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ABSTRACT

Implementation of technology in classrooms is becoming a necessity for all teachers with the advent of the 21st century. This document presents the development process of a computer software project about invertebrates for fifth grade students. The project uses a HyperStudio program that displays information on cards linked to each other. The HyperStudio program is very user-friendly, and navigation through the cards is easy. These properties make this program a good selection for elementary school students. Content includes an introduction, rationale, research, and production of the projects; information on the implementation process; evaluation of the project by students and cooperative teachers; references; and attachments. The attachments include schematics of storyboards and printouts of the HyperStudio Stacks. (YDS)

Design and Application of a HyperStudio Science Program

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Spring 2000

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Introduction

As the 21st century approached, there became a growing emphasis on using technology in elementary schools. This focus did not turn into a pressing need for many teachers who had been in the field for a number of years. Now that we have reached the new millennium, it is necessary for all teachers, especially those just entering the field, to implement unique technological experiences in the classroom. This early exposure is critical to children's development of computer skills, as well as enlightening them to the wide array of opportunities made possible by technology. Both of these will help our students to succeed in the 21st century.

We took all of this into consideration when deciding on a topic for the field project required of all fifth year Curry School of Education students. This opportunity was made possible by combining the University's Technology Infusion Project (TIP), a course we took this semester, with EDIS 788, the field project seminar. In Tip we learned how to use and implement multiple educational computer programs in meaningful and enriching ways in the classroom. Teachers often make the mistake of using technology just for the sake of using it, but this defeats the purpose of using technology in a meaningful way. Students will only benefit from the use of technology in the classroom if it enhances and supports the instruction.

After collaborating with our cooperating teachers, we resolved that the demands on teachers in Virginia to prepare their students for the Standards of Learning (SOLs) creates the need for teaching aids that help students prepare for the rigorous standardized tests. This led us to the decision to create a computer software program that would help fifth graders prepare for one aspect of the SOL testing in May.

Rationale

Why Science?

The first major choice we needed to make regarding our project was the subject and subtopic the program would cover. We narrowed our focus to the four major SOL content areas, and from there we concluded that science was the area of greatest concern for the students in both of our cooperating classes. The fifth grade science SOLs cover a wide array of topics so it was a difficult task to select just one as our project's concentration. With the help of our cooperating teachers we decided to create a program on the eight invertebrate phyla. This SOL includes many details and facts about each group of invertebrates, which explains why it can be an area of difficulty for some students. We wanted to create a project that would unquestionably be useful for both our students and teachers for learning and instructing purposes. Because the topic of invertebrates contains a large quantity of dense and often difficult information, we wanted to design a program that would not be intimidating for our students and would be easy to utilize in the classroom. Our goal throughout this whole process was to make learning exciting and meaningful through a technology-based program.

Why HyperStudio?

Now that the hardest part of the decision process was over, we needed to agree upon the software that would enable us to make our program about invertebrates. Having been introduced to HyperStudio in a previous class, we understood its usefulness in educational settings. HyperStudio is a multimedia presentation tool that displays information on cards that are then grouped into stacks. When HyperStudio projects are created, the creator links cards to other cards. Users can then navigate through the cards via action buttons located on each card. The numerous capabilities of the program, such as text boxes to house information, its ability to

include graphics, and linear and nonlinear button actions, lend themselves well to our project idea. HyperStudio is also a good match for elementary school settings because it very user-friendly. Both students and teachers can navigate through the cards and stack with great ease and comfort. Our choice of HyperStudio was solidified after a more extensive lesson on the program in our TIP class.

Research

It is important to realize that this project is not based upon research. Research, however, is an important aspect of any project. We felt the need to review other educational software to determine our likes and dislikes, as well as what works and does not work. We examined science software that our cooperating teachers found to be useful in the classroom. These programs include *The Magic School Bus Explores the Ocean* and *Grossology: Gross Science That Kids Want to Learn.*

The Magic School Bus Explores the Ocean is a "fun-filled, fact-packed science adventure." Following a review of this software, we decided to use an adventure theme for our project as well. Both *The Magic School Bus* and *Grossology* have a female tour guide to lead users through the software. This is where we first formulated our idea for Adventure Jane, the group leader for *The Quest for Knowledge.* Unfortunately, due to time constraints of an impending deadline and difficulty locating a female, we resolved to use Adventure Joe. Both of the previously mentioned software programs show consistency in their page/card appearances and button actions, and both contain a home base where users must return before taking the next step of the adventure. We found this consistency beneficial to making the program user-friendly and easily navigable. Additionally, the programs include colorful and vivid images that captivate the audience's attention. We felt that this was a necessary component of all valuable software, and therefore, implemented vivid graphics into our design.

Reviewing existing software proved to be an essential component of our planning and design. It helped us formulate ideas and confidently make decisions regarding our project. We recommend this research aspect for all those wishing to create educational software.

Production

Planning

Prior to starting the design of our project, we needed to make critical decisions. The software that we examined used tour guides to lead students through the program, which helped us to choose to have a guide. Before determining whom our guide was to be, however, we needed a theme that would carry through the entire program. In our opinion, we felt that setting up the software as an adventure would engage the students by encouraging them to take an active role in completing a mission laid out in the opening cards. Once we concluded that we would create a HyperStudio project with an adventure theme, we set out on the Web to locate a tour guide that matched these criteria. In our initial attempt, we hoped to locate a female or a minority adventure guide, but to no avail. We were unsuccessful in finding any minority adventurers at all, and the only females we located were inappropriately dressed. Hence, we selected Adventure Joe.

The next step in our planning process was to find resources that contained information about invertebrates on a fifth grade reading level. The most obvious resources were our cooperating teachers, who gladly lent us the fifth grade science text used by Albemarle County, as well as supplemental materials that they used in their classes. After we had the factual components we needed for the project, we sought out colorful graphics that would represent the animals found in each phylum. This search led us to the Web, where we located an extremely useful sight that contained hundreds of vivid photographs of countless types of animals. This one site provided the majority of the pictures we needed, but the few that it did not contain we were able to find at additional websites. Following our discovery of utilizable websites, we wrote to the creators and/or webmasters of the sites for permission to include their photographs

in our project. We were pleased that they granted us the authority to do so, and we gladly gave them credit for their photographs in accordance with their rules of use.

After choosing a theme, locating a guide and finding the necessary resources, we began planning the actual cards of our project. Our first major decision in this area was determining whether the project should be linear (moving chronologically from one card to the next) or nonlinear (not restricted to moving in one particular order through the cards and stacks). Following our decision to make the first stack an introduction to the software, we decided that it should be linear. We wanted to ensure that all students/users were exposed to the mission of the program, as well as the prerequisite knowledge they should know about invertebrates. Once they reach the home page, however, the stacks become nonlinear to allow users to traverse through the program as they please. This enables the user to study whichever phylum they want or need to at that particular time.

We concluded that the first stack should consist of introductory pages that lay out the foundation of our program. They welcome the user, explain the goals of our project, clarify the difference between invertebrates and vertebrates (the two types of animals that make up the animal kingdom) and provide a home page that serves as the starting point for their adventure. We decided that the home page should contain buttons that would take the user to the eight phyla of invertebrates. Following their study of a particular phylum, users must return to the home page, where they have the option to either continue their journey through the remaining phyla or test their knowledge at the quiz. We chose to have scrollable text boxes on the information cards (that users are taken to from the home page) to limit the number of cards for each phylum, and consequently, eliminate the distraction of having to click to another card in mid thought. We then resolved to have each information card lead to a card or cards that contain pictures of that phylum's members. Finally, after visiting the final information card, students can then go to a

quiz to test what they have learned in a format similar to that of a standardized test. They can reach this quiz from the home page.

Storyboarding and Design

Following the planning stage, we had to come to a more definite plan for the outline and appearance of our project. In order to accomplish this plan we decided to create a storyboard detailing each card and link within our project (See Attachment A). We made pencil and paper sketches of each card and its links. This allowed us to accurately envision what our project would look like and how users would navigate through the final product.

In addition to creating our storyboard, we experimented with colors and backgrounds made available through HyperStudio. This ensured that the card would be easily read and aesthetically pleasing. To promote continuity throughout the project, we designated one pattern for the border and one color for the background on all information pages. We also opted to use only two fonts throughout the entire project and to keep the layout of each category of cards consistent. For example, all the information pages look the same, just as all the quiz cards. More specifically, each information card has a title, a scrollable text box, and three navigation buttons arranged in the same manner.

We wanted continuity to exist in the quiz portion of the project as well as the information section. The format of each quiz question remains the same, with a title, a question directly below the title, and three or four answers aligned on the left side of the page. Students should click on the answer that they think is correct. If they choose incorrectly they are taken to an "Incorrect" card which then leads them back to the information card pertaining to that particular question. After reviewing, students can click on a return button that takes them back to the particular question that they answered incorrectly. They are then given another opportunity to

answer correctly. Once they do so, students will be linked to a "Correct" card, which will then lead them to the next quiz question. Following a successful completion of all quiz questions, students are congratulated on their achievement of the mission. Students then have the choice of ending the program or continuing to review.

Obstacles

One obstacle we encountered while attempting to create our project prevented us from a finished product (See Attachment B) that exactly replicated our storyboards. We realized rather late in the creation process that the quiz button located on each information page could not be the sole link back to the quiz questions. The original quiz button that we created could only link the user back to one quiz question. There is, however, more than one question about each phylum. This created the necessity for a button to return the user back to each particular quiz question. For example, the mollusk information page contains three separate quiz buttons, each of which returns the user back to a designated question.

Other obstacles made the process more difficult and time-consuming, but did not change our original design. Several times we encountered problems saving our stacks to a zip disk. To overcome this hindrance we began saving our project to as many locations as possible. These locations included: two zip disks, multiple floppy disks, the computer desktop, and the University of Virginia server. We also found that limiting the stack to no more than seven cards helped to eliminate this problem. The other major difficulty we confronted was using graphics on the cards. Once an image is placed on a card, it cannot be altered or deleted without drastically reconstructing the entire card. We found it helpful to have a blank card within every stack so we could experiment and manipulate images before permanently placing them on the card.

Implementation

I. Objectives:

The main objective of this lesson is to use a HyperStudio project to review science material for a unit test or a standardized test such as the SOL. The subject matter is invertebrates. During the lesson students will review material from SOL *5.2: Classification of Living Things*, Part C: Classifying invertebrates into the eight major phyla. This material is also a part of the Albemarle County fifth grade science curriculum.

Children will be expected to meet certain objectives.

1. After a class demonstration of the project, students will be able to maneuver their way through the HyperStudio project.
2. Following the class demonstration, students will develop learning skills by working in cooperative groups.
3. By using the *Adventure Joe* program, students will be able to verbally recall previously taught information on invertebrates.
4. Upon completing the program, students will demonstrate mastery of the content by answering 18 of the 20 quiz questions correctly.

II. Audience

The HyperStudio project can be used in a variety of ways and settings in the classroom. A teacher can use it as a review with the whole class in the regular classroom by projecting the program onto a monitor, but a computer lab with a projection screen might make the project easier to read. On the class computer, small groups of students can work on the program together or individual students can work on it alone. In a lab setting, all students can use the program at the same time.

In a large class setting, this project is ideal for all learning types and abilities. If used in small groups or individually, make sure students with disabilities have teacher or peer guidance.

The project was created for two mixed ability classrooms, ranging from low to high ability students.

III. Materials

Technology Used:

- Computer(s) depending on whether whole group instruction or small group/individual review
- Display unit for projection of project
- HyperStudio software installed on all computers

IV. Lesson Description

We used the HyperStudio project with a whole class in a regular classroom. The project was projected onto a television monitor suspended from the ceiling.

1. Have students move closer to the monitor if they are sitting in the back of the classroom.

2. Explain the project's use and goals, as well as a brief introduction to HyperStudio.

3. Click through the beginning cards, which explain their mission to gain information on invertebrates: what the phyla are, the physical characteristics of phyla animals, and how members of a particular phylum eat. The cards also explain the difference between invertebrates and vertebrates. Teachers can read this aloud or designate students to read certain parts.

4. Begin the adventure on the "Point of Departure" card. From here, start with Sponges, the simplest of the invertebrate phyla. This page lists the eight phyla in a semicircle, from simplest to most complex. We advise you to review the phyla from simplest to most complex the first time.

5. Click on the picture of the sponge. This brings you to the information page on sponges. Depending on your teaching style, either have individual students read the information or read it to the class. Following this, discuss the material and ask additional questions that extend the information and make them recall earlier lessons on the subject.

6. Next, view pictures of sponges by clicking on the graphic button. Have students name the pictures that they see and describe the physical characteristics that they just read about. Also, have them point out the characteristics of the animals that determine how and what they eat.

7. Repeat the process for the remaining seven phyla.

8. Ask for questions and comments.

9. On to the quiz: Read question number one and its choices. Explain that the format is similar to that of a standardized test, except that it has pictures.

10. Teachers can either divide the class into two competing groups to answer the questions or allow individual students to answer. If an incorrect answer is given, the program takes the student back to the information card where they can review the material. Otherwise, correct answers take the user to the next question.

11. Repeat this process for the remaining 19 questions.

12. Conclude program with credits and a quick discussion on invertebrates in general.

V. Assessment Plans

Because this program serves as a review, there is no formal and documented assessment. The lesson is supplementary to an earlier unit on invertebrates. However, individual assessment can be determined by observing who is participating in class and who is able to answer the quiz questions correctly. Teachers could create a written quiz on the information, but we chose not to do so.

Evaluation

Students

We deemed it important to ask the students how they felt about *Adventure Joe* because they are ones who need to benefit most from the program. This questioning was in the form of a survey (see Attachment C) that we created and distributed to the students after presenting the project. In response to the first question, all students agreed that *Adventure Joe* was "a useful tool for reviewing invertebrates." The majority felt that it was user-friendly and more exciting than using worksheets and textbooks to review the material for the SOLs. Students also shared with us that they enjoyed the graphics and the manner in which the information was displayed. Upon being asked whether they would prefer to use the program in small groups or in a large class setting, students were undecided. On the downside, however, students confided that the quiz was fair but not very challenging. They also thought that sound would add to the excitement of the program. In spite of their few suggestions, students were positive about Adventure Joe, which was reflected in the overall score they assigned to the program as a whole.

Cooperating Teachers

Our cooperating teachers thought that the HyperStudio program was a great review for the SOLs. Both teachers agreed that they would use the program in the future when teaching invertebrates or preparing for the SOLS. They thought that the graphics were a great addition and that the required review for students who missed a question on the quiz was a wonderful idea. One item that was suggested was the addition of text boxes that would appear when you clicked on all of the pictures. The text box would describe the animal and give an interesting fact about the animal.

Creators

We feel that the project is a worthwhile program that can be implemented into the teaching of fifth grade science. The technology enriched the lesson, which should be the main goal of using technology in the classroom. It pleased us that the students enjoyed the program and that they felt it was more fun than reviewing with other types of resources. We feel that we have accomplished our goal of implementing a meaningful technology program in the classroom and hope that others will find this resource just as useful in the future. Our concerns are addressed further in the projected modifications section of this paper.

Projected Modifications

The first change we would make would be to add sound to the project by recording a voice-over of the information so that students with disabilities could use the program on their own. Adding transitional sounds between cards will captivate learners and continually draw their attention back to the screen where they should be focused. We initially chose not to add sound because we thought that the background noises in the classroom when students used the project individually or in small groups would be distracting to other students. It came to our attention that headphones are a viable option to combat this potential disturbance.

Additionally, as we mentioned previously, we would like to add pop-up text boxes on graphics. These would give the name of each animal and any interesting fact that would grab the user's attention.

Finally, we would like to add a female or member of a minority group to serve as our guide. Unfortunately, we were unable to locate an appropriate representation of either. By default we used Adventure Joe. Having a female or minority as a guide might help female and minority students feel more a part of the adventure.

References

Australian museum online [online at http://www.aust.mus.gov.au].

Cohen, M.R. (1989). Discover science. Glenview, IL: Scott, Foresman and Company.

Corbis: The place for pictures on the internet [online at http://www.search.corbis.com].

Destinations in science: Chesapeake Bay classification. (1995). Menlo Park: Addison-Wesley.

Hayward-Senatore, Julie. (1997). Planet Dexter's grossology: gross science that kids want to learn [Computer program]. Segasoft.

Lonestar [online at http://www.lonestar.texas.net].

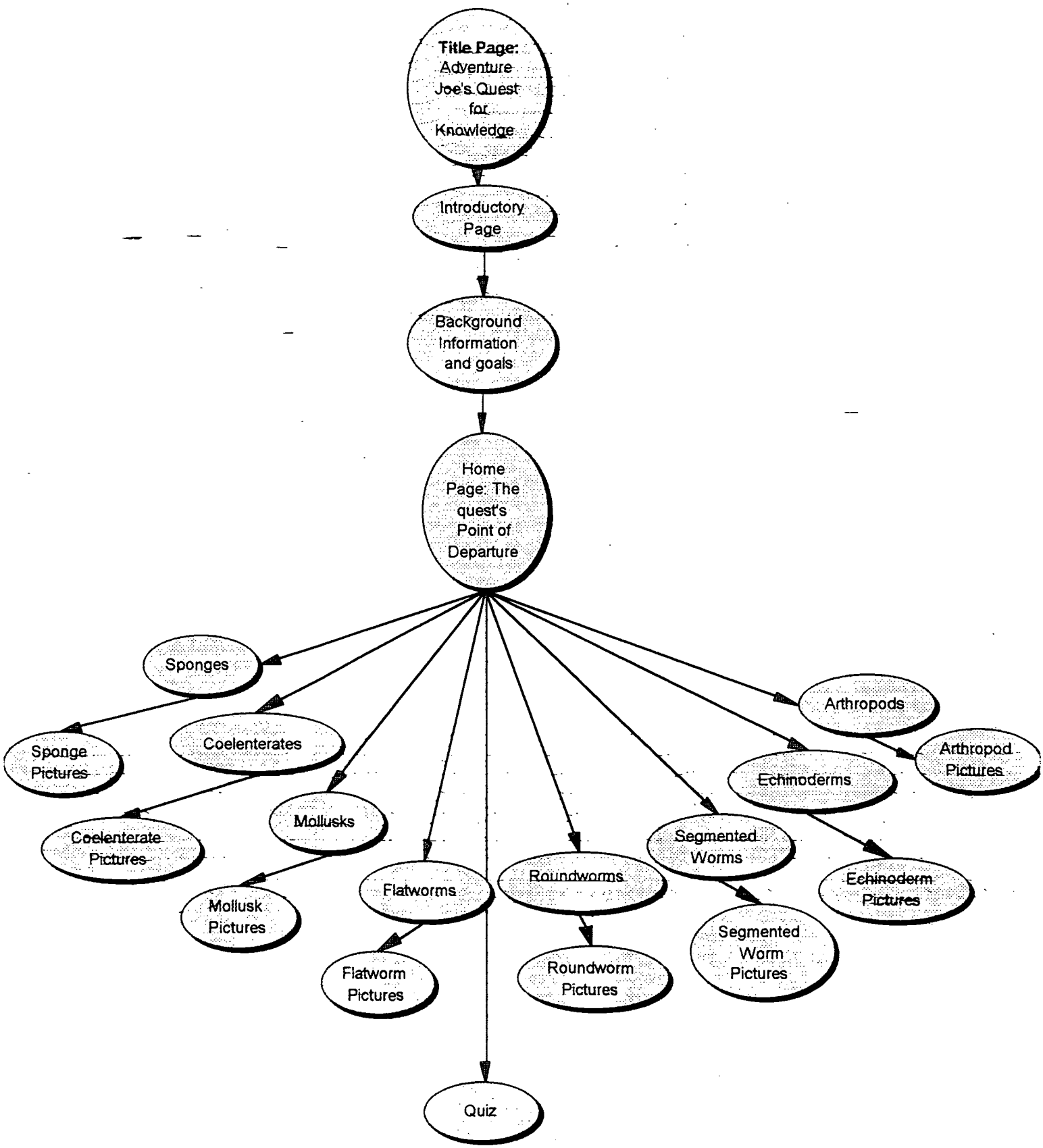
Photovault [on line at http://www.photovault.com/].

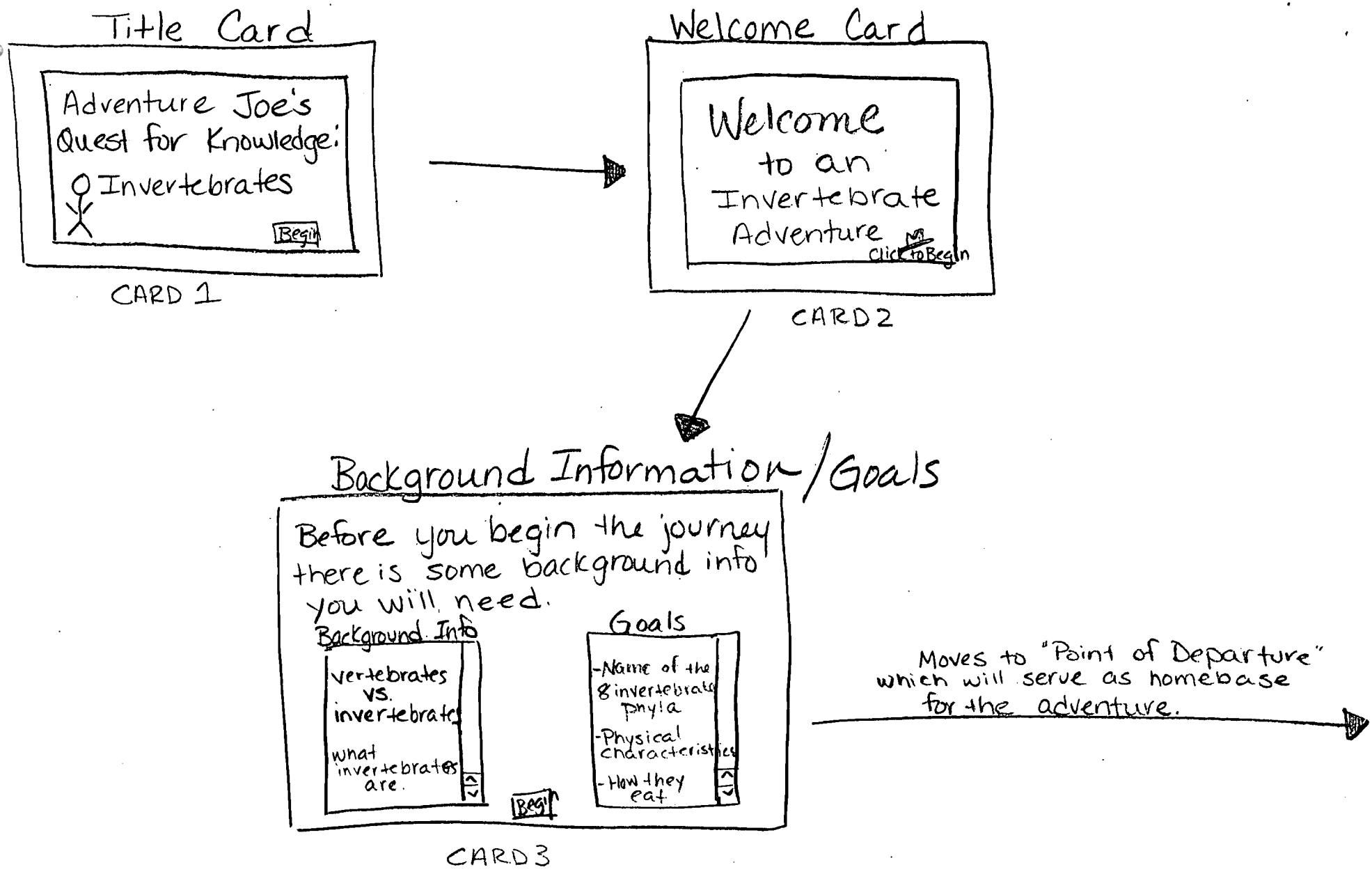
Scholastic. (1995). The Magic school bus explores the ocean (Version MAC OS) [Computer program] Microsoft Corporation.

Attachment A:

Storyboards

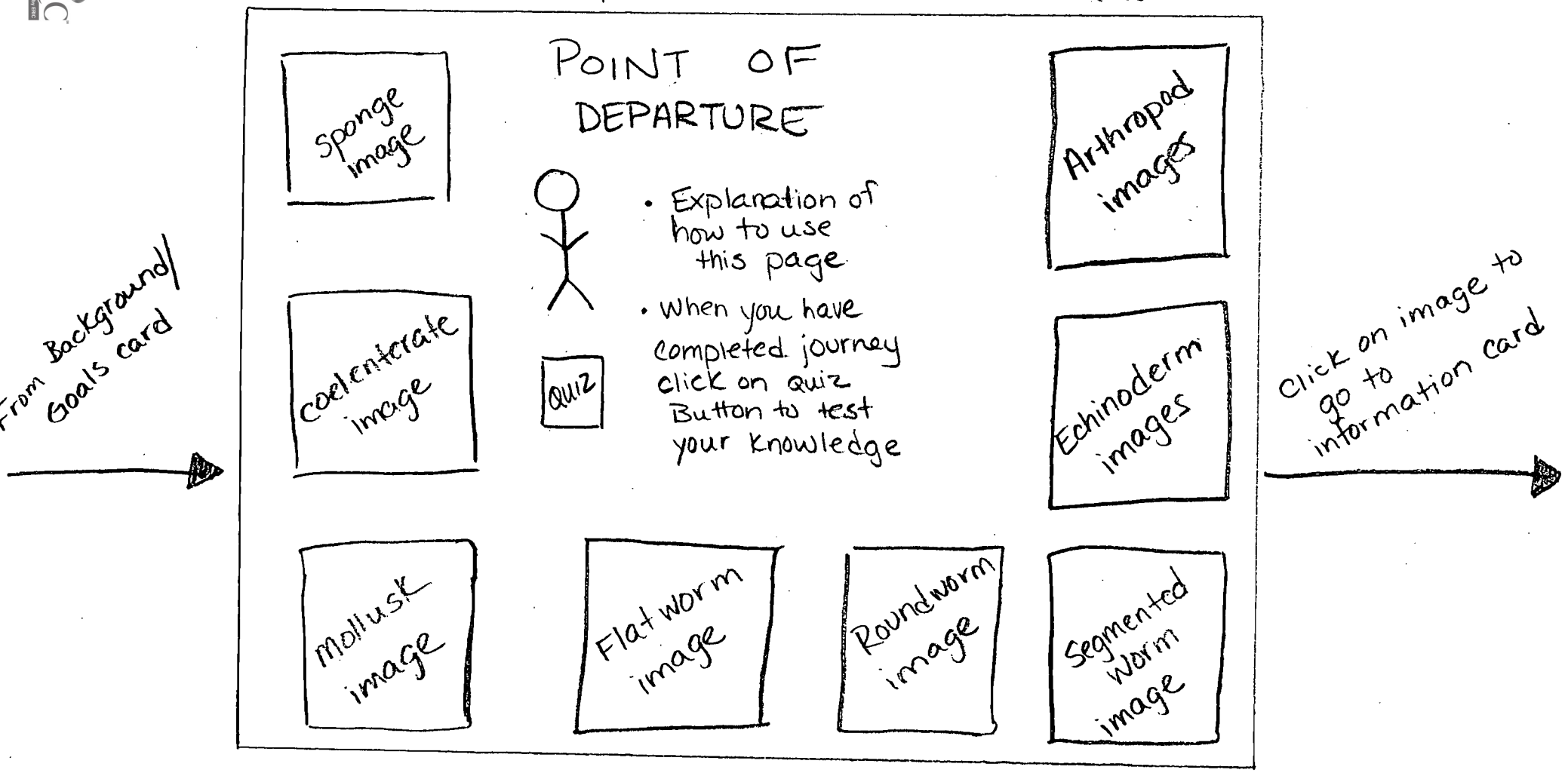
Basic Storyboard





Linear portion of HyperStudio Project: Adventure Joe

Point of Departure – Home Base



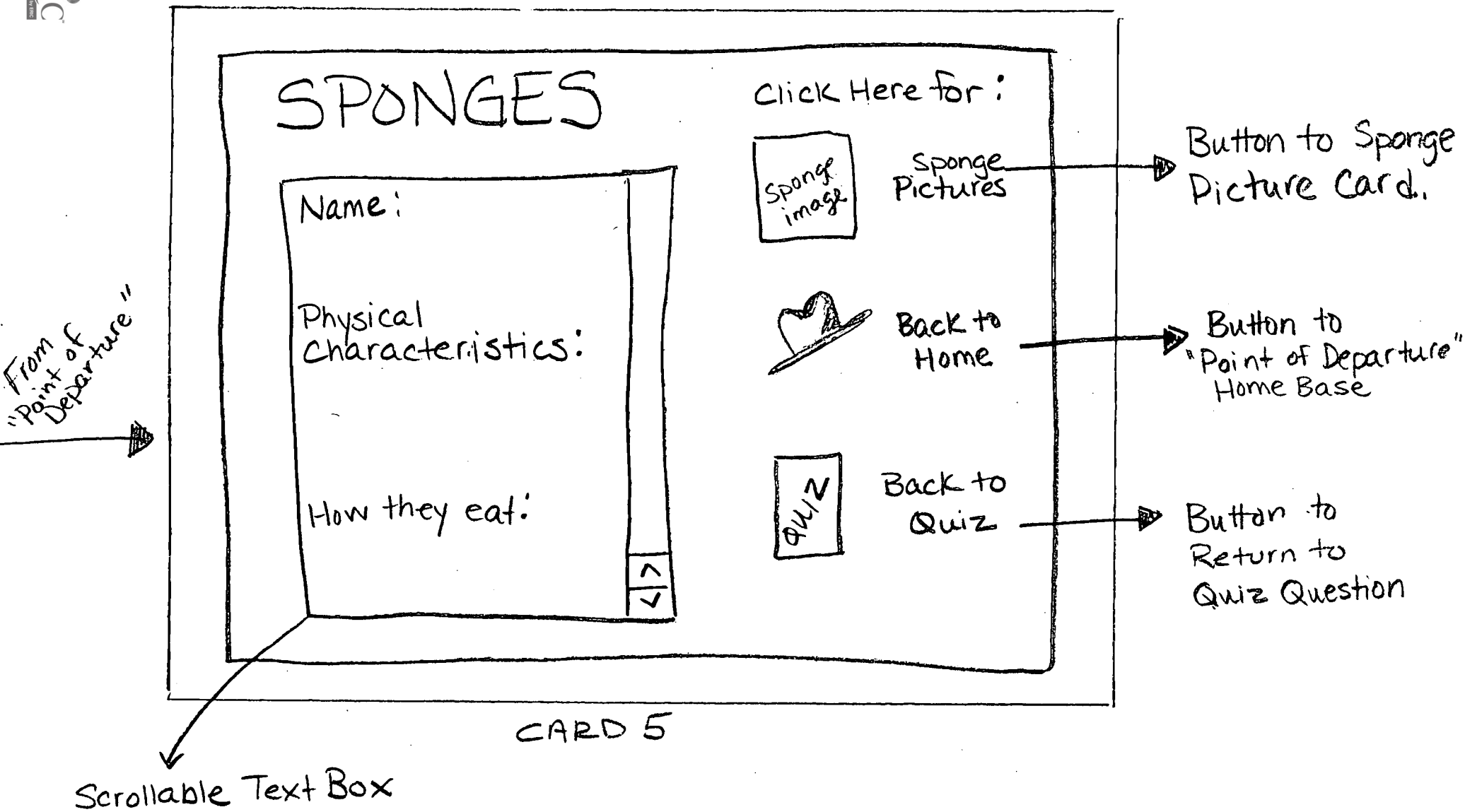
CARD 4

8 phyla ordered from simplest to most complex.

1 8
2 7
3 4 5 6

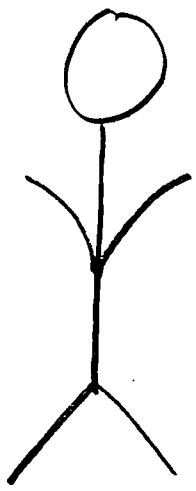
This card begins the Nonlinear phase of the project.

Information Card



* Each Information Card will look the same & have the same elements/options.

Welcome to Quiz Card



Now that you have completed the adventure, are you ready to test your INVERTEBRATE KNOWLEDGE?

Once students have completed journey click on Quiz at home base

to Quiz Intro

Click Here to:

Have a Quick Review

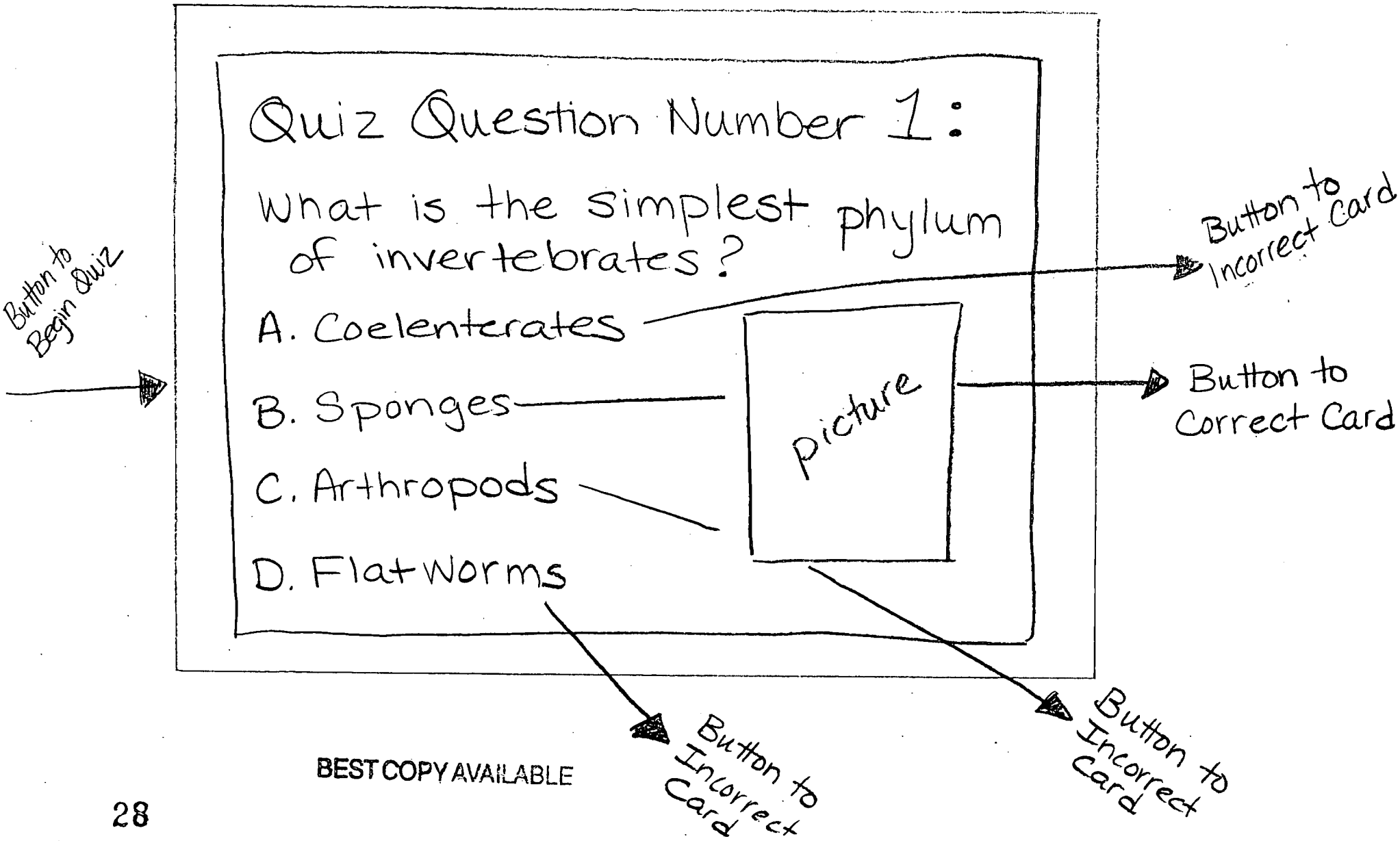
Begin Quiz

QUIZ

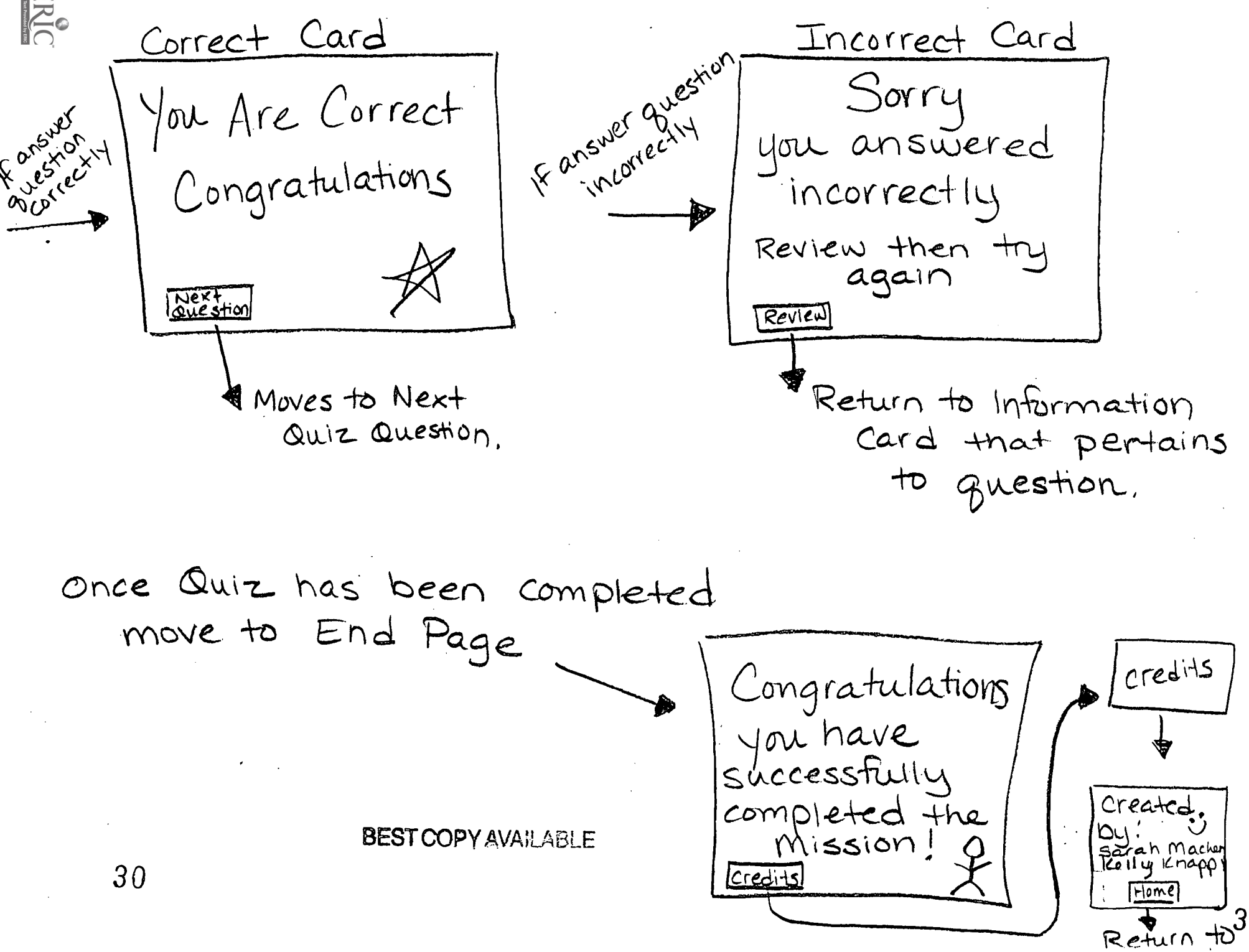
Button back to "Point of Departure"

Button to first quiz question

Quiz Question Card

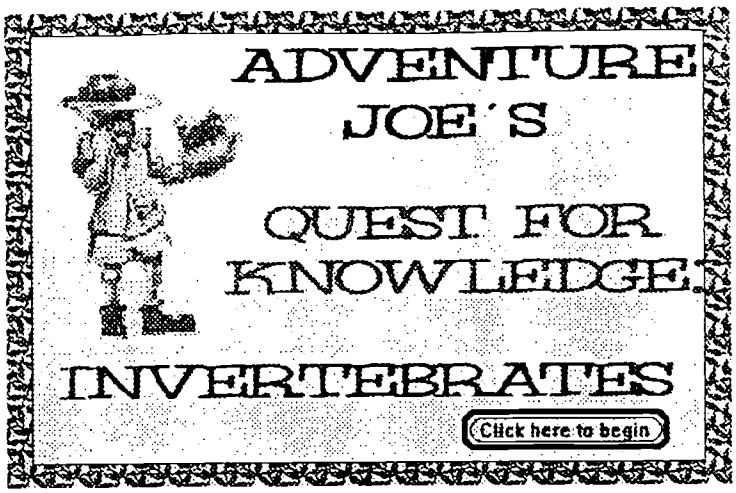


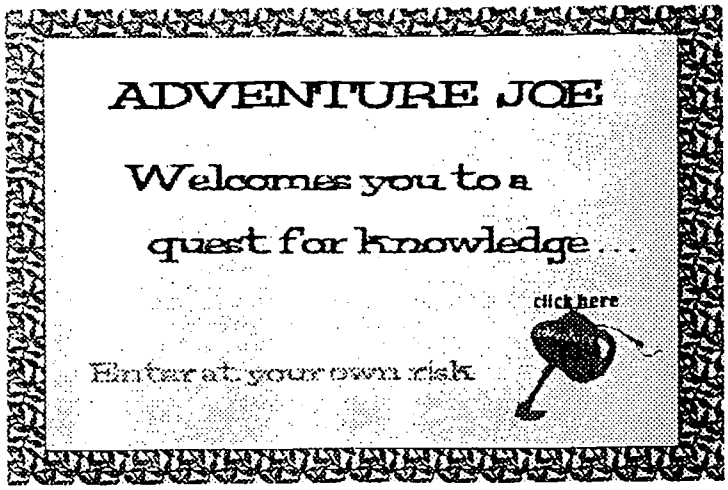
* The format of this card will be consistent for all quiz questions

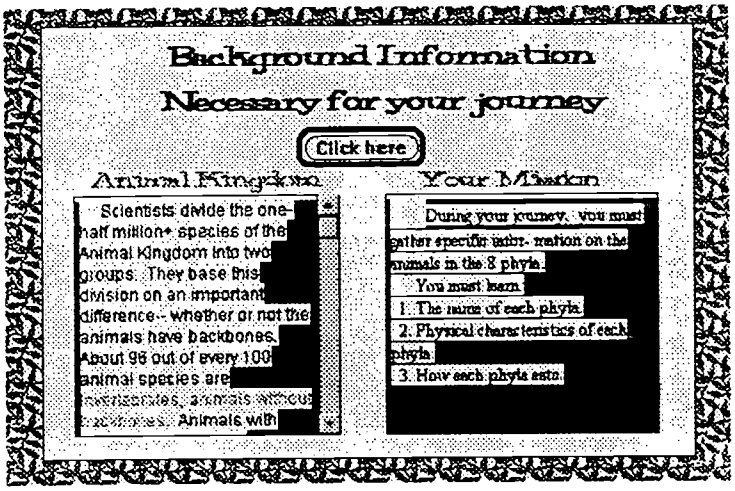


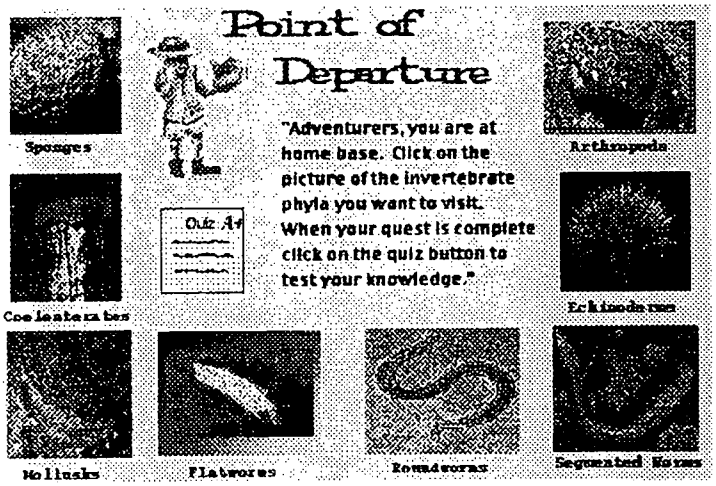
Attachment B:

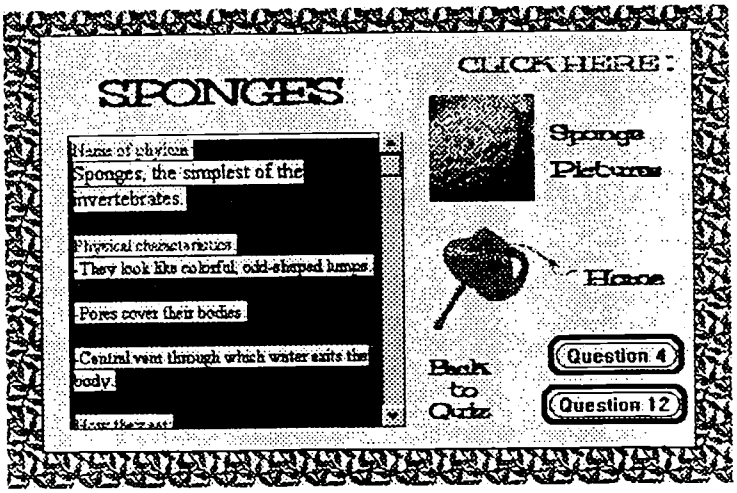
HyperStudio Stacks

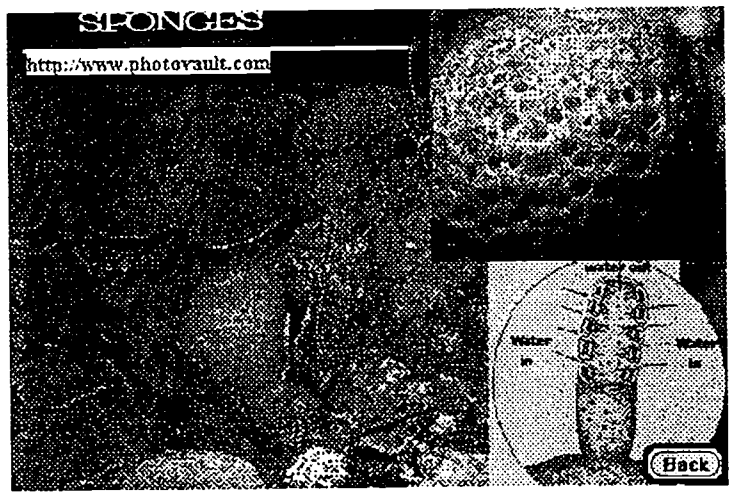

ADVENTURE
JOE'S
QUEST FOR
KNOWLEDGE:
INVERTEBRATES
Click here to begin

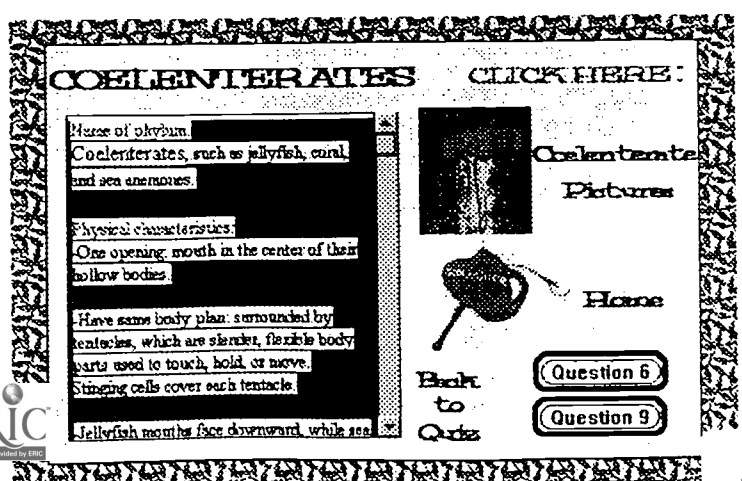

ADVENTURE JOE
Welcomes you to a
quest for knowledge...
click here
Enter at your own risk

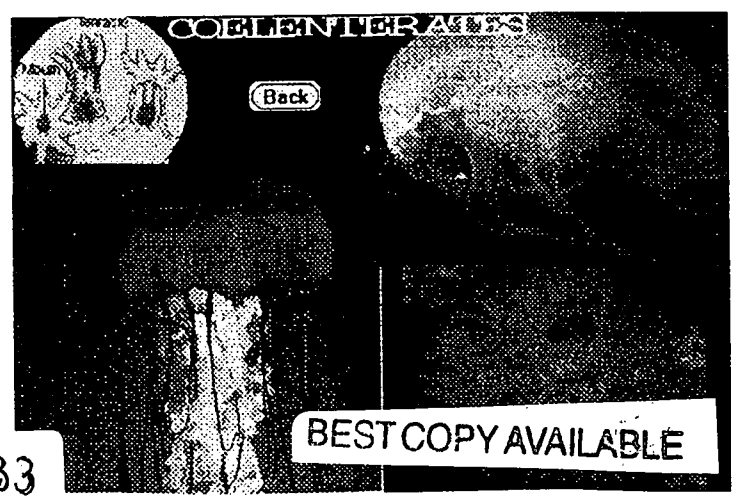

Background Information
Necessary for your journey
Click here
Animal Kingdom
Scientists divide the one-half million+ species of the Animal Kingdom into two groups. They base this division on an important difference-- whether or not the animals have backbones. About 96 out of every 100 animal species are
Animals with
Your Mission
During your journey, you must gather specific information on the animals in the 8 phyla.
You must learn:
1. The name of each phyla.
2. Physical characteristics of each phyla.
3. How each phyla eats.

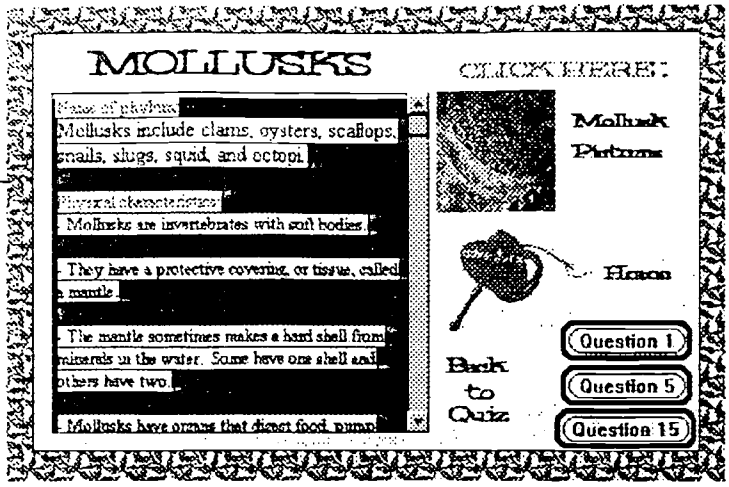

Point of
Departure
"Adventurers, you are at home base. Click on the picture of the invertebrate phyla you want to visit. When your quest is complete click on the quiz button to test your knowledge."
Sponges
Arthropods
Coelenterates
Echinoderms
Quiz
Mollusks
Flatworms
Roundworms
Segmented Worms

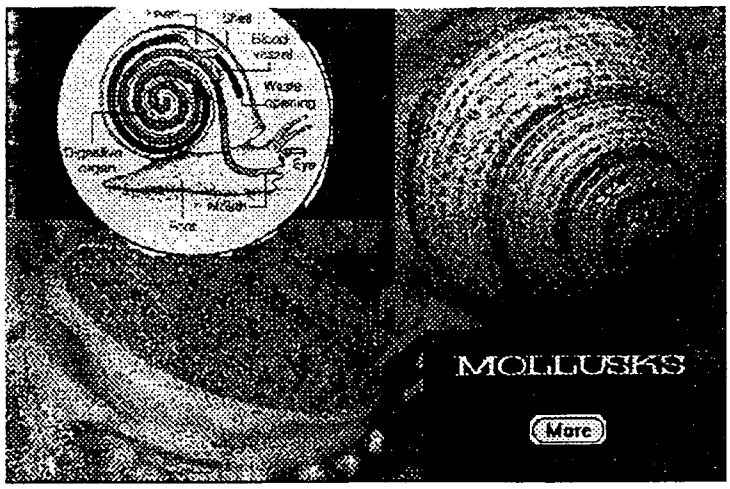

CLICK HERE:
SPONGES
Phylum of phylum
Sponges, the simplest of the invertebrates.
Physical characteristics
-They look like colorful, odd-shaped lumps.
-Pores cover their bodies.
-Central vent through which water exits the body.
Sponge Pictures
Home
Back to Quiz
Question 4
Question 12

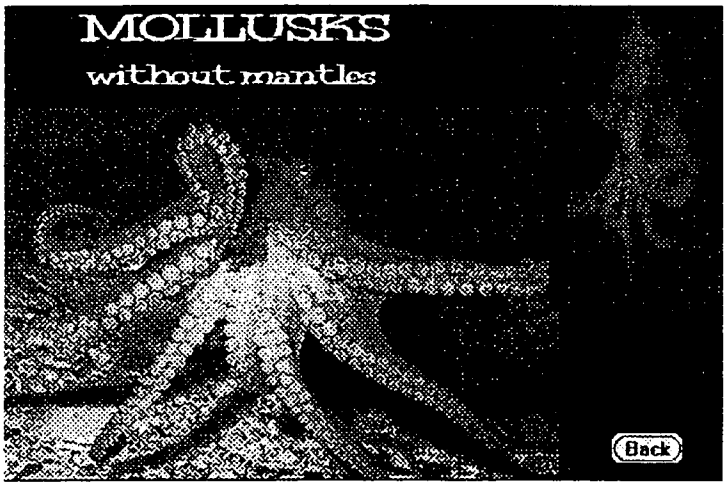

SPONGES
http://www.photovault.com
Back


COELENTERATES
CLICK HERE:
Phylum of phylum
Coelenterates, such as jellyfish, coral, and sea anemones.
Physical characteristics
-One opening: mouth in the center of their hollow bodies.
-Have same body plan: surrounded by tentacles, which are slender, flexible body parts used to touch, hold, or move.
-Stinging cells cover each tentacle.
-Jellyfish mouths face downward, while sea
Coelenterate Pictures
Home
Back to Quiz
Question 6
Question 9


COELENTERATES
Back
BEST COPY AVAILABLE







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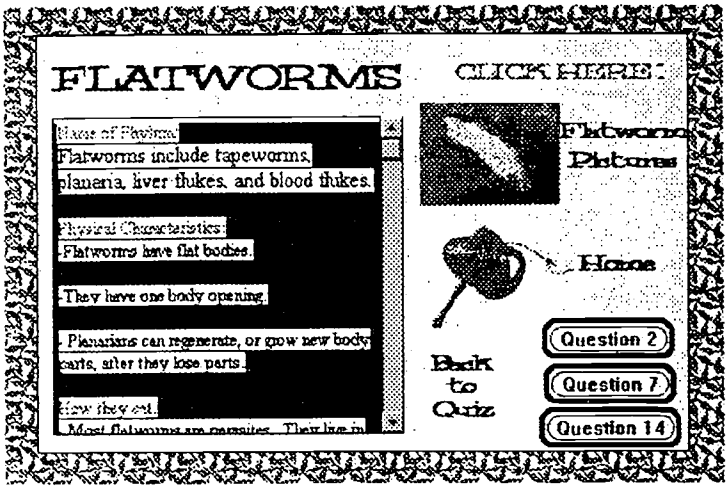
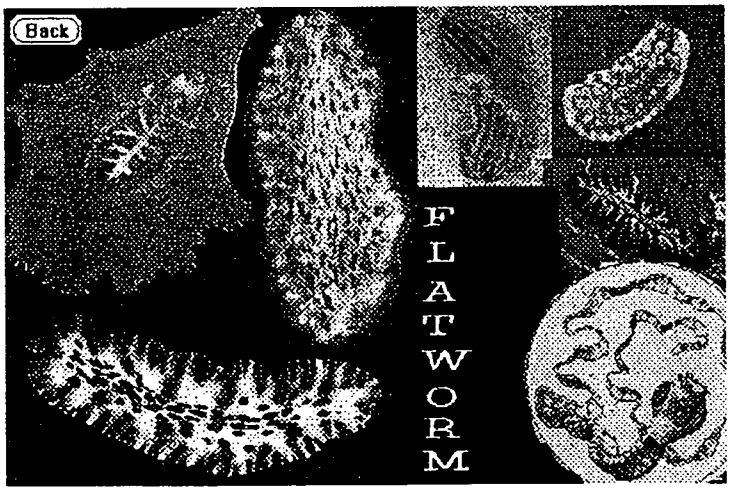
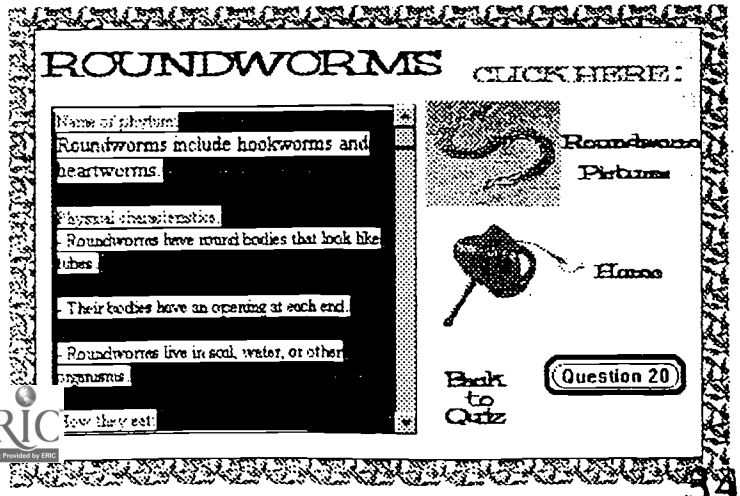
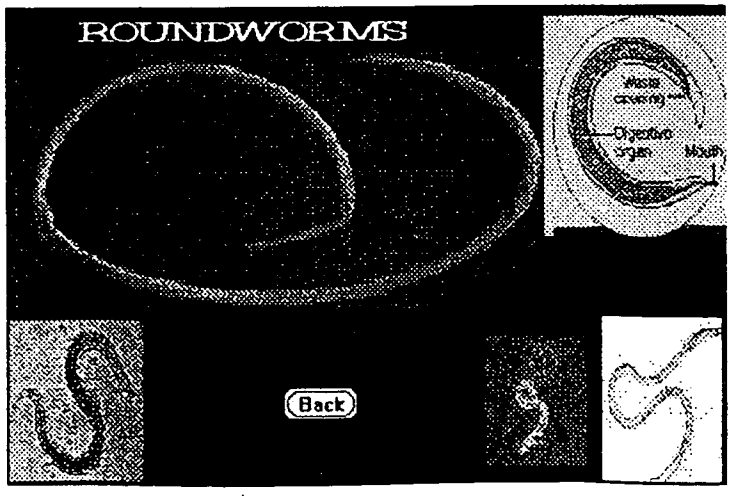
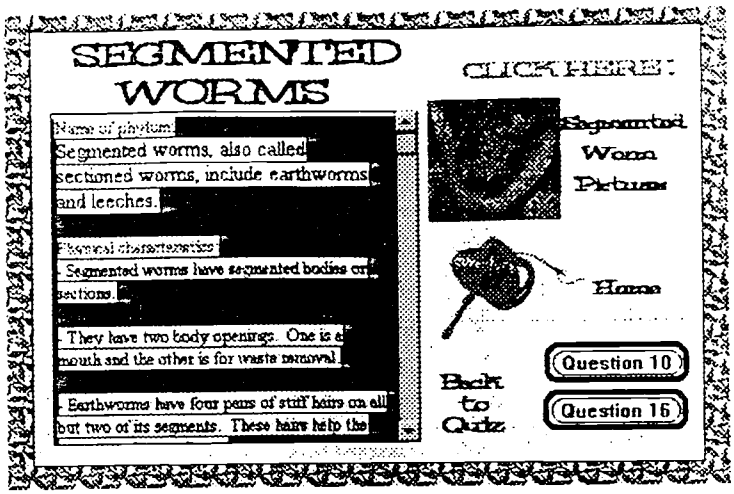
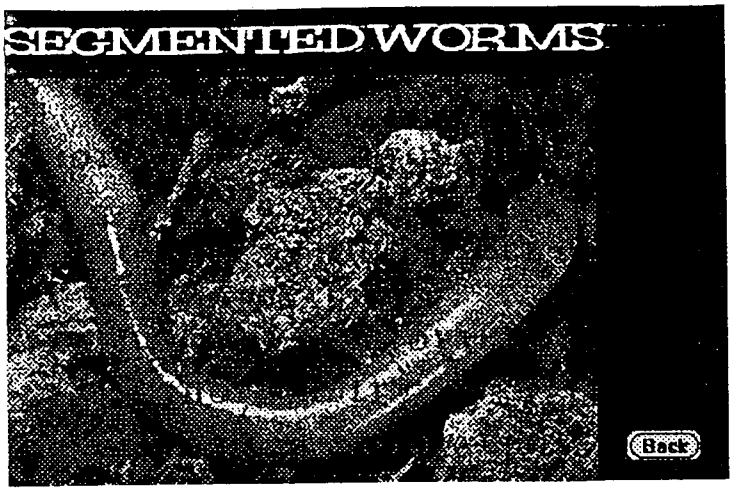


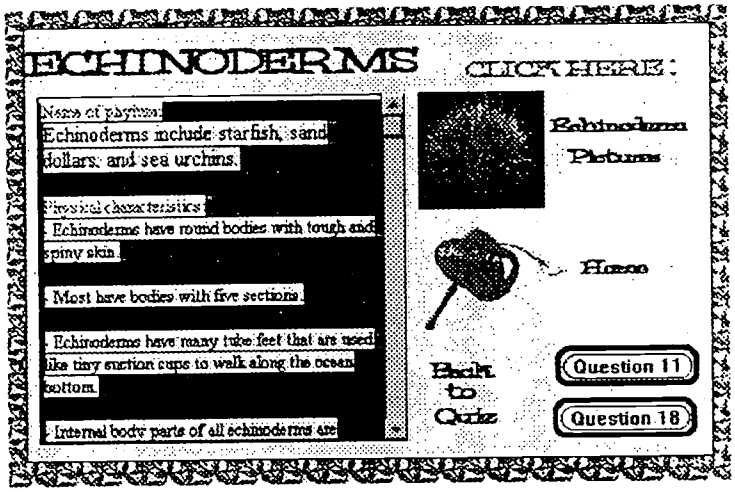


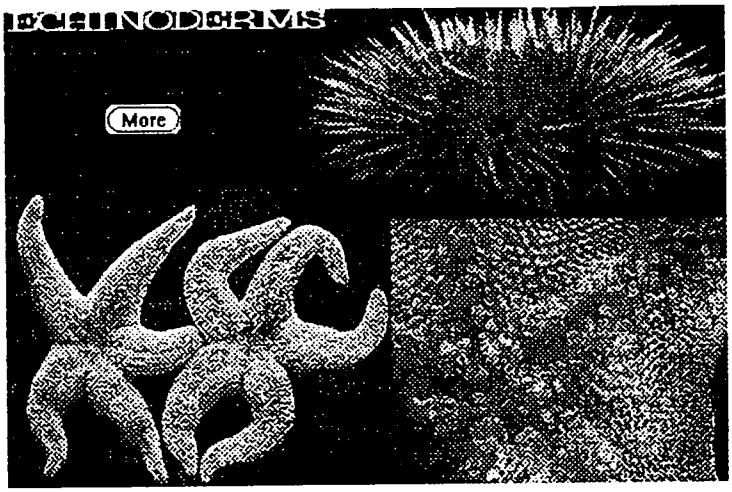


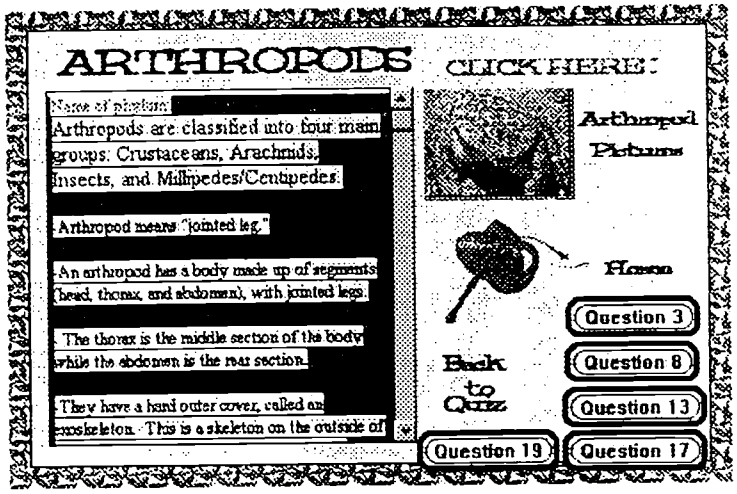


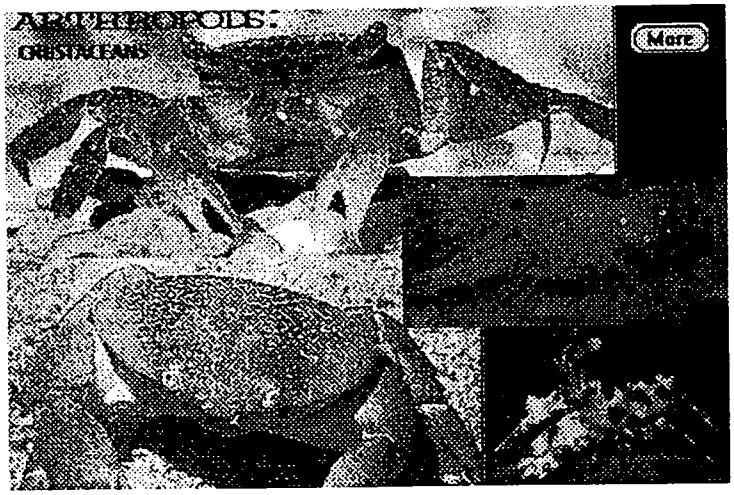


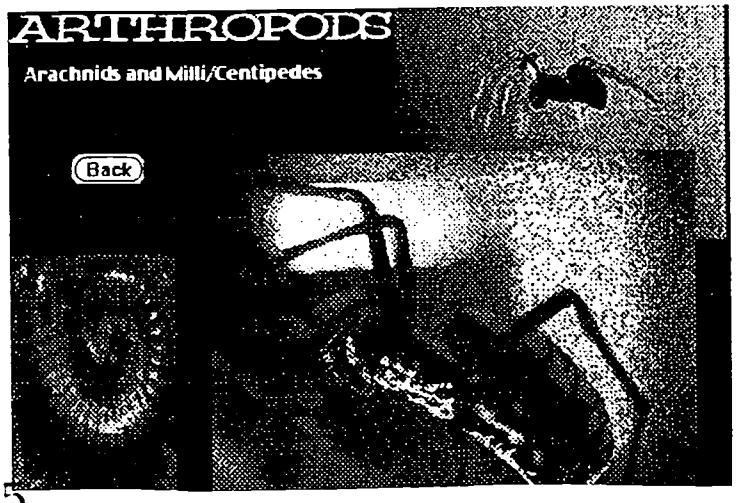


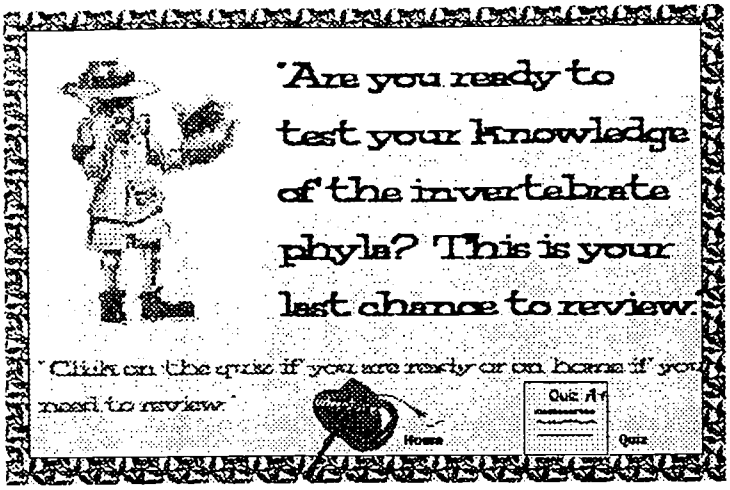


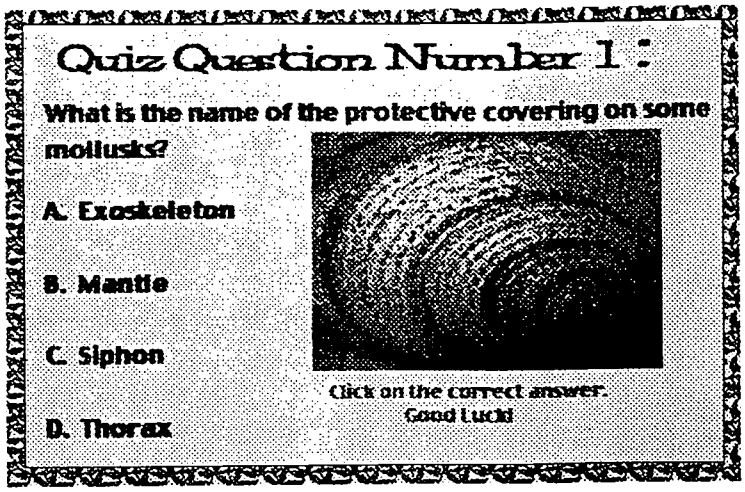


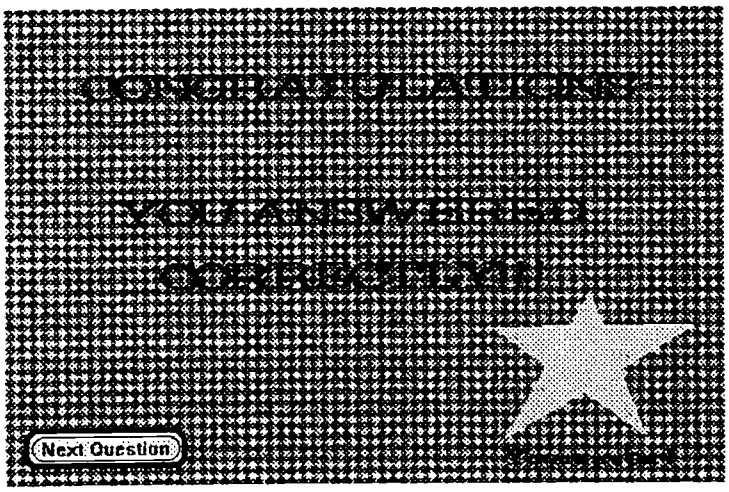


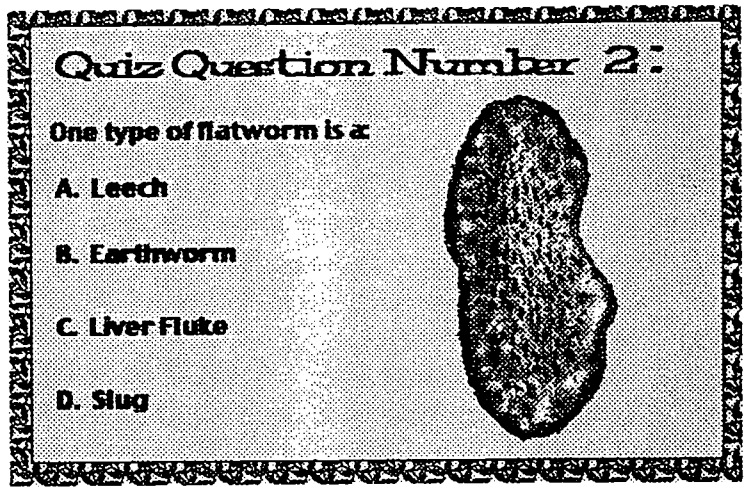


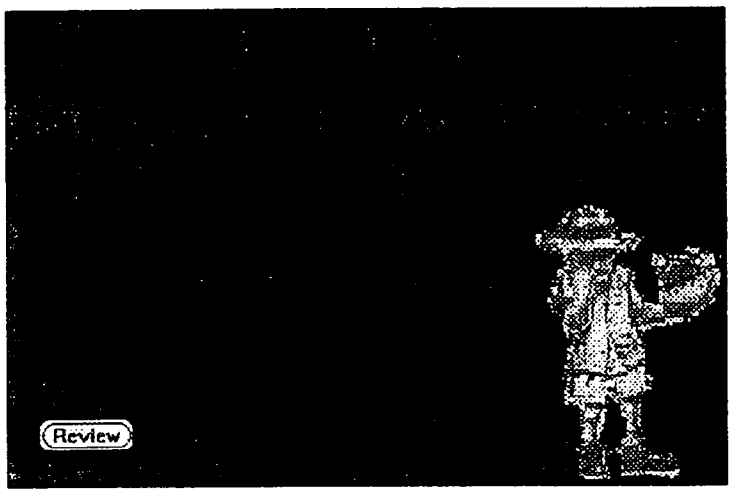


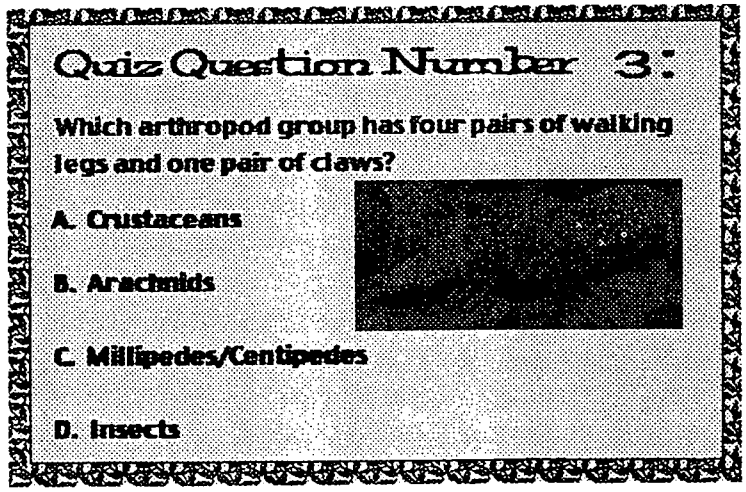


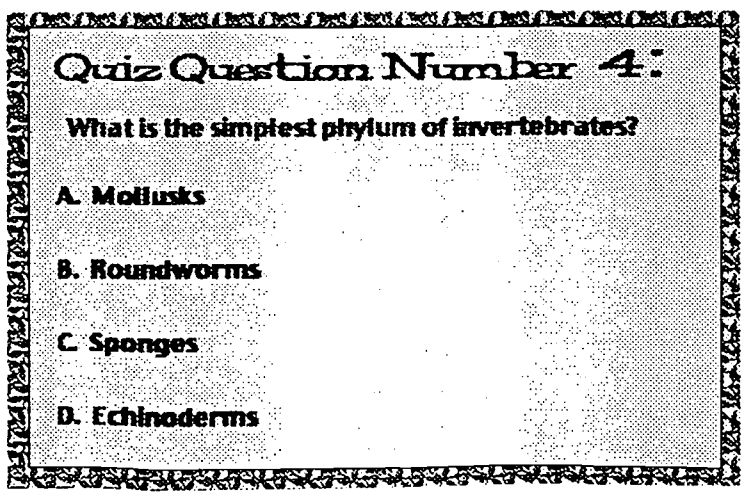












Quiz Question Number 5:

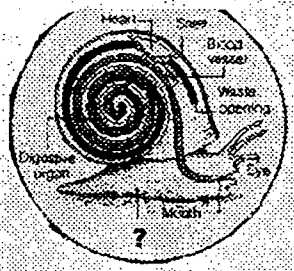
What feature of a shelled mollusk enables it to move?

A. Wings

B. Arm

C. Mantle

D. Foot



Quiz Question Number 6:

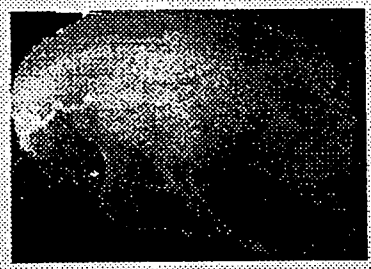
A jellyfish is what type of invertebrate?

A. Coelenterate

B. Echinoderm

C. Crustacean

D. Sponge



Quiz Question Number 7:

Most flatworms get their nutrients from the body of another organism. This type of animal is called a/an:

A. Leech

B. Carnivore

C. Parasite

D. Scavenger

Quiz Question Number 8:

Choose the answer that lists insects' body parts in order of top, middle and rear:

A. Thorax, Head, Abdomen

B. Head, Thorax, Abdomen

C. Head, Abdomen, Thorax

D. Abdomen, Thorax, Head

Quiz Question Number 9:

What body part allows coelenterates to sting and paralyze animals they want to eat?

A. Foot

B. Tentacle

C. Mantle

D. Antennae

Quiz Question Number 10:

Which of the 3 phlya of worms are not parasitic but get nutrients by eating the soil they crawl through?

A. Flatworms

B. Roundworms

C. Segmented worms

Quiz Question Number 11:

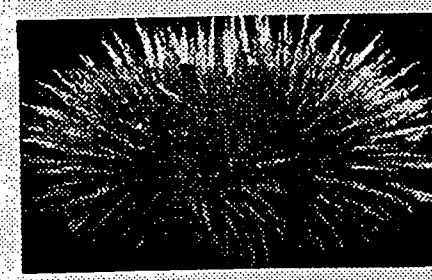
A sea urchin is what type of invertebrate?

A. Echinoderm

B. Mollusk

C. Coelenterate

D. Sponge



Quiz Question Number 12:

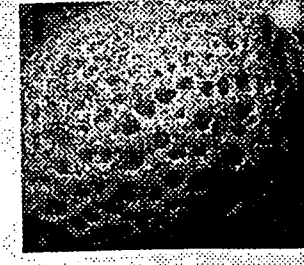
Sponges get their food from the water. What physical characteristic allows them to do this?

A. Siphon

B. Central Vent

C. Mouth

D. Pores



Quiz Question Number 13:

Arthropods have an exoskeleton. Which of the choices below is not a function of the exoskeleton?

A. Support

B. Protection from predators

C. Protection from drying out

D. Camouflage

Quiz Question Number 14:

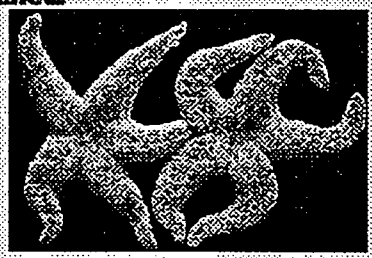
Planarians and starfish are two examples of invertebrates that can regrow lost body parts through a process called:

A. Generation

B. Recreation

C. Production

D. Regeneration



Quiz Question Number 15:

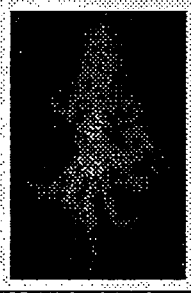
Unlike shelled mollusks, the squid and octopus do not have a foot that aids in mobility. Through what process do they move?

A. Suction

B. Siphonation

C. Jet Action

D. Propulsion



Quiz Question Number 16:

Which of the 3 phyla of worms have special organs in the multiple sections of their bodies?

A. Flatworms

B. Roundworms

C. Segmented worms

Quiz Question Number 17:

The name of this invertebrate phyla means "jointed leg."

A. Arthropod

B. Insect

C. Echinoderm

D. Mollusk

Quiz Question Number 18:

What feature on echinoderms allows them to walk on the ocean bottom?

A. Foot

B. Tube Feet

C. Tentacle

D. Thorax

Quiz Question Number 19:

The shape of this body part determines what insects will eat.

A. Head

B. Mouth

C. Stomach

D. Abdomen

Quiz Question Number 20:

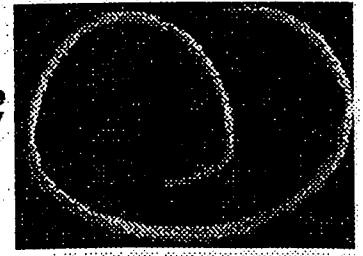
Which of the following is not true of roundworms?

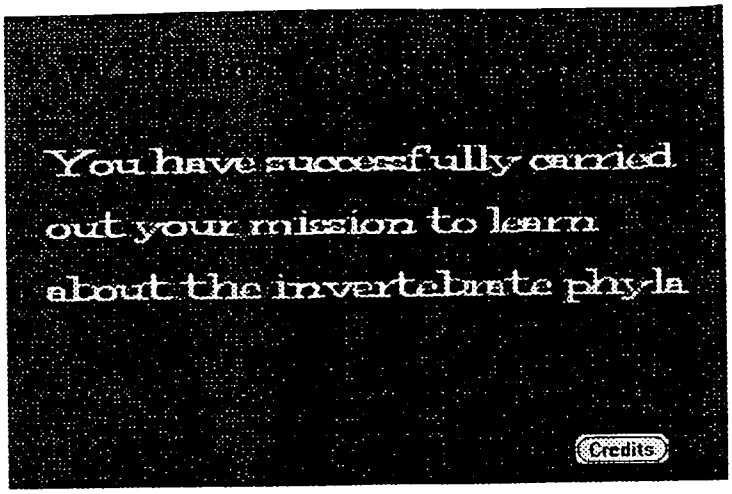
A. Parasitic

B. Have 2 openings, one on each end of body

C. Have several hearts throughout body

D. Have digestive organs





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for use of their amazing graphics!

Addison-Wesley. Destinations in Science. Menlo Park, 1995.

Scott, Foresman. Discover Science. Glenview, Illinois, 1989.

for use of graphics and information

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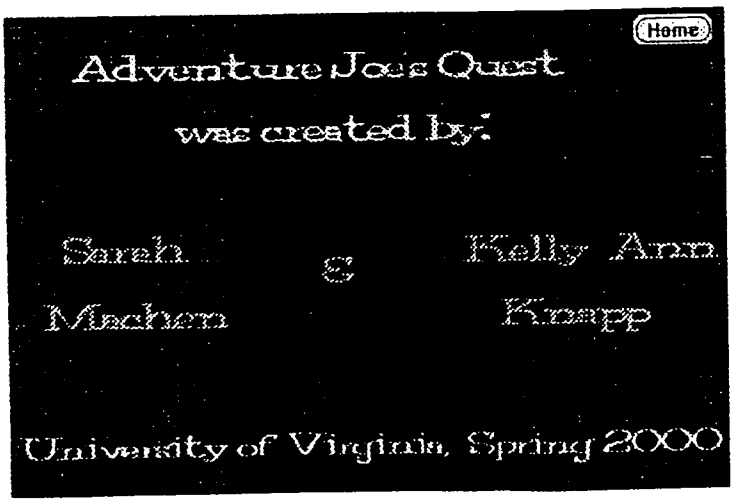

Attachment C:

Survey

Technology Evaluation:
Adventure Joe

	Agree	Not Sure	Disagree
1. I feel that Adventure Joe was a useful tool for reviewing invertebrates.	1	2	3
2. Technology helped to make this review exciting.	1	2	3
3. I would rather use *Adventure Joe* to review than worksheets or textbooks.	1	2	3
4. I would rather use this project individually or in small groups, instead of in a whole class setting.	1	2	3
5. I would use *Adventure Joe* to review on my own, even without my teacher's request.	1	2	3
6. I think that the quiz was challenging but fair.	1	2	3

7. After using *Adventure Joe*, please describe one fact that you will remember about invertebrates that you did not recall from your past lessons.

8. Please rate *Adventure Joe* on a scale of 1 to 10 (1 is the lowest score and 10 is the highest) based on:

- how easy it is to use
- the quality of the pictures
- how the information was shown
- its usefulness as a review tool
- how much you enjoyed it

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