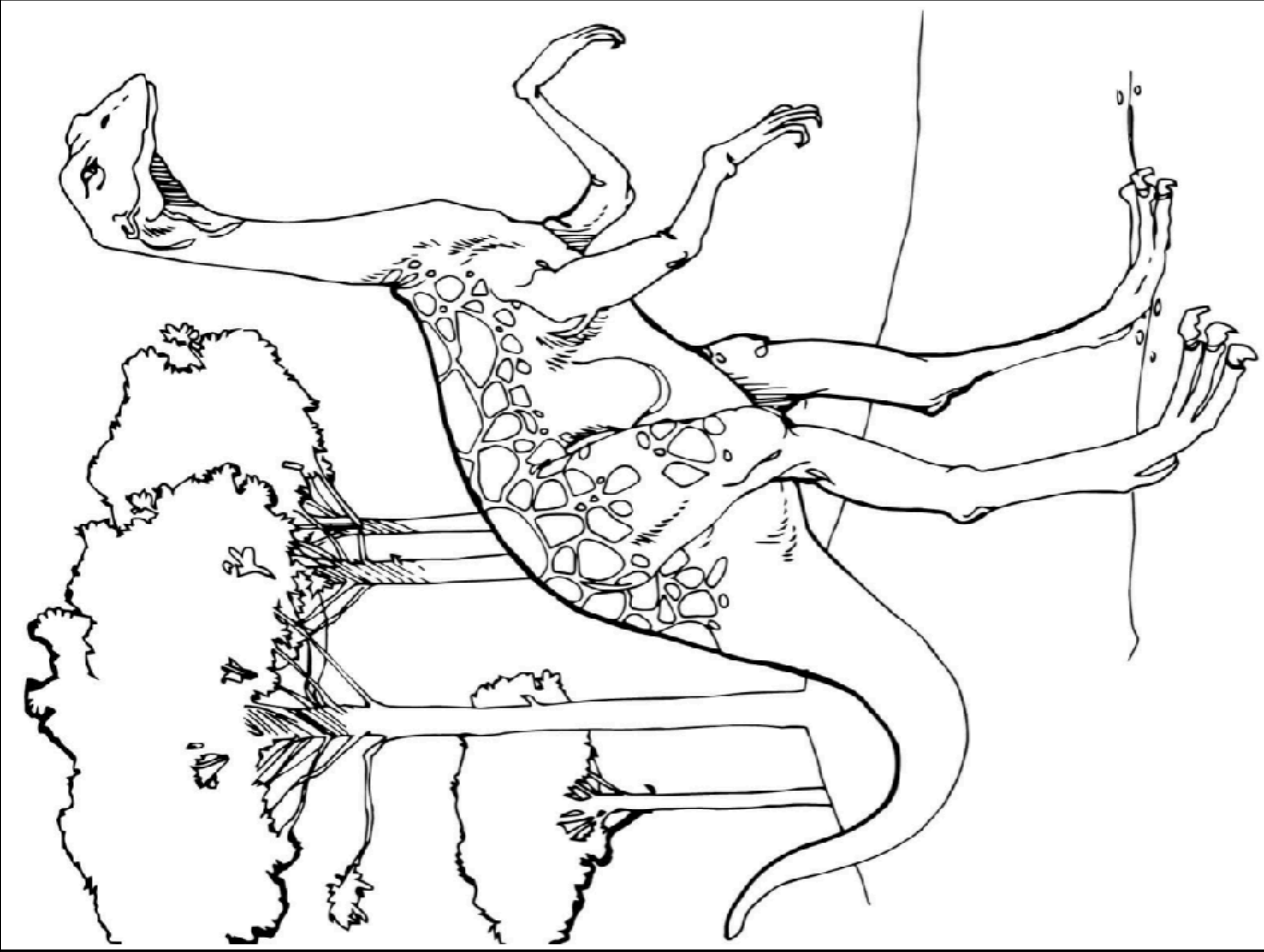




| | | | | | | | | | | | | | | | | | |
|--------------|----|----|----|----|----|----|----|--|--|----|----|----|----|----|----|----|----|
| 1H | 1G | 1F | 1E | 1D | 1C | 1B | 1A | Agamograph Optical Kinetic Art- BACK (2 IMAGE) | | 2H | 2G | 2F | 2E | 2D | 2C | 2B | 2A |
| ART # 1 BACK | | | | | | | | ART # 2 BACK | | | | | | | | | |

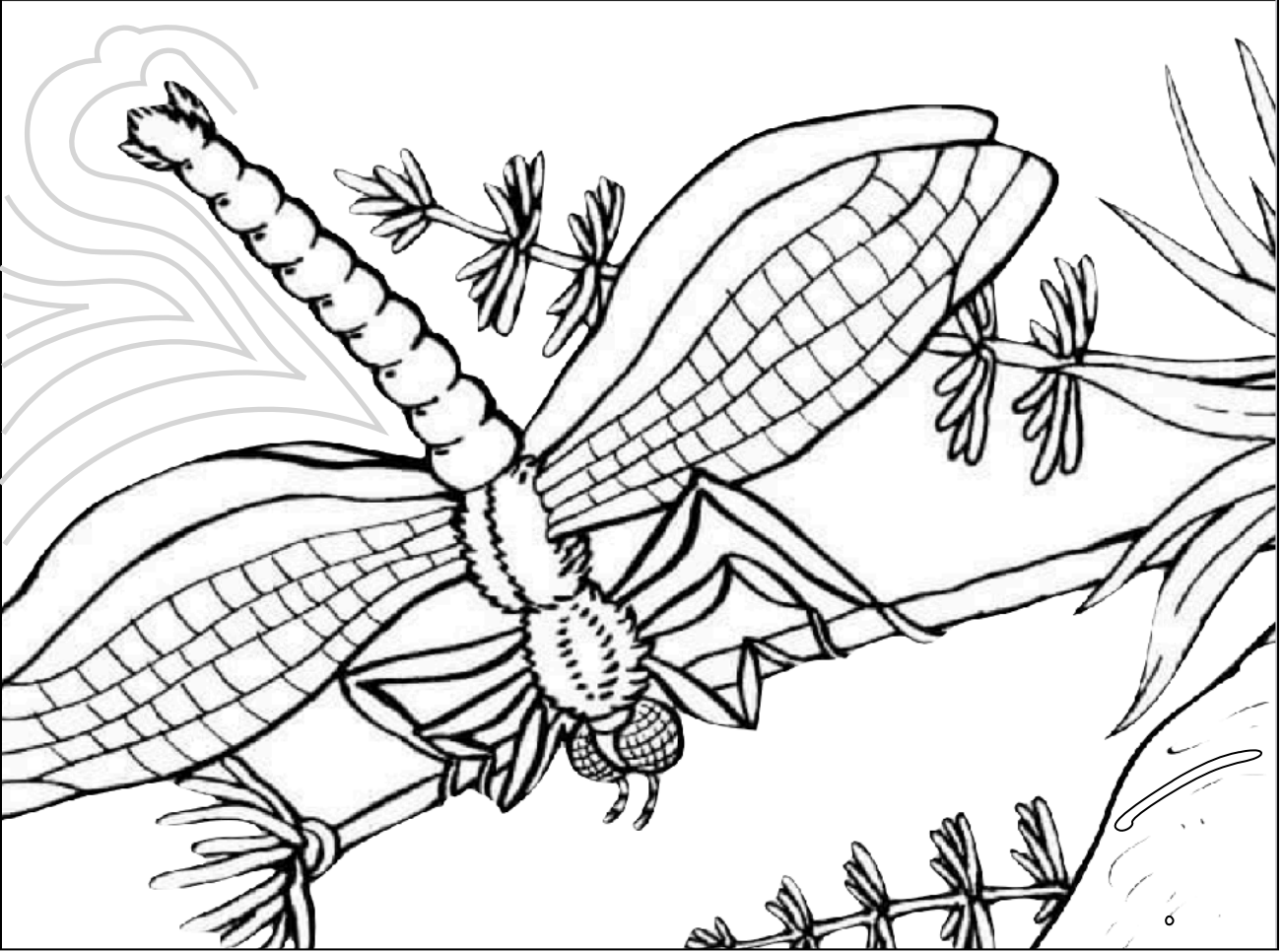


Agamograph | Optical Kinetic Art- FRONT A- (2 IMAGE)

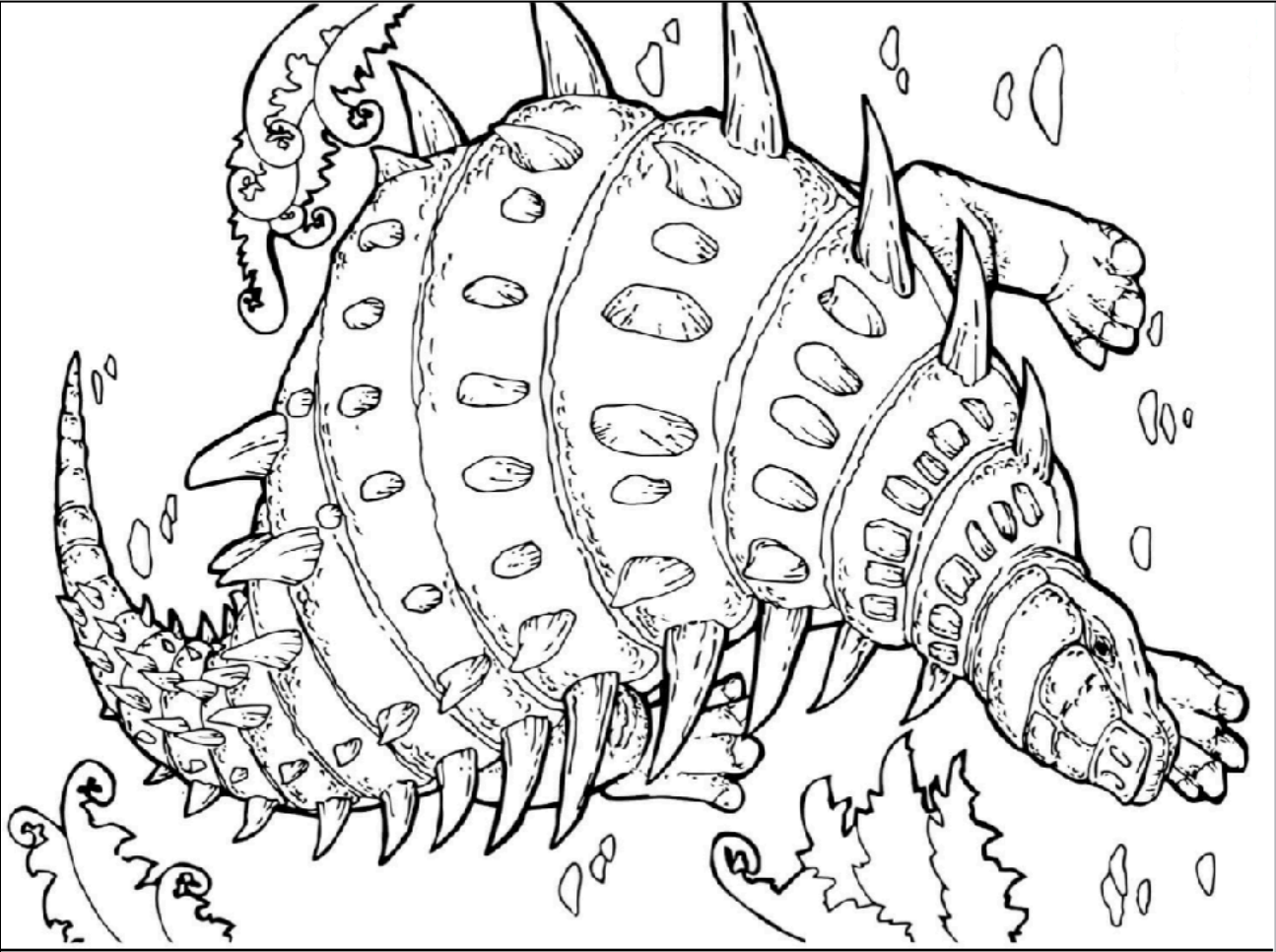


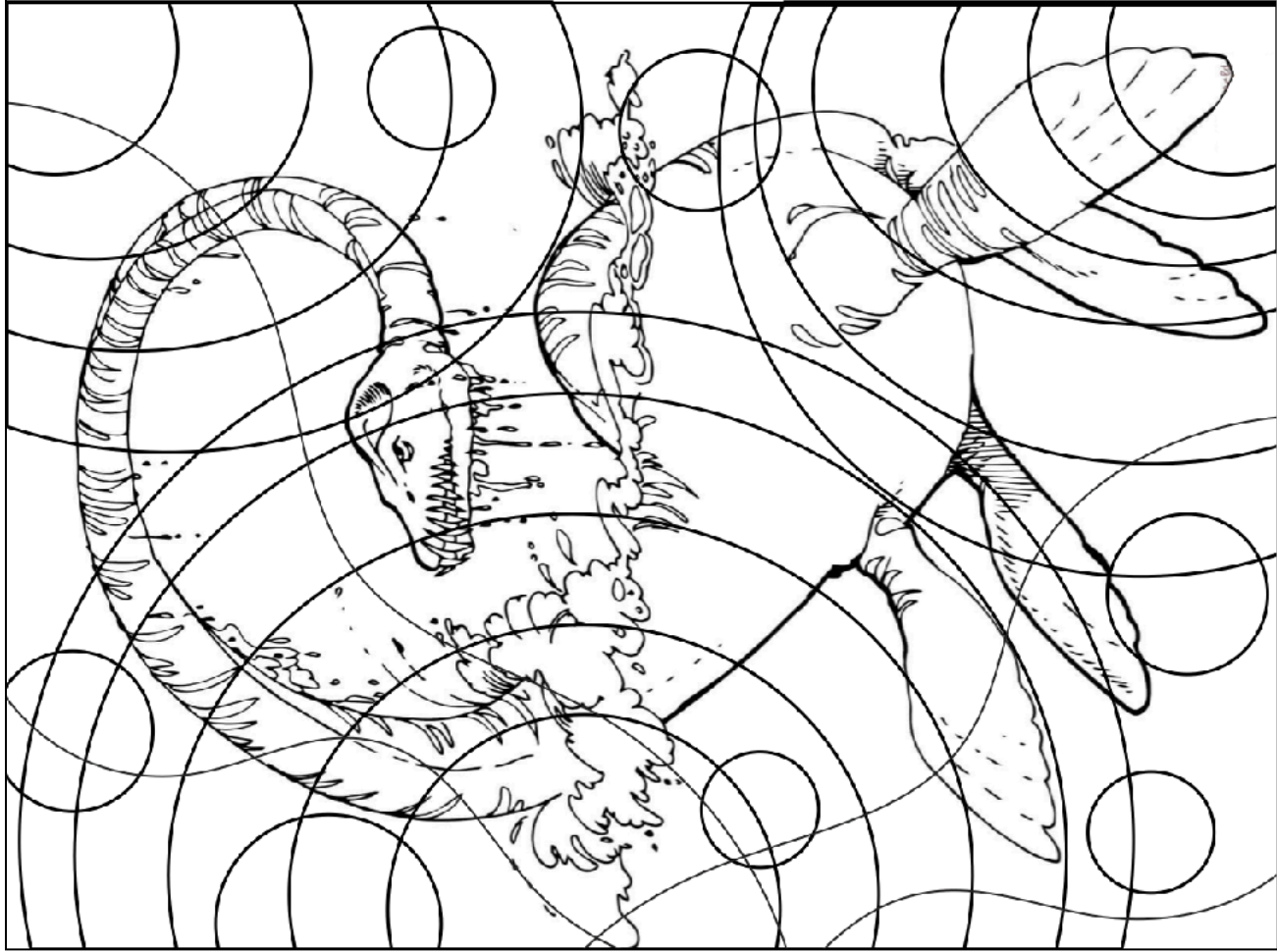
Option B: Concentric Lines & Opposites
Color Scheme
© P.Hope Brannon 2023

Draw Concentric lines in all of the negative spaces (blank spaces) on both images even the small ones. Concentric lines follow the edges of an object and continue to repeat all the way to the edge of the frame. As an example we have drawn several light gray lines at the top of the dragonfly.

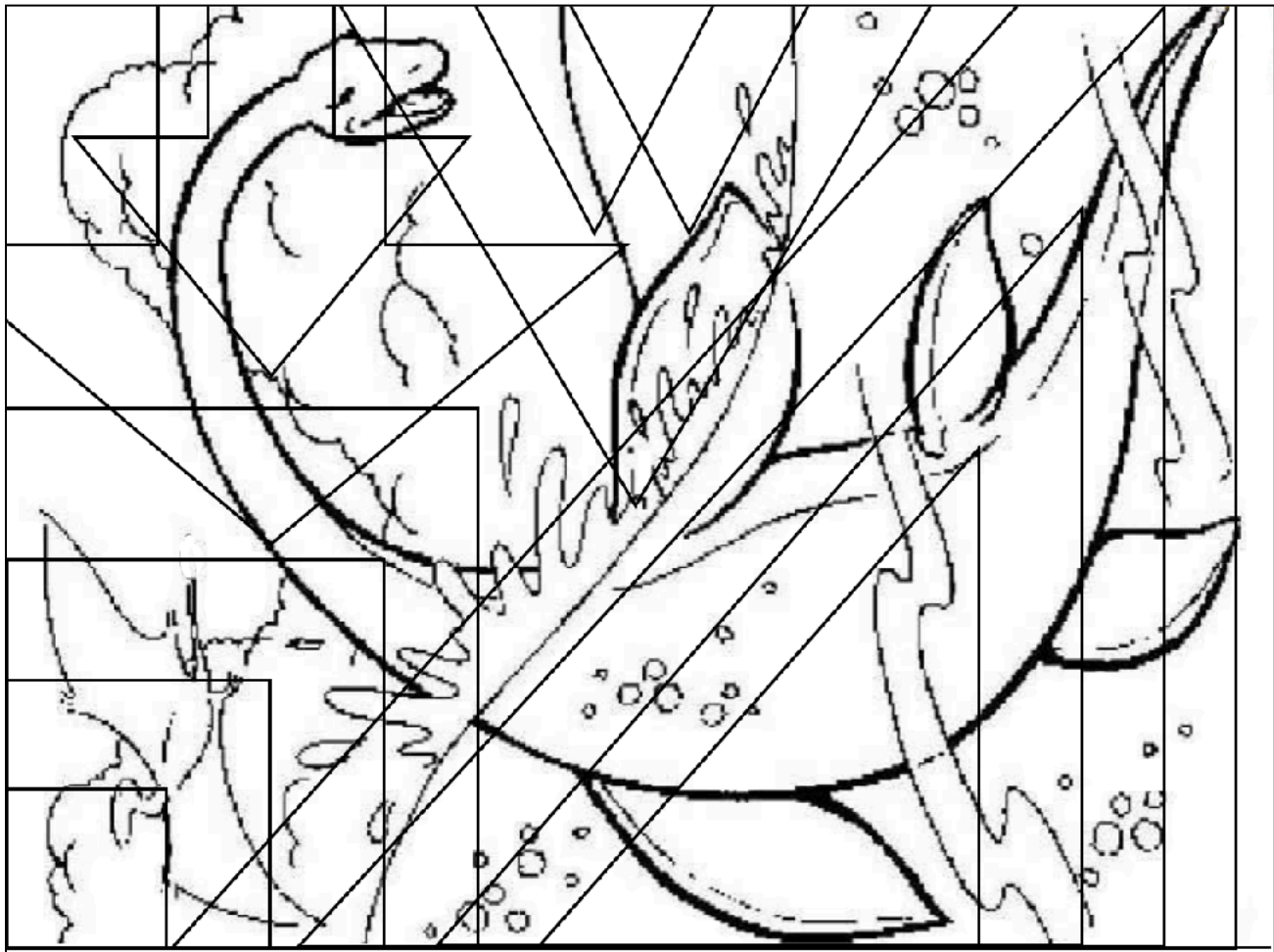


Agamograph | Optical Kinetic Art- FRONT B- (2 IMAGE)





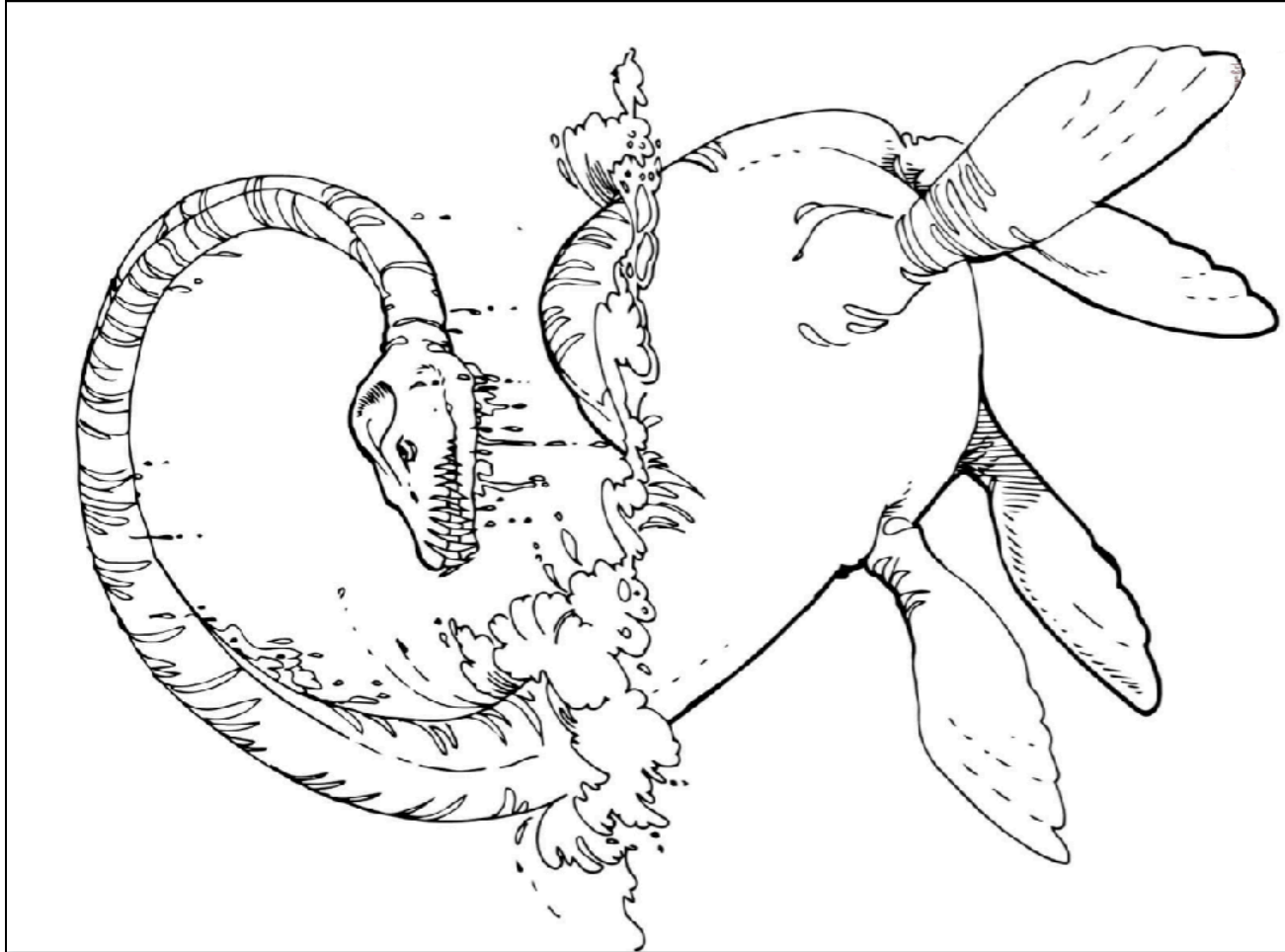
Agamograph | Optical Kinetic Art- FRONT C- (2 IMAGE)



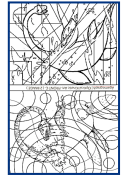
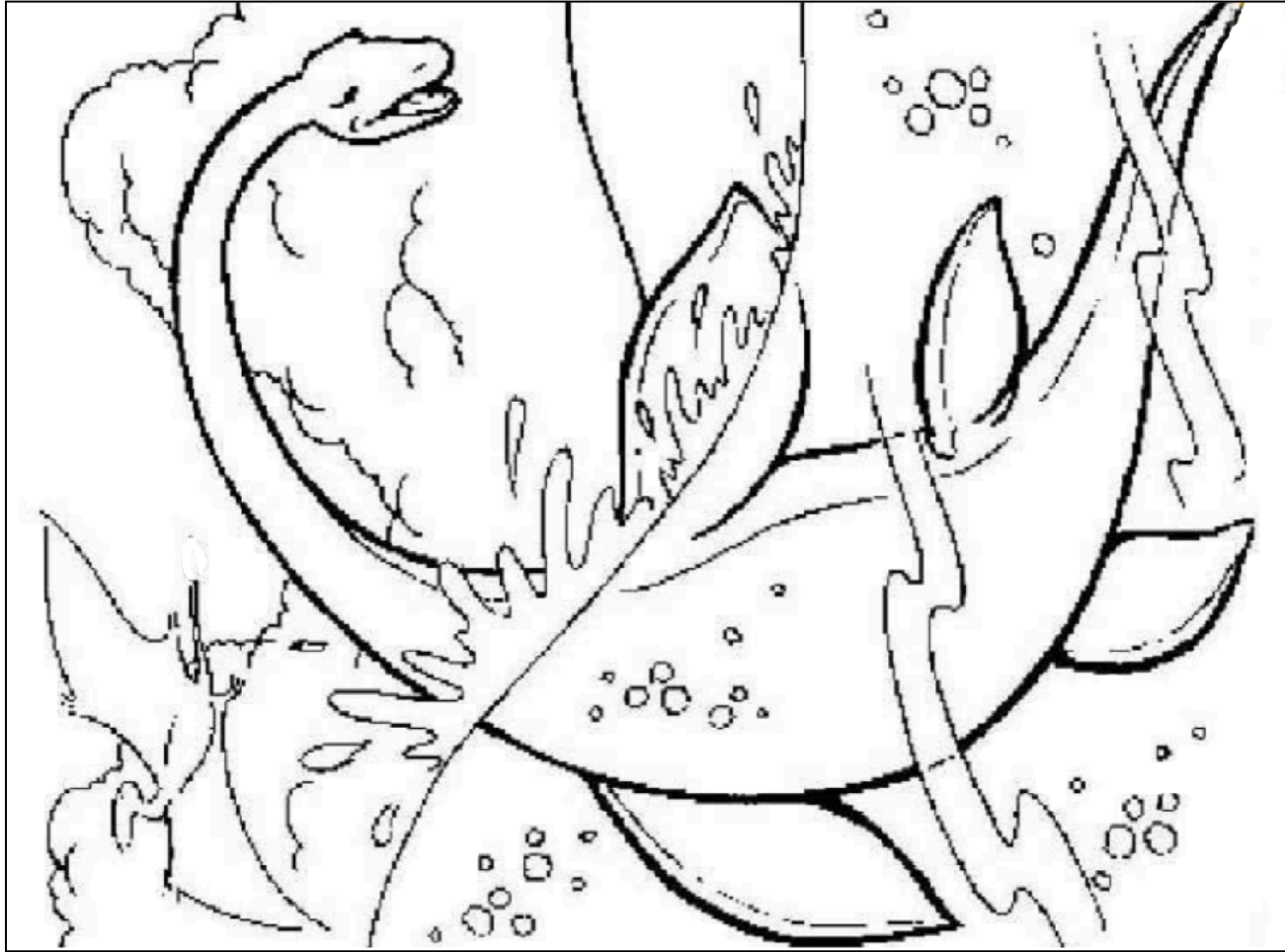
This side: Add your own curvilinear or circular lines and shapes on top of the entire image like Ca..

Option Cb: Circular and Angular Overlay & Opposites Color Scheme

This side: Add your own angular lines and shapes on top of the entire image like Ca.



Agamograph | Optical Kinetic Art- FRONT C- (2 IMAGE)



Option D: Draw your own images & use an Opposites Color Scheme of your choice.

© P.Hope Brannon 2023

| | | |
|--|--|--|
| | Agamograph Optical Kinetic Art- FRONT D- (2 IMAGE) | |
|--|--|--|





CREATIVE WRITING – Poetry for Kids FIVE STEP

Choose a painting or object.

Pick a subject from the painting.

1. Write down the noun—a person, place or thing.
2. On the line below that, write two adjectives – words that describe the noun. Separate the two adjectives by a comma.
3. On the third line, write three verbs that tell what the noun on the first line does. Separate the verbs by commas.
4. On the fourth line, write a thought about your noun. A short phrase will do nicely.
5. For the fifth line, repeat the word you wrote on the first line, or write down a synonym or some other related word.

1. Trees
2. Shady, Bare
3. Branching, Blooming, Growing
4. They eat your kites.
5. Trees

1. Commercials
2. Clever, Colorful
3. Stupid Amuse, Inform,
4. Boring, icebox time.
5. Commercials

Title _____

1 _____

2 _____

3 _____

4 _____

5 _____





CREATIVE WRITING – Poetry for Kids SEVEN STEP

Choose a painting or object.

Pick a subject from the painting.

1. Write down a write down the subject’s name (noun). At this point you may want to skip to line 7 and write the opposite of this noun.
2. On the second line, write two adjectives which describe the noun.
3. On the third line, write three participles (verbs that end in-ing or-ed).
4. On the fourth line, write down four nouns related to the subject. The second two nouns may have opposite meanings from the first two.
5. On the fifth line, write three participles indicating change or development of the subject.
6. On the sixth line, write two adjectives carrying on the idea of change or development.
7. On the seventh line, write a noun that is the opposite of the subject.

1. Galaxies
2. Distant, huge
3. Glowing, turning, going
4. Space, mystery – energy, life
5. Glowing, circling, building
6. Tiny, basic
7. Atoms.

Title _____

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

7 _____





I WISH #1

This kind of poem illustrates a way of imagining. Every person lives partly in his wishes or dreams. We all know of things we would like to have happen even though they probably won't. Here is a chance for you to express a wish about one of the paintings or objects in the Discovery Center.

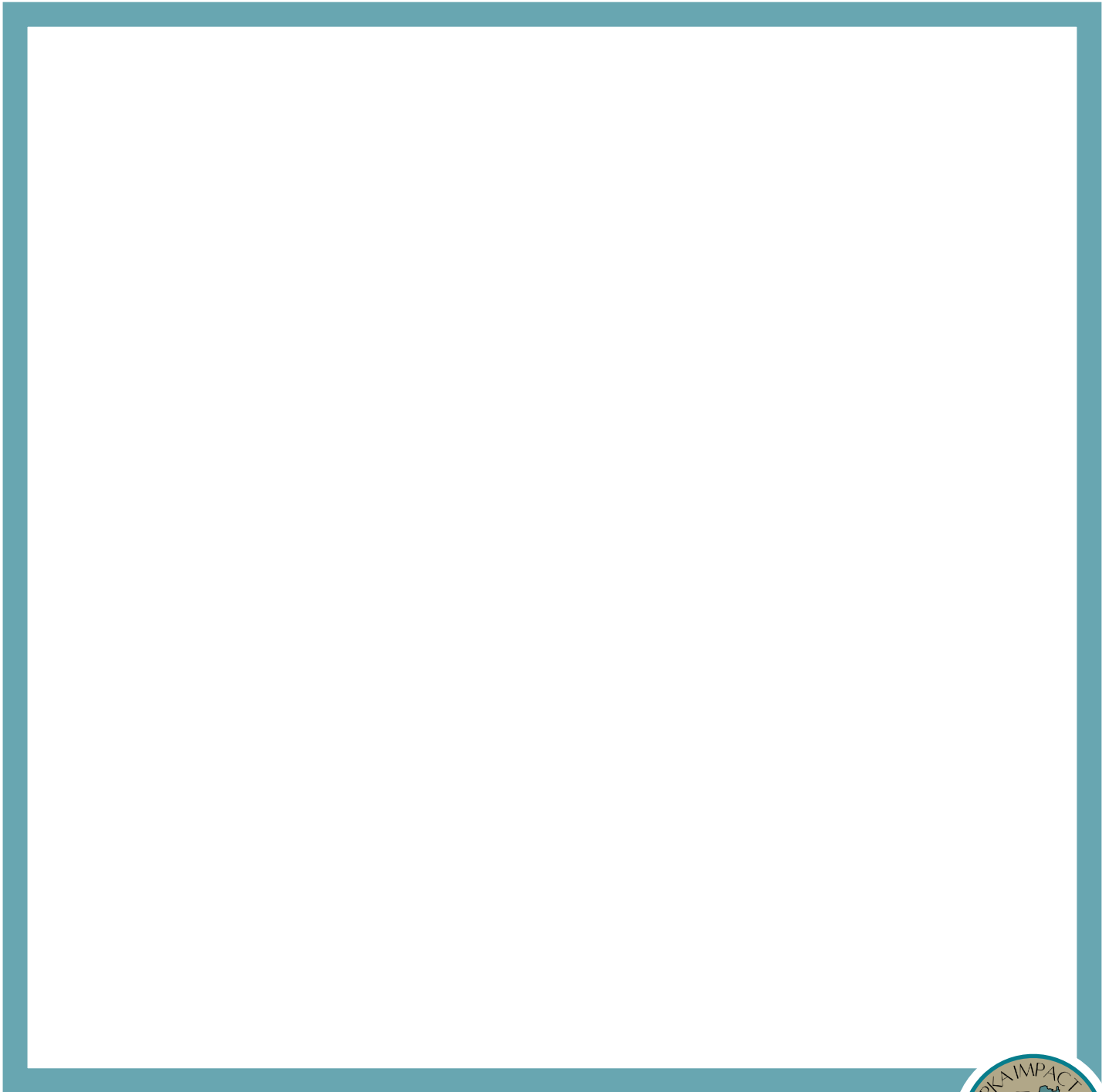
Just start each of your poems with "I wish..." Then complete the statement with whatever you wished for. The form is up to you, and so is the wish.

When you have completed your poem, you will need to illustrate it in the space below it.

I wish
I didn't have a toothache like a tambourine
a fever like a xylophone & a cough like a lazy bassoon.

I WISH...

By _____



I WISH...





By _____



I WISH #2 "I USED TO ... BUT NOW..."

These poems offer another way of imagining. They are basically like the wish poems in form with an extra phrase to guide your thought.

Here is a chance for you to express a wish about one of the paintings or objects in the Discovery Center.

I used to... What you once were or thought can be fact or fiction;
But now... should be a fact you have learned during our tour or already knew.

Examples;

I used to think the world ended one block away.

But now I wonder if there are some signs somewhere saying "You are now leaving the universe."

I used to be orange laughing at any foolish thing.

But now I'm purple and all I do is think.

I WISH...

I USED TO _____

BUT NOW _____



Title: _____

I USED TO _____

BUT NOW _____



By _____



HAIKU AND TANKA

Haiku is a form of verse invented in Japan centuries ago. It is a short verse form with three non-rhyming lines.

In Japan the three lines can have only 17 syllables –

- 5 in the first line,
- 7 in the second,
- and 5 in the third.

The magic of a good haiku lies in the power of suggestion, like the impact of a pebble tossed into a pool. The poem portrays a moment of vivid perception, rippling across your imagination.

5 The meteor struck
7 Wind hurled the spirits about;
5 Leaving dead, dry leaves.

5 The mighty wind blows
7 A hot dry wind descends
5 Nothing left but ash.

5 Big fish in the sea
7 Swimming, thrashing day and night
5 Hunting silly ammonites.

Tanka are related to haiku. They are also very popular. They are longer, and typically deal with a season of the year.

The five lines of the tanka Japan, run only slightly longer and strictly measure 5-7-5-7-7 syllables, but a tanka in English may consist of five short lines without any specific number of syllables.

5 Yellow, pink, and red
7 Flower blossoms everywhere
5 Blooming like popcorn;
7 Throughout the forests and fields
7 Just waiting for bees to drink.

5 An ashy snow fell
7 Over the land and trees.
5 Floating through the air
7 Like moths flying in the sun
7 And covered the craters rim.

Activity

Ask students to choose an object, painting or subject they have discovered or learned about on their tour at the Discovery Center. Students will then write a haiku and a Tanka about their chosen object, painting or subject and illustrate it.



HAIKU & TANKA



By _____



CLERIHEW

Clerihews, named after their inventor, **Edmund Clerihew Bentley**, are simple in form. Edmund Clerihew Bentley Loved words most intently and just for something to do he thought up the clerihew.

- The first two lines rhyme with each other
- and the third and fourth lines rhyme with each other. *See below...

Charlie Brown
Is perpetually down.
And when Lucy comes by,
He's certain to "SIGH."

Write your own Clerihew about one of the following:

- The Wetumpka impact crater
- The Cretaceous period
- One of the paintings on display
- One of the animals in the Discovery Center
- One of the objects in the Discovery Center

| |
|--------------|
| Title: _____ |
| _____ |
| _____ |
| _____ |
| _____ |
| By _____ |



CONCRETE POETRY

When is a poem more than a poem? When it's also a picture. Concrete poems create an actual picture or form on the page, appealing to the eye as well as to the heart and mind.

SOME TACTICS FOR TALKING AND THINKING ABOUT A PAINTING OR OBJECT

Describe the object or art.

What attracts you to this work of art?

Was it the technique or the content that first caught your attention?

What medium is used?

On what is it painted?

With what do you think the artist applied the paint?

Look carefully at the surface of the painting.

Is it rough or smooth?

Is the paint thick or thin?

Is the paint opaque or transparent?

Does there seem to be a single layer or are there many layers of paint?

Is the surface uniform or does its character change from one area to another?

If there are changes, do they correspond to the content or what is represented?

Consider the colors.

Do you think that the medium the artist used had any effect on the colors?

Was color an important factor in your choice of this painting?

Try to imagine the painting if it were painted in a different medium...in the same medium but with a different technique.

Do you think you would still respond to the picture in the same way?

If you were an art critic writing a Concrete Poem for a local newspaper, what are some of the words or phrases you might use to describe this painting in your column?

Compose your Concrete Poem.

ILLUSTRATING THE CRETACEOUS PERIOD:
ALABAMA'S LIFE, ENVIRONMENT OR WETUMPKA METEOR IMPACT



TOPICS:

CRETACEOUS ENVIRONMENT BEFORE IMPACT

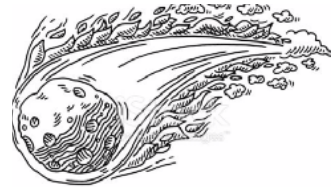
1. Cretaceous Life on Land
2. Under the Sea
3. Beaches & Tropical Environment
4. Barrier Islands & Inland Sea
5. Life in the Understory
6. Swamps and Estuaries

CRETACEOUS LIFE BEFORE IMPACT

7. Angiosperms & Plant Life
8. Dinosaurs
9. Flying Reptiles & Birds
10. Marine Reptiles
11. Cretaceous Fish & Turtles
12. Cretaceous Amphibians
13. Cretaceous Lizards
14. Cretaceous Crocodiles
15. Mammals
16. Insects
17. Invertebrates

METEOR IMPACT EVENTS

18. Meteor Approaches Earth from Space
19. Meteor Enters the Earth's Atmosphere
20. Contact and Compression in Shallow Sea
21. Excavation and Ejection of Rock Debris
22. Excavation and Earthquake
23. Hurricane Force Winds
24. Falling Rocks
25. Modification and Trans-Crater Slide:
The Cliffs
26. Modification and Tsunami
27. Crater Forms and Southern Rim Collapses
28. Later the Crater Becomes a Terrestrial
Island
29. Crater Buried in Sediment
30. Wetumpka Impact Crater Revealed



A PARTING ACTIVITY
DINOSAUR DANCE VIDEO: 15 MINUTES



When you see the PRACTICE slide/section of the image below, there are pauses that will give you time to practice with your group so they can learn the dance moves.

Otherwise the video will lead you and the group through what you and your group will be doing. You will need to participate with the group throughout the video.

*NOTE - This activity will not be successful if you just stand and watch.

The video will be in the Discovery Center and also on the wetumpkacraterart.org website on the Docents & Guides page.

The image shows a video frame for "Dinosaur Dance Practice". On the left, there is a green T-Rex illustration above the text "DINOSAUR DANCE PRACTICE" in large, colorful, block letters. The rest of the frame is divided into seven numbered panels, each showing a woman in a tan vest and black pants performing a different dance move in a forest setting:

- 1 Walk**: The woman is walking forward with her right leg raised.
- 2 Talk**: The woman is standing still with her hands raised in a "talking" gesture.
- 3 Shake**: The woman is standing still with her arms raised and shaking them.
- 4 Roar**: The woman is leaning forward with her hands held out in front of her, as if roaring.
- 5 Dinosaur Dance**: The woman is performing a dance move with her arms raised and hands open.
- 6 Explore-Find**: The woman is leaning back with her arms outstretched, as if exploring.
- 7 Go Back in Time**: The woman is standing still with her arms raised, as if going back in time.



Title: _____

By: _____





Title: _____

By: _____









Message: _____

From: _____



To:

© P.Hope Brannon 2023



Message: _____

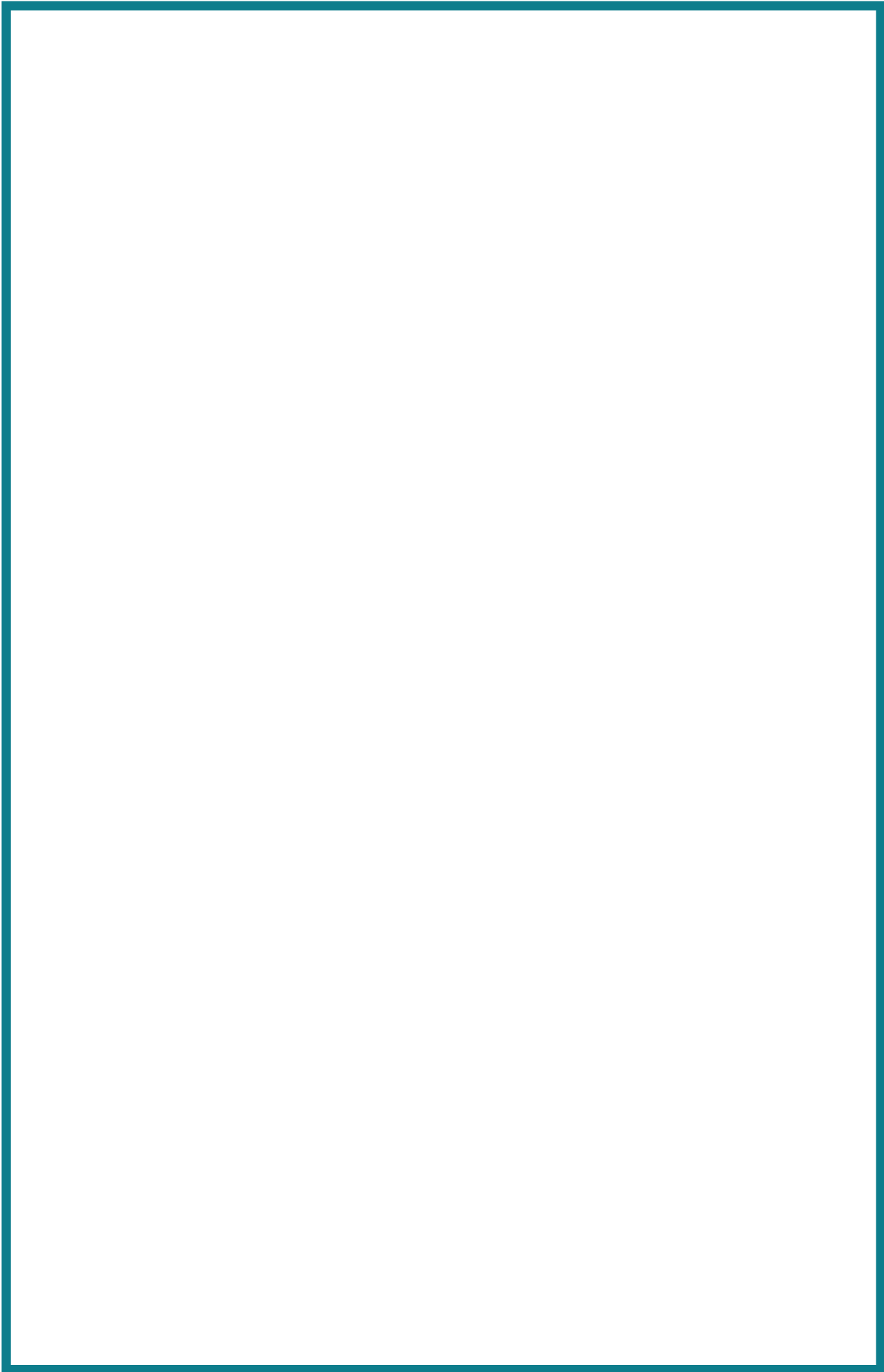
From: _____



To:

© P.Hope Brannon 2023

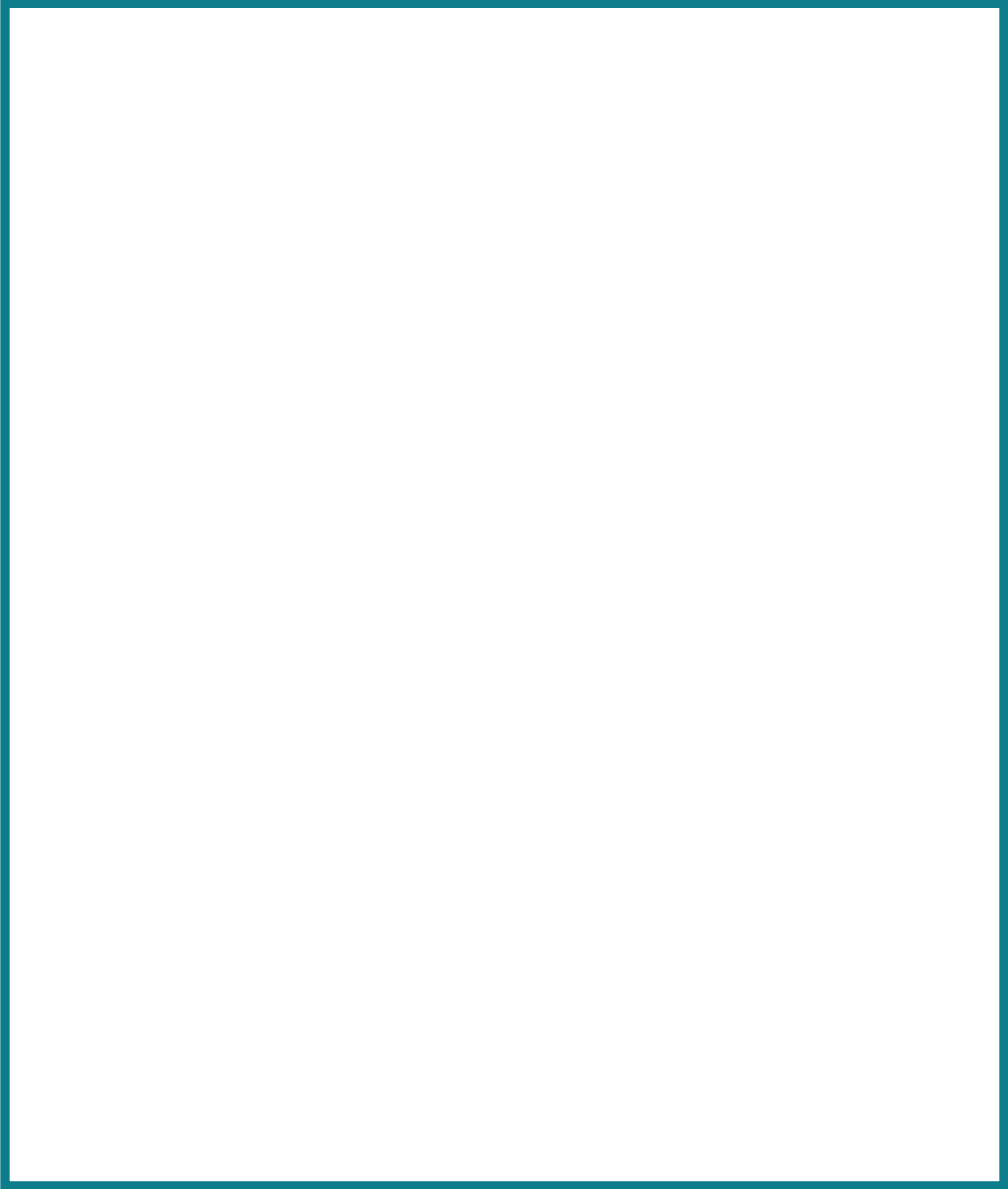




Name _____

Title _____





Name

Title

CRETACEOUS ART TRADING CARDS: FINISH THE PICTURE



ABOUT

A.T.C. (ARTIST TRADING CARDS)

Artist Trading Cards are a fascinating pastime for a great number of professional artists. The cards are made on any surface and are always 2-1/2" x 3-1/2", a size that fits into standard baseball card storage sleeves. They are the same size as a football or Pokemon card.

Artist trading cards are miniature works of art that are traded around the world. Artists, of all skill levels, make and trade their artwork with other artists. These trades can be done in person or over the internet using the mailing system.

HISTORY

ATCs are part of the mail art movement that originated in 1997 by the Swiss artist M. Vanci Stirnemann.

Stirnemann made 1200 cards and ran an exhibition at his art gallery and bookshop. At the end of the exhibition he held a trading session. This artist trading card event was open to all people and all artistic styles. These trading sessions were ongoing and held in person where trades were done face to face.

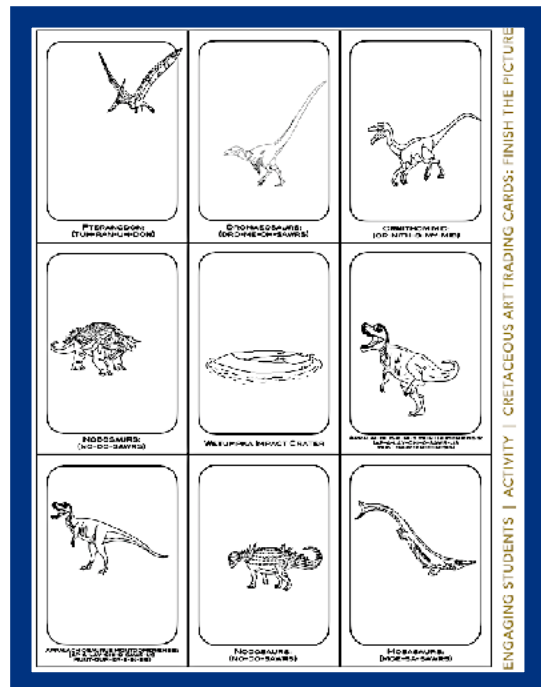
This idea was soon adopted by other artists, and quickly spread to a world-wide art form. With the use of the Internet, this remains a very popular way to trade art with others from around the world.

TODAY

Face to face trading sessions still exist today, but is much more commonly found online. Often, these in person sessions are in the form of workshops where cards can be created during the workshop. These cards are then traded to other attendees of that workshop.



This is an example of previous student work (obviously not from the Cretaceous period.)



This is an example of the ATC's we will be working with. Student's will finish the picture..



STUDENT ACTIVITY

Process

1. Put the pre-printed cards in a box and mix them up.
2. Have each student pick a card without looking.
3. Use the printed side of the card (with an image) for the art work.
4. The image is a prompt. Using lines and shapes, students will draw a Cretaceous landscape or seascape that is appropriate for the image. (They should have learned about the Cretaceous environment & meteor impact events during the tour.)
5. First, draw lightly with pencils.
6. It can be left as a pencil line drawing, or the lines may be traced over in black or color. It may be entirely colored in with flat color or it could be shaded.
7. It can be realistic or an abstract design.
8. Show students examples. Explain or demonstrate as necessary.
9. If time permits, students may make more than one ATC.
10. On the reverse side of the art (that has the Discovery Center logo at top) add artists' statistics. Include:
 - Student Name
 - Grade
 - Teacher
10. Students will turn their cards in to the docent who will place them in the protective binder sheets.

Materials

Sharpie Markers- Fine Tip & Extra Fine Tip (color and black)
Gel Pens - Color
PrismaColor Colored Pencils
Graphite Pencils
Erasers
Clipboards

Note Anything goes as long as it fits on the playing card. The cards are for trading only. Students trade within the class, between other classes and with other schools. A good project for "pen pal" overseas students also.

National Standards

Content Standard #1 — Understanding and applying media, techniques, and processes.

- K-4 Students use different media, techniques, and processes to communicate ideas, experiences, and stories.
- 5-8 Students intentionally take advantage of the qualities and characteristics of art media, techniques, and processes to enhance communication of their experience and ideas.

Content Standard #3 — Choosing and evaluating a range of subject matter, symbols, and ideas.

- K-4 Students explore and understand prospective content for works of art.
- 5-8 Students use subjects, themes, and symbols that demonstrate knowledge of contexts, values, and aesthetics that communicate intended meaning in artworks.



Artist Trading Card Rules

When it comes to making and trading artist trading cards, there are very few rules that have to be followed. However, the ones that do exist **MUST** be followed. The artist trading card rules are as follows.

- Size = 2.5 x 3.5 inches (64 mm ~ 89 mm)
- ATCs are traded not sold
- Signed and dated on the back
- Neatness counts
- Do NOT trade other artists cards
- It is highly frowned upon to trade cards that are not your own, or to give them away. Cards are meant to be collected, not given away when you get bored with them. Or especially, if you don't enjoy them.
- The orientation of a card can go either way. They should be thin enough to fit into the **clear plastic sleeves** used for baseball card or other collectible cards.
- If you want to add embellishments to your cards, or alter the overall size and shape of the card, it needs to be able to fit into those sleeves.

Finding Other Ideas

Looking at group swaps can be a great way to get ideas for what you should draw. If you join [atcsforall](#), they have an entire section for themed swaps. Even if you don't have time to commit to the trades, go there from time to time just to look for ideas.

How to Store Artist Trading Cards

You will need to store your cards in a safe place after they are completed.

- I bought some clear plastic sleeves to keep my cards in. They are inexpensive and the box comes with 200 sleeves. They are found by the trading cards at Target, Walmart, or other stores that sell trading cards.
 - ▶ Then place your cards in a metal tin until it gets shipped out to its new owner. This makes it easy to locate the cards that are being traded, and it keeps the cards safe. from being accidentally damaged.
- Another option is to store them in binders with pockets to hold artist trading cards. This is typically how cards you have received from other artists will be stored.
- Either option is fine, just be sure to keep both your cards, and the cards you get in the mail safe.

How to Trade Artist Trading Cards

Now you need to find someone who wants to make a trade with you. There are many sites out there for trading artist trading cards. Typically, you will post your cards in a gallery and state that it is available for trade. It's usually best to have a variety of cards available for trade. Unless time is not an issue for you, then making them on the fly might not be a concern for you. have several finished Artist Trading Cards available for trade at any given time. Be sure to keep them protected from getting damaged until they find new homes. Having one of your beautiful mini works of art to get ruined is the last thing you want.



Types of Artist Trading Card Trades

When you get to the point where you start making trades, there are many different types of trades you can make. The type of trade you decide to do is up to you, and depends on what's available. And who's willing to trade with you.

- **Personal Trades**

These are the most common. They are usually of equal quantities from both people making the trade. These numbers will sometimes be written as 1o1 or 3o3. This means you send 1 card, and you receive 1 card (1o1). Or, 3 cards for 3 cards (3o3).

You may get asked to do an uneven trade with someone where they give you less cards than what they want you to send to them. I typically won't do this type of trade. This really isn't what the tradition of trading is about.

- **Blind Trade**

This means you don't know what piece of artwork you're going to receive, and they don't know what you are going to be sending to them. Be sure to send quality work if you're doing a blind trade. Don't use this as a way to get rid of your cards you don't want anymore.

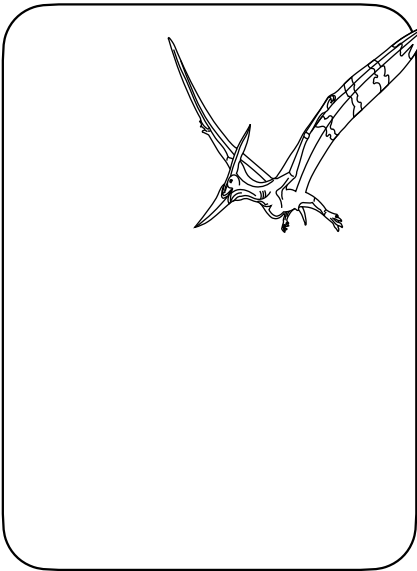
- **Themed Group Swaps**

These types of swaps are a bit more complicated, and take more time. There will be a theme, and some guidelines set when the swap is set up. All participants make the specified number of cards. Usually 6 or 7 cards will be required. All cards are sent to the person who is leading the group swap. There will be a deadline set for when you need to ship the cards out in the mail. The swap leader then mixes up all of the cards and sends them out to each person you sent cards in. You'll receive several cards, each from a different artist. But of the same theme that was set for the swap. Often, you will need to send in stamps and self addressed envelopes with these swaps. And sometimes an extra card for the leader of the group swap. Even if the extra card is not required, I always send an extra. Running a group swap is a lot of work.

- **P.I.F. Trades**

Pay It Forward trades are quite interesting. These are usually started in their own threads of posts. The way it works is that someone requests a card to be drawn for. them. Someone responds by saying they will draw them the card they asked for. The person who responded then requests a card to be made for them. Someone else comes along later and commits to making that card, and requests their card. This continues for all of eternity. The person you send your artwork to isn't who you receive artwork from. And is basically a form of blind trade because you never know what your card looks like until you get it in the mail.

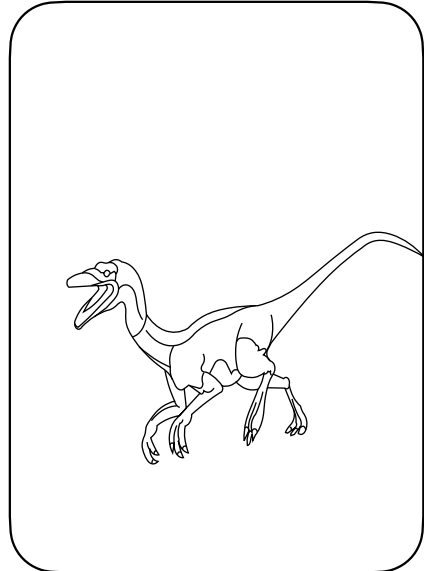
Regardless of which type of trade you're participating in, be sure to ship your cards as soon as you can. If there is a reason for delay, let the person you're trading with know.



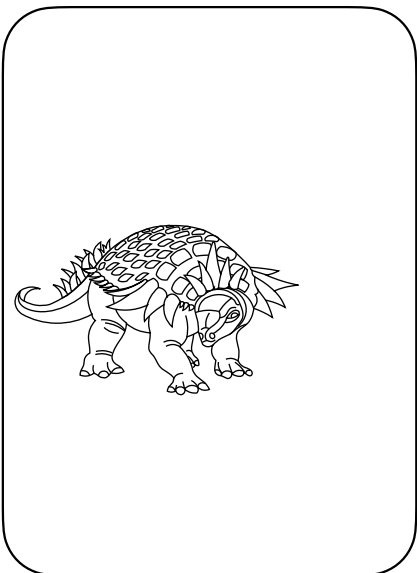
PTERANODON:
(TUH-RAN-UH-DON)



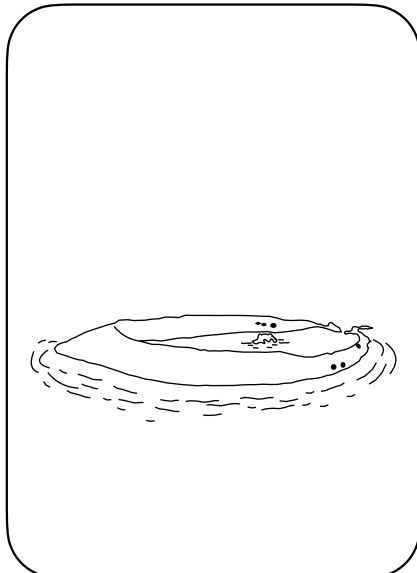
DROMAEOSAURS:
(DRO-ME-OH-SAWRS)



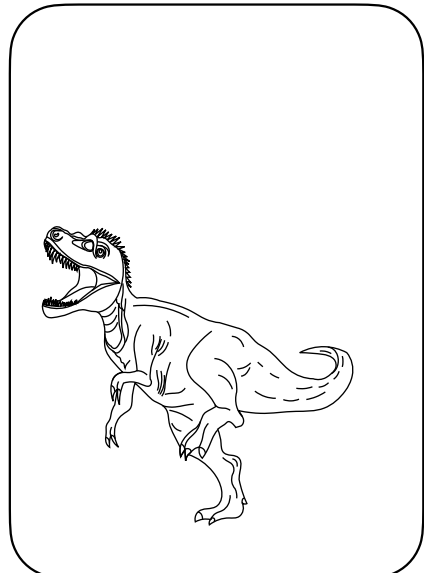
ORNITHOMIID:
(OR-NITH-O-MY-MID)



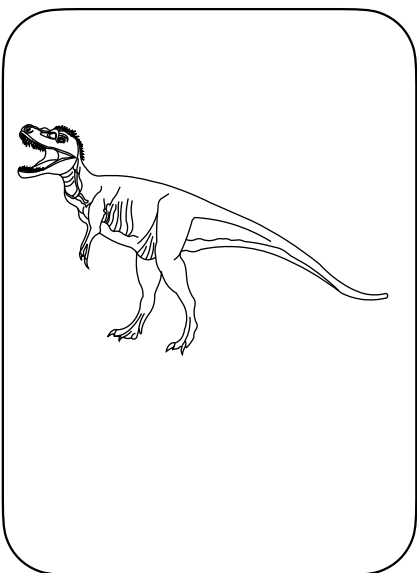
NODOSAURS:
(NO-DO-SAWRS)



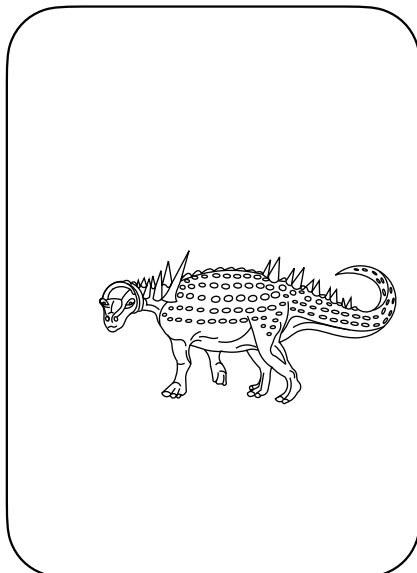
WETUMPKA IMPACT CRATER



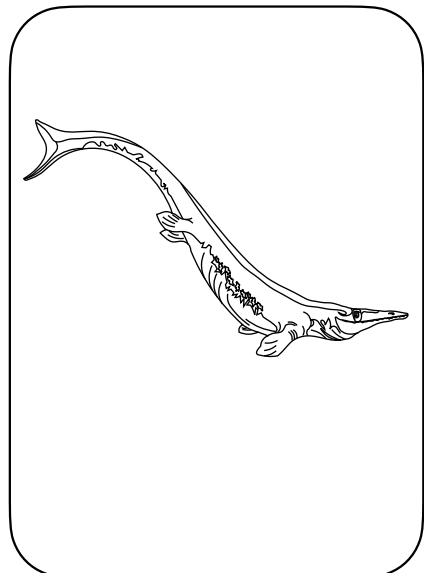
APPALACHIOSAURUS MONTGOMERIENSIS:
(AP-A-LAY-CHI-O-SAWR-US
MUNT-GUM-ER-E-IN-SIS)



APPALACHIOSAURUS MONTGOMERIENSIS:
(AP-A-LAY-CHI-O-SAWR-US
MUNT-GUM-ER-E-IN-SIS)

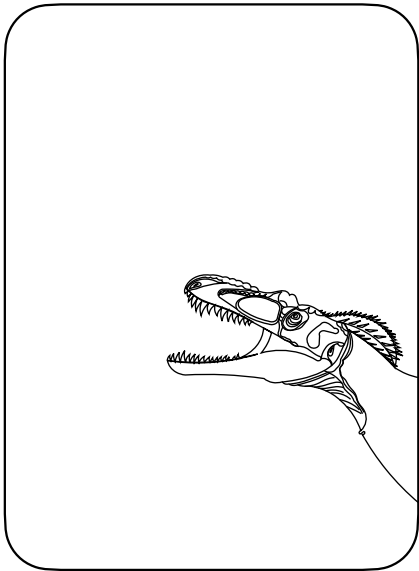


NODOSAURS:
(NO-DO-SAWRS)

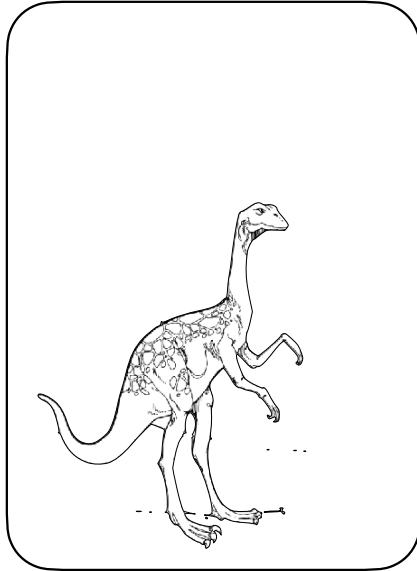


MOSASAURS:
(MOE-SA-SAWRS)

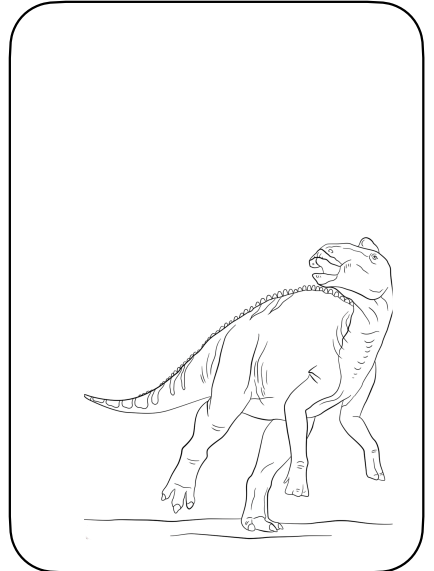




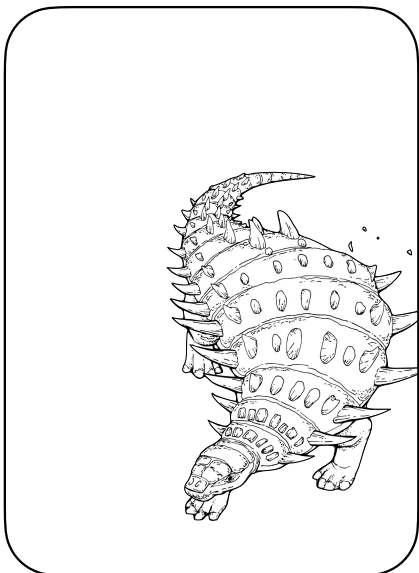
APPALACHIOSAURUS MONTGOMERIENSIS:
(AP-A-LAY-CHI-O-SAWR-US
MUNT-GUM-ER-E-IN-SIS)



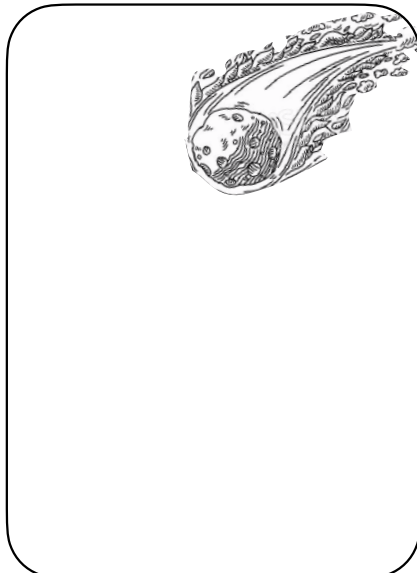
ORNITHOMIMID:
(OR-NITH-O-MY-MID)



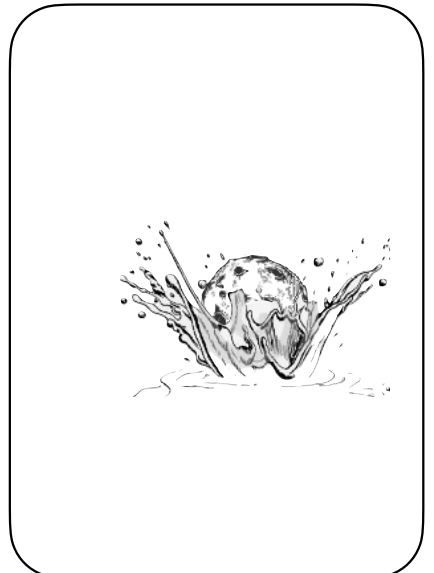
LOPHORHOTHON ATOPUS:
(LOW-FO-ROW-THON)



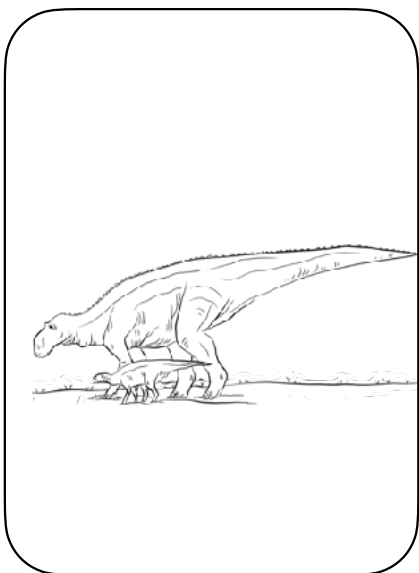
NODOSAURS:
(NO-DO-SAWRS)



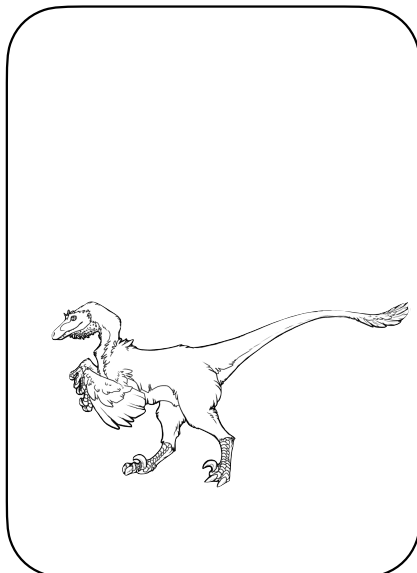
APPROACHING METEOR



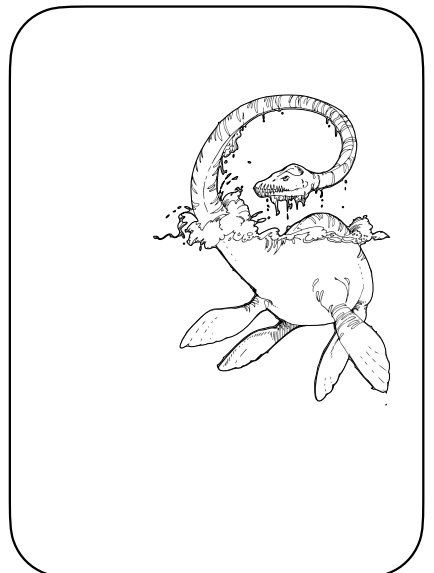
CONTACT IN SHALLOW SEA



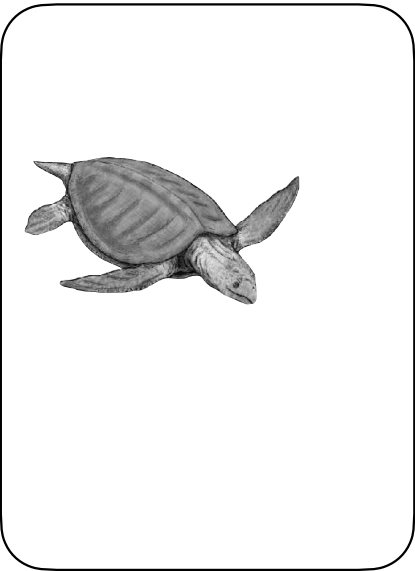
LOPHORHOTHON ATOPUS:
(LOW-FO-ROW-THON)



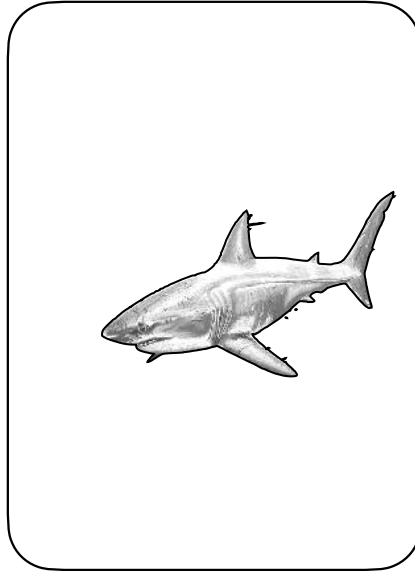
DROMAEOSAURS:
(DRO-ME-OH-SAWRS)



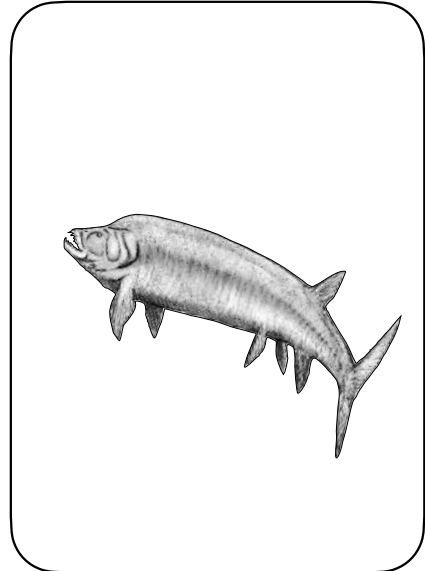
PLESIOSAUR- ELASMOAURS
(E-LAS-MO-SAU-RUS)



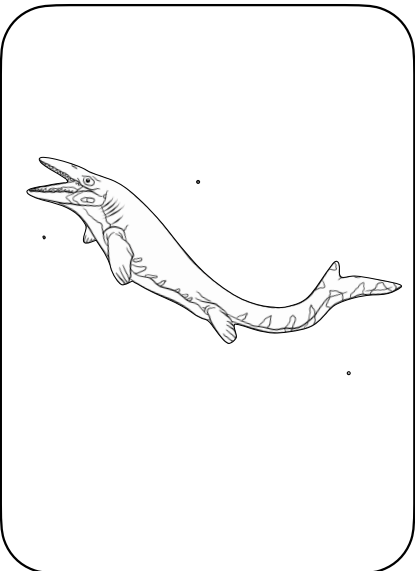
PROTESTEGA:
(PRO-TOE-STEG-A)



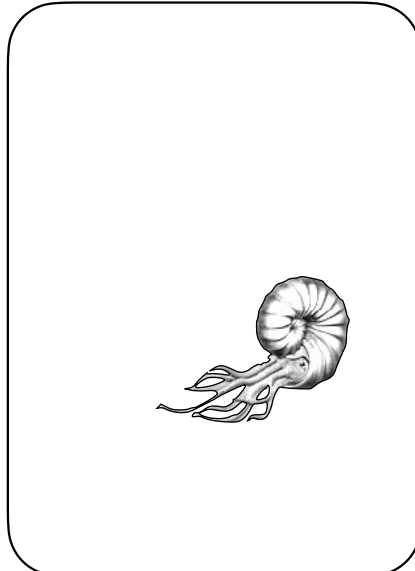
CRETOXYRHINA:
(KREE-TOX-EE-RYE-NUH)



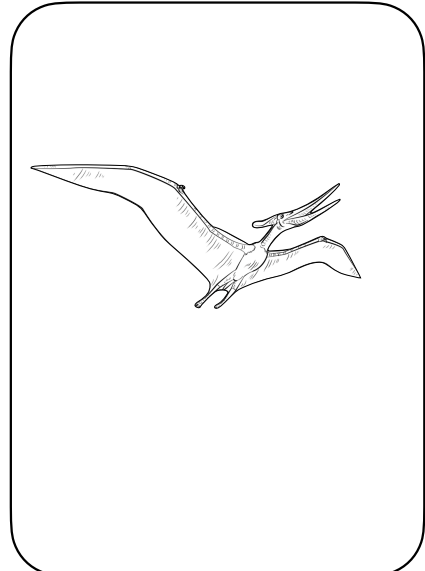
XIPHACTINUS:
(ZAI-FACT-IN-US)



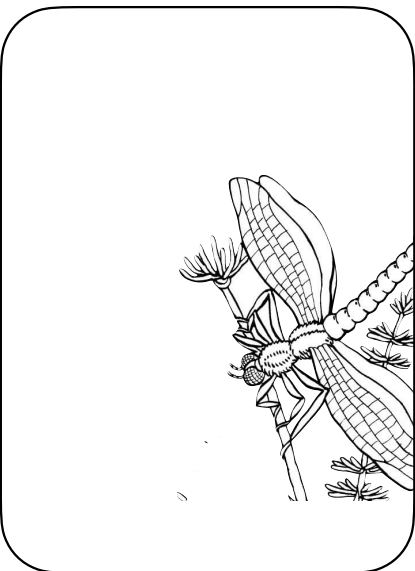
MOSASAURS:
(MOE-SA-SAWRS)



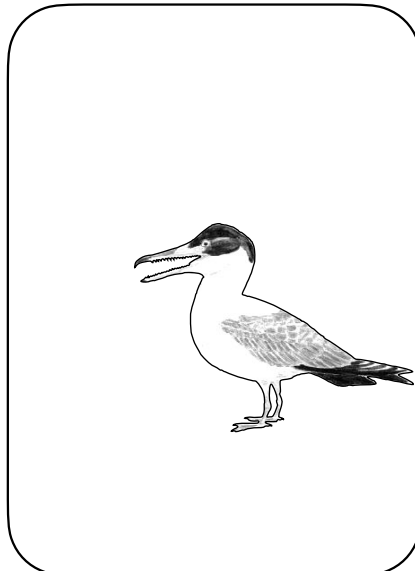
AMMONITE
(AM-MO-NITE)



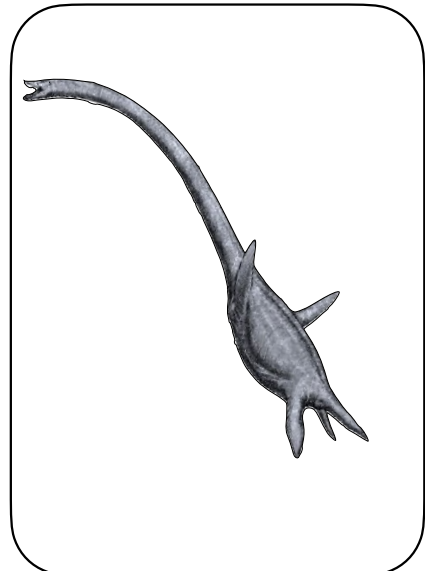
PTERANODON:
(tuh-ran-uh-don)



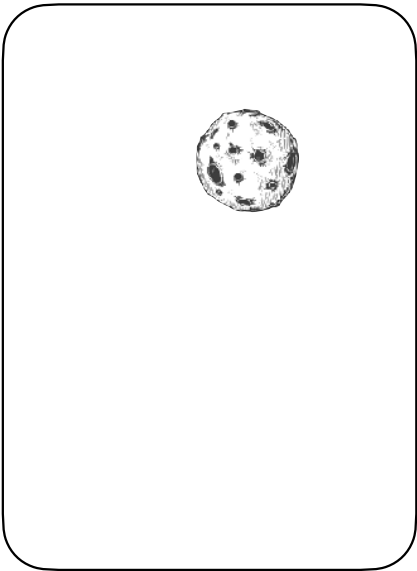
DRAGONFLY



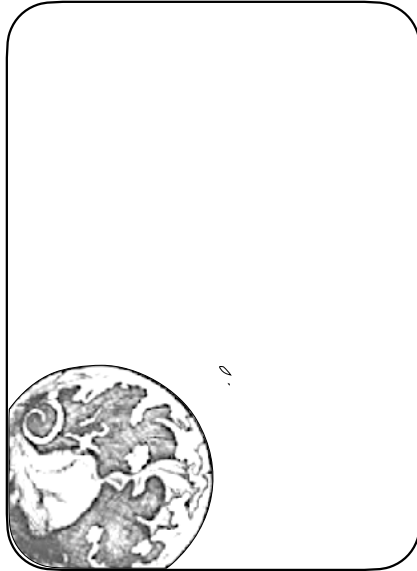
ICHTHYORNIS



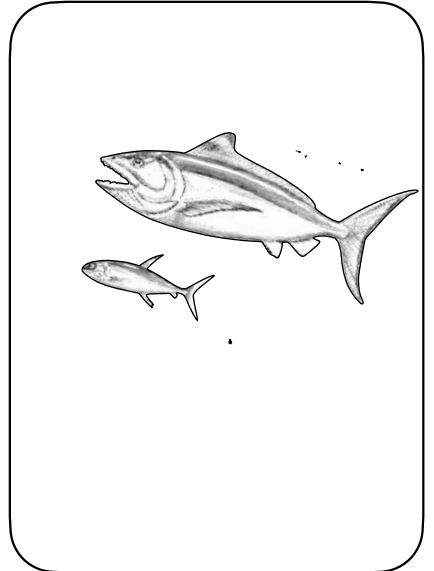
PLESIOSAUR- ELASMO SAURS
(E-LAS-MO-SAU-RUS)



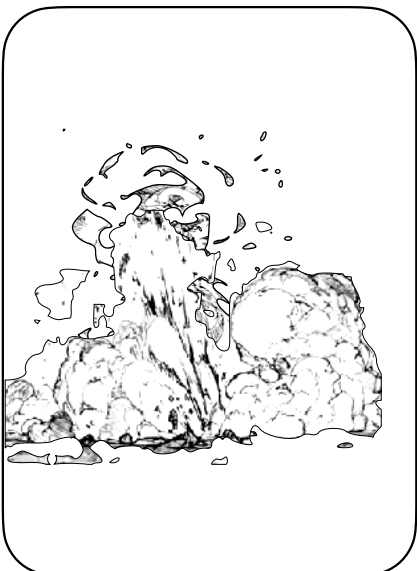
METEOR



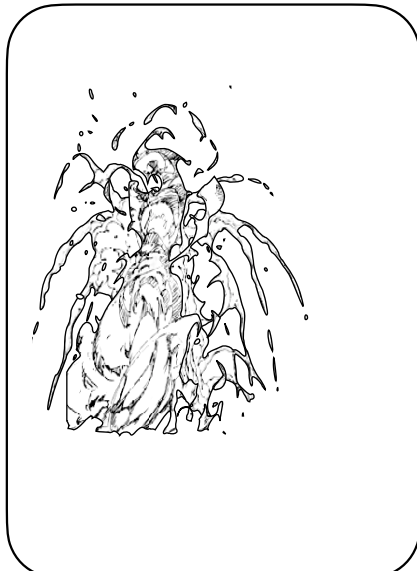
EARTH



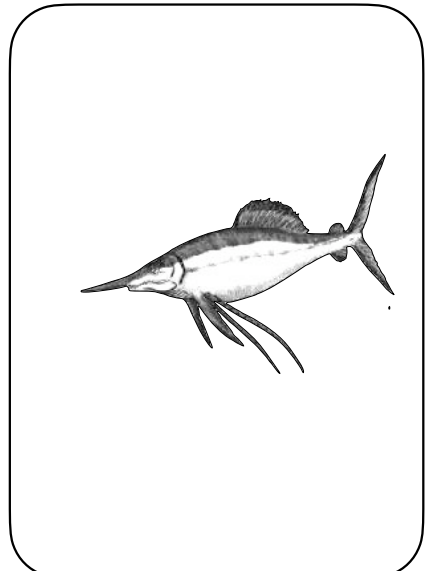
PROTOSPHYRAENA
(PRO-TO-S-FY-RAY-NAH)



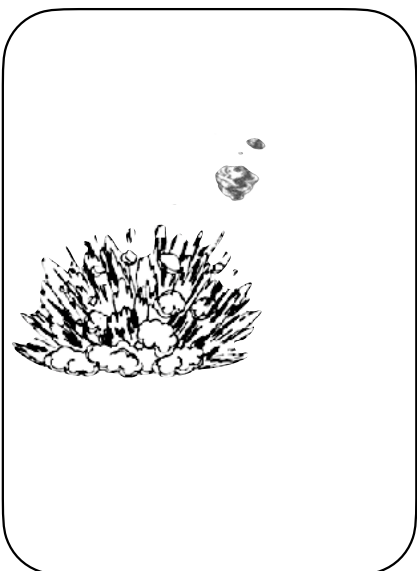
IMPACT EXPLOSION



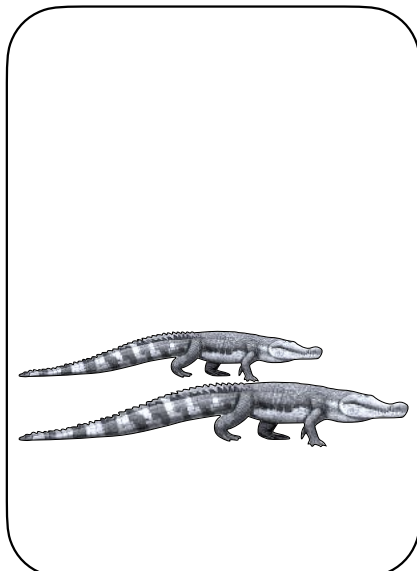
IMPACT EXPLOSION



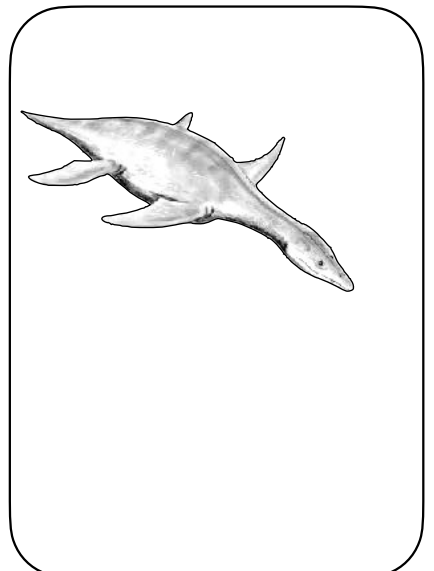
PACHYRHIZODUS:
(PACK-EE-RYE-ZO-DUS)



IMPACT EXPLOSION



DEINOSUCHUS:
(DAI-NUH-SYOO-KUHS)



POLYCOTYLID PLIOSAUR,
DISCOSAURUS: (POLLY-COT-EYE-LID)

| | | |
|--|--|--|
| | | |
| | | |
| | | |



Grade _____

Teacher _____

Name _____



Grade _____

Teacher _____

Name _____



Grade _____

Teacher _____

Name _____



Grade _____

Teacher _____

Name _____



Grade _____

Teacher _____

Name _____



Grade _____

Teacher _____

Name _____



Grade _____

Teacher _____

Name _____



Grade _____

Teacher _____

Name _____



Grade _____

Teacher _____

Name _____






Grade _____

Teacher _____


Name _____



Grade _____

Teacher _____


Name _____



Grade _____

Teacher _____


Name _____



Grade _____

Teacher _____


Name _____



Grade _____

Teacher _____


Name _____



Grade _____

Teacher _____


Name _____



Grade _____

Teacher _____


Name _____



Grade _____

Teacher _____


Name _____



Grade _____

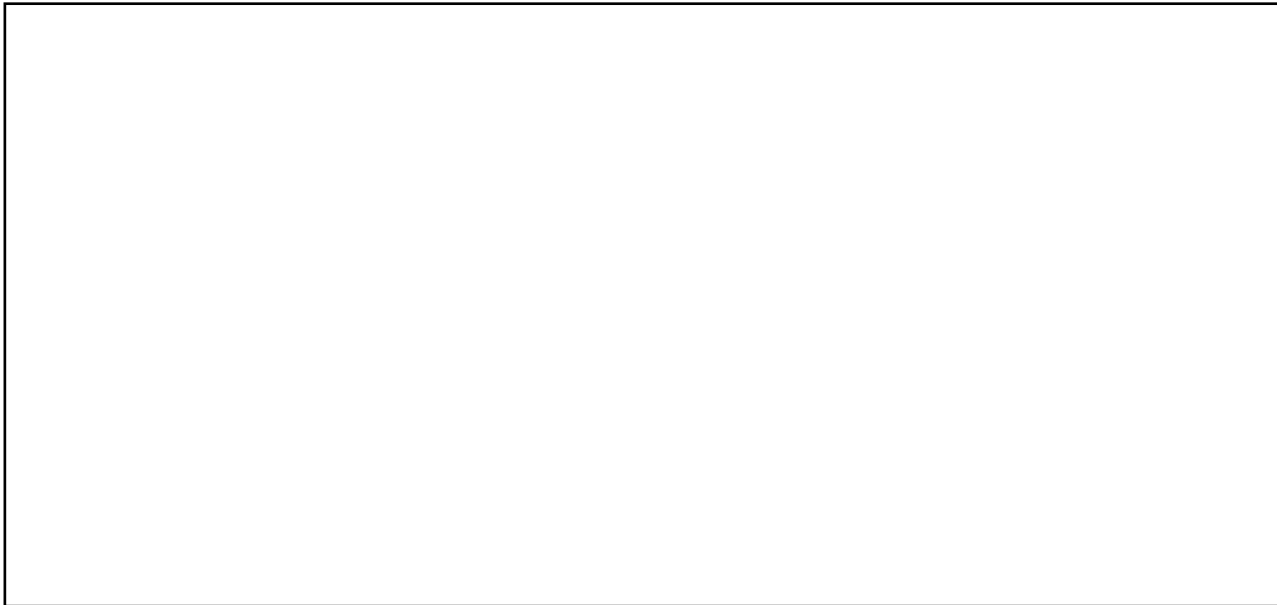
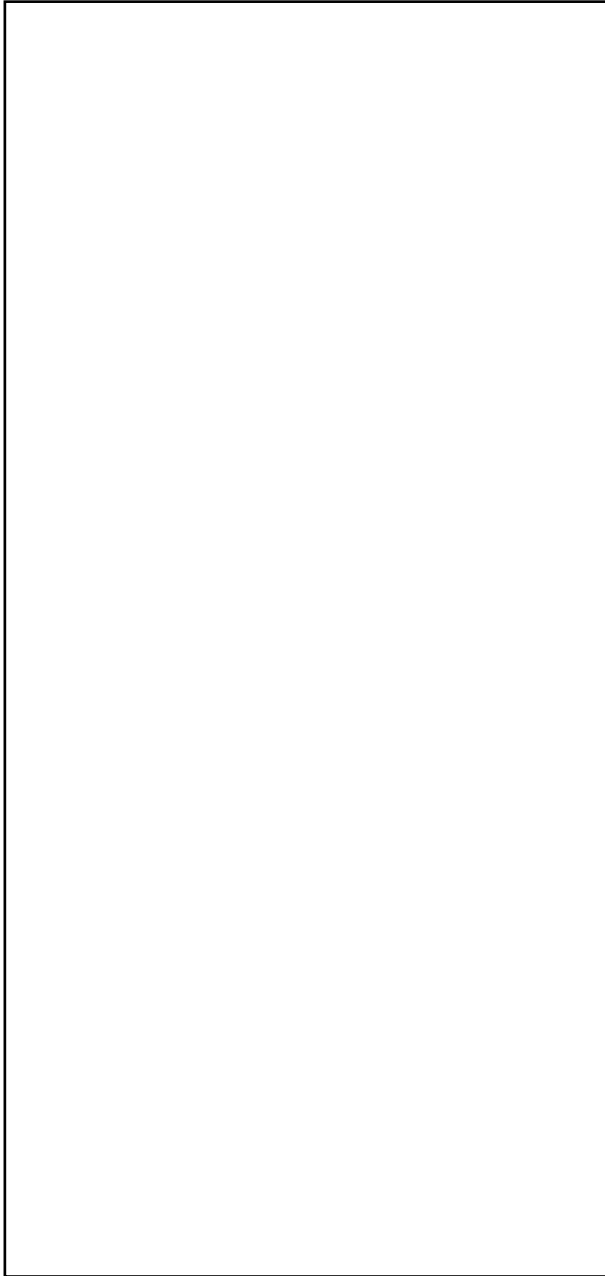
Teacher _____

Name _____



| | | |
|--|--|--|
| | | |
| | | |
| | | |





CRETACEOUS ART MINI-WORKS



These mini gems are created the size of a dollar bill! They may be horizontal or vertical.

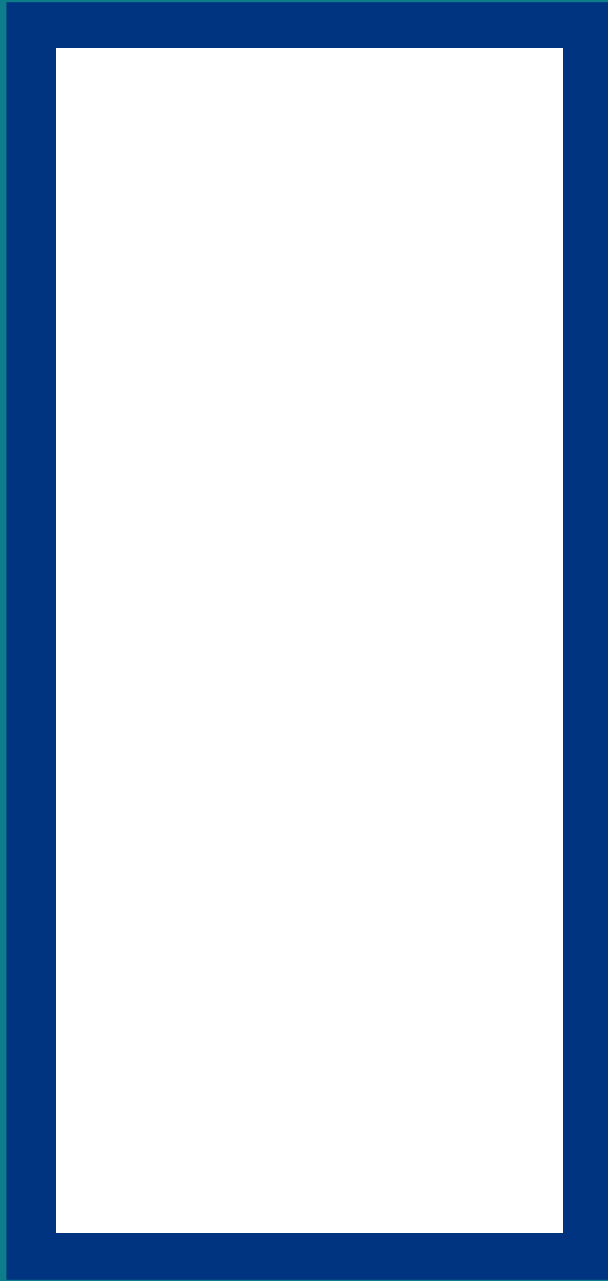
Choose one of the topics on page 46- *Illustrating the Cretaceous Period: Alabama's Life, Environment or Wetumpka Meteor Impact.*

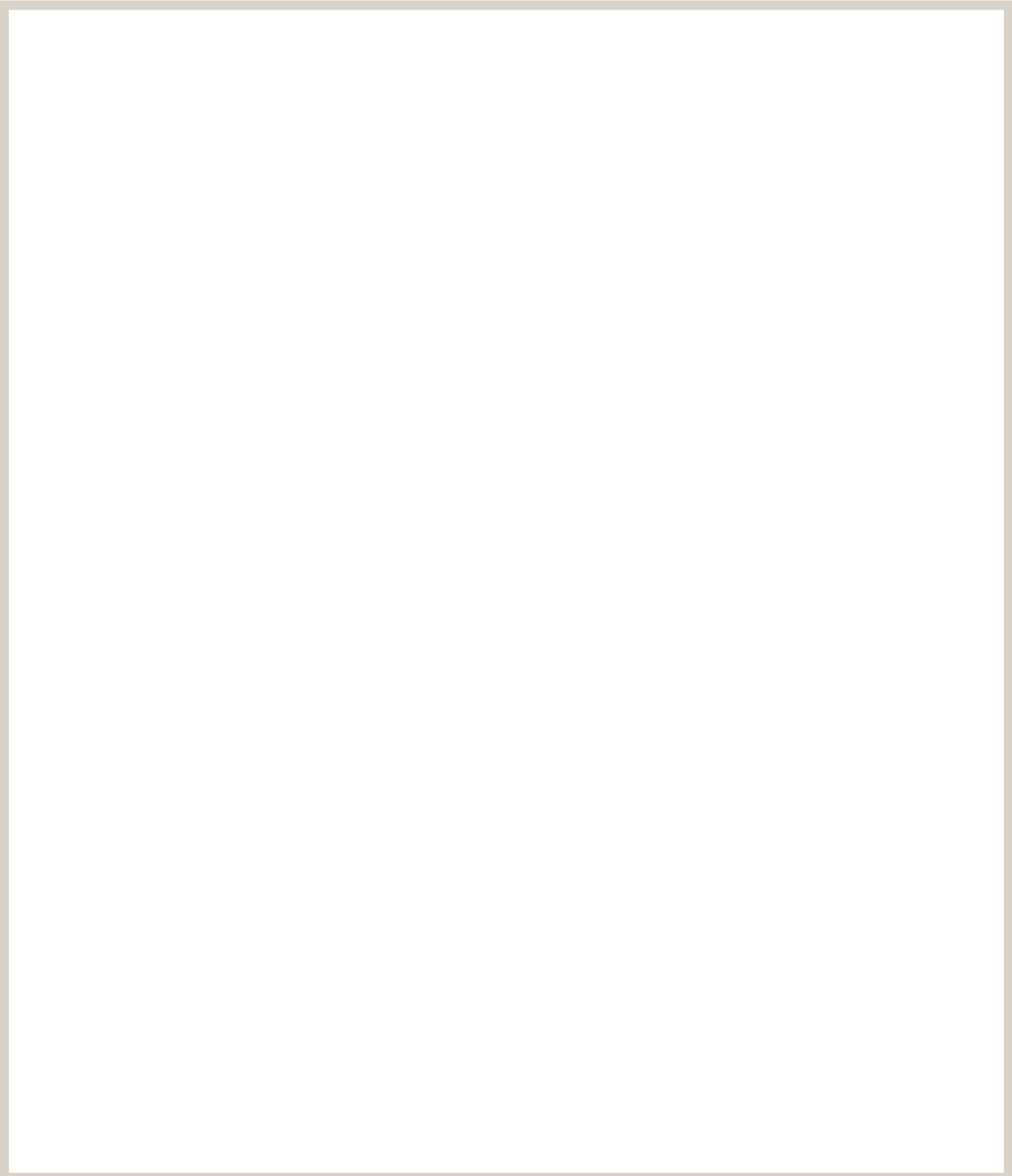
Create a drawing about one of the sub-topics.

1. First, draw lightly with pencils.
2. It can be left as a pencil line drawing, or the lines may be traced over in black or color. It may be entirely colored in with flat color or it could be shaded.
3. It can be a realistic or an abstract design.
4. Show students examples. Explain or demonstrate as necessary.
5. If time permits, students may make more than one.

Materials

- Mini-Work Template
- Sharpie Markers- Fine Tip & Extra Fine Tip (color and black)
- Gel Pens - Color
- PrismaColor Colored Pencils
- Graphite Pencils
- Erasers
- Clipboards





Name _____ Title _____
Grade ____ Teacher _____ School _____



[Large empty rectangular area for drawing or writing]

Name _____

Grade ____ Teacher _____



Title _____

School _____



Dino Zentangles

First, what is a Zentangle? A Zentangle is an unplanned and unstructured pattern usually created on small square tiles in black and white. The patterns are called tangles. You can make a tangle with one or a combination of dots, lines, circles, squares, swirls, waves etc.

The Zentangle Method is an art form that combines structured patterns with mindfulness. It was developed by Rick Roberts and Maria Thomas as a way to encourage creativity, relaxation, and focus. The name “Zentangle” is a combination of “Zen,” which represents a state of meditation and mindfulness, and “tangle,” which refers to the intricate patterns used in the art.

The Zentangle Method involves creating small, abstract drawings using repetitive patterns called tangles. These tangles are usually composed of simple, elemental strokes such as dots, lines, curves, and orbs. The process of creating Zentangle art is meant to be intuitive and relaxing, with no predetermined outcome.

Zentangle - A Zentangle is an abstract drawing created by using repetitive patterns. It is usually structured within a certain shape. Drawing a Zentangle is entertaining, relaxing, and a great way to express yourself creatively.



String - A string is generally a random line drawn in pencil which creates an area within which you draw your tangles.

Tangle - In its verb form “tangle” means to draw a tangle. You tangle a tangle, and in that process create Zentangle art. In its noun form this word is used as a replacement for “pattern.”

No Erasing or Mistakes: There are no mistakes in Zentangle. Unintentional marks or deviations from the original plan are embraced as opportunities for creative exploration.

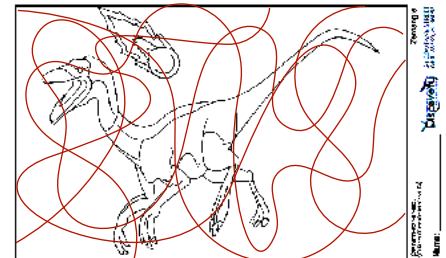
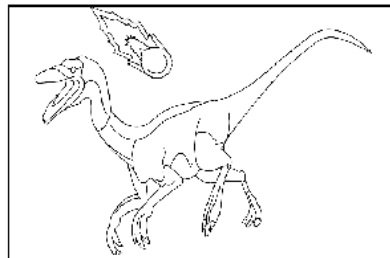
Structured Patterns: Zentangle uses a variety of structured patterns, called tangles, which can be combined and repeated to create intricate and visually appealing designs.

Portable and Accessible: Zentangle can be done with minimal materials, making it a portable and accessible art form that can be practiced anywhere.

Zentangle art can be created on small paper tiles using fine-tipped pens or pencils. The process of creating these drawings allows individuals to tap into their creativity, express themselves artistically, and experience a sense of mindfulness and relaxation.

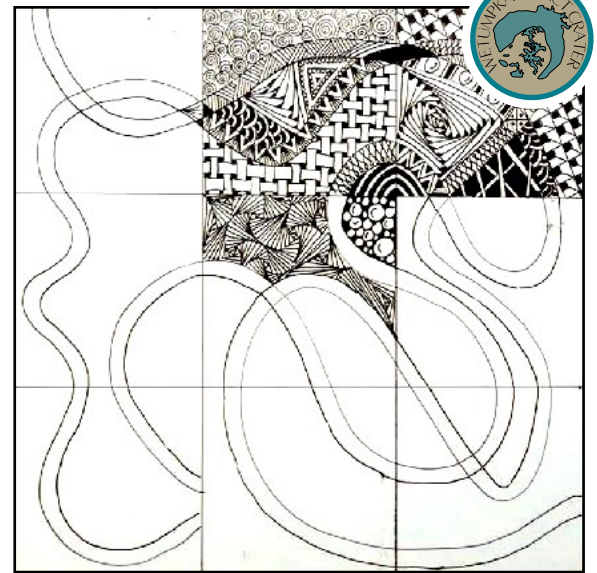
Materials:

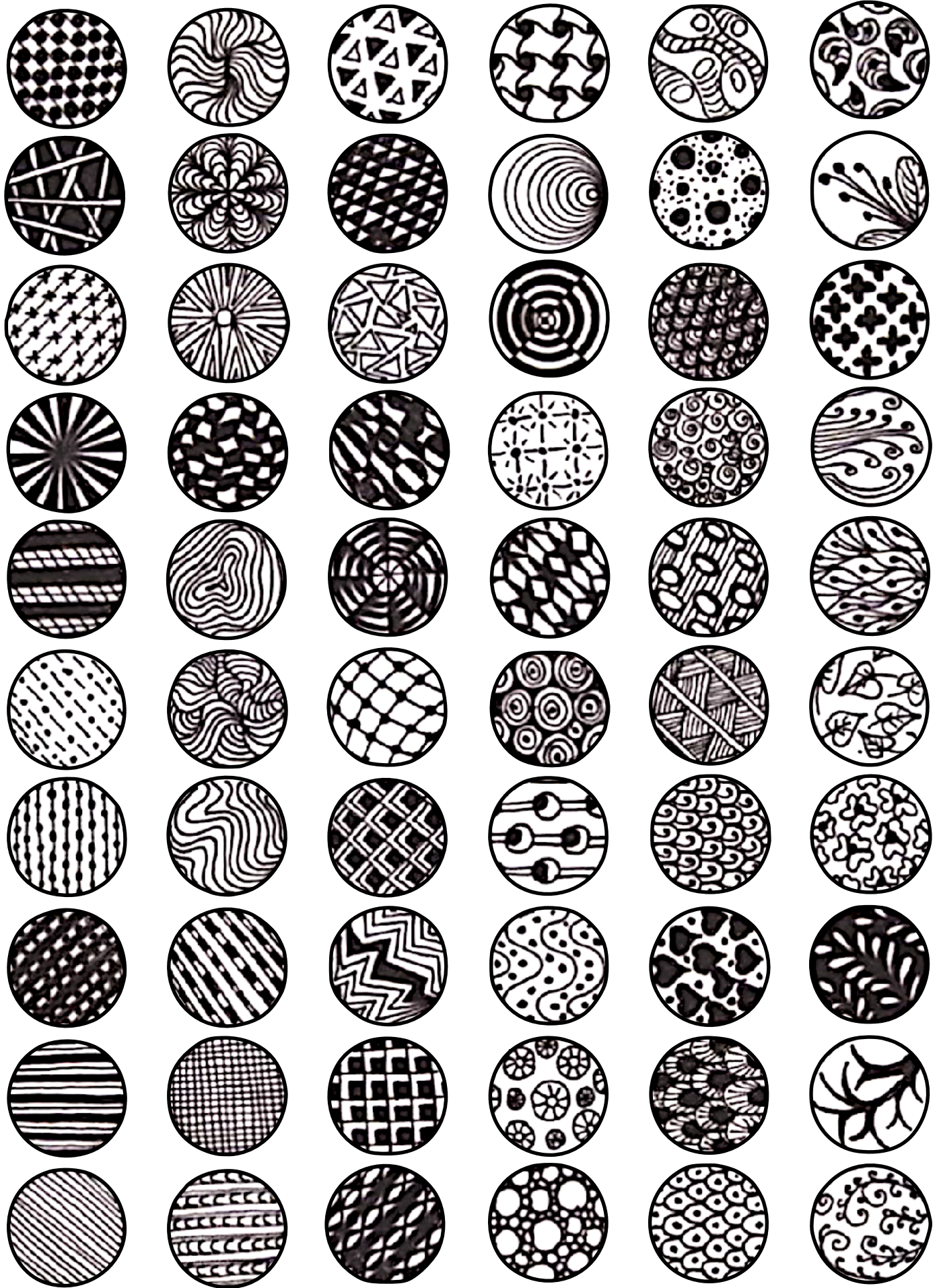
- Paper
- Pencils
- Fine tip black markers (sharpie)
- Fine tip black pens



Procedure:

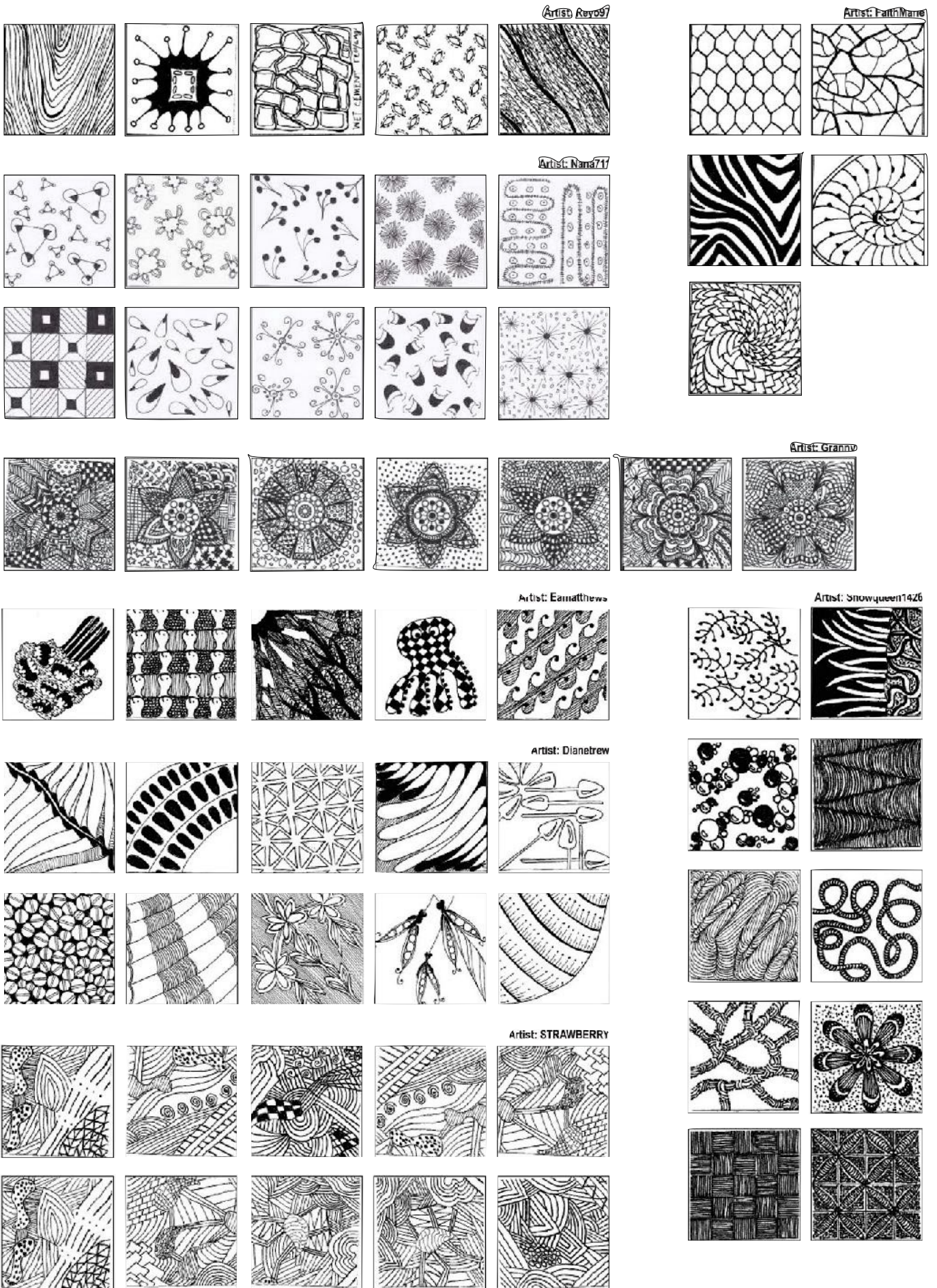
1. Complete your Zentangle pattern practice.
 - Brainstorm different shapes you could use as the outline or frame of your Zentangle. We will use a dinosaur background.
2. Draw in some “strings” to fit your “tangles” into on your dino template. These lines can be random, or they can help make your frame into a recognizable object, like the eyes and feathers of the bird right.
3. Choose at least 5 patterns from your Zentangle pattern practice to use in your Zentangle.
4. Fill in your Zentangle with your tangles (patterns). Think about balance and unity when filling in your design. You should use at least 8 tangles in your completed image. At least 5 must come from your own Zentangle pattern practice.
5. When your Zentangle is complete, go over everything with black marker.





Zentangle Patterns



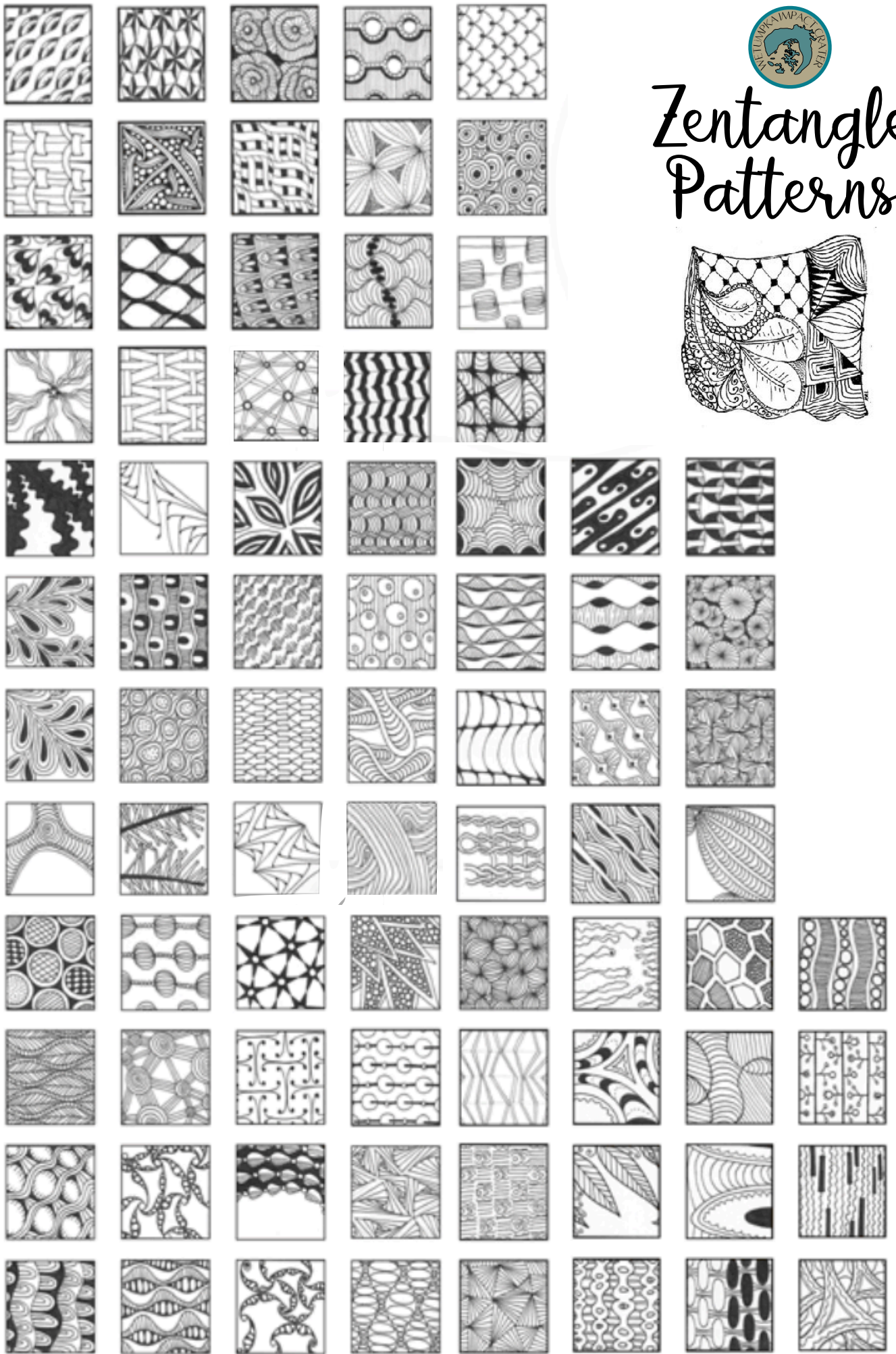


Zentangle Patterns



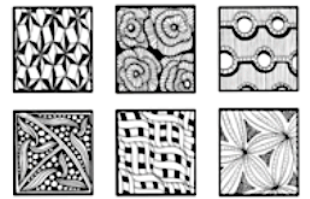


Zentangle Patterns



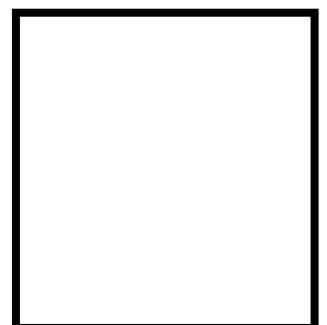
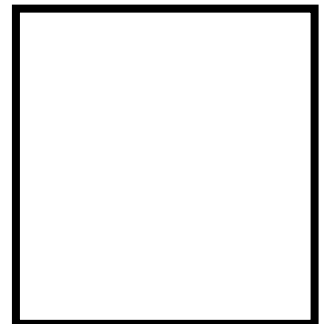
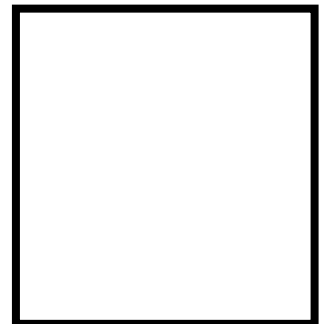
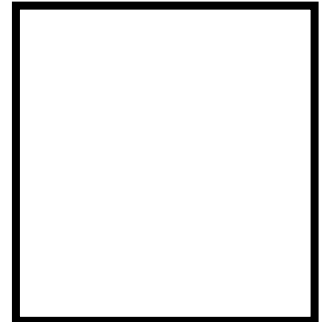
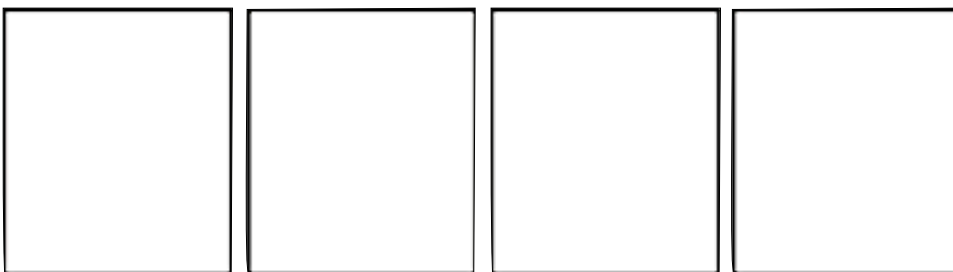
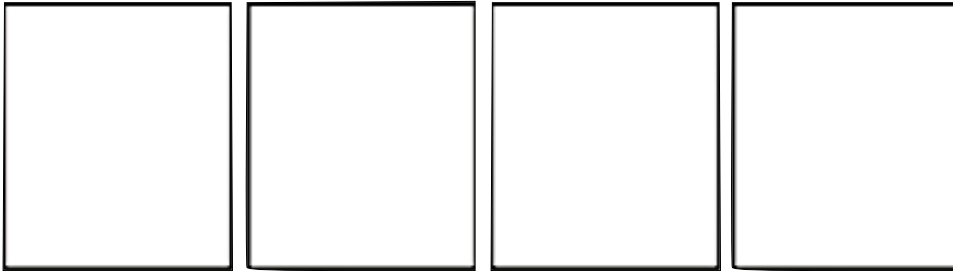


Zentangle Pattern Practice

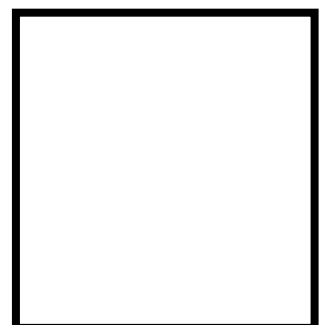
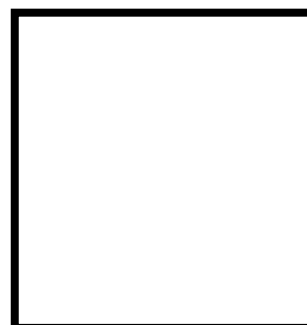
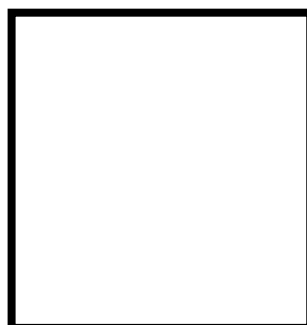
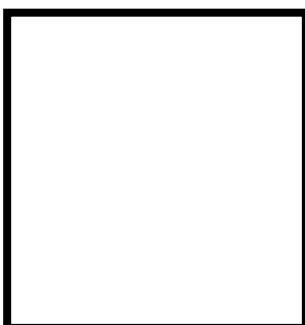


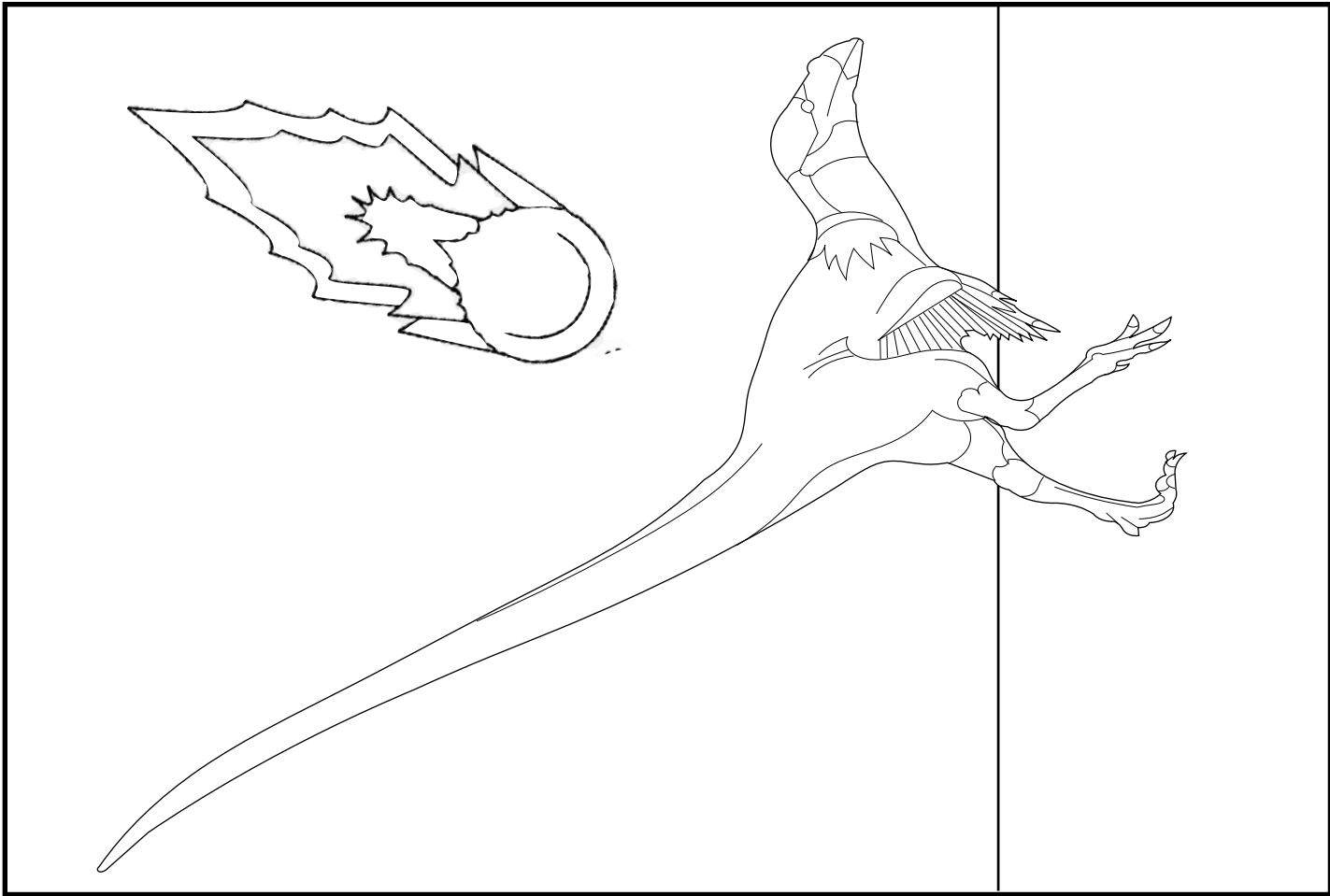
Create your own patterns

Choose 2 of these tangles and copy them in the box below it.



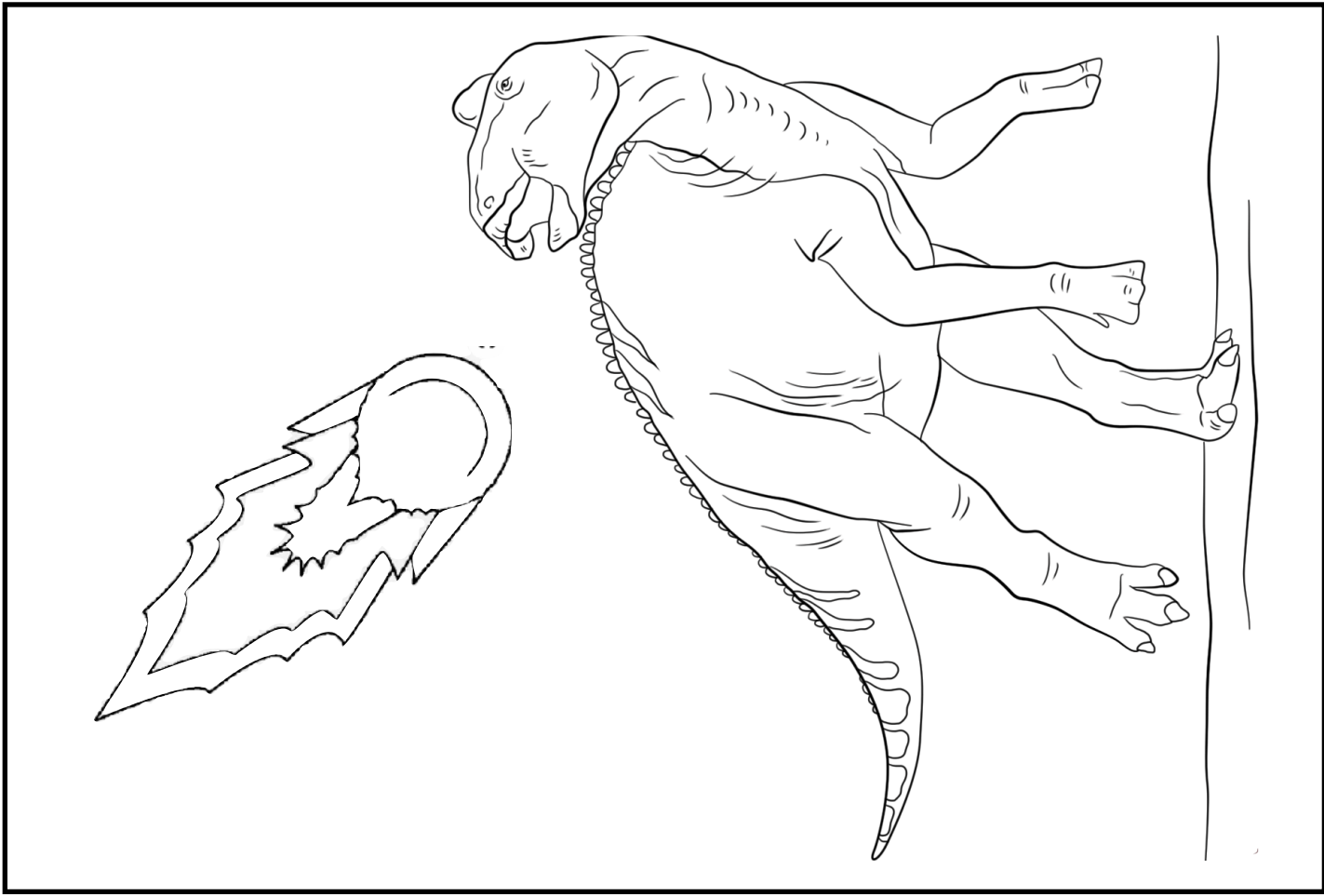
Create your own patterns





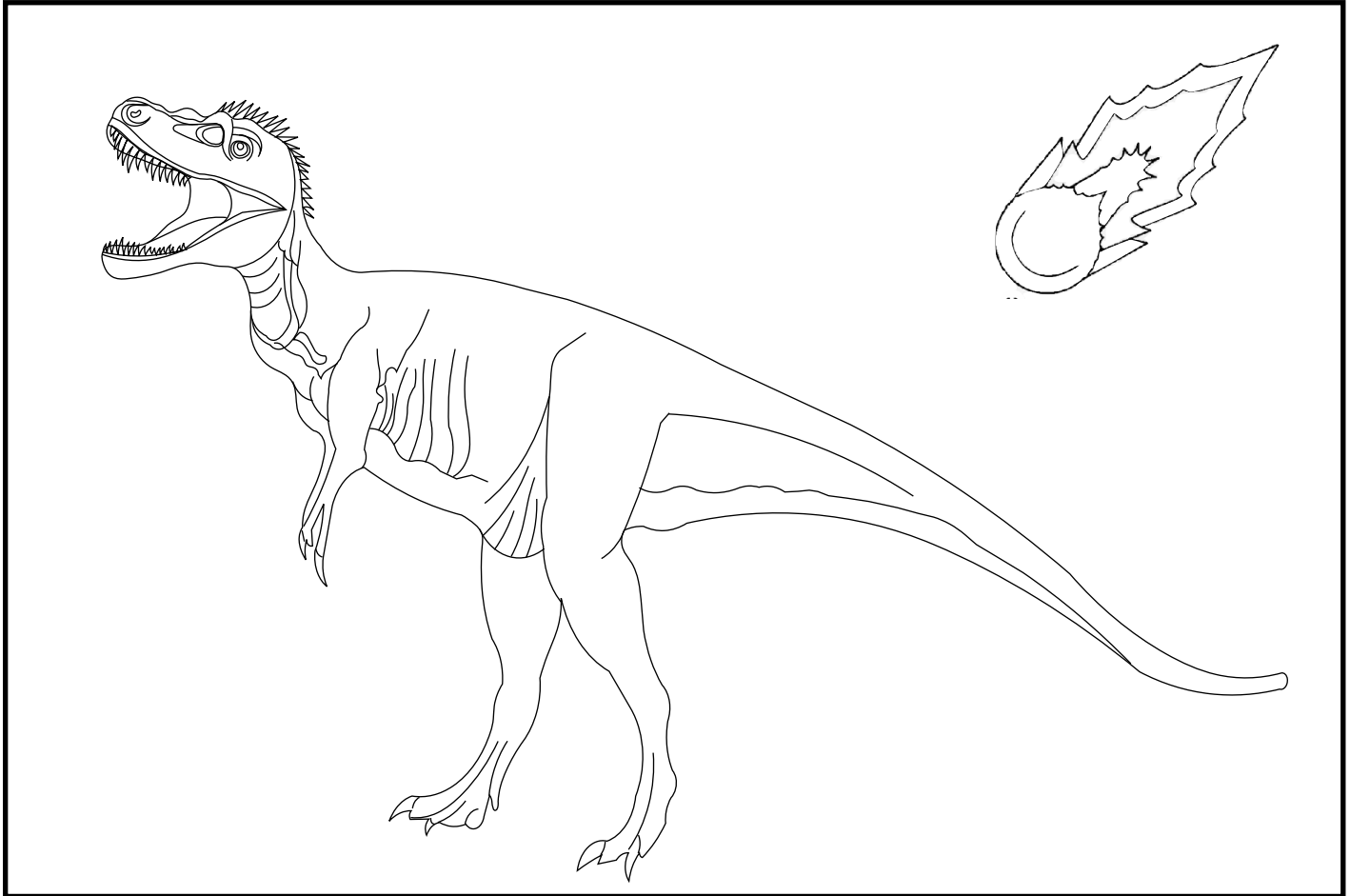
DROMAEOSAURS:
(DRO-ME-OH-SAWRS)

Name: _____



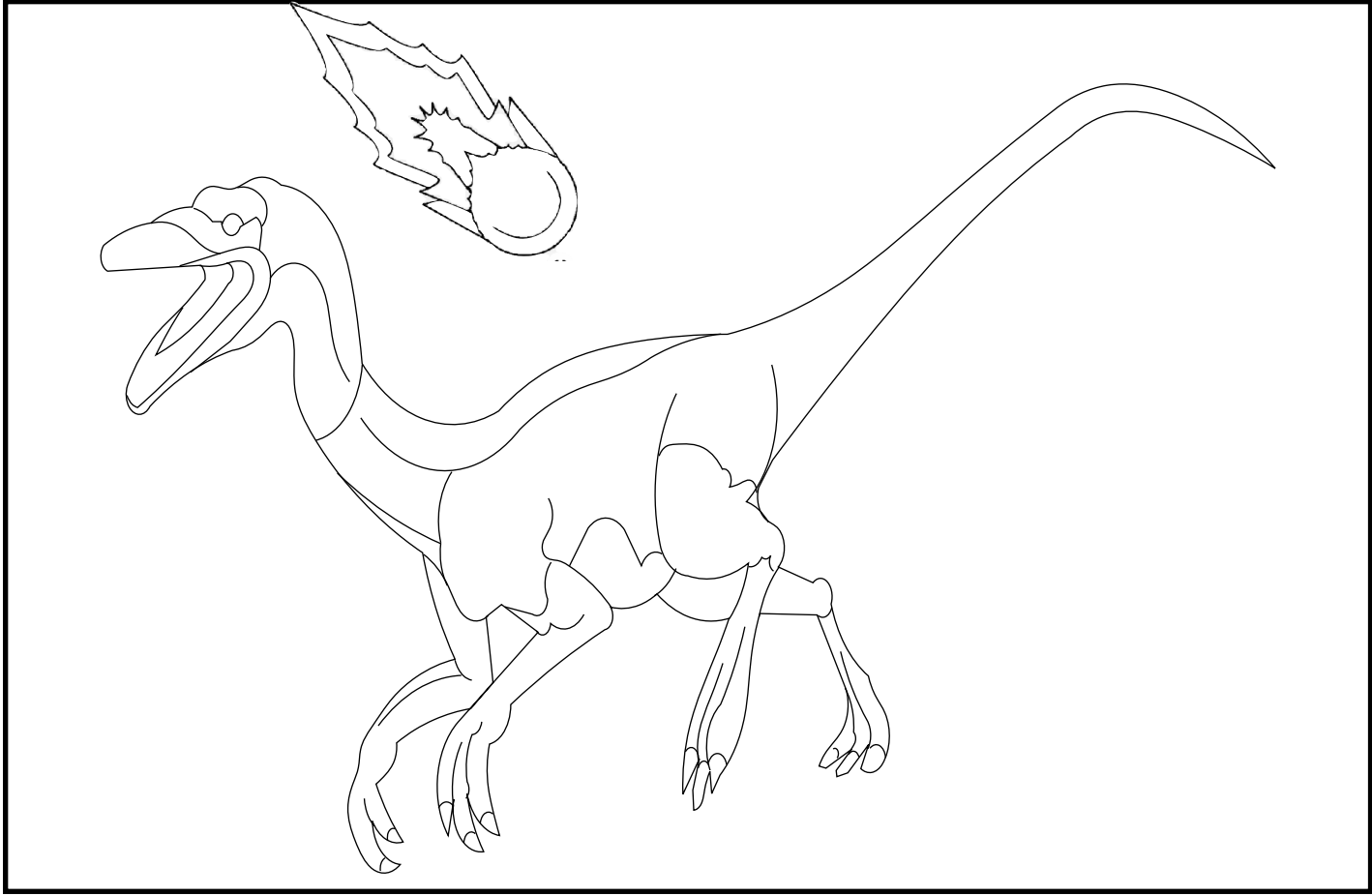
LOPHORHYNCHON ATOPUS:
(LOW-FO-ROW-THON)

Name: _____



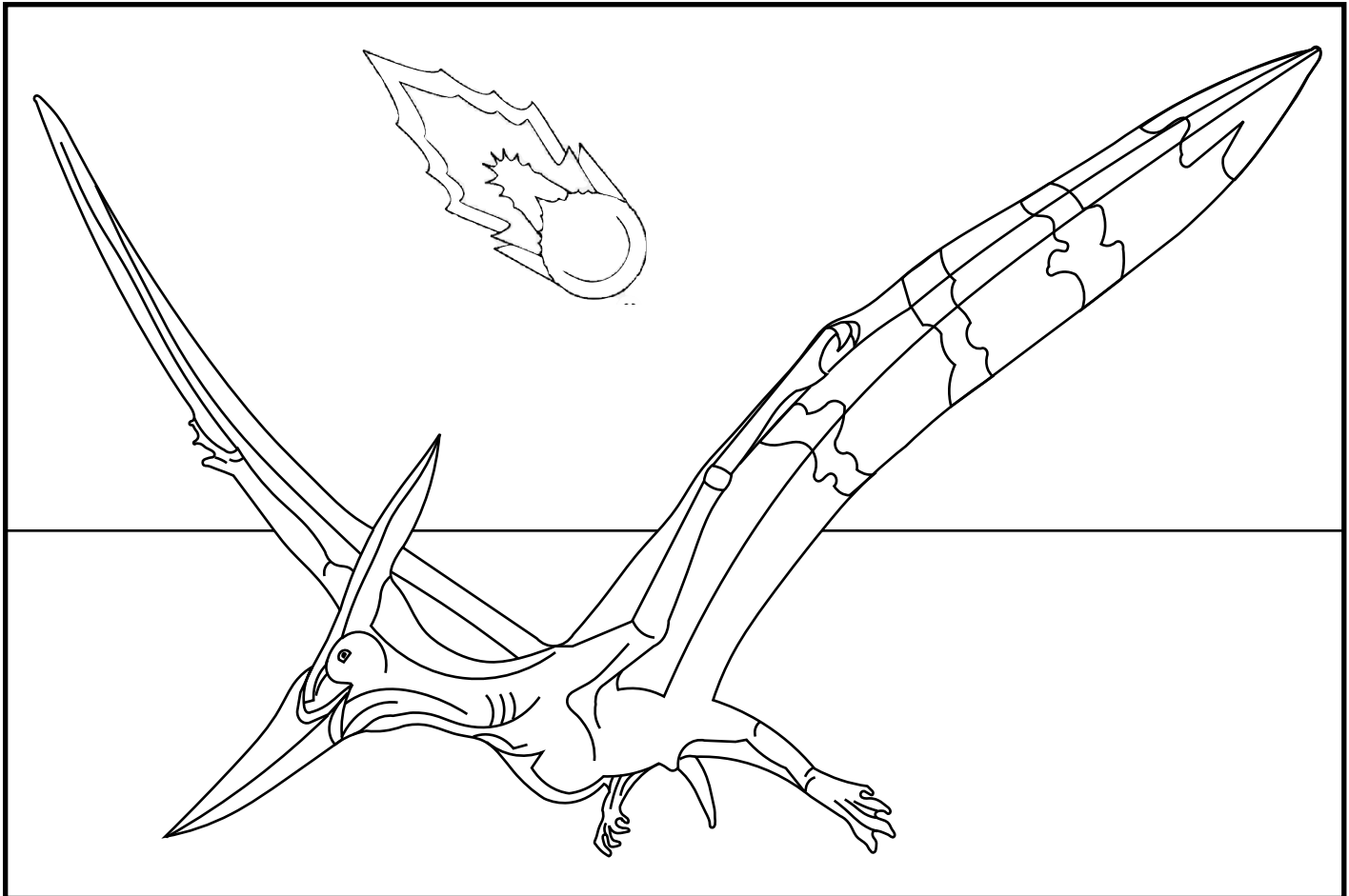
APPALACHIOSAURUS MONTGOMERIENSIS:
(AP-A-LAY-CHI-O-SAWR-US
MUNT-GUM-ER-E-IN-SIS)

Name: _____



ORNITHOMIMID:
(OR-NITH-O-MY-MID)

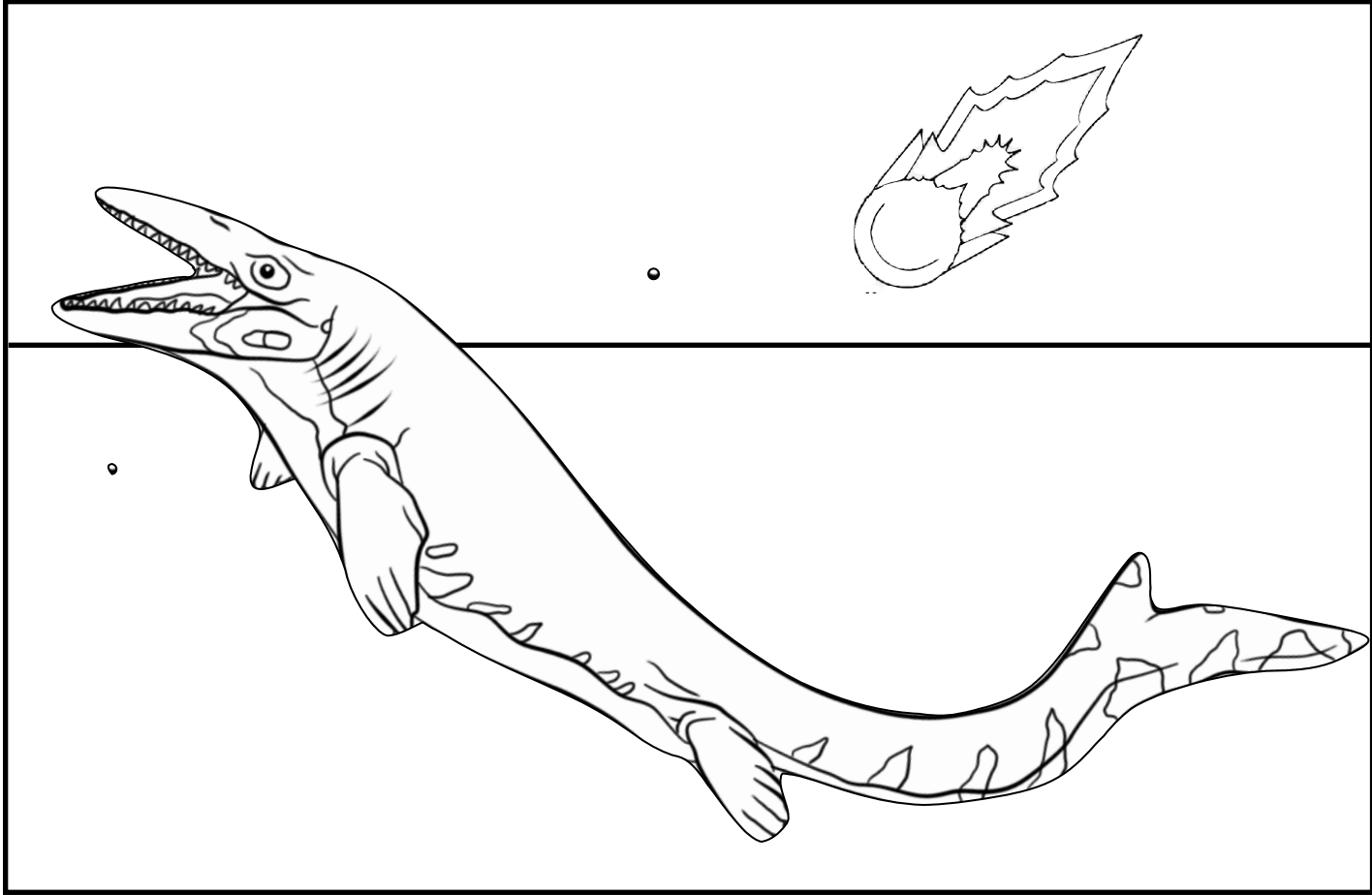
Name: _____



PTERANODON:
(TUH-RAN-UH-DON)

Name: _____

Zentangle
WETUMUKAMPAKT CENTER
Discovery
VISITOR CENTER



MOSASAURS:
(MOE-SA-SAWRS)

Name: _____

Zentangle
WETUMUKAMPAKT CENTER
Discovery
VISITOR CENTER



PTERANODON:
(TUH-RAN-UH-DON)

Name: _____

Zentangle



MOSASAURS:
(MOE-SA-SAWRS)

Name: _____

Zentangle





Cretaceous Angiosperms

The Cretaceous saw the first appearance of many lifeforms that would go on to play key roles in the coming Cenozoic world. Perhaps the most important of these events, at least for terrestrial life, was the first appearance of the flowering plants, also called the angiosperms or Anthophyta. First appearing in the Lower Cretaceous around 125 million years ago, the flowering plants first radiated in the middle Cretaceous, about 100 million years ago. By the close of the Cretaceous, a number of forms had evolved that any modern botanist would recognize. The Cretaceous also saw the first radiation of the diatoms (photosynthesizing algae) in the oceans (freshwater diatoms did not appear until the Miocene).

About 40 to 60% of the forests appear to have been composed of flowering plant species, with the remainder composed of ferns, cycads, and conifers.

The ancient Alabama landscape was much different than what we see today. Dinosaurs and other animals lived in a lush, tropical and coastal environment dotted with barrier islands and estuaries, swamps, ponds, and marshes. Sea levels were much higher than today. Eastern and western North America were divided by the Western Interior Seaway and were teeming with life. The climate was one of the warmest in Earth's history-there were no glaciers or ice caps anywhere on Earth.

Some Cretaceous angiosperms included magnolias, laurel, barberry, early sycamores, dogwoods, dawn redwood, sassafras, witch hazel, grapes and figs. Other plants included alder, pine, juniper, oak, walnut, ginkgo, willow, elm, maple and southern beeches. Of course, many forms of palms (large & small) and a large variety of ferns were present along with grass and conifers like longleaf pine and cypress.. A few understory plants we might recognize today include: boxwood, podocarpus, horsetails, lotus, waterlilies, elephant ear, ginger, aspidistra (or Cast Iron Plant) and acanthus (or Bears Breeches).

Cretaceous vegetation increased in density and species diversity as the quick-to-adapt flowering plants radiated throughout the world. Closely associated with the angiosperms were pollinating insects, including a form of the dragonfly, and most were similar to today's insects.

Magnoliaceae: Magnolia



Witch-hazel: Hamamelis



Lauraceae (like Laurus and Sassafras)



Cornaceae (the dogwood family)



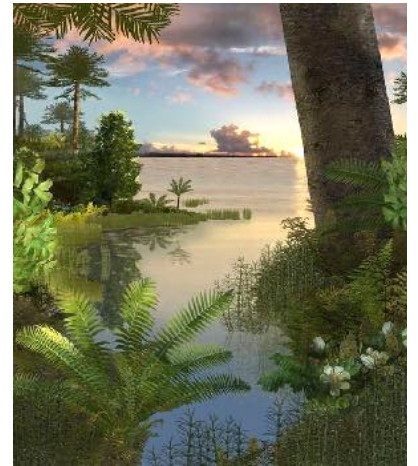
Lotus



Waterlily



Paintings With Cretaceous Angiosperms



Can You Find These Cretaceous Angiosperms? (flowering plants)



1



2



3



4



5



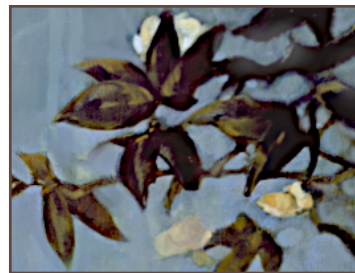
6



7



8



9



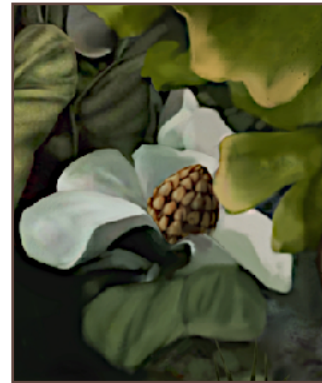
10



11



12



13



14



Cretaceous Angiosperms

Learn About Solubility With Coffee Filters

MATERIALS: Round Coffee Filters, Water Soluble (Washable) Markers, Water in a Spray Bottle, Pipe Cleaners, Scotch Tape, Scissors, Gallon Ziplock Bags



STEP 1. Flatten round coffee filters, and draw colors in circles, patterns, or even scribbles! Make a rainbow on one with all the colors or stick with just complimentary colors!

Make a gorgeous bouquet of flowers with coffee filters, and markers. No coloring in skills needed because we simply add or spray water onto the coffee filter after creating a colorful design, and the colors beautifully blend together.



STEP 2. Place the colored coffee filters on a gallon size zipper bag or metal baking sheet pan and then mist with a water spray bottle.

Why do the colors on your coffee filter flower blend together? It's all to do with solubility! If something is soluble that means it will dissolve in that liquid (or solvent). The ink used in these washable markers dissolves in what? The water of course!

Watch the magic as the colors blend and swirl! Set aside to dry.

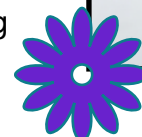


With coffee filter flowers, the water (solvent) is meant to dissolve the marker ink (solute). For this to happen, the molecules in both the water and the ink must be attracted to each other. When you add drops of water to the designs on the paper, the ink should spread out and run through the paper with the water.



STEP 3. The last step in your coffee filter flower bouquet is a stem.

- Once they are dry, fold them back up and round the corners if desired.
- Pull the center together just a touch and tape with clear tape to make a flower.
- Wrap a pipe cleaner around the tape and leave the remaining pipe cleaner for a stem.



Cretaceous



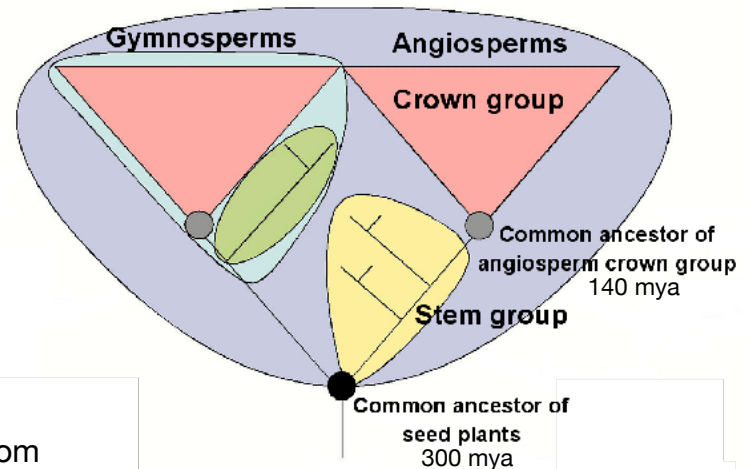
Minding your stems and crowns

Frederick B. Essig

Associate Professor Emeritus, Department of Integrative Biology, University of South Florida

Since evolution became the primary framework for biological thought, we have been fascinated, sometimes obsessed, with the origins of things. Darwin himself was puzzled by the seemingly sudden appearance of the angiosperms (flowering plants) in the fossil record. In that mid-Cretaceous debut, they seemed to be already diversified into modern families, with no evidence of what came before them. This was Darwin’s famous “abominable mystery.”

Birds arose around the same time, but for them we have a detailed fossil record documenting the evolution of their feathers, wings, and specialized skeletal features. For plants, there is still a huge gap between living angiosperms and fossil groups that might be related to them, but we do have tools for whittling away at the mystery.

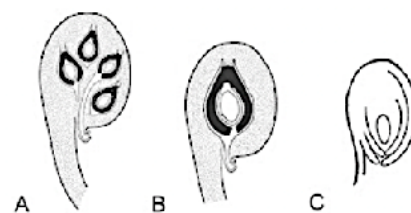


The “top-down” approach uses modern methods of DNA-based phylogenetic analysis to build accurate trees of the living angiosperms, identify the most archaic taxa among them, and from their characteristics make predictions about their common ancestor. By definition, the living members of a group of organisms, their common ancestor, and any extinct species, or “dead ends,” among them, constitute a “crown group” (Fig. 1 above).

The “bottom up” approach analyzes the available fossil record, to identify which extinct species might be most closely related to the crown group, and which of their structures might have been transformed into the characteristic features of the crown group. In the angiosperms, this means particularly the flower parts. The extinct organisms leading up to the crown group are referred to as the “stem group,” which, by definition, extends backwards to an earlier ancestor shared with the next most closely related group of living organisms. For example, the closest living relatives of birds are the crocodilians, and the bird stem group includes all of the dinosaurs! That may sound like the tail wagging the dog (we can alternately call birds a subgroup of dinosaurs), but it is during the long line of dinosaurian ancestry that we see the evolution of feathers, wings, and flight, along with other features shared by birds and dinosaurs but not found in crocodilians. Similarly, the stem group of amphibians is where fish turned into land animals, and the stem group of reptiles is where amphibians turned into reptiles, with advanced (amniotic) eggs that could be laid on land. The stem groups are where all the fun is!

But who were the “dinosaurs” of the angiosperm story? The stem group of the angiosperms goes back some 300 million years to where it split from the ancestor of the living gymnosperms – conifers, cycads, etc. (the “crocodilians” of the angiosperm story) (Fig. 1 above). The common ancestor of both gymnosperms and angiosperms, which lived some 300 million years ago, was some kind of seed fern, a plant that bore seeds and pollen on its leaves. The first full flowers, which may have come into existence around 140 million years ago were bisexual, with distinctive closed carpels, flattened stamens with 4 pollen sacs, and embryonic seeds (ovules)

that were “bent” and contained by a double envelope (integument) (Figs. 2 right). The plants that might tell how, why, and where ancient leafy structures were transformed into these distinctive organs are not only extinct, but also largely missing from the fossil record.



Among known members of the angiosperm stem group, one bright spot lies within the extinct order Caytoniales. Some phylogenetic analyses of fossil Mesozoic seed plants reveal this group to be the most closely related to the angiosperms. This supports an older hypothesis promoted by evolutionary botanist G. L. Stebbins that the peculiar bent angiosperm ovule was derived from the seed-bearing cupule of the Caytoniales (Fig. 3). Known members of the Caytoniales, however, provide little information about the evolution of modern stamens and carpels.

Why should there be a gap in the crucial part of the record? The various Mesozoic seed ferns left a fair number of fossils; why not those leading up to the first angiosperms? Aside from the lower fossilization rate of plants in general, it may be that the pre- and proto-angiosperms evolved in habitats where fossilization was particularly unlikely. For Stebbins and others, that habitat was semiarid subtropical uplands. Stebbins felt that the patchy physical environment and seasonal, marginally sufficient rainfall in such environments provided the maximum stimulation for evolution of new growth forms, and in particular for the short reproductive cycle that is characteristic of the angiosperms. Such environments are the primary hotbeds (“cradles”) of angiosperm innovation and diversity today, while wet tropical forests serve more as refugia or “museums” for archaic angiosperms.

The study by Taylor Feild and his colleagues in 2004, which included analysis of the anatomy, physiology, and ecology of archaic living angiosperms, resulted in a very different hypothesis about the crown group ancestor: that it was adapted to disturbed areas and stream margins in dark, damp forests, where there might be similar pressures for a more rapid reproductive cycle. Who was right?

The answer depends on our reference point. The top-down approach defines the nature of the crown group ancestor, while the bottom-up approach makes hypotheses about adaptive events along the long stem lineage. Angiosperm precursors in the stem group may very well have lived in a variety of habitats, including upland, semi-arid habitats prior to moving into damp, disturbed habitats.

The accumulation of the distinctive features of the angiosperms probably took millions of years, paralleling the progression from feathered dinosaur to true birds. In fact, if we designate the first plant with closed carpels as the first angiosperm (“hidden seeds”), and if other standard features of the flower evolved either before or after that, then “angiosperms” and “flowering plants” are not exactly synonymous. And the crown group ancestor refers to a still later reference point! The crown group ancestor was not the first angiosperm, just as there were true birds prior to the bird crown group ancestor. All we can say for sure is that it was a successful angiosperm, with all the standard floral features in place, and that it proliferated at the expense of other early angiosperms.

Therefore, when postulating the origins of groups of plants, we must be careful to mind our stems and crowns!



The Birthplace of the Angiosperms

Frederick B. Essig

Associate Professor Emeritus, Department of Integrative Biology, University of South Florida

One of the great thrills for any botanist, gardener, or wildflower enthusiast is a visit to the southwestern tip of Africa in the springtime, as featured in the current series on my wildflower page. Rain falls mainly in the winter here, as it does in southern Europe or California, creating a Mediterranean type of climate at the tip of a largely tropical continent. Rainfall varies, creating relatively lush shrublands, locally called Fynbos, along the southern coast, and these grade into desert to the north and west. The isolation, rough terrain, and diversity of microhabitats has resulted in one of the richest and most spectacular floras to be seen anywhere in the world. The moistening of the soil in the winter releases a frenzy of growth and reproduction in plants that have been dormant for 9 to 11 months, blanketing the usually barren fields and rocky hillsides with brilliantly colored wildflowers. In a month or two, the show is over and the Fynbos sleeps again.

According to some theories, the flowering plants, or angiosperms, began their existence in an environment similar to the semi-arid hills of southern Africa today. Such regions provide varied challenges to both survival and reproduction. The short growing season and limited rainfall in particular force plants to economize in numerous ways, to shorten their reproductive cycles and decrease their exposure to the long dry summers. Many go dormant, surviving underground as bulbs, corms, or tubers. Adaptations to such habitats by early angiosperms opened the door to herbaceous life styles not available to the slow-growing and slow-reproducing gymnosperms.

Semi-arid habitats also tend to be fragmented by rocky terrain into patches of varying moisture, temperature, and soil conditions. The north side of a rock, for example, has less sun exposure than the south side and remains moist longer. Streambeds and marshes remain wet longer and provide additional habitats. This breaks up populations of plants into small localized subpopulations which may become further isolated through adaptation for specialized pollinators. Isolation is key to the birth of new species, and promotes rapid evolution among plants. Plants inhabiting such areas today are among the most progressive and diverse of angiosperms, and include members of the legume, sunflower, iris, and grass families, to name only a few. These families represent the current cutting edge of plant evolution.

For these reasons, botanists such as Daniel Axelrod (1952) and G. Ledyard Stebbins (1974) proposed that semi-arid subtropical uplands similar to those seen in South Africa today serve as “cradles” of evolutionary innovation, where successive waves of plant innovation have occurred. The cutting edge of plant evolution 120-180 million years ago consisted of the precursors of flowering plants. Lowland moist forests, long thought to be the home of the first flowering plants, would have provided no incentives to shorten the life cycle or invent new forms of vegetation. Diversification of early flowers and modes of pollination also would have been favored in semi-arid environments, where insects are abundant late in the wet season and compete fiercely with one another for limited resources.

If this model of evolutionary cradles is correct, it helps to explain Darwin’s “abominable mystery.” In the fossil record, angiosperms appear rather abruptly, and in great diversity. There is no sign of the “missing links” between earlier seed plants and those with flowers. If early angiosperms and their precursors lived in hilly, semi-dry environments, where fossilization rarely takes place, they would not have left any traces in the rocks. Flowering plants, and the seed plants leading up to them, may have lived in upland environments for millions of years before some of their descendants moved into the forests and swamps of the lowland flood plains, where fossilization was more likely. The fossil record of angiosperms began with those lowland immigrants, and by that time there were already many different kinds.



Before this “semi-arid upland” theory, it was generally believed that angiosperms had evolved in moist lowland forests. This is where we find the most archaic living angiosperms, such as **Amborella**, the **Austrobaileyales**, and many **magnolids**. To Stebbins, however, such forests were “museum” habitats that harbored refugees from earlier waves of evolution in the dry uplands as they were replaced by newer forms of plant life. Successful new kinds of plants tend to radiate into different habitats, including moist forests and wetlands. One early wave led to the **waterlily order (Nymphaeales)**, a very ancient lineage, but one that is still quite successful and widespread today.

Think of a department store as an analogy. The newest fashions are on the frontline, full-price racks. This is where the action is – where new fashion trends evolve and all the cool people buy their clothes. As these fashions are replaced by newer designs, the remnants migrate to the bargain racks in the back of the store. The clearance racks are the museum habitat for clothing fashion. Most will gradually disappear, but a few of the more interesting ones may persist in actual museums featuring clothing fashions of past eras.

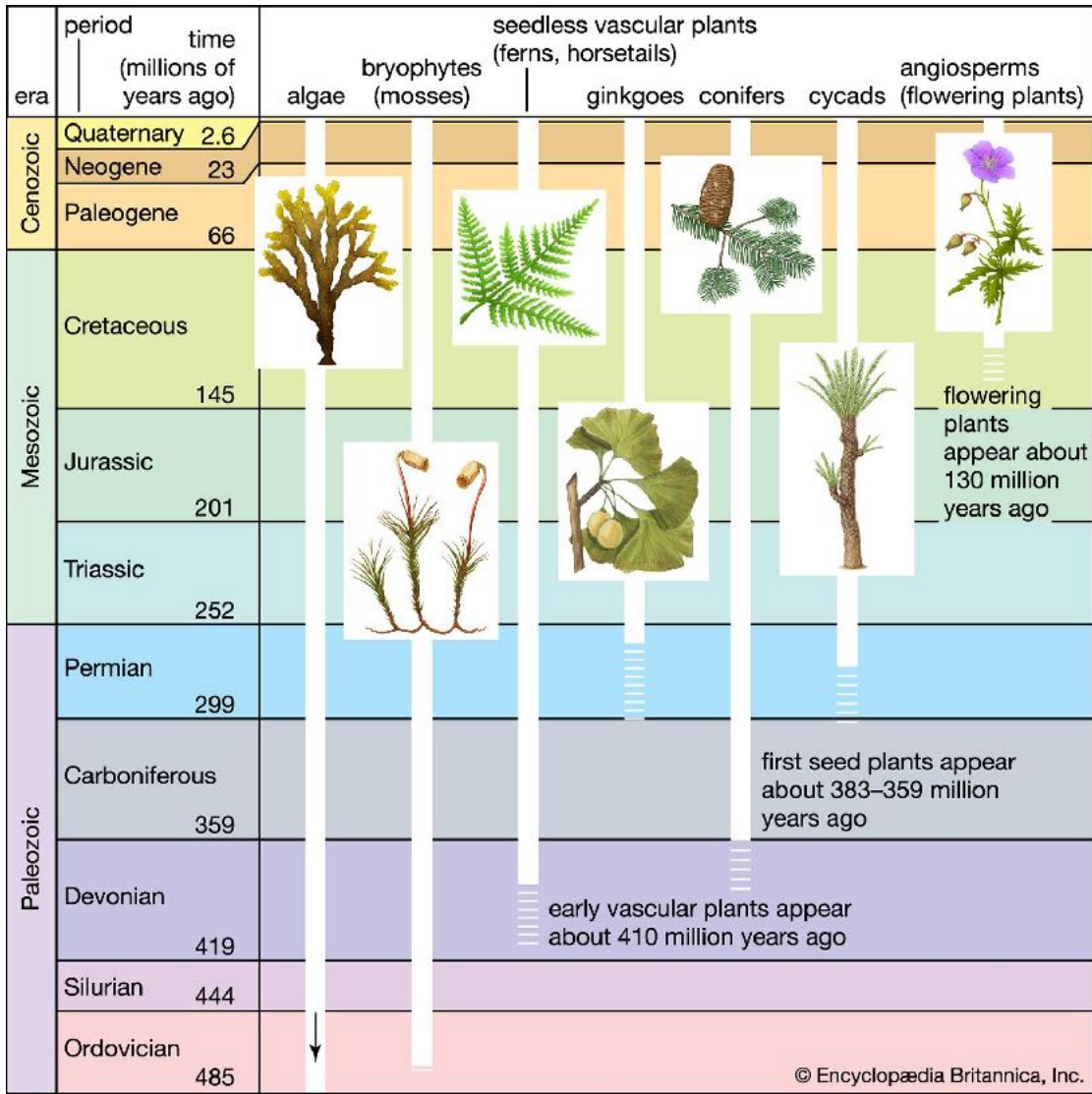
Despite that attractive logic, there are still arguments that angiosperms may have in fact evolved in moist lowland habitats. Taylor Feild (yes, his name is Feild, not Field, as I’ve had to explain numerous times to my spell-checker and one reviewer of my manuscript!) and colleagues (Feild et al., 2004) have examined the physiology of living archaic angiosperms, representing diverse families, and found them fundamentally adapted to moist, shady, and disturbed habitats. According to the “dark and disturbed” hypothesis, habitats subject to frequent disturbance would have promoted the shorter life cycles and vegetative flexibility inherent to angiosperms. Genetic evidence indicates that these forest adaptations appear to have been inherited from a common ancestor, suggesting that they stemmed from the earliest angiosperms. So the ecology of angiosperm origins is not yet fully agreed upon.

A tale of stem and crown

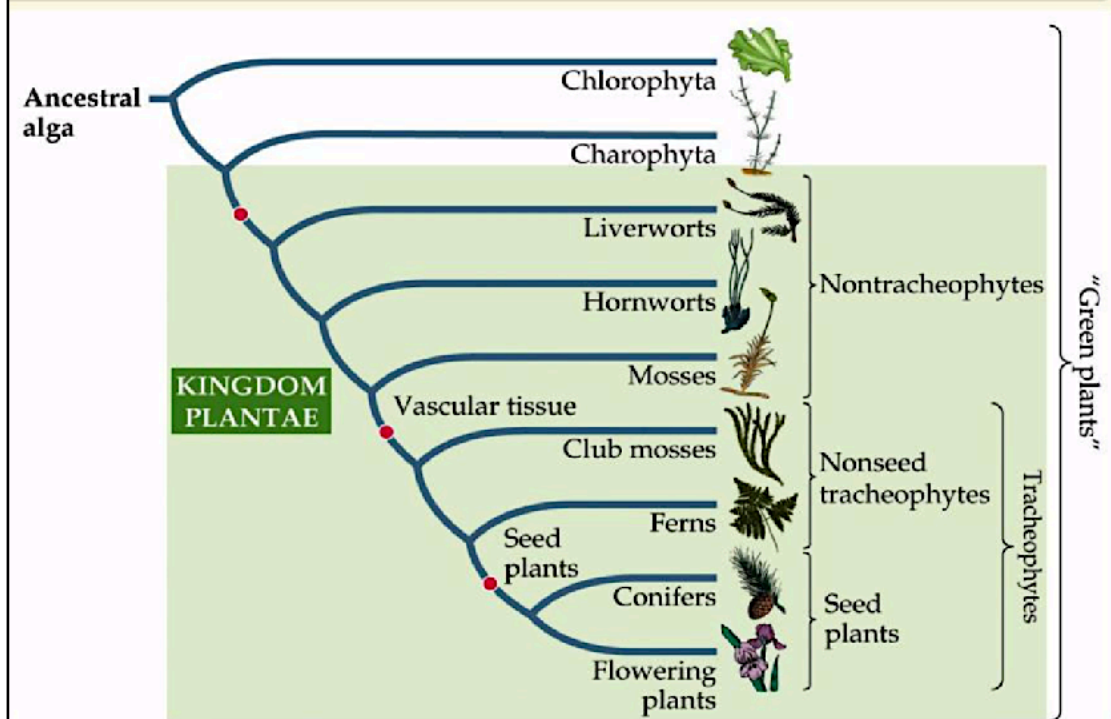
Perhaps, however, the real story will turn out to be a combination of the dry upland theory and the dark and disturbed theory. Those advocating a dry upland origin for angiosperms, were suggesting that the fundamental features of angiosperms evolved gradually in upland habitats in the early angiosperms or even pre-angiosperms. Feild on the other hand, suggested only that the angiosperms we know today had a common ancestor that evolved in a dark, disturbed environment. What’s the difference between these two statements?










All living angiosperms have a hypothetical common ancestor, and together constitute the “crown group” of angiosperms. That common ancestor was not the very first angiosperm, however. It emerged from a long line of early angiosperms and transitional pre-angiosperms, which constituted the “stem group.” Aside from the crown group ancestor and the living angiosperms that descended from it, all stem angiosperms, by definition, are now extinct.

Early development of the angiosperms, and the evolution of their key features, may very well have evolved among stem angiosperms living in semi-dry uplands, as proposed by Axelrod and Stebbins. That environment still offers the greatest stimulation for evolutionary change, and in particular for the types of changes that led to the angiosperms. The early angiosperm that was destined to give rise to all modern angiosperms, however, apparently migrated into a “dark, disturbed” environment, where the finishing touches of angiospermy were applied, giving rise to a diverse, flexible and aggressive group of plants that came to dominate the earth. So the different theories, like blind men feeling different parts of an elephant, described different parts of the story: one begins where the other leaves off. The real story may prove to be even more complex, however, for plants have repeatedly moved from wet habitats to dry habitats and vice versa. Only time will tell.



Evolution of Plants

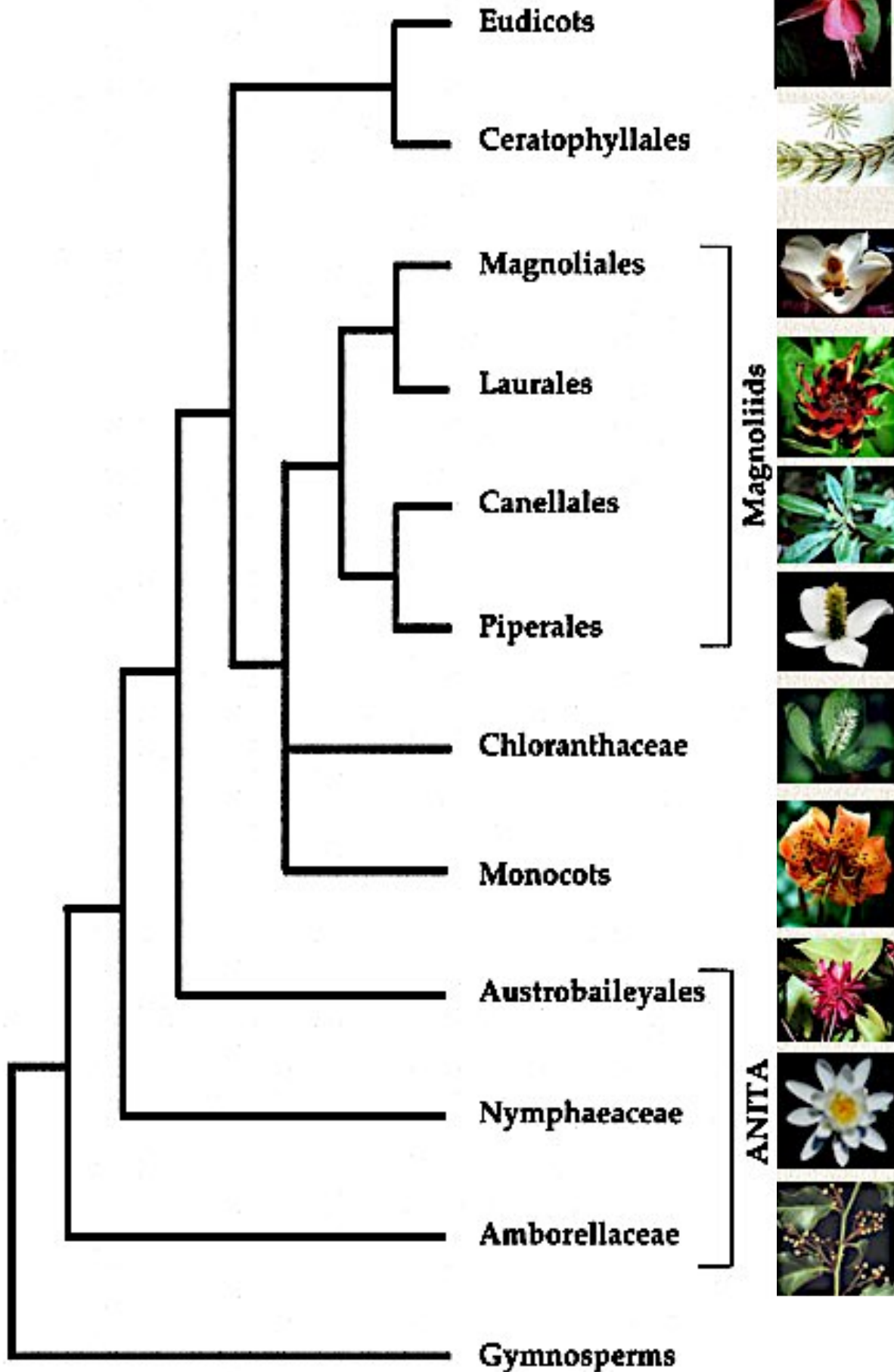


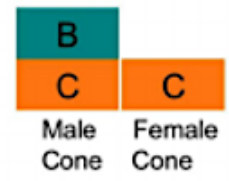
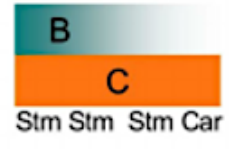
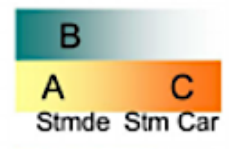
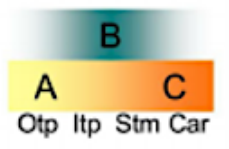
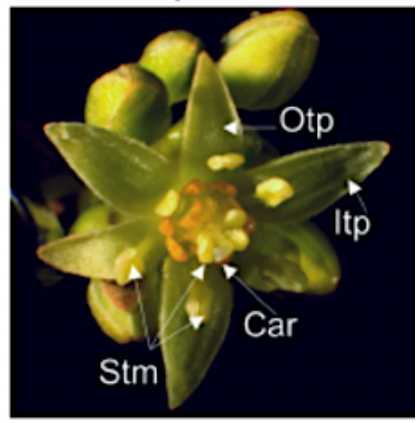
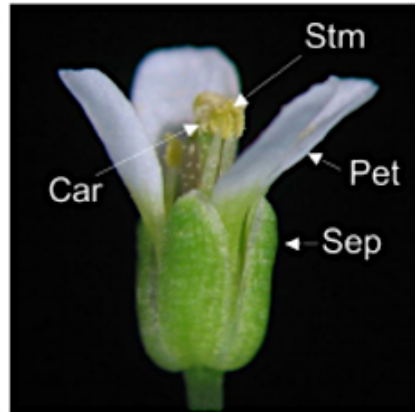
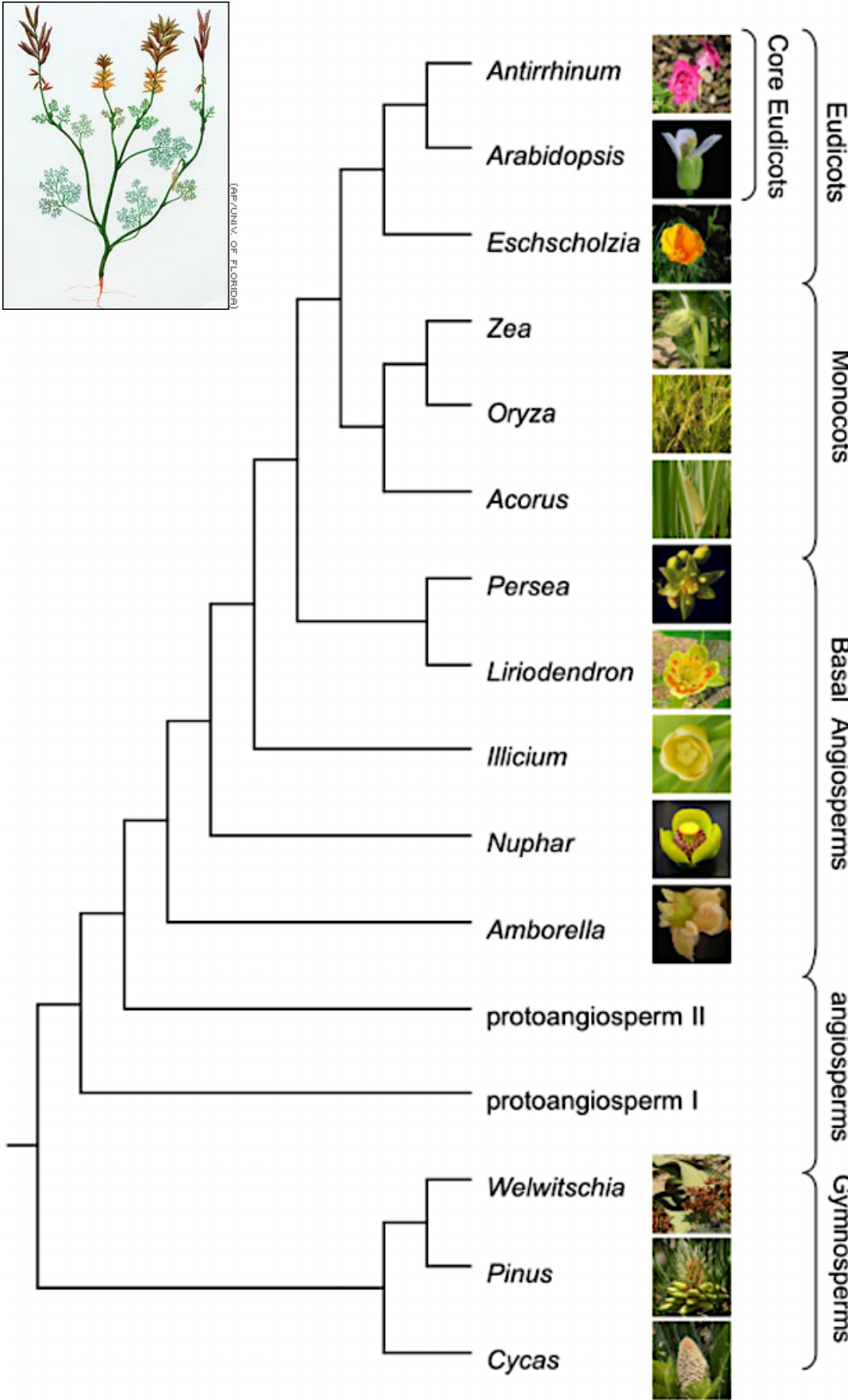
| Phylum | Typical Examples | Key Characteristics | Approximate Number of Living Species |
|--|---|--|--------------------------------------|
| Nonvascular Plants | | | |
| Hepaticophyta (liverworts) | <i>Marchantia</i>  | Without true vascular tissues; lack true roots and leaves; live in moist habitats and obtain water and nutrients by osmosis and diffusion; require water for fertilization; gametophyte is dominant structure in the life cycle; the three phyla were once grouped together | 15,600 |
| Anthoceroophyta (hornworts) | <i>Anthoceros</i> | | |
| Bryophyta (mosses) | <i>Polytrichum</i> , <i>Sphagnum</i> (hairy cap and peat moss)  | | |
| Seedless Vascular Plants | | | |
| Lycophyta (lycophods) | <i>Lycopodium</i> (club mosses)  | Seedless vascular plants, some are similar in appearance to mosses but diploid; require water for fertilization; sporophyte is dominant structure in life cycle; found in moist woodland habitats | 1,150 |
| Pterophyta (ferns) | <i>Azolla</i> , <i>Sphaeropteris</i> (water and tree ferns) <i>Equisetum</i> (horsetails) <i>Pilotum</i> (whisk ferns)  | Seedless vascular plants; require water for fertilization; sporophytes diverse in form and dominate the life cycle | 11,000 |
| Seed Plants | | | |
| Coniferophyta (conifers) | Pines, spruce, fir, redwood, cedar  | Gymnosperms; wind pollinated; ovules partially exposed at time of pollination; flowerless; seeds are dispersed by the wind; sperm lack flagella; sporophyte is dominant structure in life cycle; leaves are needlelike or scalelike; most species are evergreens and live in dense stands; among the most common trees on earth | 601 |
| Cycadophyta (cycads) | Cycads, sago palms  | Gymnosperms; wind pollination or possibly insect pollination; very slow growing, palmlike trees; sperm have flagella; trees are either male or female; sporophyte dominant in the life cycle | 206 |
| Gnetophyta (shrub teas) | Mormon tea, <i>Welwitschia</i>  | Gymnosperms; nonmotile sperm; shrubs and vines; wind pollination and possibly insect pollination; plants are either male or female; sporophyte is dominant in the life cycle | 65 |
| Ginkgophyta (ginkgo) | Ginkgo trees  | Gymnosperms; fanlike leaves that are dropped in winter (deciduous); seeds fleshy and ill-scented; motile sperm; trees are either male or female; sporophyte is dominant in the life cycle | 1 |
| Anthophyta (flowering plants, also called angiosperms) | Oak trees, corn, wheat, roses  | Flowering; pollination by wind, animal, and water; characterized by ovules that are fully enclosed by the carpel; fertilization involves two sperm nuclei: one forms the embryo, the other fuses with the polar body to form endosperm for the seed; after fertilization, carpels and the fertilized ovules (now seeds) mature to become fruit; sporophyte is dominant in life cycle | 250,000 |



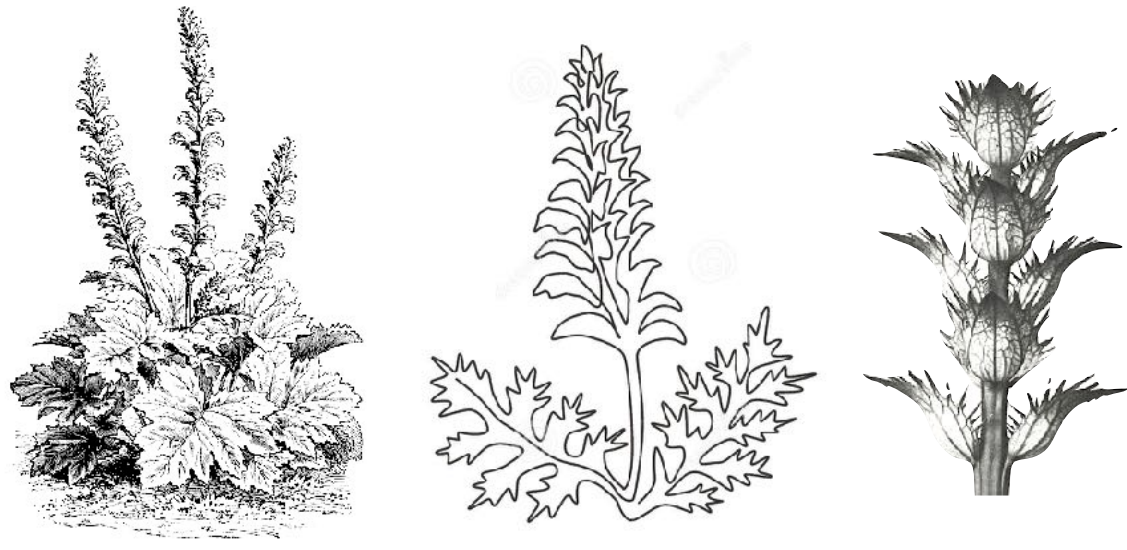
Basal Angiosperm Phylogeny

APG II 2003





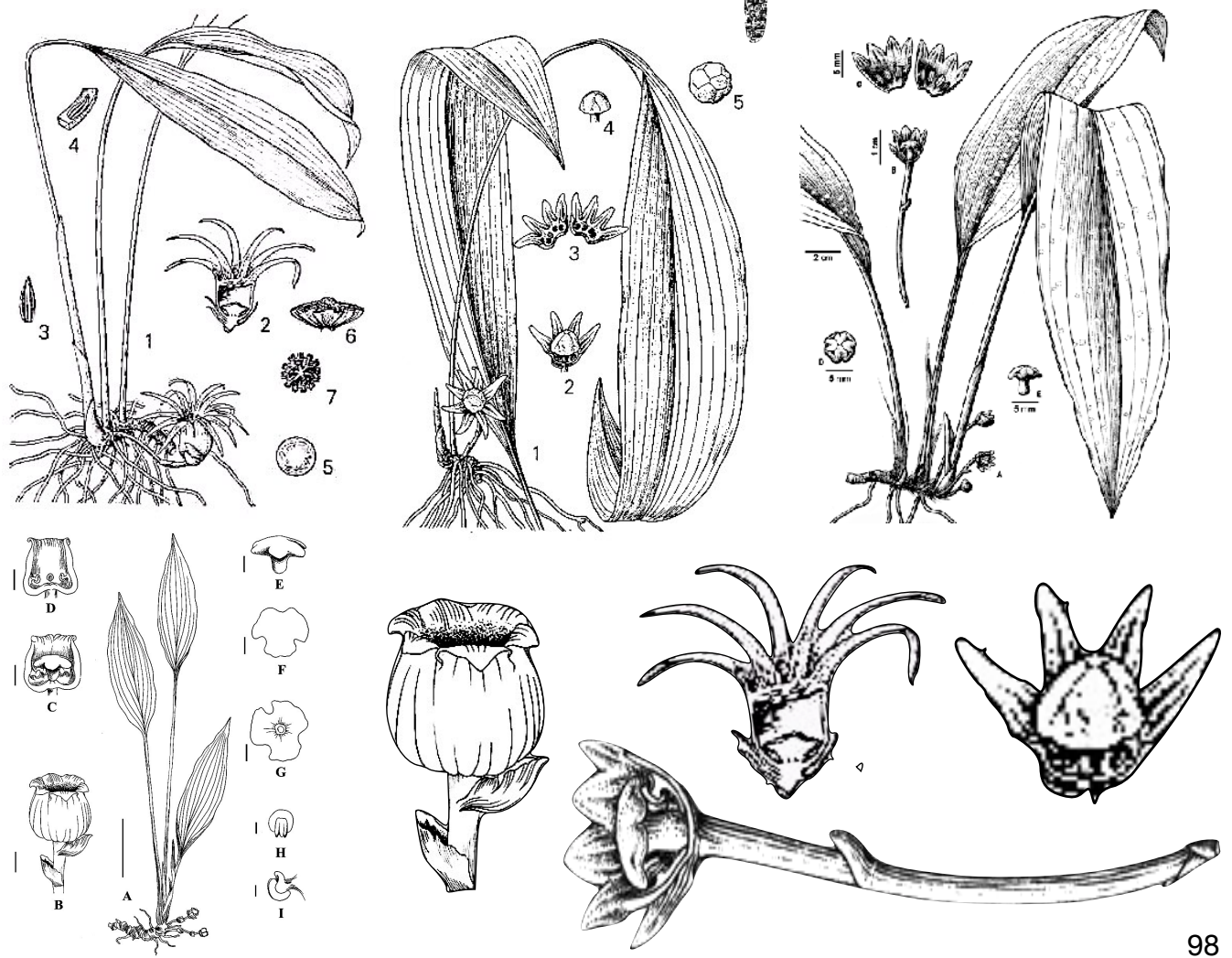
Acanthus



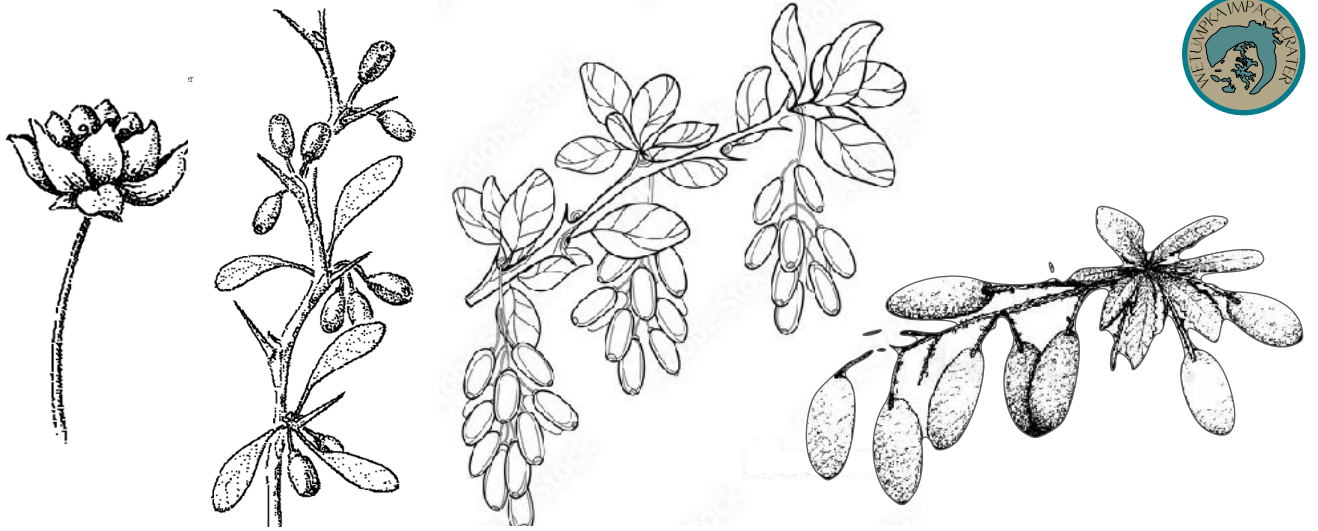
Alder



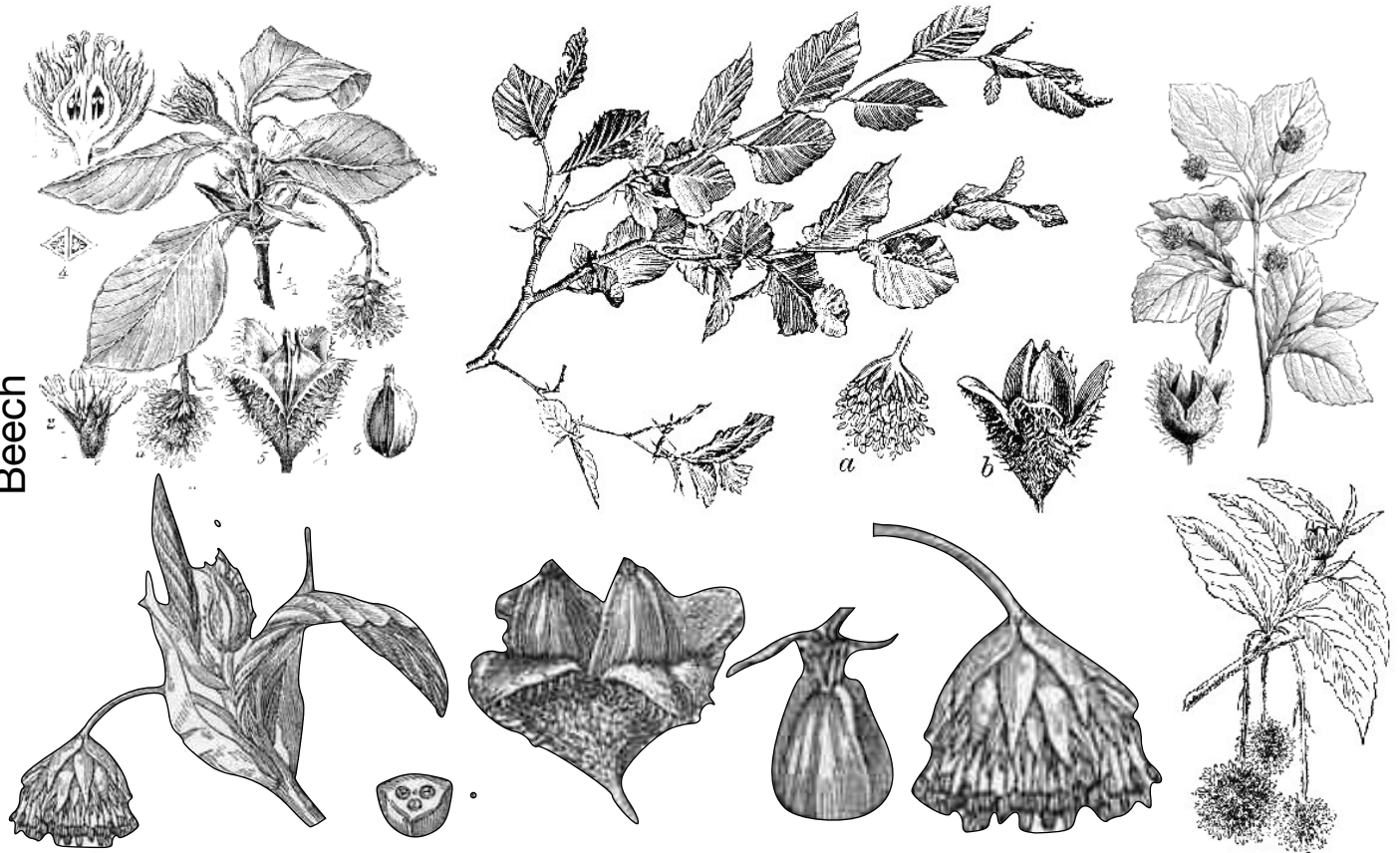
Aspidistra



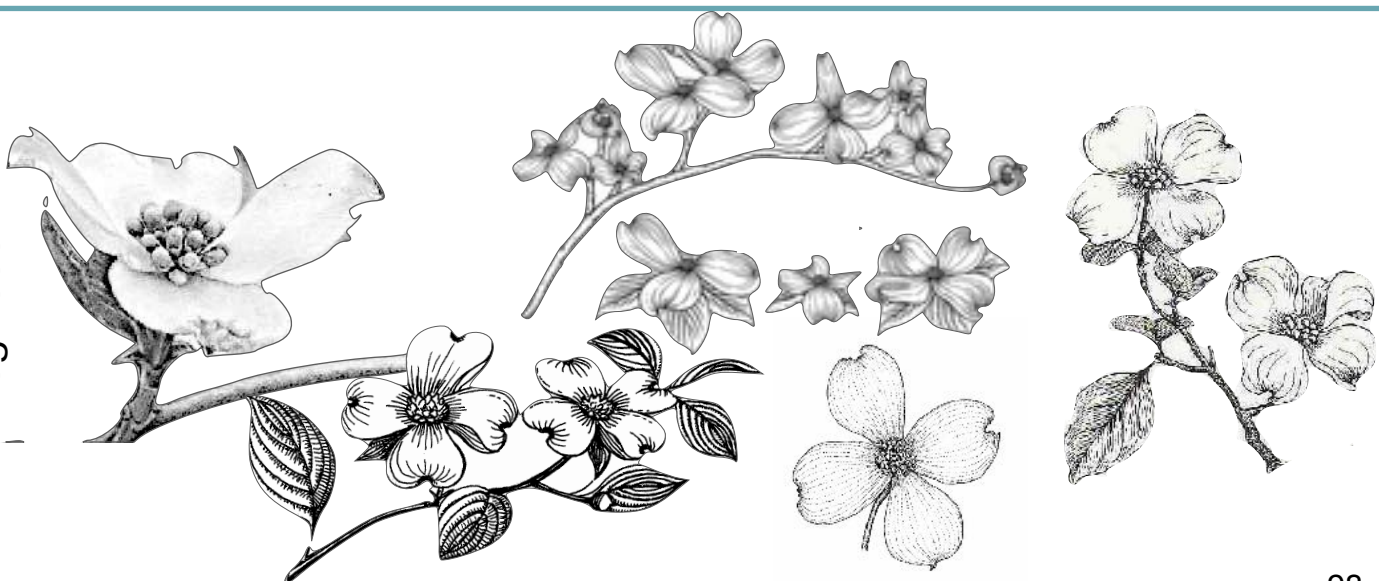
Barberry



Beech



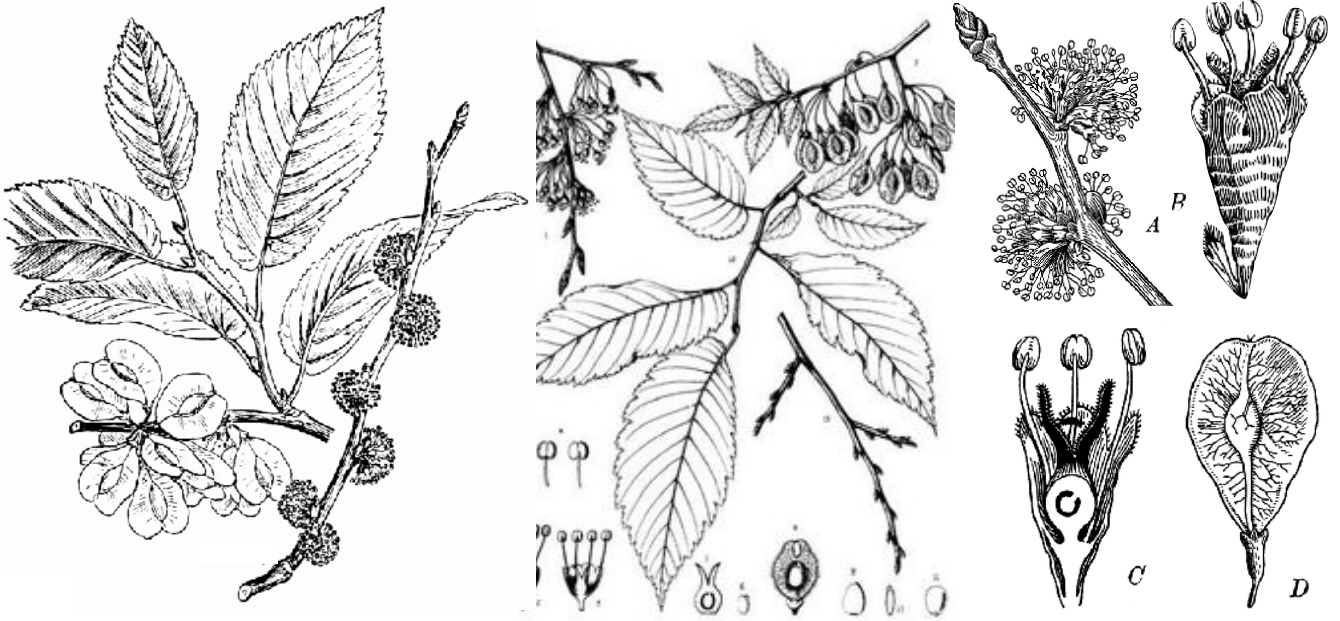
Dogwood



Elephant Ear



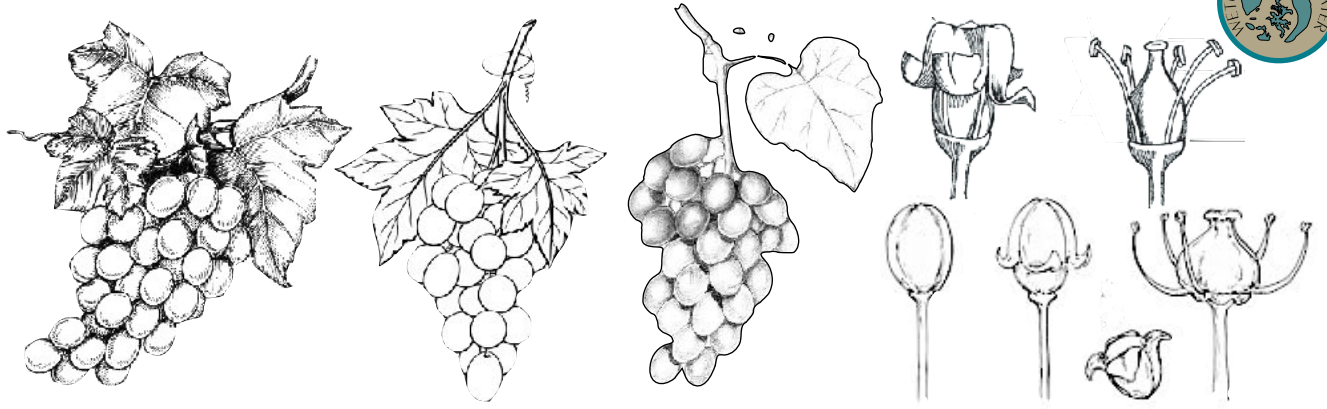
Elm



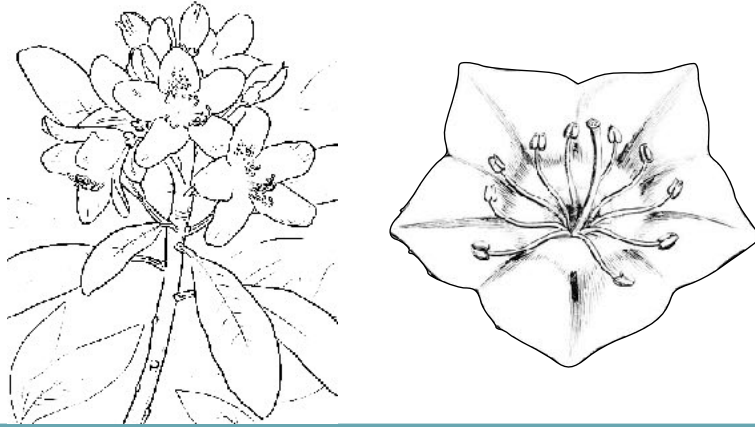
Fig



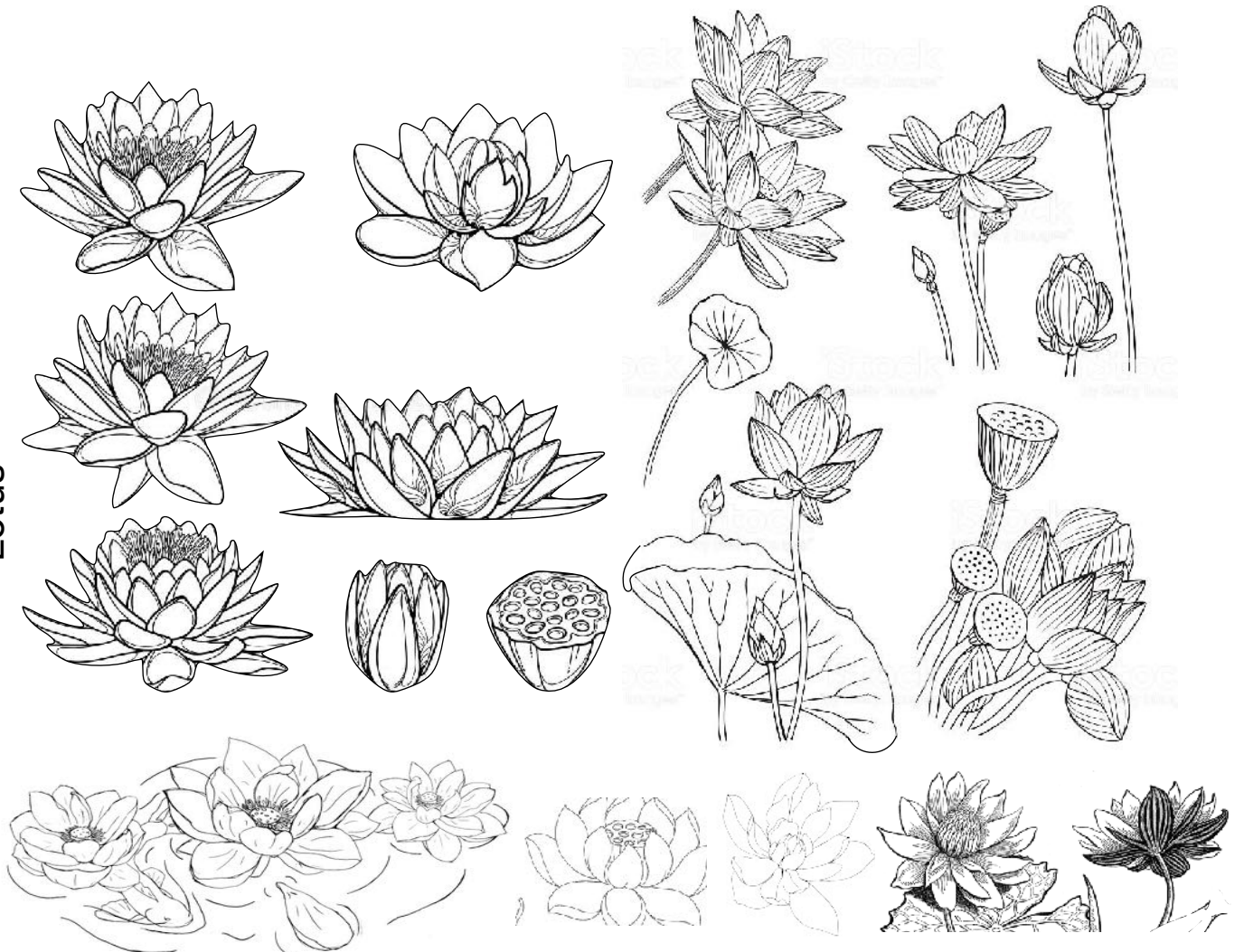
Grape



Laurel



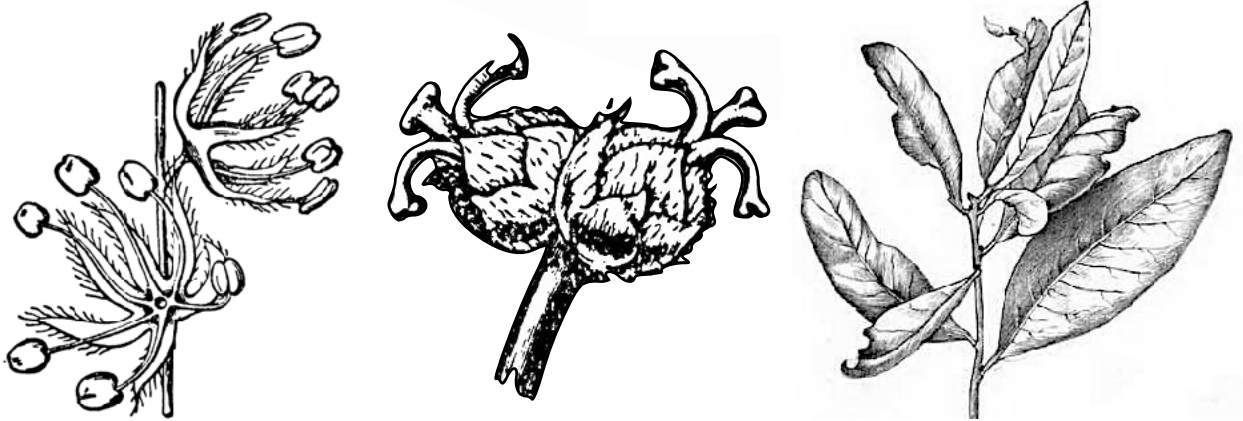
Lotus



Magnolia

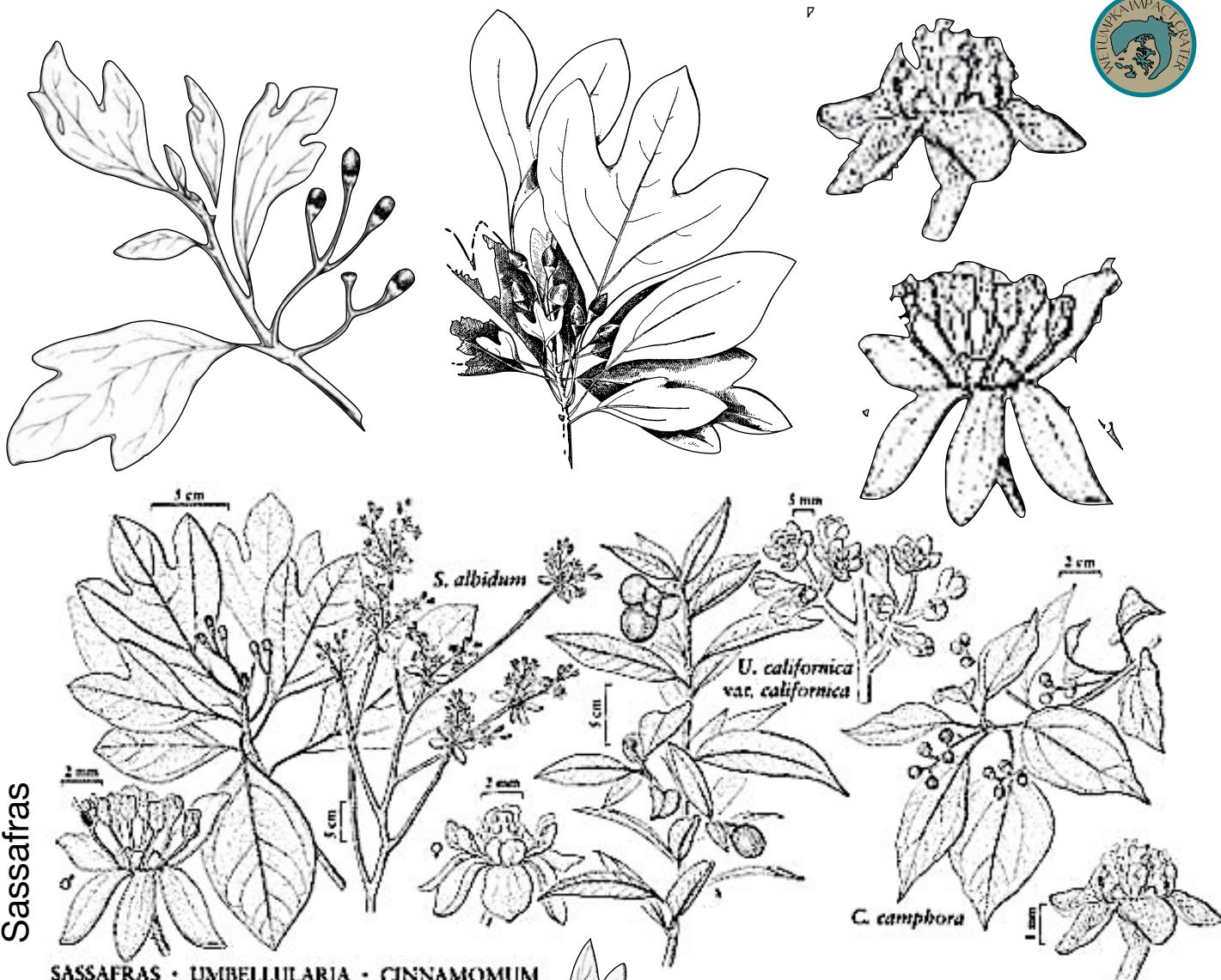


Oak



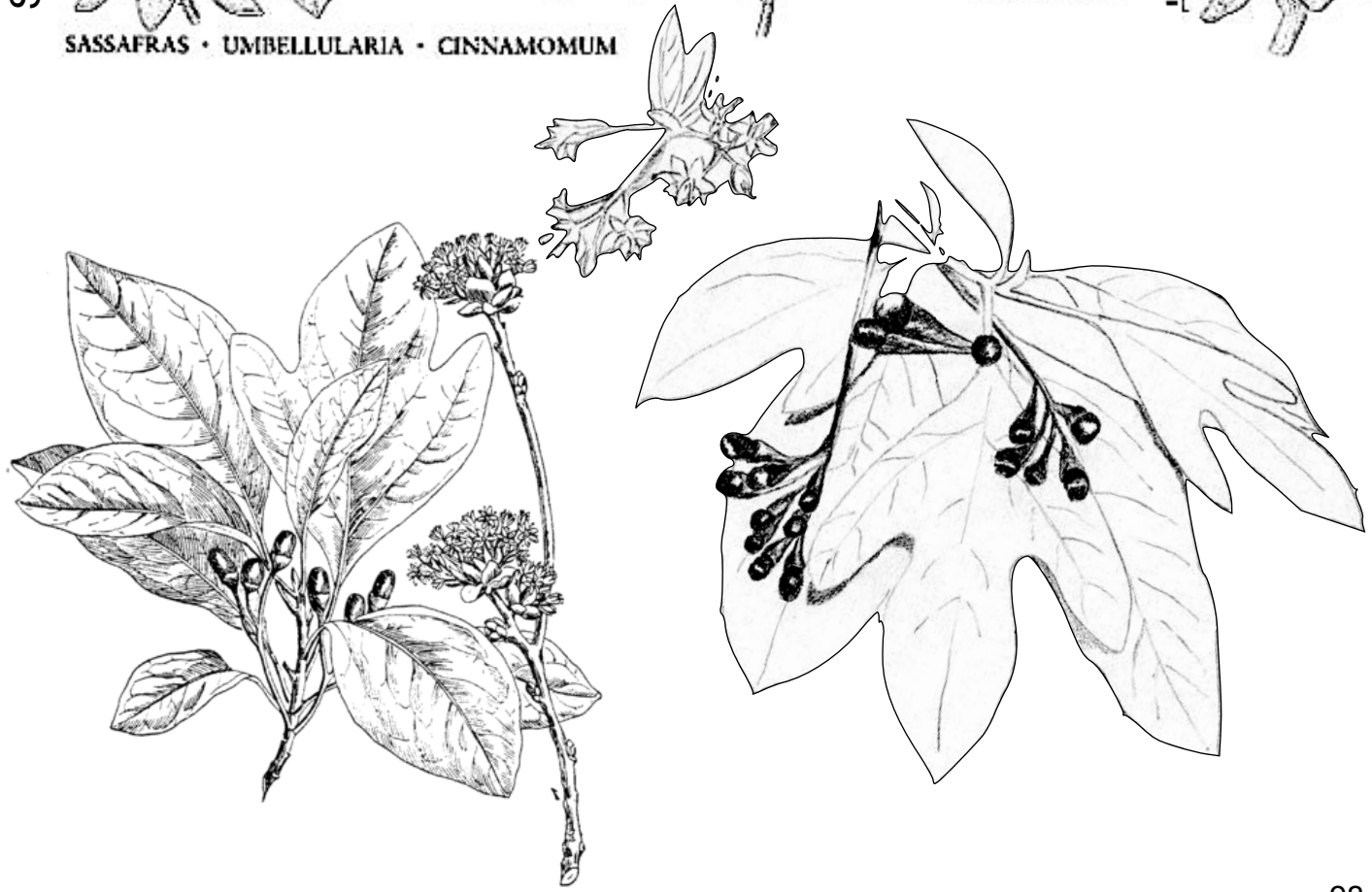
Walnut



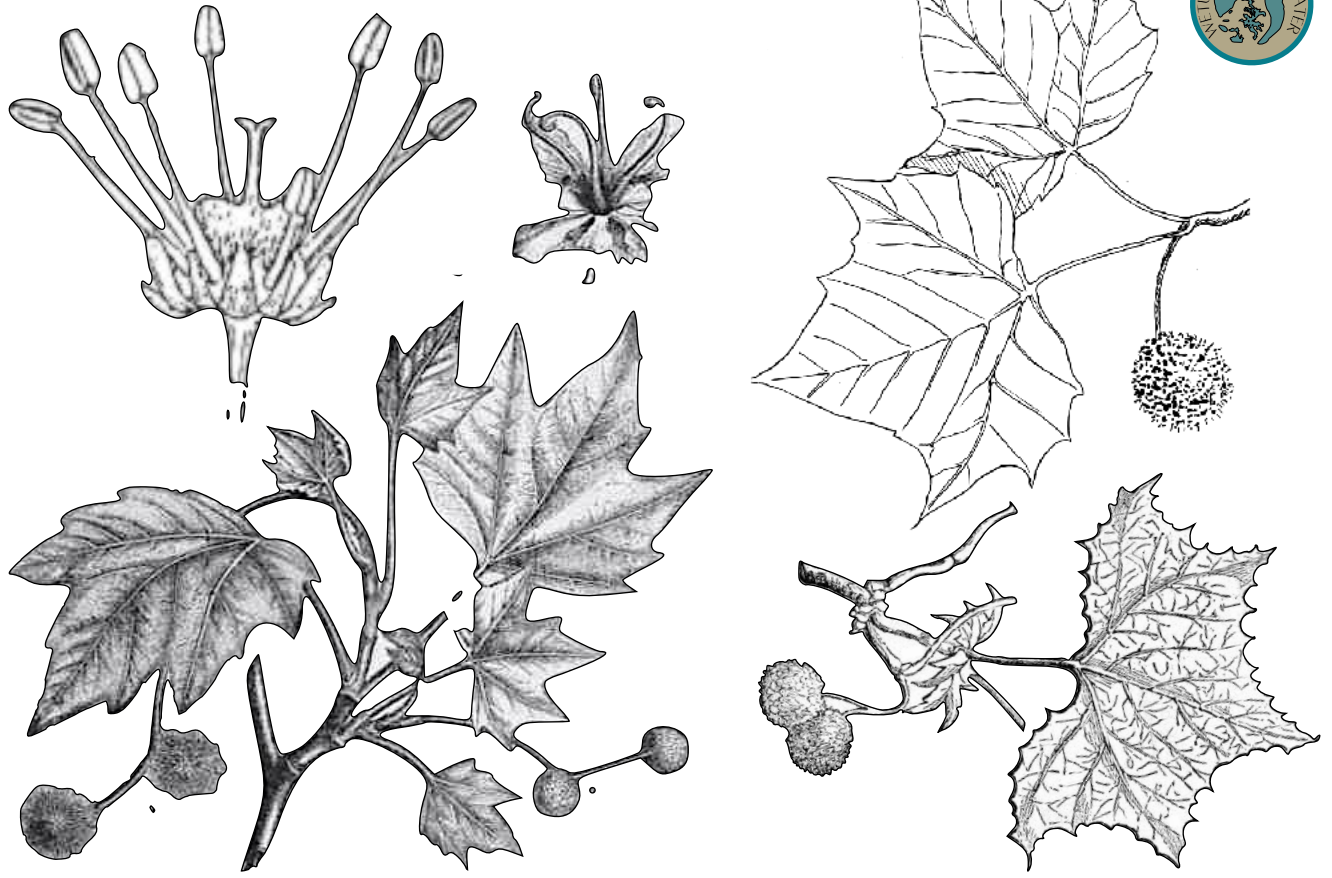


Sassafras

SASSAFRAS • UMBELLULARIA • CINNAMOMUM



Sycamore



Water Lily



Witch Hazel

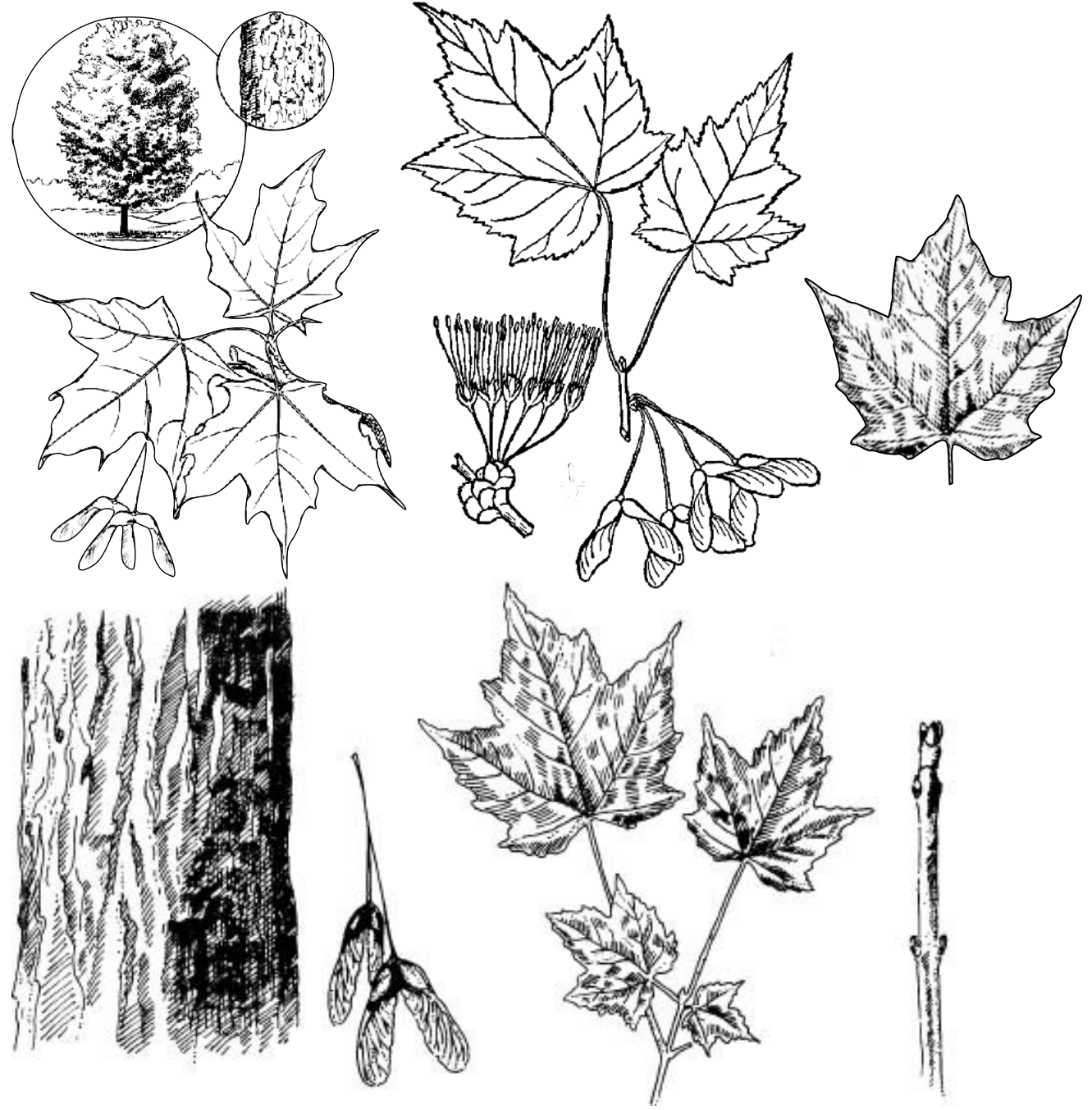




Podocarpus



Maple

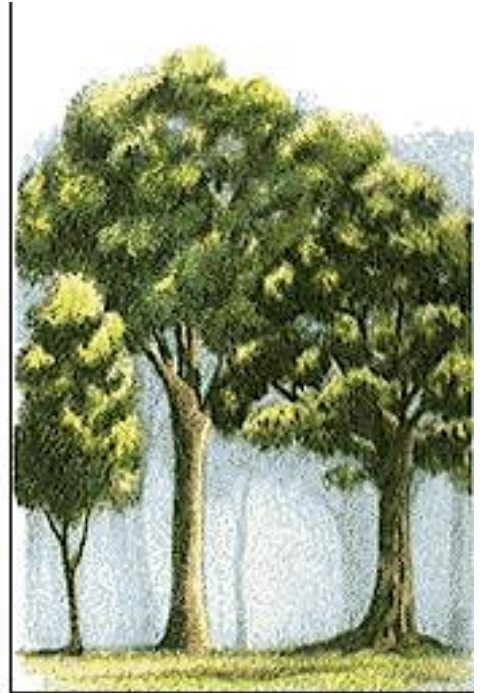




Carboniferous forest

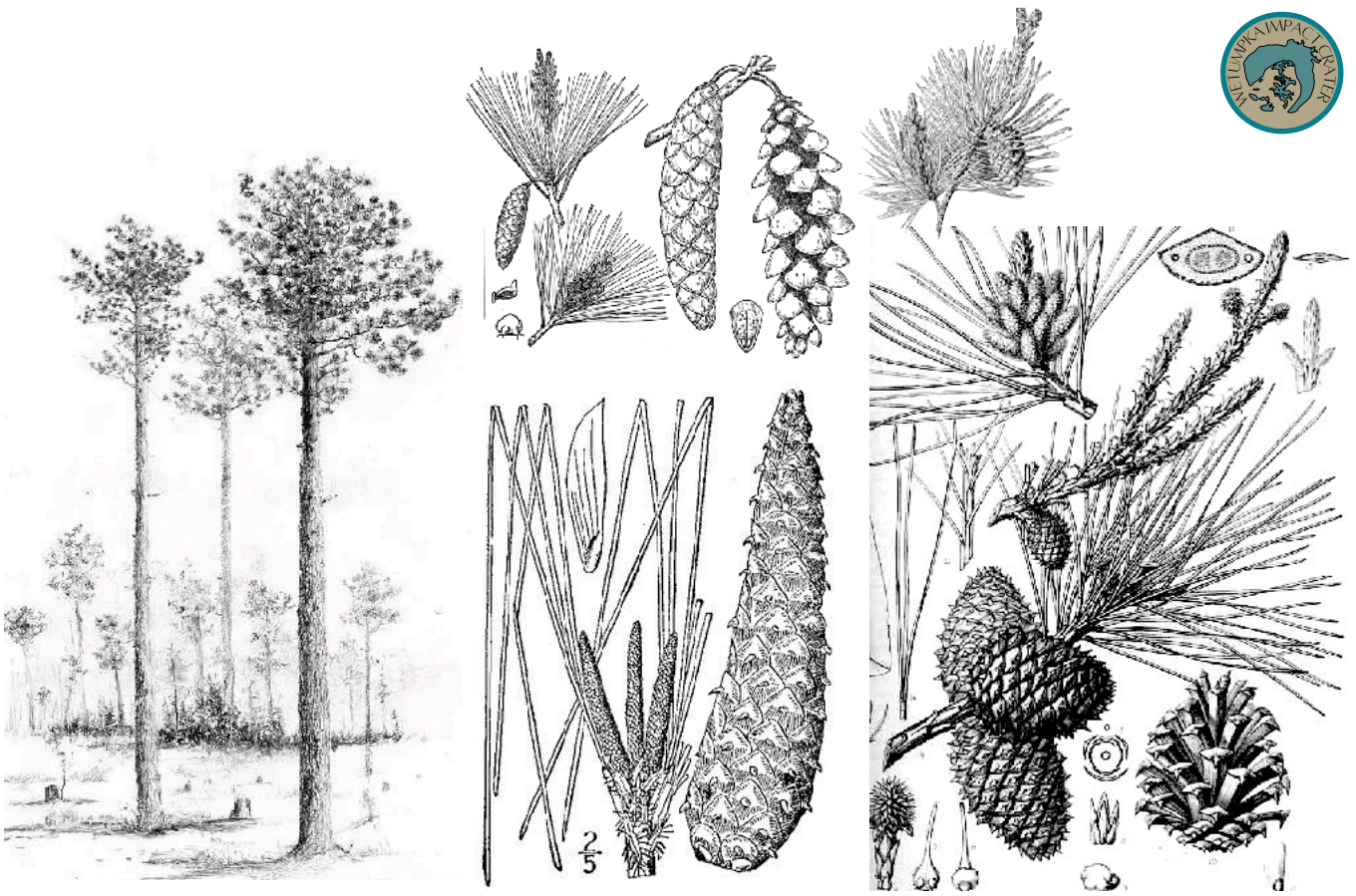


Jurassic forest

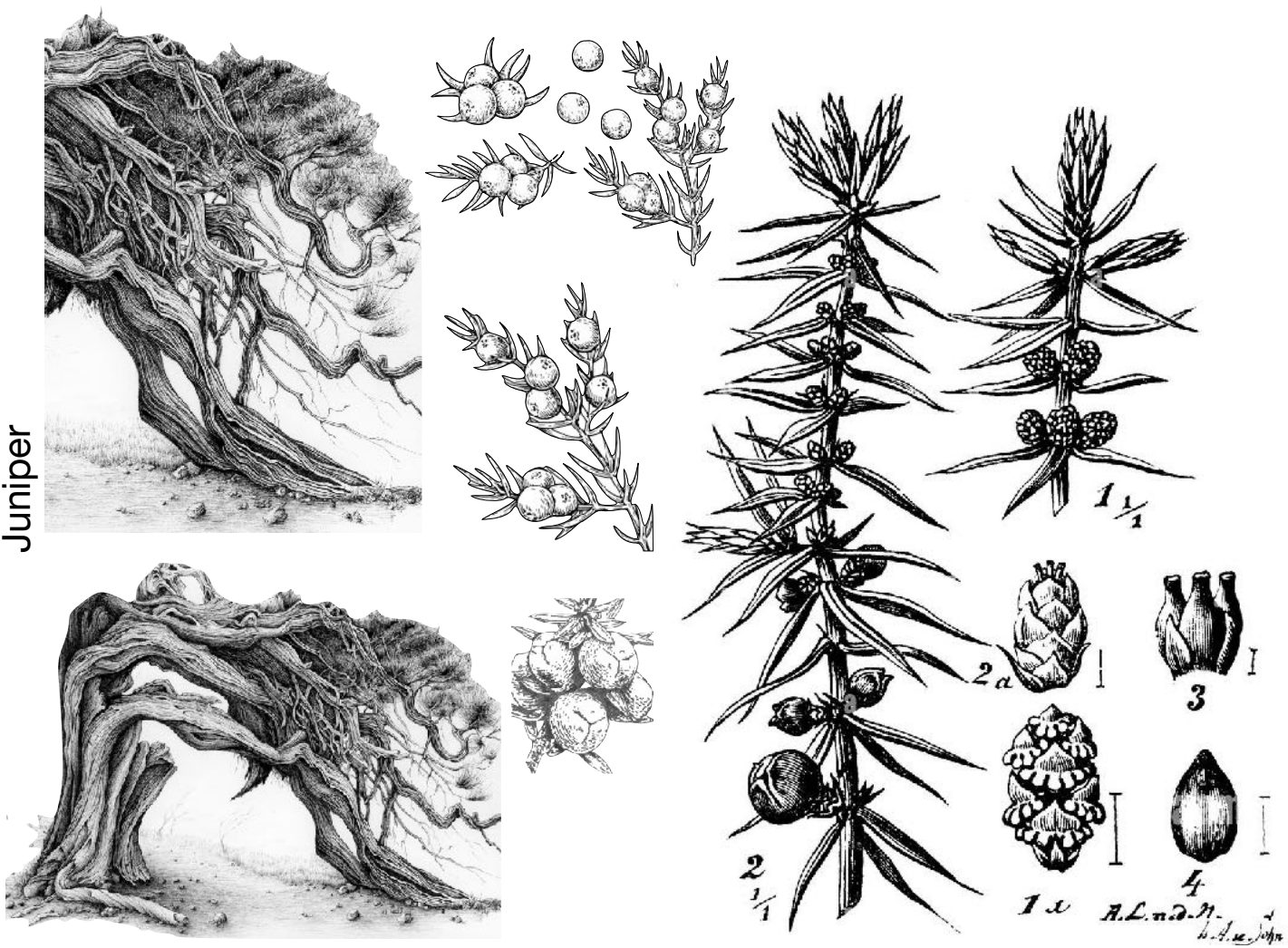


Tertiary forest

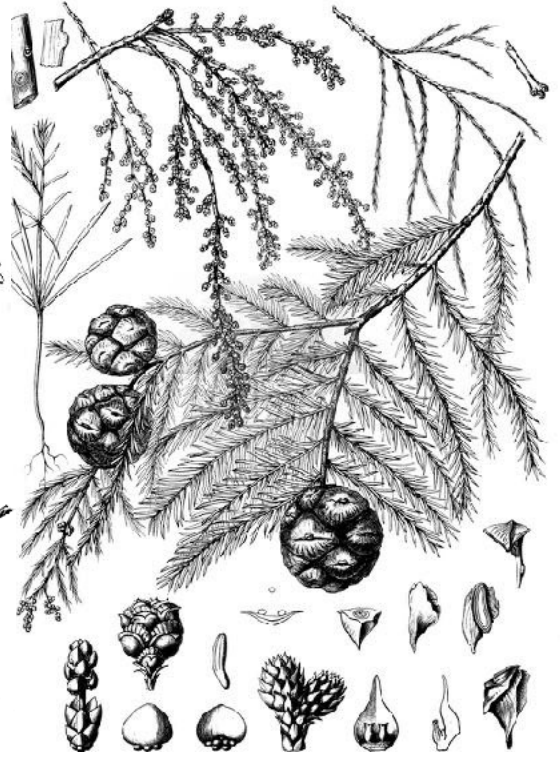
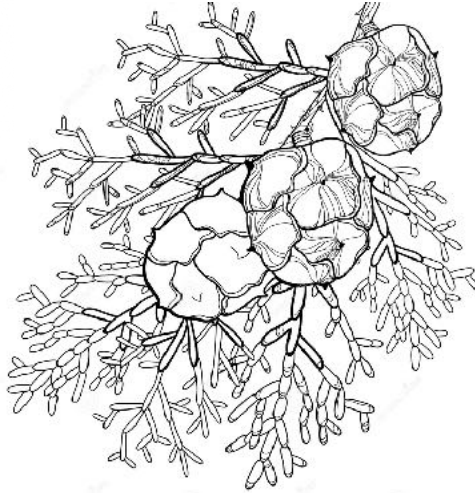
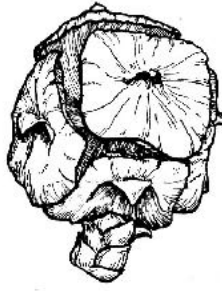
Longleaf Pine



Juniper



Cypress



Willow

Palms



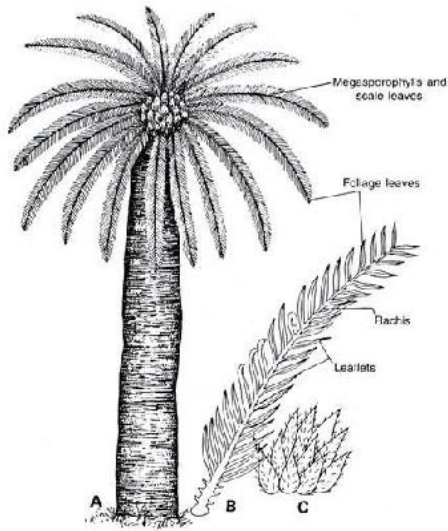
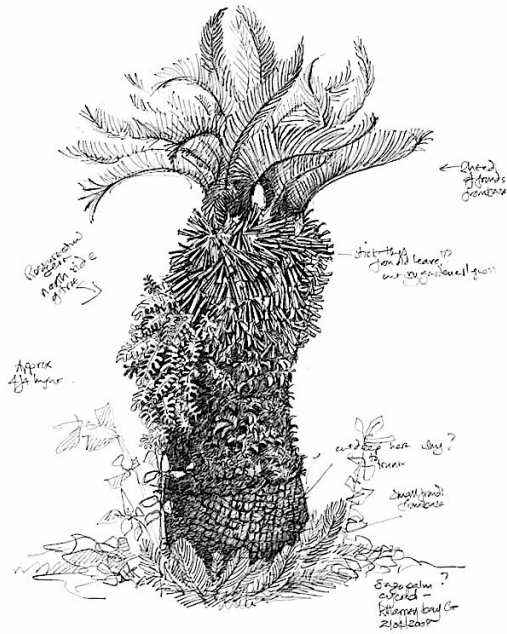
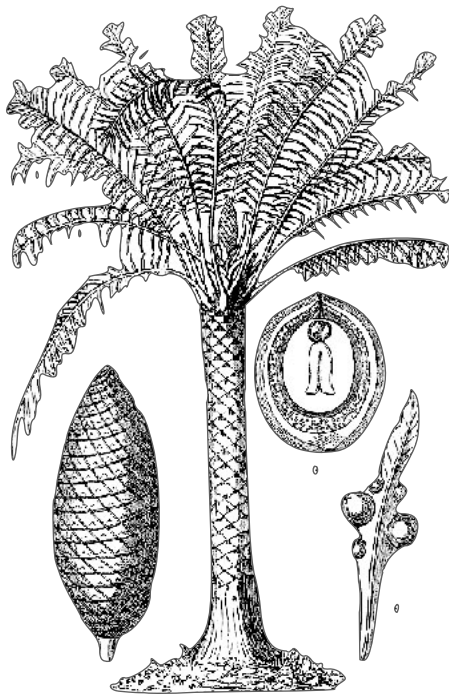
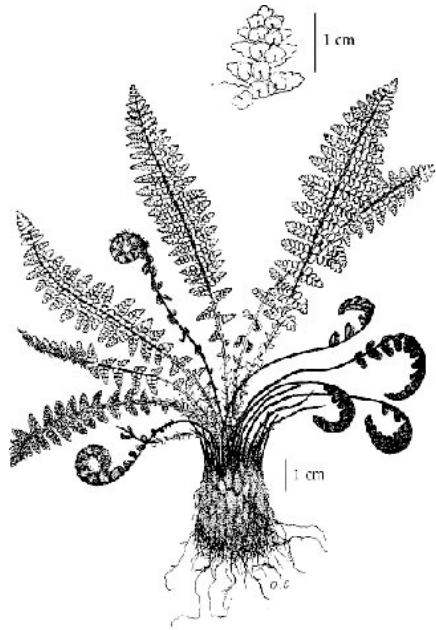


Fig. 3.6. Cycose. External structure. A, a female plant of *Cycas revoluta*, B, leaf of *C. revoluta*, C, scale leaves of *C. revoluta*.



Cycads



Ferns, Mosses & Clubmosses, Horsetails

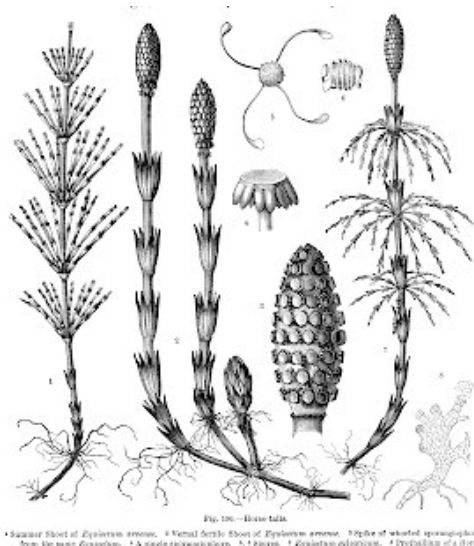
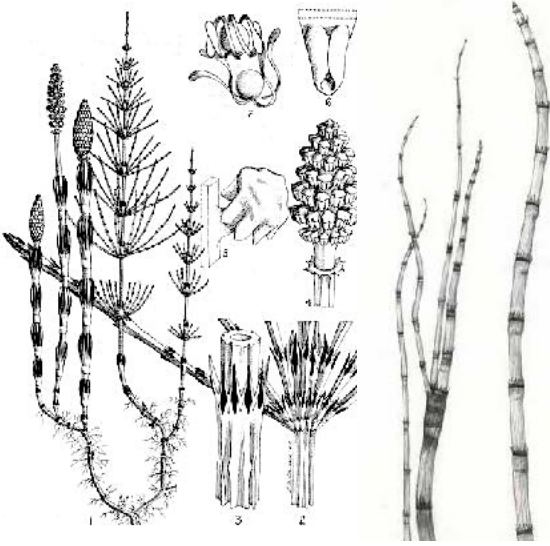


Fig. 126.—Equisetum. * Sterile shoot of *Equisetum arvense*. * Fertile shoot of *Equisetum arvense*. * Right of whorled sporangium from the stem *Equisetum*. * A single sporangium. * * * * * *Equisetum arvense*. * Production of a strobilus. * * * * * (After Hillebrand, 1912.)



Fig. 131. Reconstruction of *Calamites* sp. (After Hillebrand, 1912.)

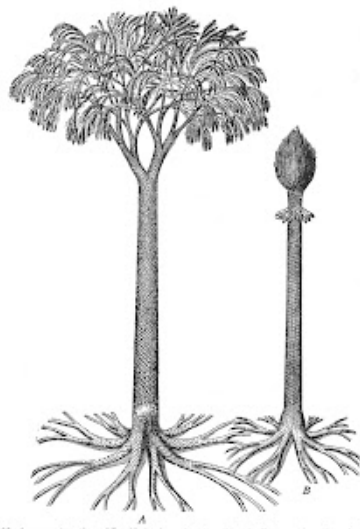
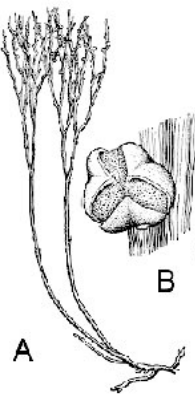
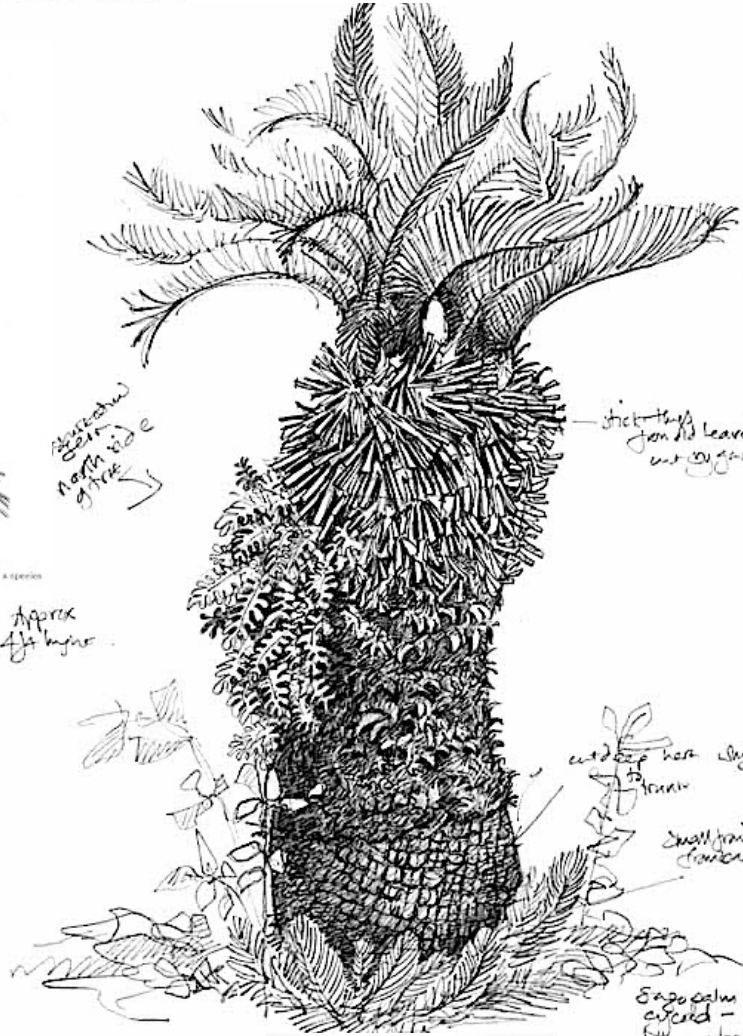
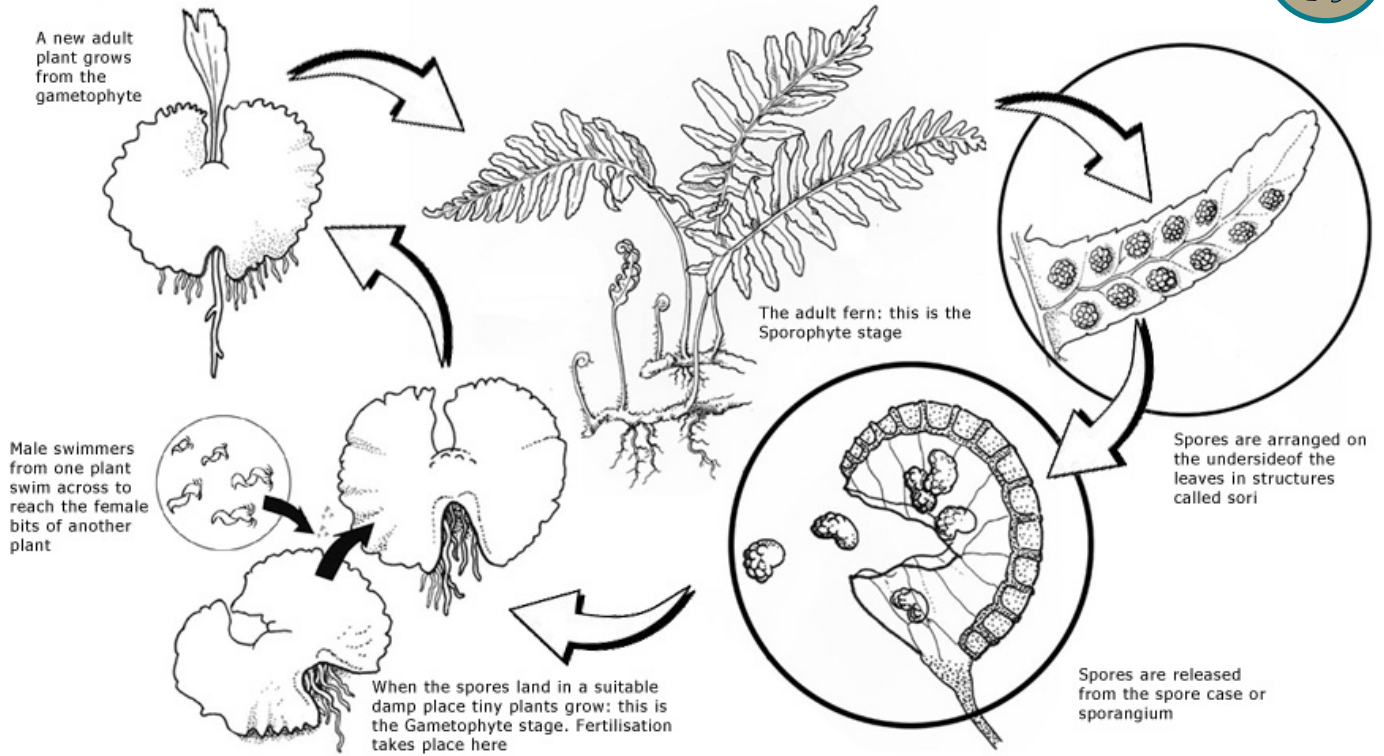
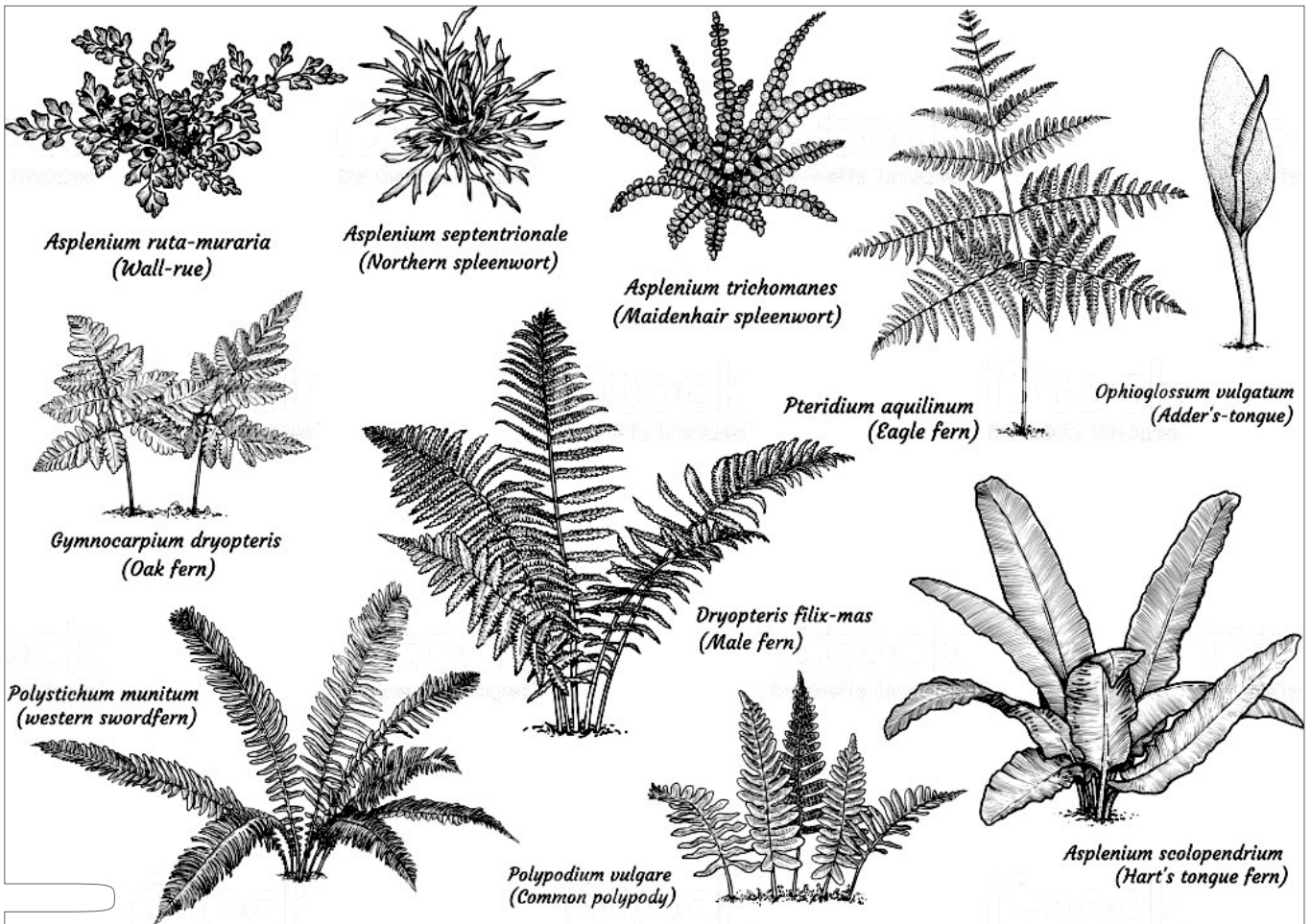


Fig. 138. A, reconstruction of *Lepidodendron obtusum* Steud. B, reconstruction of a species of *Sigillaria*. (After Hillebrand, 1912.)

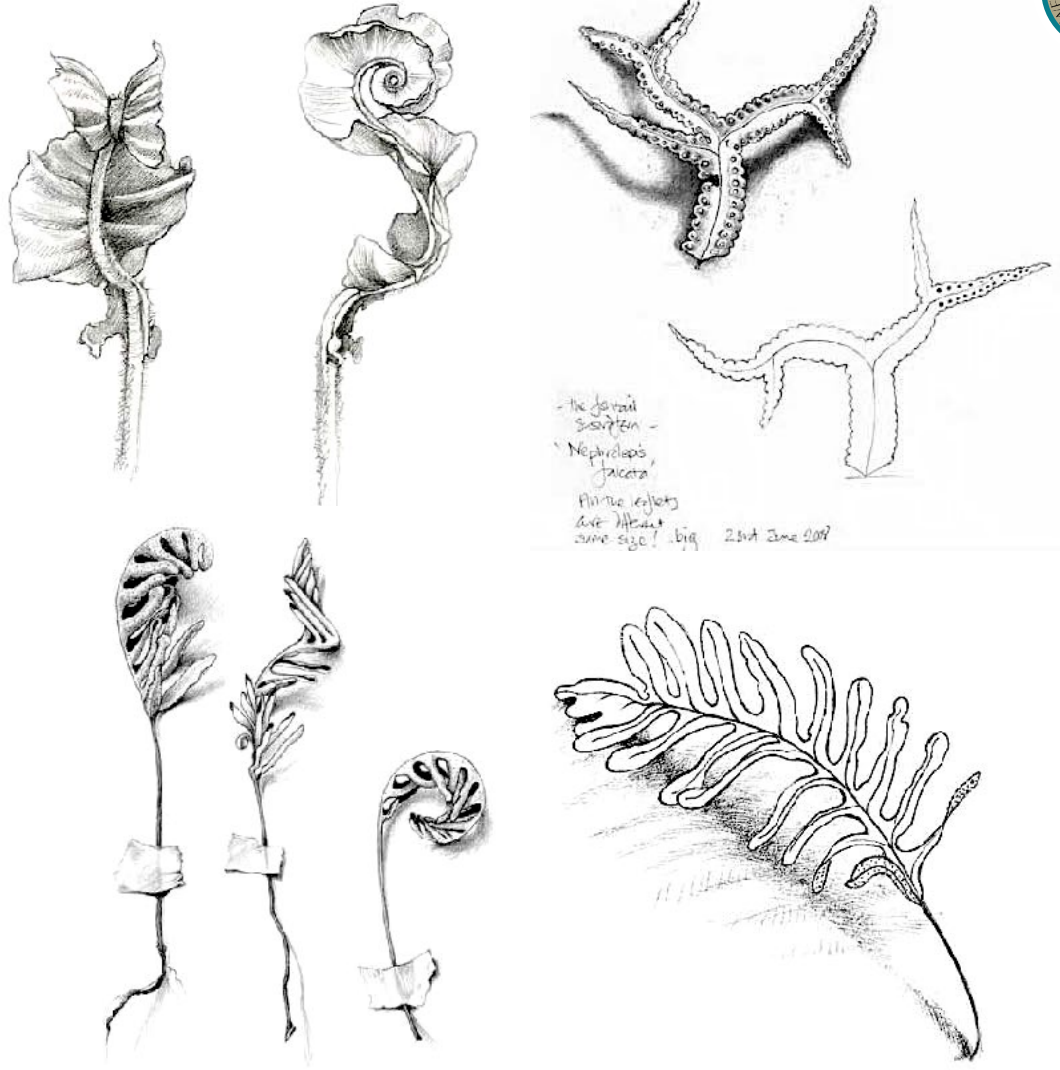


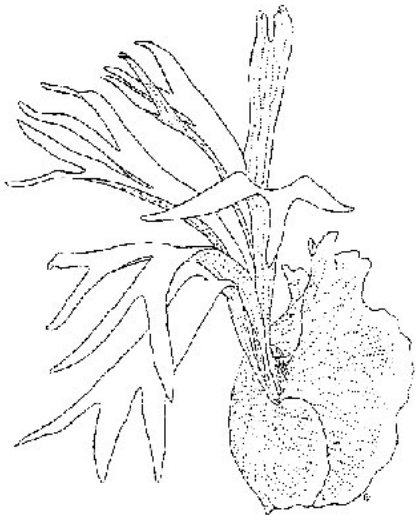


Ferns

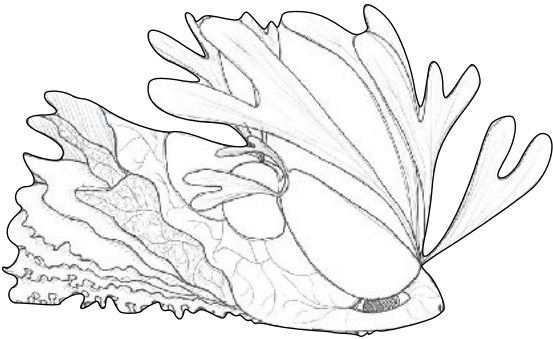
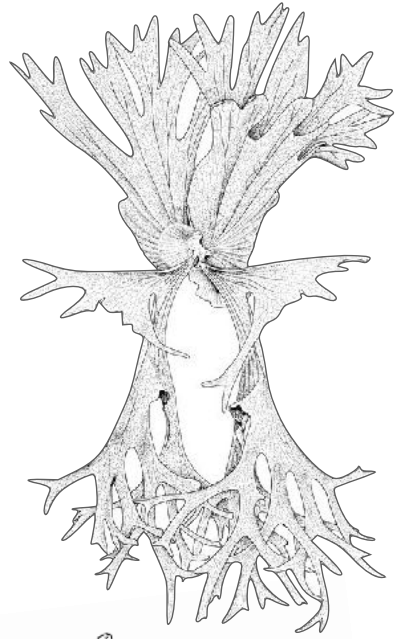


Ferns



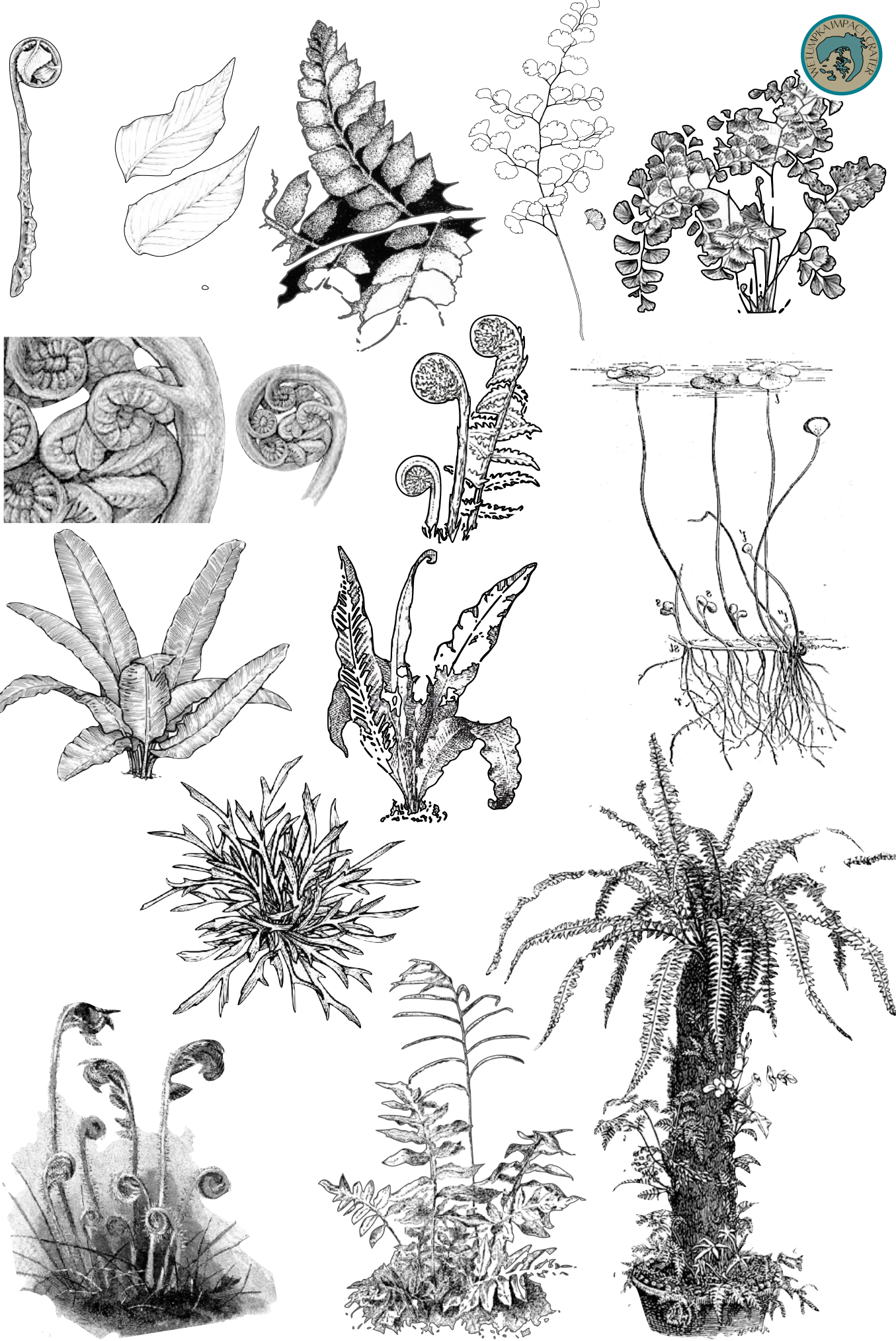


Ferns





Ferns



Ferns



DINO PRINTS

2ND GRADE + OLDER

Printmaking is a sometimes misunderstood aspect of visual art. The distinction between fine art prints and “limited edition prints” which are actually commercially reproduced prints (posters which have been signed) is not always easy to make.

Fine art printmaking involves the creation of a master plate from which multiple images are made. Simply put, the artist chooses a surface to be the plate. This could be linoleum, styrofoam, metal, cardboard, stone or any one of a number of materials. Then the artist prepares the printing plate by cutting, etching or drawing an image onto the plate. Ink is applied (in a variety of ways) and paper is pressed onto the plate either by hand or by way of a hand-run printing press. The finished print is pulled from the plate.

Often the first three or four prints of are different than the rest of the edition. These first prints are called artist’s proofs. The number of prints pulled from one plate is called an edition. Once a certain number of prints are pulled, the plate is destroyed so that more prints won’t be printed later, thus ensuring the value of the edition. At the bottom of a print are two to three things always written in pencil. On the left is a number that appears as a fraction (e.g. 6/25), this means that the print is number six of a total of twenty five prints pulled from one plate. This number excludes the artist proofs which are designated with an A/P. In the centre of the bottom of the print is the title (if any). At the bottom right, is the artist’s name and sometimes a date.

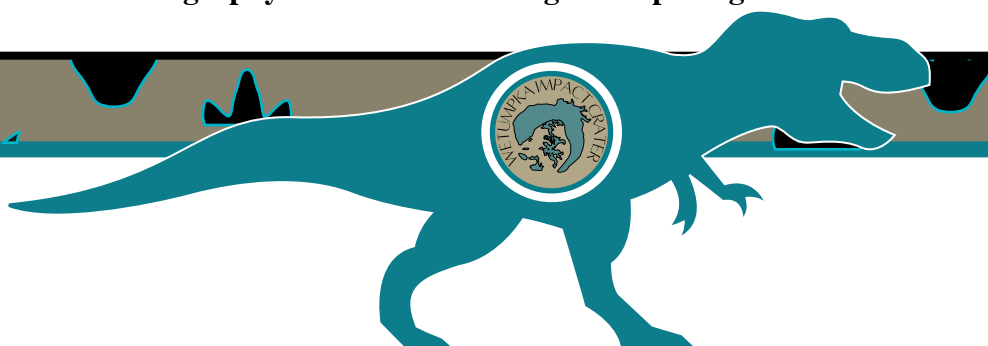
There are four main types of printmaking. The process and materials of these techniques influence the appearance of the final print...

Relief Printing-printing from a raised surface

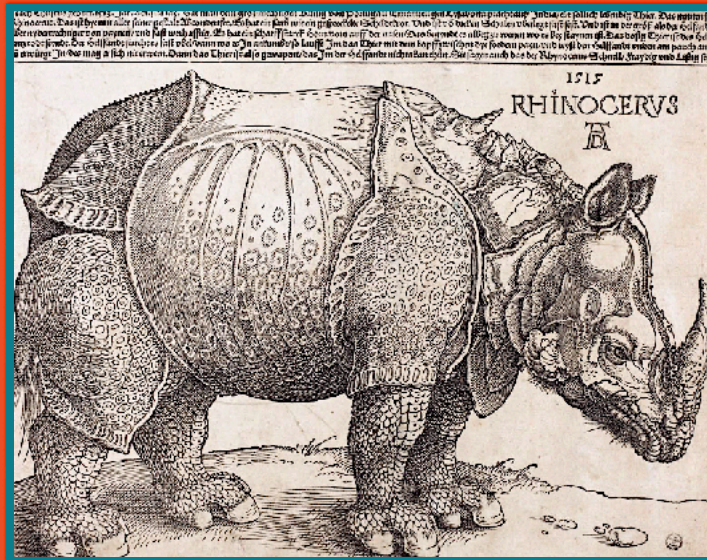
Intaglio-cutting the picture into the surface and printing

Planography (Lithography)-printing of a flat surface

Stencil: Serigraphy-ink is forced through the openings



PRINTMAKING HISTORY



Albrecht Durer, *Rhinoceros*, woodcut 1515

Albrecht Durer

Over 500 years ago, printmaking was not considered a real art form. Printed images were used for illustrations in books and publications. A German artist by the name of Albrecht Dürer (1471-1528) created woodcuts with such beautiful surface texture, pattern and design that people wanted to frame them and put them on display like paintings and sculptures. He revolutionized printmaking and raised it to the level of an independent art form.



Today, printmaking includes **DIGITAL ART**; **which** describes the use of technology in creative thinking and art making. Ranging across a wide variety of mediums, digital art spans from computer, generative, robotic, kinetic, and net art, through to post-internet, virtual reality, and augmented reality art.

Our collection includes Digital Art Prints by Karen Carr and Hope Brannon's Crater Sequence Events Murals in the Alleyway. The original art (designed to be printed at various scales) was created on and resides in a computer.



Dino Prints Styrofoam Printmaking with Paint



Materials Needed:

(Ideal) Block printing ink
(Realistic) Leftover house or craft paint

(Ideal) Professional brayer
(Realistic) Empty toilet paper roll

(Ideal) Styrofoam sheets
(Realistic) Old carryout container

Step 1: Find inspiration by browsing the Cretaceous Footprint Templates below.

Step 2: Draw your design onto the foam with a pen or pencil. Press down to make indentions in the foam. Anywhere you make a line will remain white when the color print is created.

Note: Your print will turn out backwards. Keep this in mind if you are adding letters or words!

Step 3: Next, use a flat surface like a paper plate to spread your paint. Roll the toilet paper roll or brayer across the paint and try to get an even coating.

Step 4: Roll the paint gently over the surface of your foam design.

Step 5: Press the paint side of your design firmly onto a piece of paper.

Step 6: Peel off the foam to reveal your print!

Tip: Too much paint or not enough? You can reuse your foam print to practice. The foam is easily washable with water, allowing you to experiment with different colors and techniques.

Cretaceous Critters Footprint Foam Printmaking with Washable Markers!



This is a simple project with a lot of variations and you've probably got all the you need to make it on hand! Printmaking is the art of transferring an image from a template or "Matrix" to another surface – typically onto paper or fabric. There are several different types of printmaking techniques like, woodcuts, linocuts, engraving, lithography, screen printing & mono-printing. With printmaking you are able to make multiple prints of the same image (with the exception of mono-printing.). For this project we'll use a simple process to create your own matrix and original prints!



The hearts are just an example.

We will be making Cretaceous Critters Footprints.

See templates below.



What You Need:

- Foam – Like a foam plate or foam food package – I recycled a foam take out container for my examples!
- Scissors
- A ball point pen
- A toothpick
- Washable Markers (Sharpies or permanent markers will not work for this project)
- Paper to apply your prints to – I prefer card stock but copy paper or any paper with a smooth surface will work!
- Paper towels

Step one: First you will need to cut your foam! If you're using a take out container make sure you cut out a flat area of the container. I find that a piece of foam around 2 – 4 inches works best to get started with! You can make your matrix any shape you'd like!



Step two: Use your pen to draw your design on to your foam – the goal is to make an indent on the surface of the foam, so you need to use a fair amount of pressure, but be careful not to go through your foam! Also keep in mind your design will be reversed once it's printed – so if you were to do a letter or word it would be backwards when you printed it!



Step three: Adding color! Use your washable markers to color on your foam – you can go right over top of your design you made in the last step. The marker ink stays “wet” on the foam so your colors will also mix if they touch – this gives us some cool effects! Mixing colors on your foam may also make your marker tips dirty – you can scribble off any mixed up colors on a scrap piece of paper.



Step four: Now that you have your foam colored in it’s time to stamp it on your paper! Carefully flip your foam over and firmly press it onto your paper. Being careful that your foam doesn’t move, press firmly with your fingers all over the back of the foam to help transfer your print! Then carefully lift your foam from the surface of the paper to reveal your print!

Tips: Sometimes the first print does’t always work well – that’s okay! You can keep practicing with more prints until you find what works! If you want to change colors on the surface of your stamp without your colors getting mixed up you can wipe off any leftover marker ink on a paper towel or

rinse your foam in water (just make sure it’s super dry before using it again). Don’t take too long on coloring your foam – this gives the marker ink a chance to dry up on the foam and it won’t print as well. I find that any paper with a smooth surface works best!

This heart print was made by coloring my foam and printing it several times to create one piece of art. It was inspired by the work of artist [Jim Dine](#) – An artist part of the Pop Art movement. Pop artists used images of popular mass culture (‘Pop’ art) in their works and many used printmaking methods to create their works of art. Check out other pop artists like [Andy Warhol](#), [Roy Liechtenstein](#), & [Peter Max](#).



You can also make a more complex and detailed design on a slightly larger piece of foam, and instead of using a pen to create your impressions with, use a toothpick. While you are able to get smaller details with the toothpick the foam itself won’t allow a lot of tiny details close together (it just kind of gets smushed and that won’t make a good print!) so when completing your design keep in mind to make sure your lines are not too close together (notice on my fish print where his body curves that it didn’t print well – too many lines, too close together!). Also be sure that when you color your foam not to take too long as this gives the marker ink a chance to dry on your foam!



FOOTPRINT GUIDE APPALACHIAN CRETACEOUS TERRESTRIAL LIFE



TYRANNOSAURIDS
APPALACHIOSAURUS
MONTGOMERIENSIS:
(ap-a-lay-chi-o-sawr-us munt-gum-er-e-in-sis)
DRYPTOSAURUS
ALBERTOSAURUS



HADRSAURS
LOPHORHOTHON ATOPUS:
(low-fo-row-thon)
EOTRACHODON ORIENTLIS
EDMONTOSAURUS
HYSIBEMA
PARASAUROLOPHUS



DROMAEOSAURS
(dro-me-oh-sawrs) terrible claw
SAURORNITHOLESTES



NODOSAURS
(no-do-sawrs)
LIKE PANOPLOSAURUS



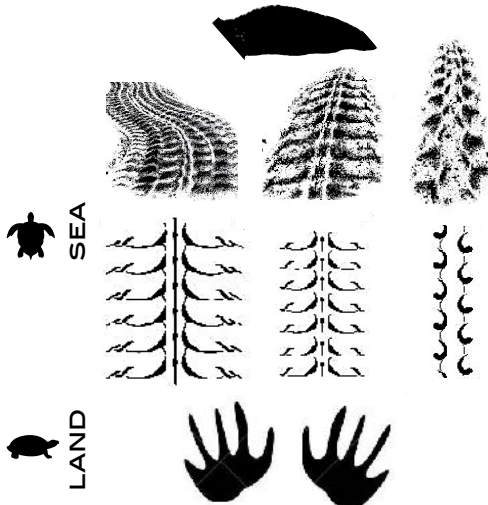
EARLY RODENTS & MAMMALS



AMPHIBIANS
LIKE FROGS & SALAMANDERS
SIRENIDS: HABROSAURUS, BATRACHOSAURIDID
SALAMANDER: PARRISIA, HYLIDS, EOPELOBATES,
DISCOGLOSSUS



LIZARDS
TEIID PROTOTEIU, IGUANIDS,
HELODERMATIDS, NECROSAURIDS



TURTLES
ADOCUS, APALONE, BOTHREMYIS, TEXAS-
PLEUROCHAYAH, ALABAMA- APPALACHEMYS



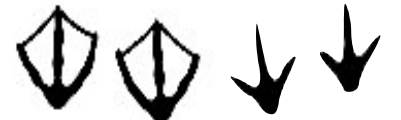
ORNITHOMIMID
(or-nith-o-my-mid)
ORNITHOMIMUS
ANTIQUUES



ORNITHOMIMID
(or-nith-o-my-mid)
COELOSAURUS
ANTIQUUES



CROCODILIANS
DEINOSUCHUS:
(dai-nuh-syoo-kuhs)
DAKOTASUCHUS, WOODBINESUCHUS,
BOTTOSAURUS, SCOLOMASTAX,
THORACOSAURUS, BOREALOSUCHUS



BIRDS
ICHTHYORNIS
ENANTIORNITHES: HALIMORNIS
HESPERORNITHES: HESPERORNIS,
CANADAGA, BAPTORNIS,
FUMICOLLIS, PARAHESPERORNIS,
ORNITHURANS: APATORNIS,
LACEORNIS,
CHARADRIIFORMES: GRACULAVUS
TELMATORNIS, ANSERIFORMES



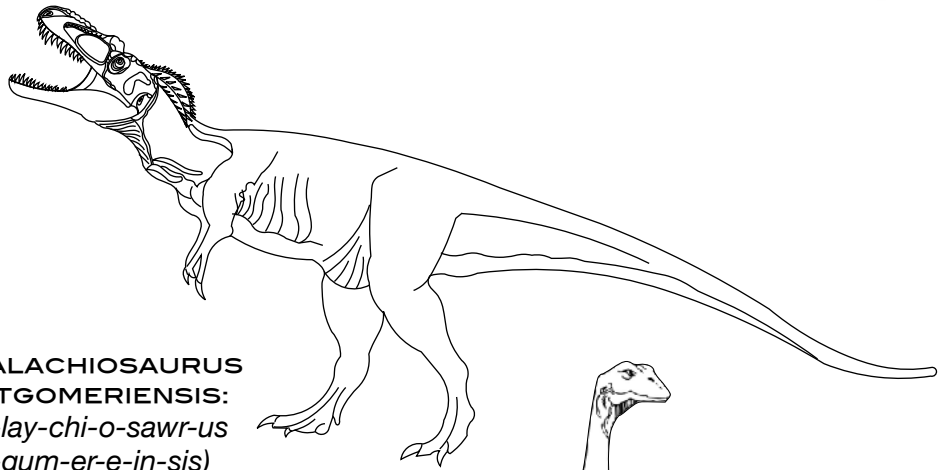
PTERANODON
(tuh-ran-uh-don)

FOOTPRINT GUIDE APPALACHIAN CRETACEOUS TERRESTRIAL LIFE



TYRANNOSAURIDS

**APPALACHIOSAURUS
MONTGOMERIENSIS:**
(ap-a-lay-chi-o-sawr-us
munt-gum-er-e-in-sis)



ORNITHOMIMID:
(or-nith-o-my-mid)



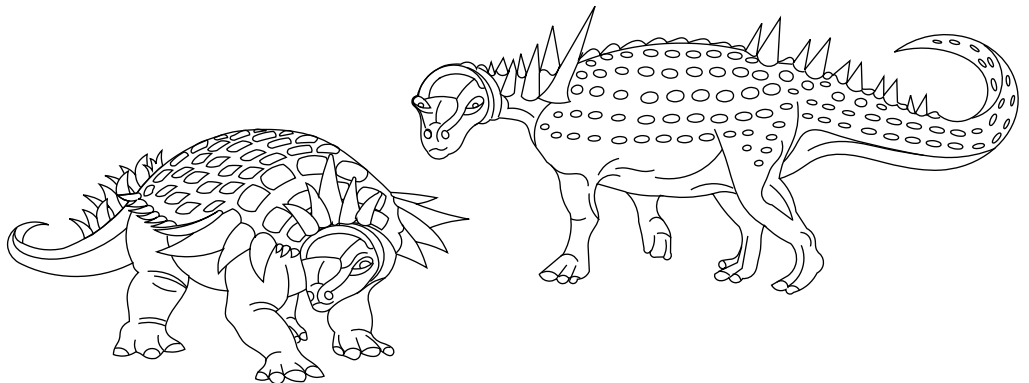
ORNITHOMIMID:
(or-nith-o-my-mid)



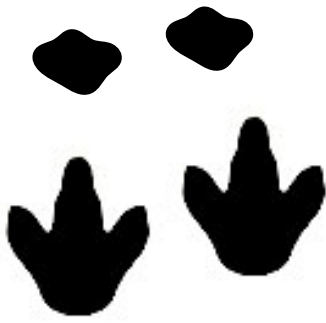
DROMAEOSAURS:
(dro-me-oh-sawrs)



NODOSAURS:
(no-do-sawrs)

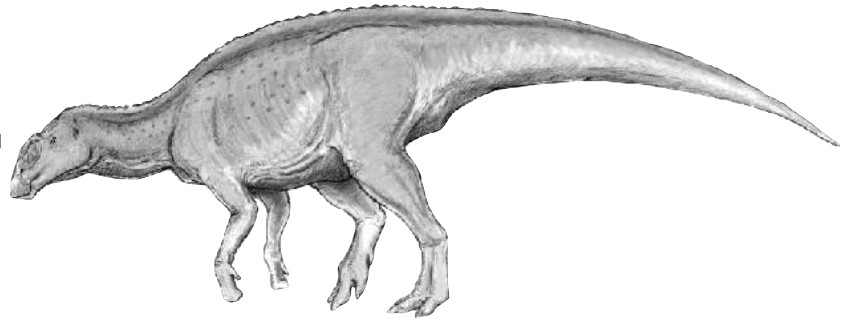


FOOTPRINT GUIDE APPALACHIAN CRETACEOUS TERRESTRIAL LIFE



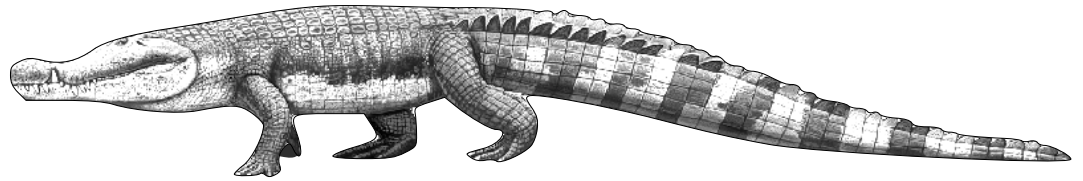
HADRSAURS

LOPHORHOTHON
ATOPUS:
(low-fo-row-thon)



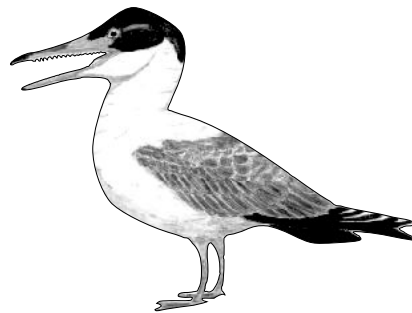
CROCODILIANS

DEINOSUCHUS:
(DAI-NUH-SYOO-KUHS)

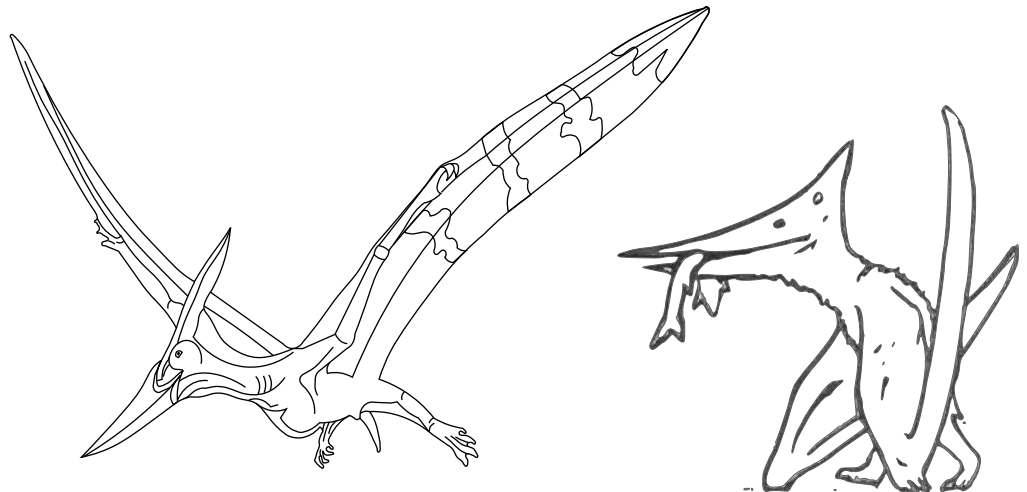


BIRDS

ICHTHYORNIS



PTERANODON:
(tuh-ran-uh-don)



DINO PRINTS

HISTORY OF STAMPING

Stamping has a history that dates to ancient times, with paint, printing ink and rubber being a relatively recent invention in the process.

One of the first examples of stamping art was using wax to seal folded paper. These wax seals were critical for verifying the authenticity of products, correspondence, and documents. The seals would have been carved out of materials such as stone or bone.

Another form of stamp art originated in Asia. These ancient tools were part of a process called woodblock printing, and they look very much like wood versions of modern rubber stamps. A craftsman would carve an image into the surface of a wood block, which would then be inked and applied to fabric or paper to create an image.

PRE K - 2ND GRADE

INSTRUCTIONS

STEP 1: Print out dinosaur activity pages.

STEP 2: Dip the toy dinosaur's feet into paint.

STEP 3: Experiment by stomping, sliding, spinning.

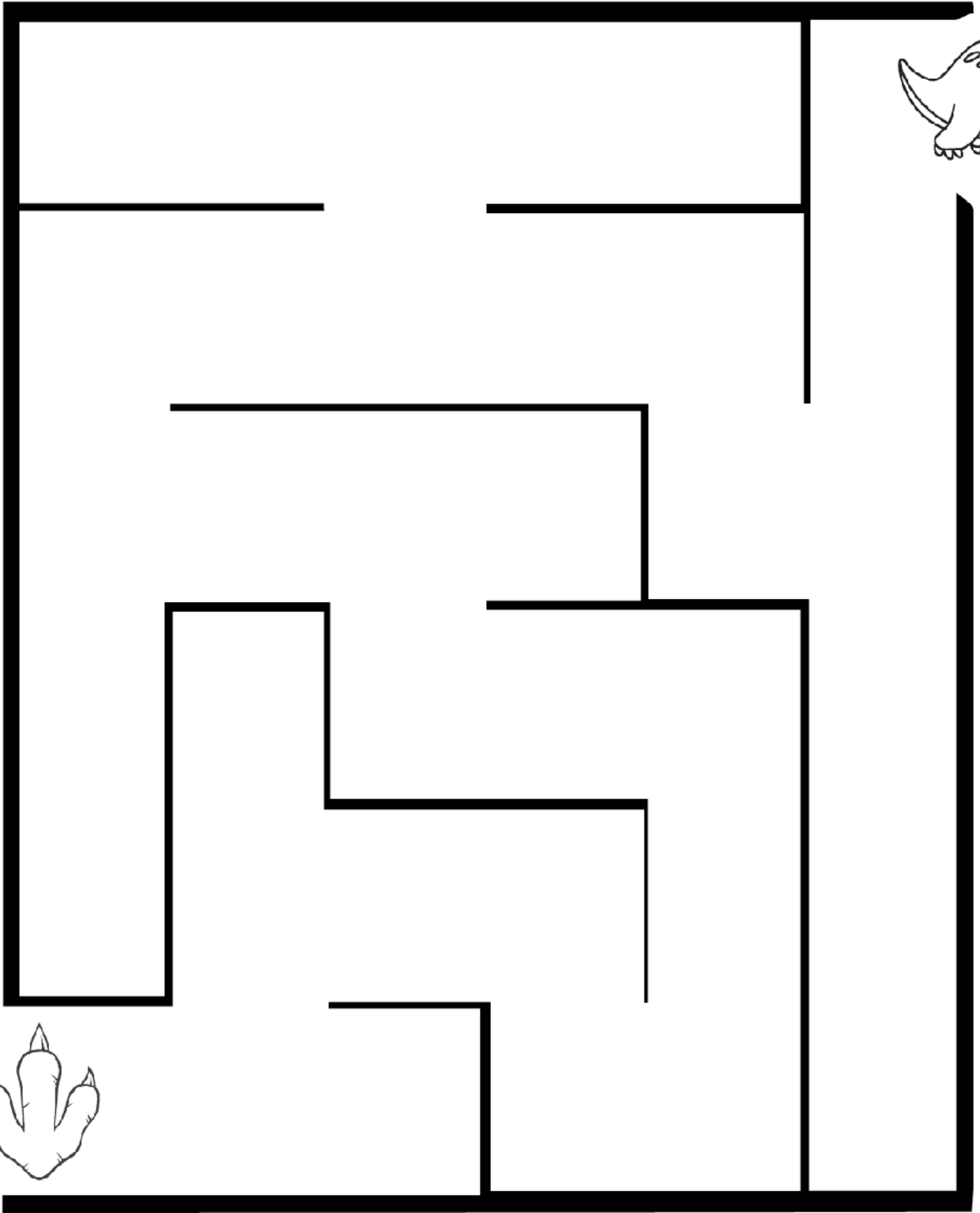
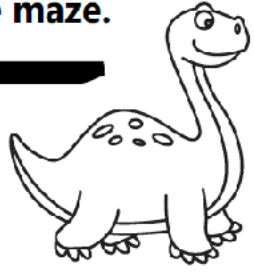
STEP 4: Try mixing colors, counting steps, even painting with dino tails!



DINO MAZE



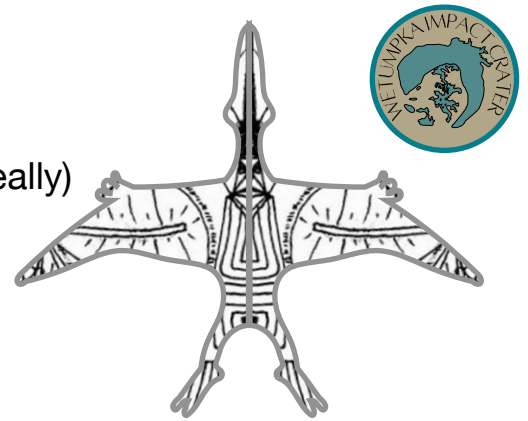
Use a toy dinosaur dipped in paint to make footprints through the maze.



Paper Pterodactyl Puppet

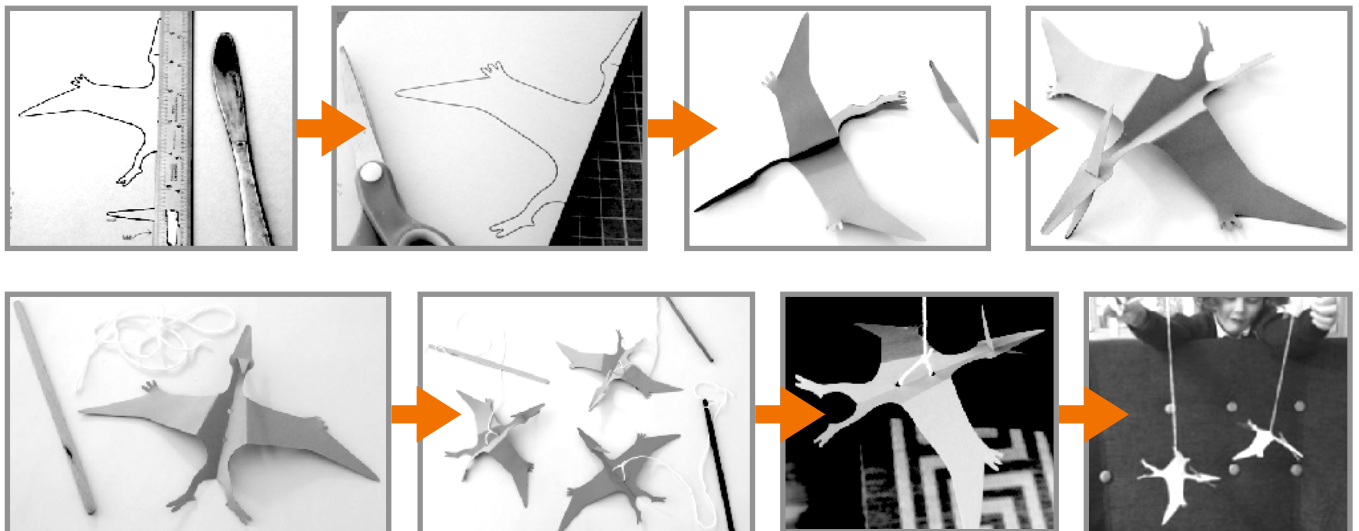
You will need

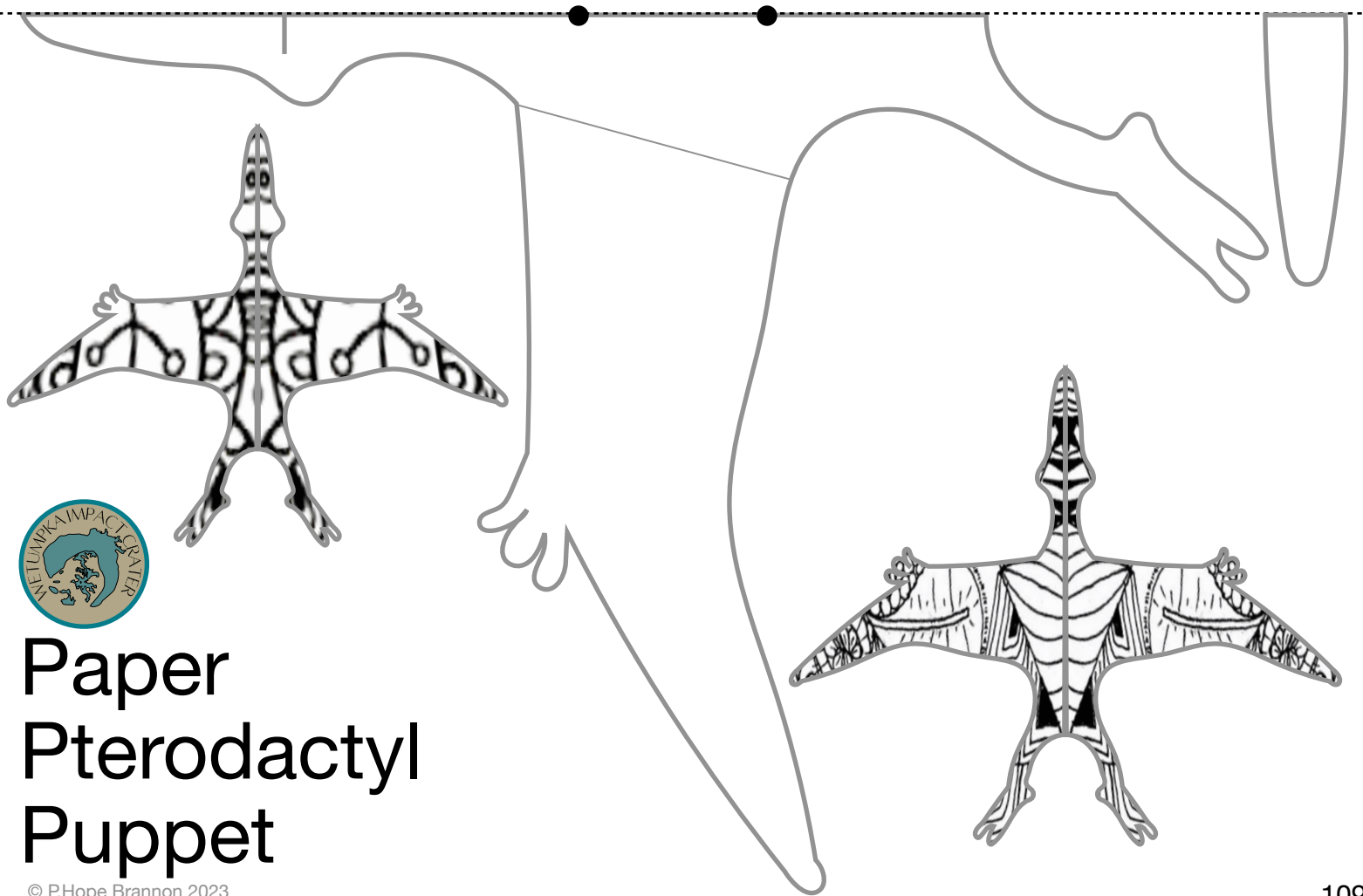
- String
- A long craft stick or dowel rod (or any stick really)
- A hole punch and scissors
- Tape
- Markers
- Print the template below on card stock.



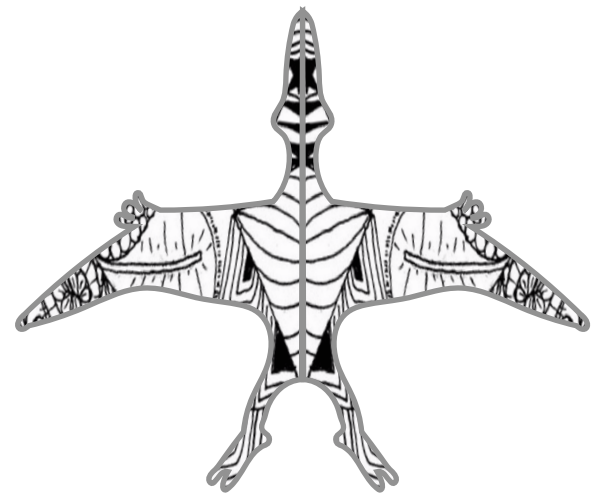
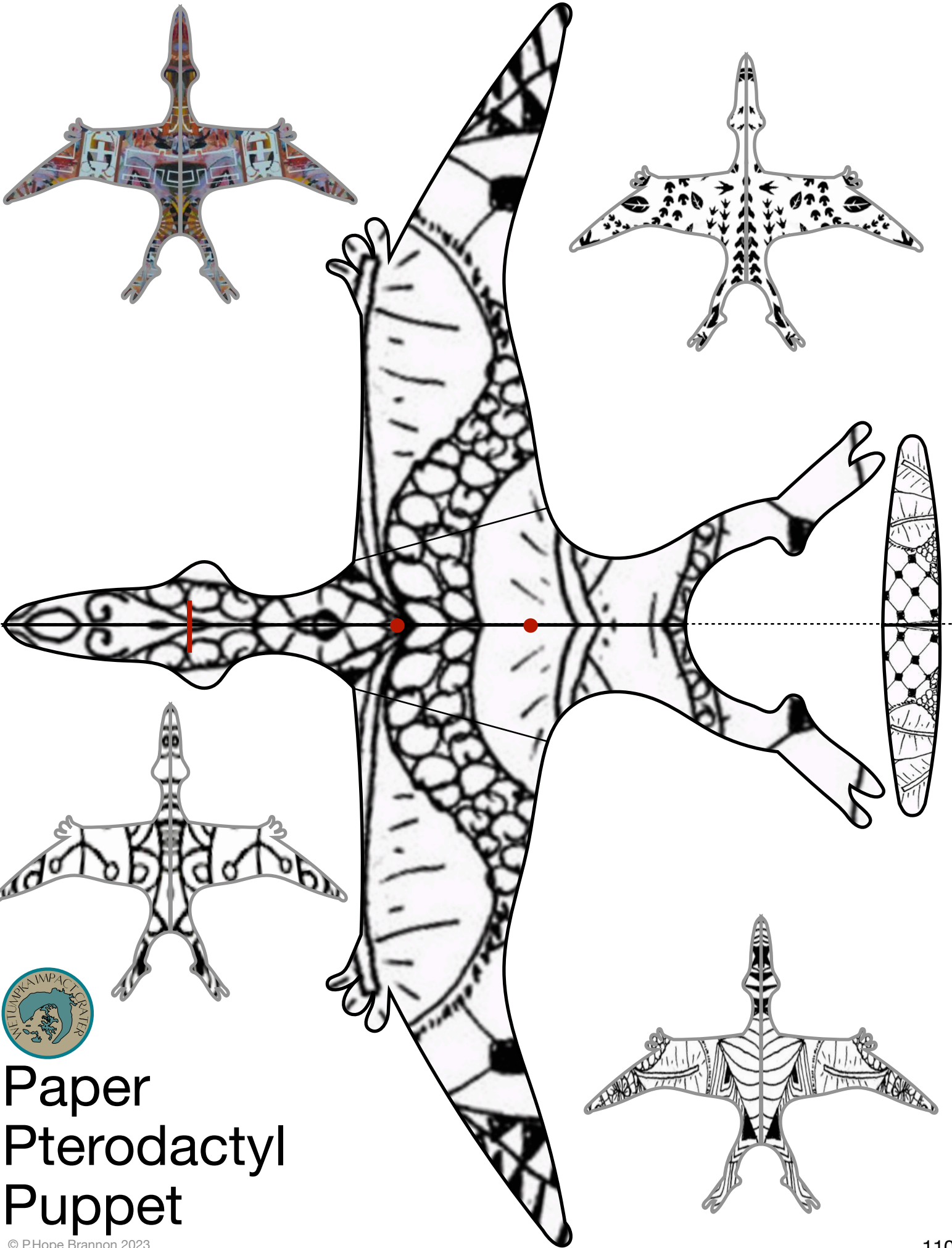
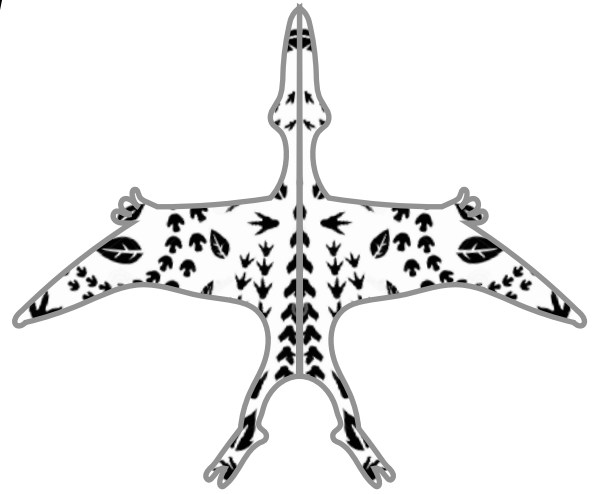
How to

1. To begin, score the fold line with a blunt knife (like a butter knife) and ruler. This might sound a bit unnecessary but it gives you a really perfect, clean fold. You will find it's really easy to fold after scoring the line and it helps for this project because the Pterodactyl balances on a single string so any unevenness might cause it to tilt off balance and not work properly.
2. Once it's folded, cut along the gray line with a pair of scissors, including the slit on the head and the extra mouth piece/horn on the bottom of the page.
3. Create an abstract design on the front and back using marker.
4. Fold the wings down evenly. The mouth piece goes through the slit with half of it sticking out the top for the spike on the back of the Pterodactyl's skull.
5. Use a hole punch to carefully make two holes over the dots marked, trying to keep them right on the fold line to keep your puppet balanced.
6. Next, tie the string through the two holes and onto the stick and you have your puppet! If you find that your puppet won't balance properly you might need to add a small piece of tape underneath on the tummy to keep the string in place.
7. This same process can be used with other Cretaceous critters!





Paper Pterodactyl Puppet



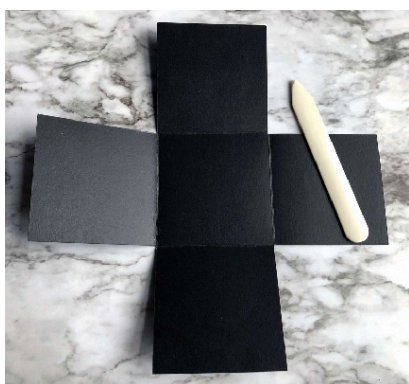
Paper Pterodactyl Puppet

Exploding Box



An exploding box is nowhere near as dangerous as it sounds! The name comes from the fact that the sides of the box cascade outwards when the box is opened - no other explosions are involved. This makes an unusual box.

The exploding box is very simple to vary and, once the basic principles are understood, the box is easy to create in any size.



A template is not necessary... as the base of the exploding box is created from three pieces of card that are the same shape but each piece is slightly smaller. This allows them to sit snugly inside each other.

However, a template is attached which will make creating this exploding box easier. Simply print the template onto cardstock paper and start designing.

EXPLODING BOX

What You'll Need

EQUIPMENT / TOOLS / MATERIALS

- Scissors
- Ruler
- Pencil
- Double Sided Clear Tape
- Cardstock or Printed Templates on Cardstock
- Standard Pinter Paper- for practice
- Embellishments of your choice
- Markers, Pencils, etc.
- Tacky or hot glue

INSTRUCTIONS

1. PRINT OR CREATE YOUR OWN TEMPLATE

Start by printing out the templates for the various sized boxes you'd like to use. If you've decided not to use our printable template, use your own measurements to create your unique template directly on some standard pinter paper. Because exploding boxes are cascading boxes, you'll need to create a few templates of varying sizes: small, medium, and large.

2. IF CREATING YOUR OWN, TRACE THE PATTERNS ONTO CARDSTOCK PAPER

Once you have a good idea of how the pieces need to be laid out, cut, and folded, trace your patterns onto the cardstock or thick paper.

3. CUT OUT THE CARDSTOCK TEMPLATES

Or... if you created your own, after you have your templates traced onto the cardstock, cut out the exploding box pieces.

Fold the pieces, then flatten them out. Make crisp and definite folds, as this will ensure that the sides cascade outwards effectively when your box is completed.

4. DECORATE THE BOX WITH METEOR / CATER ILLUSTRATIONS, DESIGNS AND STORIES

Decide which cater illustrations, designs, stories or embellishments you are going to use for your box and draw, color or glue them to the base of the card. Feel free to make different designs, press on stamps, or write messages on the sides of the different sized boxes that you've cut out. You are only limited by your imagination.

5. REFOLD THE BOX

After you've completed your drawings and stories and attached any embellishments with glue and tape, refold the sides of the card box back. Make sure the fold are crisp and definite folds, as this will ensure that the sides cascade outwards effectively.

6. DECORATE THE LID

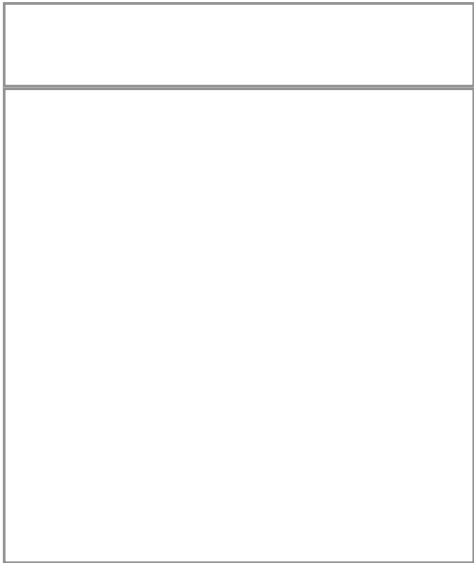
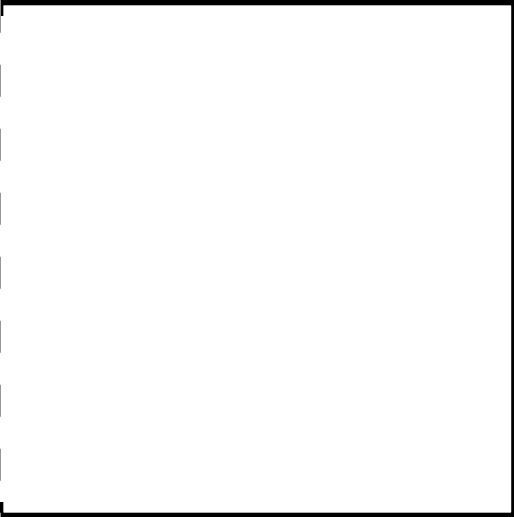
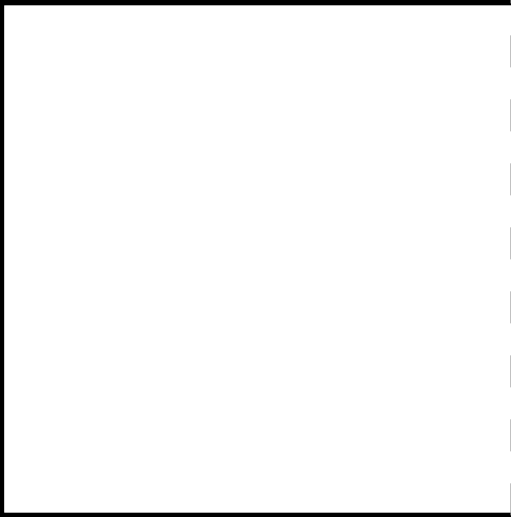
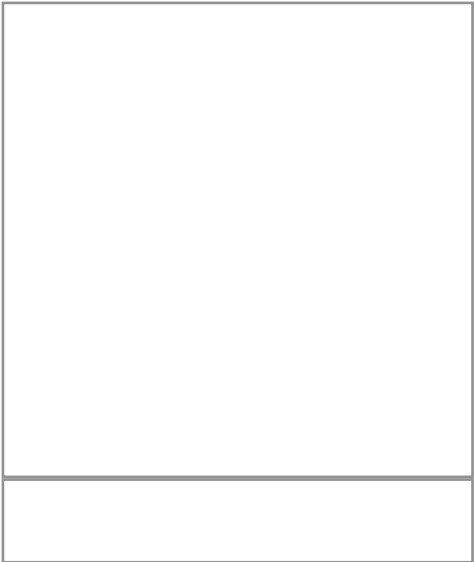
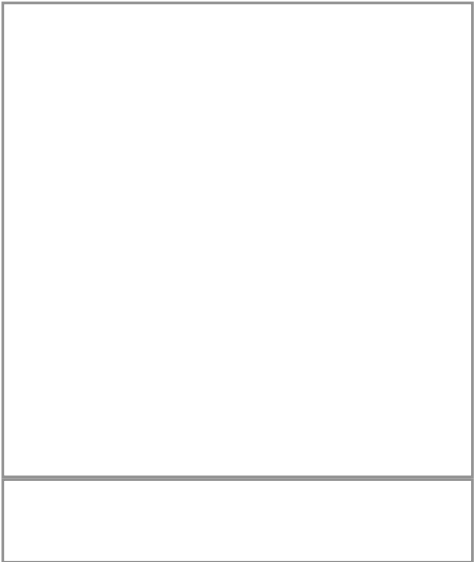
Once you've created your simple base or have decided to have various sized boxes, it's time to create, cut and fold the lid. Flatten it out. Add any special attachments, designs or embellishments to the lid of the box before refolding it. If making your own, leave a 1/8-inch to 1/4-inch space around the perimeter of the box top.

7. Place The Lid On Top

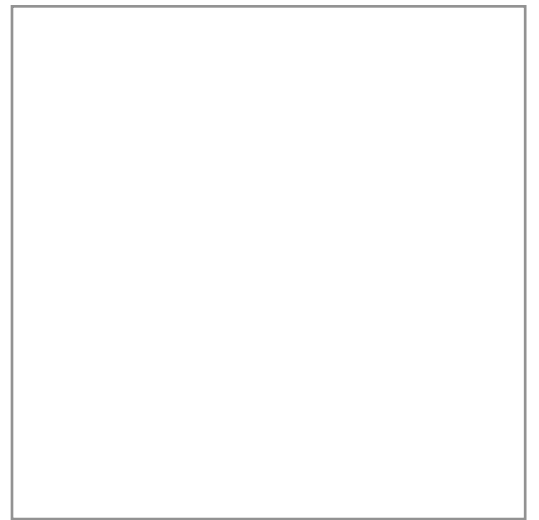
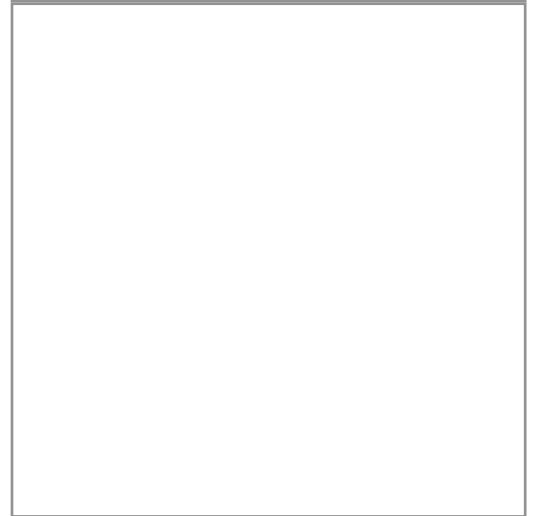
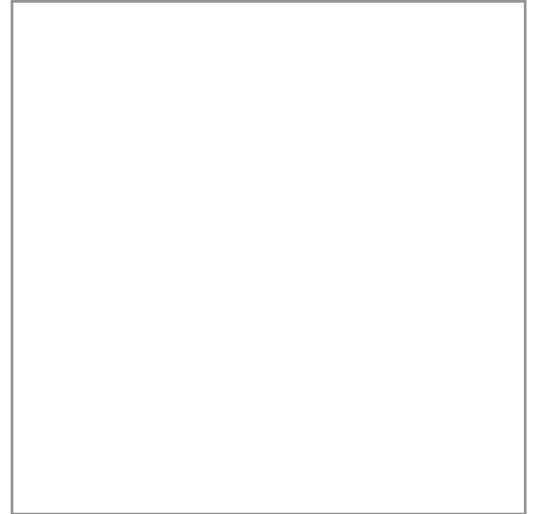
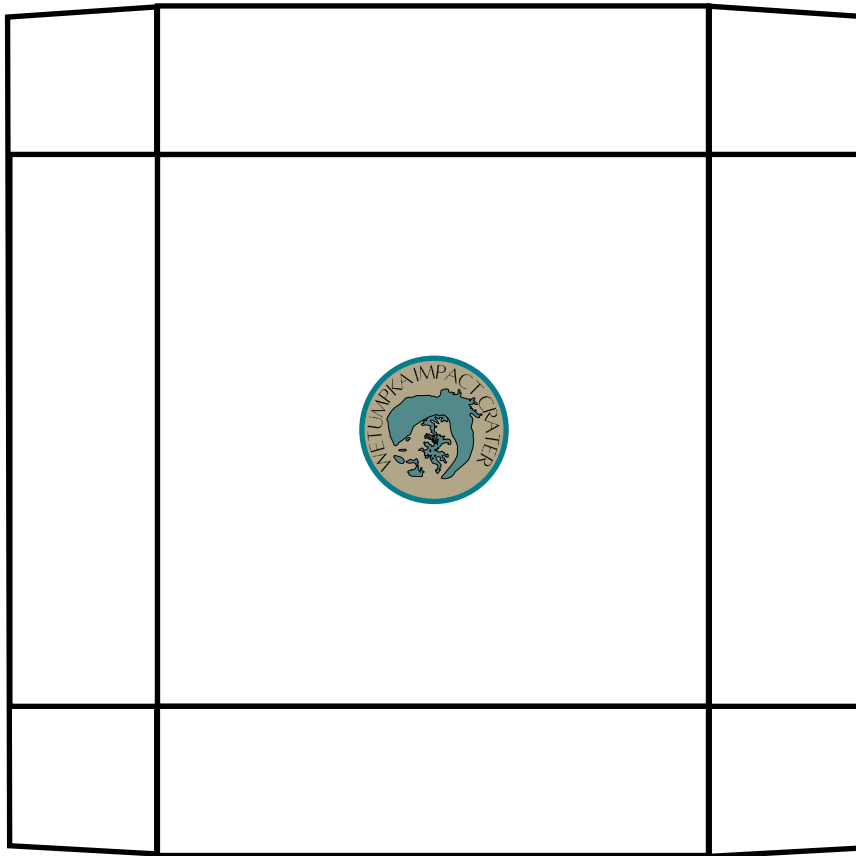
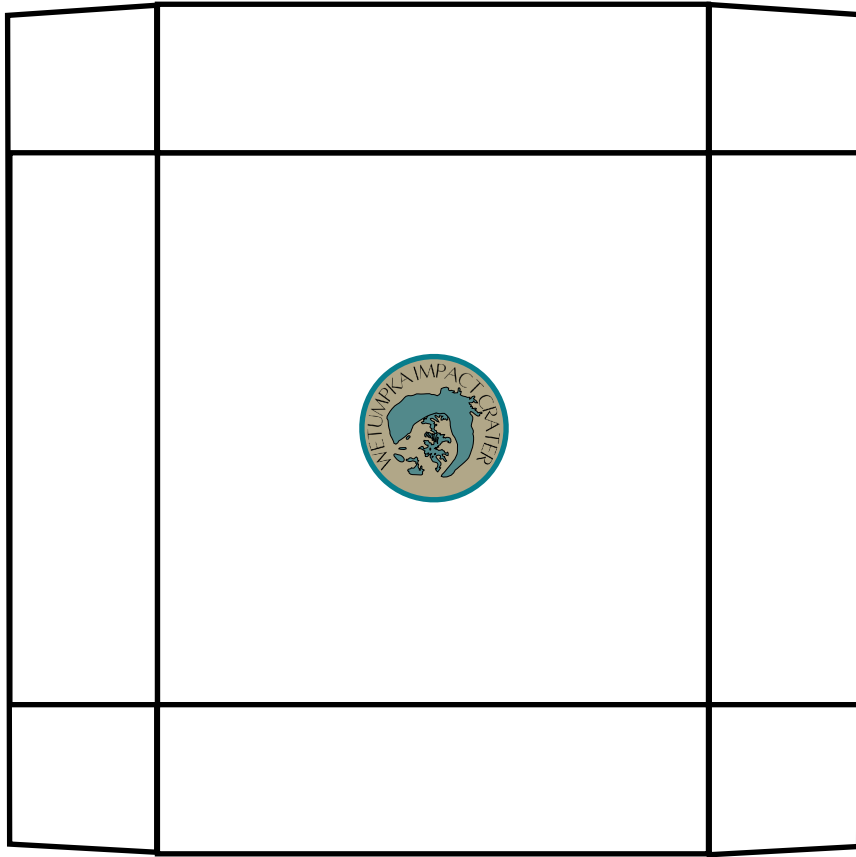
To finish the box, simply tuck the base into the lid. When the lid is removed from the box, the sides will cascade outward on their own.



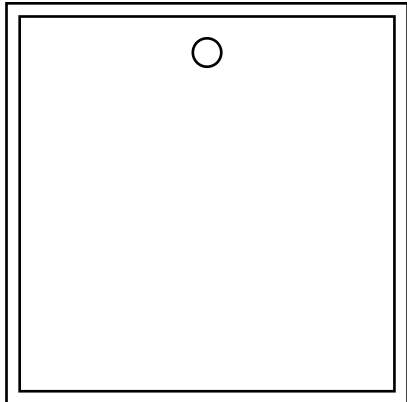
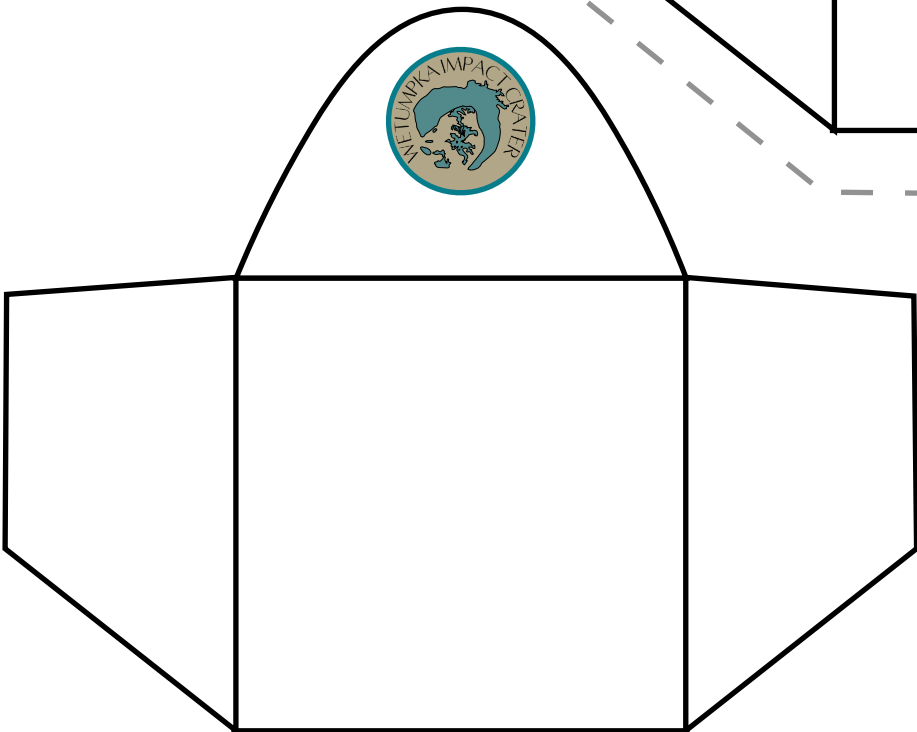
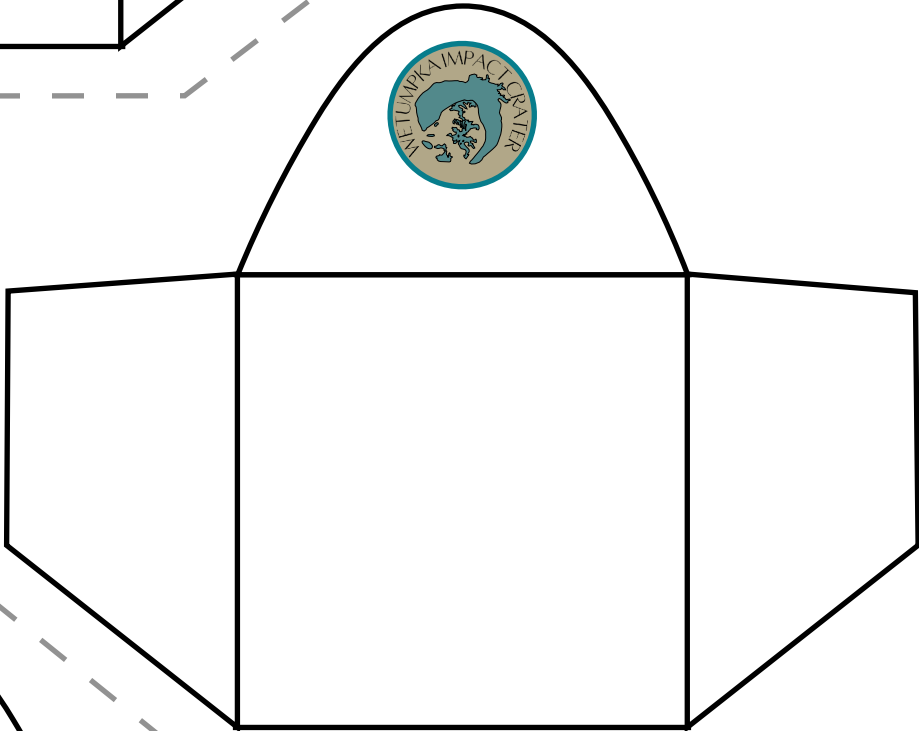
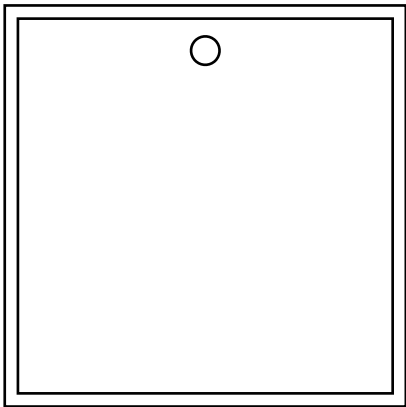
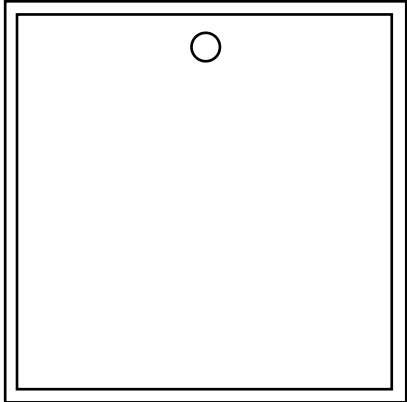
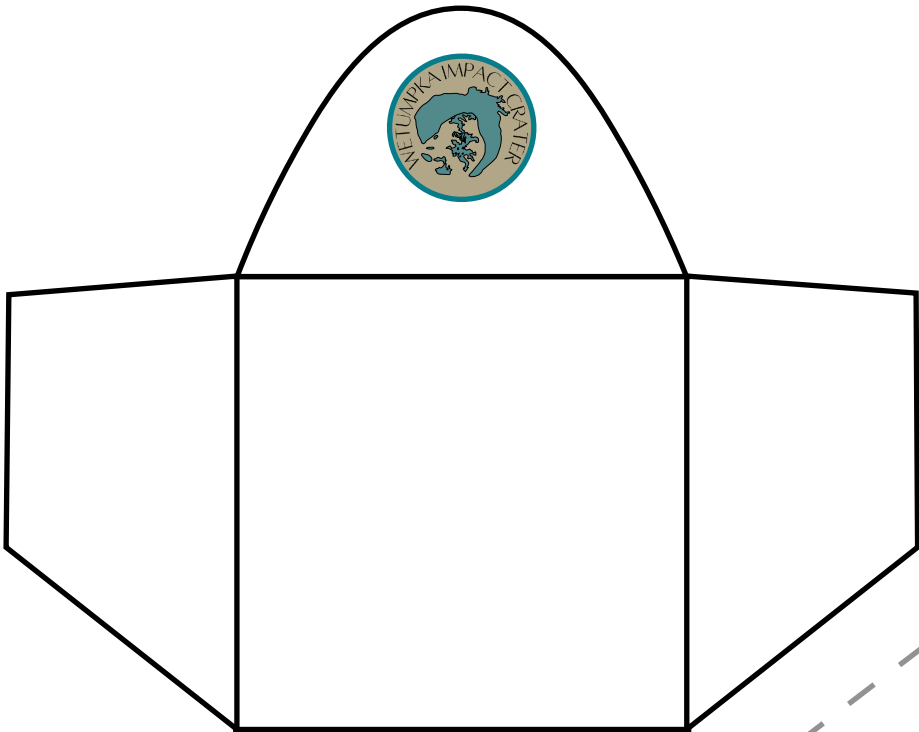
Exploding Box Large Template



Exploding Box Top & Add-On Cards



Exploding Box
Notecard & Envelope

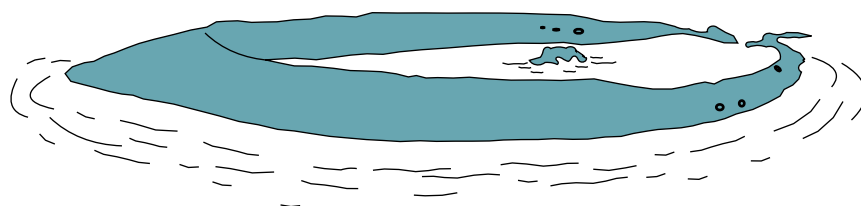




WETUMPKA IMPACT CRATER WORD FIND

G R A V I T Y S C H U L T Z S B R E C C I A R Z
S E. S M I T H C R E T A C E O U S O U P C W I C
T X C R A T E R R I M Z B O R E H O L E O E V A
A C R U S T Z A D I S R U P T I O N Z R N T E T
R A Z P E R A T O P A P P A L A C H I A I T U R A
W V H I L L S E E A R T H Q U A K E O O A M T S
O A M E T E O R F L A S H F I R E S C D C P E T
U T Z D R. W O L F A S T E R O I D B E L T K R R
N I G M I C A S C H I E S T O P Q M A A A A R O
D O E O M L S T A R F O S S I L U O N N L I A P
K N O N P I T I L T A R C U S D A D Z D C M C H
O I L T A F R A C T U R E N T R R I C S O P E I
E R O C C F O S U R V E Y A O I T F R L M A D C
B I G O T S B O U L D E R M S L Z I A I P C E O
E D Y R T. N E A T H E R Y I E L 8 C T D R T P A
R I C E N T E R R E B O U N D E 5 A E E E C O S
L U H S A T M O S P H E R E Z J M T R O S R S T
Z M A G E Z E X P L O S I O N E Y I F O S A I L
M B L A S T W A V E Z R I M I C A O L Z I T T I
A Z K S O N I C B O O M C R E T A N O E O E S N
P F L A S H P O I N T R A D I A T I O N N R S E
S D R. K I N G M E T A M O R P H I C R O C K A N
B A L D K N O B B Y C O O S A R I V E R L A N D
Z H A R W E L L M I L L C R E E K I S L A N D X
T O P O G R A P H Y R O C K O U T E R S P A C E
U P P E R C O A S T A L P L A I N B E D R O C K

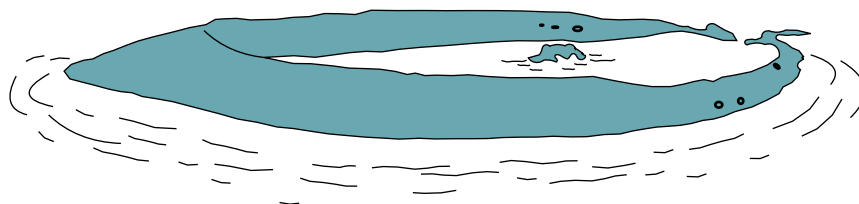
This could be done as a group activity or individually.



CAN YOU FIND THESE WORDS?



- | | | |
|---|--|--|
| <input type="checkbox"/> Age | <input type="checkbox"/> Era | <input type="checkbox"/> Ocean |
| <input type="checkbox"/> Appalachia | <input type="checkbox"/> Explosion | <input type="checkbox"/> Ooze |
| <input type="checkbox"/> Asteroid Belt | <input type="checkbox"/> Earthquake | <input type="checkbox"/> Outer Space |
| <input type="checkbox"/> Astrobleme | <input type="checkbox"/> Excavation | <input type="checkbox"/> Period |
| <input type="checkbox"/> Atmosphere | <input type="checkbox"/> E. Smith | <input type="checkbox"/> Piedmont |
| <input type="checkbox"/> Arc | <input type="checkbox"/> Ejecta | |
| | | |
| <input type="checkbox"/> Borehole | <input type="checkbox"/> Flash Point Radiation | <input type="checkbox"/> River Terrace |
| <input type="checkbox"/> Blast Wave | <input type="checkbox"/> Fossil | Deposits |
| <input type="checkbox"/> Boulder | <input type="checkbox"/> Flash Fires | <input type="checkbox"/> Rim |
| <input type="checkbox"/> Bald Knob | <input type="checkbox"/> Fracture | <input type="checkbox"/> Rock |
| <input type="checkbox"/> Breccia | | |
| <input type="checkbox"/> Bedrock | <input type="checkbox"/> Gravity | <input type="checkbox"/> Soar |
| | <input type="checkbox"/> Geology | <input type="checkbox"/> Schultz |
| | | |
| <input type="checkbox"/> Crust | <input type="checkbox"/> Hill | <input type="checkbox"/> Star |
| <input type="checkbox"/> Chalk | <input type="checkbox"/> Harwell Mill Creek | <input type="checkbox"/> Survey |
| <input type="checkbox"/> Contact | | <input type="checkbox"/> Sonic Boom |
| <input type="checkbox"/> Compression | <input type="checkbox"/> Impact | <input type="checkbox"/> Star Wound |
| <input type="checkbox"/> Creta | <input type="checkbox"/> Island | <input type="checkbox"/> Shocked Quartz |
| <input type="checkbox"/> Catastrophic | <input type="checkbox"/> Iridium | |
| <input type="checkbox"/> Crater | | <input type="checkbox"/> T. Neathery |
| <input type="checkbox"/> Coastline | <input type="checkbox"/> Koebrel | <input type="checkbox"/> Tsunami |
| <input type="checkbox"/> Crater Floor | | <input type="checkbox"/> Tilt |
| <input type="checkbox"/> Coosa River | <input type="checkbox"/> Landslide | <input type="checkbox"/> Topography |
| <input type="checkbox"/> Cretaceous | <input type="checkbox"/> Land | <input type="checkbox"/> Upper Coastal Plain |
| <input type="checkbox"/> Cater Rim | | |
| <input type="checkbox"/> Center Rebound | <input type="checkbox"/> Maps | <input type="checkbox"/> Wetumpka Impact |
| <input type="checkbox"/> Cliffs | <input type="checkbox"/> Meteor | Crater |
| <input type="checkbox"/> Cores | <input type="checkbox"/> Mica Schiest | |
| | <input type="checkbox"/> Metamorphic Rock | <input type="checkbox"/> 85 MYA |
| <input type="checkbox"/> Disruption | <input type="checkbox"/> Mica | |
| <input type="checkbox"/> Dr. Wolf | <input type="checkbox"/> Modification | |
| <input type="checkbox"/> Dr. King | | |
| <input type="checkbox"/> Disturbance | | |
| <input type="checkbox"/> Drill | | |





WETUMPKA IMPACT CRATER WORD FIND

G R A V I T Y S C H U L T Z S B R E C C I A R Z
S E S M I T H C R E T A C E O U S O U P C W I C
T X C R A T E R R I M Z B O R E H O L E O E V A
A C R U S T Z A D I S R U P T I O N Z R N T E T
R A Z P E R A T O P A P P A L A C H I A I T U R A
W V H I L L S E E A R T H Q U A K E O O A M T S
O A M E T E O R F L A S H F I R E S C D C P E T
U T Z D R W O L F A S T E R O I D B E L T K R R
N I G M I C A S C H I E S T O P Q M A A A A R O
D O E O M L S T A R F O S S I L U O N N L I A P
K N O N P I T I L T A R C U S D A D Z D C M C H
O I L T A F R A C T U R E N T R R I C S O P E I
E R O C C F O S U R V E Y A O I T F R L M A D C
B I G O T S B O U L D E R M S L Z I A I P C E O
E D Y R T N E A T H E R Y I E L 8 C T D R T P A
R I C E N T E R R E B O U N D E 5 A E E E C O S
L U H S A T M O S P H E R E Z J M T R O S R S T
Z M A G E Z E X P L O S I O N E Y I F O S A I L
M B L A S T W A V E Z R I M I C A O L Z I T T I
A Z K S O N I C B O O M C R E T A N O E O E S N
P F L A S H P O I N T R A D I A T I O N N R S E
S D R K I N G M E T A M O R P H I C R O C K A N
B A L D K N O B B Y C O O S A R I V E R L A N D
Z H A R W E L L M I L L C R E E K I S L A N D X
T O P O G R A P H Y R O C K O U T E R S P A C E

KEY- ACROSS



WETUMPKA IMPACT CRATER WORD FIND

G R A V I T Y S C H U L T Z S B R E C C I A R Z
S E S M I T H C R E T A C E O U S O U P C W I C
T X C R A T E R R I M Z B O R E H O L E O E V A
A C R U S T Z A D I S R U P T I O N Z R N T E T
R A Z P E R A T O P A P P A L A C H I A I T U R A
W V H I L L S E E A R T H Q U A K E O O A M T S
O A M E T E O R F L A S H F I R E S C D C P E T
U T Z D R W O L F A S T E R O I D B E L T K R R
N I G M I C A S C H I E S T O P Q M A A A A R O
D O E O M L S T A R F O S S I L U O N N L I A P
K N O N P I T I L T A R C U S D A D Z D C M C H
O I L T A F R A C T U R E N T R R I C S O P E I
E R O C C F O S U R V E Y A O I T F R L M A D C
B I G O T S B O U L D E R M S L Z I A I P C E O
E D Y R T N E A T H E R Y I E L 8 C T D R T P A
R I C E N T E R R E B O U N D E 5 A E E E C O S
L U H S A T M O S P H E R E Z J M T R O S R S T
Z M A G E Z E X P L O S I O N E Y I F O S A I L
M B L A S T W A V E Z R I M I C A O L Z I T T I
A Z K S O N I C B O O M C R E T A N O E O E S N
P F L A S H P O I N T R A D I A T I O N N R S E
S D R K I N G M E T A M O R P H I C R O C K A N
B A L D K N O B B Y C O O S A R I V E R L A N D
Z H A R W E L L M I L L C R E E K I S L A N D X

KEY- DOWN

Accretionary lapilli – a small spherical object that forms in a dust cloud (volcanic, impact, etc.) by accretion or adding on layers due to static electric attraction; lapilli means “little stones” (Italian)

Appalachia - eastern half of North America during the Cretaceous. Appalachia was completely isolated from other dinosaur populations, so the Late Cretaceous dinosaurs that lived in what is now the Eastern U.S. are unique, having evolved in isolation for some 30 million years

Astrobleme- literally, a star wound

Atmospheric blast wave- (hurricane-force, straight-line winds)

Bedrock

Boulder – a broken fragment of rock with size greater than 25.6 cm (10.1 in) in diameter up to 10 m (32.8 ft) in diameter; fragments larger than boulder are sometimes called megaboulders

Breccia

Center rebound- (rises several hundred feet)

Chalk – an ancient marine sediment of the continental shelf that is composed mainly of the tiny fossil remains of marine plankton and other small organism that were floating in the ocean at time that the chalk formed; chalk is mainly associated with the geological time period called Cretaceous (*creta* is the latin word for chalk), which spanned 145 to 66 million years ago

Campanian age

Contaminating elements – elements that were part of the impacting asteroid but are now imbued in the local bedrock of the impact crater and/or in the crater-filling materials; these elements were liberated from the asteroid when it vaporized on impact

Coastal Plain (Upper)

Contact and Compression—Energy forces rocks down; some melt or are shocked by intense pressure

Crater rim – the elevated ring of rocks that encircles an impact crater and thus encircles the crater floor; crater rims can consist of harder rocks (as at Wetumpka) or rocks that have been significantly uplifted

Crater floor – the relatively low relief area of an impact crater that typically exists inside the crater rim and consists of geological materials that are typically more soft than the crater rim

Cretaceous Coastline - In Alabama

Cretaceous period - (*creta* is the latin word for chalk), which spanned 145 to 66 million years ago

Deformed sedimentary rocks and sediments – sedimentary rocks, and sediments, are deposited by water or wind in horizontal layers that are laterally continuous, therefore any configuration of sedimentary rocks and sediments that is other than horizontal and laterally continuous means the sedimentary rocks and sediments have been deformed (e.g., compressed or broken)

Disturbance – a general term in geology for the cause of a disruption in the normal organization of rocks in an area; may be due to internal forces of the Earth (fault movement, tectonics, etc.), volcanism, or cosmic forces from meteorite impact

Disruption – a general term in geology for the cause of a disturbance in the normal organization of rocks in an area; may be due to internal forces of the Earth (fault movement, tectonics, etc.), volcanism, or cosmic forces from meteorite impact

Earth's atmosphere

Earthquake

Earth database

Ejecta – small particles of rock and minerals, including glass fragments, and larger particles such as pebbles and boulders that have been launched from the impact crater during the phase of excavation of the crater that immediately follows the impact

Excavation—Material is thrown out (ejected) as crater gets larger

Explosion

Falling Rocks

Fall Line**Flash fires****Flash Point Radiation**

Floodplain – the low-lying area adjacent to a river channel that receives flood water from the river when the amount of water moving through the river exceeds the river channel’s capacity to contain the water

Floodplain sediments – generally clays, silts, and fine sands that are entrained in the waters that flow over the floodplain during times of high river discharge (during a flood); sediments settle out on the floodplain and thus a layer of sediment is left behind when the flood water recedes

Fossils**Geologic Time Scale****Geology****Gravity**

High-pressure damage – tiny layers of crushed and melted material within mineral grains that have been suddenly subjected to high-pressure shock waves that formed when the impacting meteor detonates in the target rock

High-pressure effects – damage done to the crystal structure of a mineral by the thousands of atmospheres of pressure exerted by meteorite impact

Hurricane force winds- Wind blasts more powerful than a violent hurricane

Inclination – in geology, the departure from horizontal of a rock layer or foliation in metamorphic rocks; measured as the angle between horizontal and the top of the inclined layer

Impact crater – a concentric or circular depression in the Earth’s surface that was formed by the energy of an impacting meteor, asteroid, or comet

Iridium

Landslide – a mass movement of Earth materials that is driven by the force gravity; the materials move from higher to lower places, or from less stable to more stable sites

Low Earth orbit

Marine Impact Crater

Mesozoic era

Metamorphic rocks – rocks that have formed mainly because of heat and pressure affecting pre-existing rocks

Meteorite

Mica – a silver or black mineral that occurs in the form of flat sheets; the surfaces of these sheets are smooth and shiny

Mica Schist – a metamorphic rock made of mica, quartz, and other hard minerals; organized into flat layers called foliation and breaks into flat pieces

Modification—Crater is created and center rebounds (rises several hundred feet)

Mooreville Chalk Formation

Piedmont

Radiometric age dating – a general term for a collection of laboratory processes that involve measuring the tiny amounts of radioactive decay products versus the content of original radioactive atoms within mineral crystals

Richter scale – a scale of measure of the strength of earthquakes, specifically their energy of motion, which is measured by a seismometer; magnitude 8 to 9 are considered catastrophic earthquakes and represent the largest known to people since the advent of earthquake studies

Rock debris

Sandy sediment – sediment that is rich in sand grains, which are particles of broken rocks and mineral in the size range of 0.02 to 2 mm (0.0008–0.08 inch); typically contains other fine sediments such as silt and clay in varying proportions

Scientific borehole – a hole drilled into the ground by drilling equipment for the purpose of discovering and documenting the underlying geological materials and

features; cylindrical drill cores of rock and sediment may be extracted during drilling of the borehole (as at Wetumpka impact crater)

Shocked quartz

Shock waves into the Earth

Sonic Boom

Stony meteor

Superposition – where sedimentary rocks or sediments lie upon one another in a horizontal manner the lower layer is always considered to be the older one, unless there is good evidence to the contrary

Terrestrial island

Tilt or inclination – the attitude of rock layers, including layers of metamorphic rock (called foliation) and layers of sedimentary rocks; if the attitude is not horizontal, the layer is said to have tilt or inclination; tilt or inclination has both (1) a compass direction and (2) a magnitude in degrees

The Cliffs

Topographic relief – the difference in elevation between the lowest and highest points in a given area; topographic refers to topography, or the lay of the land

Topography

Trans-Crater Slide - layers of rock that slide across the crater floor and collide with the rim during the modification stage.

Tsunami – a wave in the ocean that is caused by a large earthquake or meteor impact; in an impact, the tsunami wave first moves away from the crater, and then returns to the crater (usually laden with eroded sediment from the adjacent sea floor)

Well cuttings – tiny fragments of rock or pieces of sediment that are ground up by the drill bit during subsurface borehole drilling and collected at the surface when they emerge from the borehole

Types of Craters

Simple Crater

Complex Crater

Transient Crater

Western Interior Seaway- During the Cretaceous period (144-65 million years ago), sea levels were much higher than today. Eastern and western North America were divided by the Western Interior Seaway and were teeming with life. The climate was one of the warmest in Earth's history. This was a result of a variety of factors including: The continents were in different positions so that a world-spanning equatorial ocean current distributed warm ocean water even as far north and south as the poles, atmospheric carbon dioxide was approximately 4 to 6 times higher than modern levels and Increased area covered by oceans (melted ice caps). Water retains heat from the Sun more efficiently than land. The combination of these and other factors resulted in a climate so warm that there were no glaciers or ice caps anywhere on Earth, and all of that ice volume was added to the oceans as water. This resulted in the second highest sea level in all of Earth's history, and flooded about one-third of the present day land surface with shallow seas. Hurricanes, which derive their energy from sea surface temperatures, were a common phenomenon. They basically followed a course similar to the present day track of hurricanes, but seem to have most often moved through the Gulf of Mexico and straight up the Western Interior Sea, all the way to present day Canada.

Wetumpka Impact Crater

