



Curriculum Units by Fellows of the Yale-New Haven Teachers Institute
1996 Volume V: Genetics in the 21st Century: Destiny, Chance or Choice

I Wear My Genes Inside Out: The Genetic Characteristics of Animals

Curriculum Unit 96.05.04
by Francine C. Coss

Introduction

Each year, my Kindergarten class completes a extensive unit on animals. Beginning in late February with pets and continuing through May with wild life and water life, my Kindergartners study many different types of animals. Through the theme-based curriculum provided by *The Treasure Tree*¹ the children are exposed to four animal-centered themes: *Pet Show*, *2 On the Farm*, *3 Animals Animals*, *4 and Splish Splash*. *5 Each theme introduces specific types of animals, their habitats, eating habits and physical characteristics. Although these aspects are covered through the recommended curriculum resources, information is lacking in family history, procreation and bearing young. The unit, "I Wear my Genes Inside-Out: The Genetic Characteristics of Animals" will fill the void of information in these areas through its discussion of how genetic information can be revealed, recorded and engineered in animals. "I Wear my Genes Inside-Out," in conjunction with the recommended curriculum in The Treasure Tree , will expand the four animal-centered themes to include the genetic relationship between adult animals and their offspring, the probability of specific characteristics occurring in offspring through the parents' genetic history, and the effects genetic characteristics have on a living being when combined with environmental changes.*

Genetics: A Kindergarten Definition

Before entering into the realm of animal life, field trips and classroom pet projects, it is necessary to clarify the definition of genes and why the concept of genetics is being taught in a Kindergarten classroom.

Genetics is a multi-leveled, highly complicated aspect of science which, on the surface, would not and, according to some, should not be taught to Kindergartners. I choose to disagree. Genetic qualities are discussed in my Kindergarten classroom daily: "He's light skinned," "She's got green eyes," "Her hair is curly and brown," "My Mommy says I look like my Daddy." All these comments are genetically linked and need to be addressed, if not at a chemical level, then at a level ' *observable* ' to five and six year olds. Hair color, hair type, skin color, and even gender determination requires knowledge of genetics. The laws of genetics will not be stated here in length due to their complexities and sophistication, yet, the aspects of genetics that affect the outcome of the various projects and activities planned in this unit will be discussed.

A gene is defined as

. . . an element of the germ plasm that controls transmission of a hereditary character by specifying the structure of a particular protein or by controlling the function of other genetic material and that consists of a specific sequence of purine and pyrimidine bases usu. in DNA. ⁶

This definition is not appropriate for Kindergarten students. A modified definition, such as the one stated below can also be considered too difficult to digest.

. . . any one of many tiny parts joined together in the nucleus of a cell that control the characteristics that are inherited from parents. ⁷

Therefore, an extremely simple definition will be adopted for use in this animal unit.

Parents give their children genes that remember who or what their children should look like on the outside. ⁸

This very general definition permits understanding at the students' ability level. Kindergartners can better understand the concrete, tangible examples of genetics; this denotes the definition's specificity to the outer characteristics effected by genes. ⁹ The definition also provides a foundation for expansion if the students' comprehension of the concept of genes increases. This definition is presented and molded to fit the unit topic of discussion. It will be used continually as each new unit topic is introduced and analyzed. The definition of a gene, as stated above, although primitive, presents minimal information with optimal expansion as each unit topic is addressed. The following units illustrate the use of this primitive gene definition and its stated expansion.

Pet Show

The unit, Pet Show, is placed first in the order of teaching units due to the familiarity children have with cats and dogs. The first issue addressed in the Pet Show unit will be the sexual orientation of these pets. In my current classroom population of Kindergartners, and even in previous populations of some now first and second grade students, there is a tendency to associate dogs with being male and cats with being female. This confusion will be addressed through the juxtaposition of physical differences in human sex organs. The highlighted point in this juxtaposition will be in how a human male urinates, versus how a human female urinates; a familiar difference to most five and six year olds. The obvious body structure discrepancies will be linked to sexual identification. A parallel will be drawn from human sex organs to the sex organs of cats and dogs. A veterinarian, who will visit the class with cats and dogs, will continue the discussion of sexual identification through a hands-on identification activity. First, the students will be asked to identify the sex of each animal by simply looking at the creature's face and coat color. The students' determinations will be graphed for comparison to future predictions. Then the veterinarian will allow the students to alter their determinations by viewing the underside of each animal, thus viewing the animal's external sex organs. Altered results will also be graphed and placed side by side to the first set of results. The act of discerning sexual orientation by the size, color or type of animal will be refuted, opening the doors for accuracy in determining gender. The belief that all cats are female and that all dogs are male will be negated, providing the foundation for the commencement of the true Pet Show unit without further confusion or delay.

As an introductory segment of the Pet Show unit, several 'everyday' dog and cat songs, including the two listed below, are sung.

"How Much is that Doggy in the Window?"

How much is that doggy in the window? (bark-bark)
The one with the waggly tail.
How much is that doggy in the window? (bark-bark)
I do hope that doggy's for sale.
"Bought Me a Cat"
Bought me a cat, the cat pleased me.
Fed my cat under yonders tree.
Cat goes fiddle-i-fee, fiddle-i-fee.
Cat goes fiddle-i-fee, fiddle-i-fee.

These first songs of the unit are later used to emphasize other pet types and their characteristics as the following lyrics illustrate.

"How Much is that Ferret in the Window?" ¹⁰
How much is that ferret in the window? (sniff-sniff)
The one with the mousey face.
How much is that ferret in the window? (sniff-sniff)
He looks like a rat from space.

"Bought Me a Frog" ¹¹
Bought me a frog, the frog pleased me.
Fed my frog flies and bees.
Frog goes ribbity-hee, ribbity-hee.
Frog goes ribbity-hee, ribbity-hee.

Building upon the foundation of the children's experiences with pets and using the introduction of familiar pet characteristics via music and other methods, the information and concepts taught during the Pet Show theme enable the students to acquire an understanding of other common pets, such as fish, hamsters, and gerbils. This expansion of pet knowledge will also lead to the understanding of unfamiliar pets including ferrets, hermit crabs and iguanas. Notwithstanding the importance of the characteristics and habitats of the many different animals that can be deemed 'pets,' the Pet Show unit will also expand upon the basic concepts of genetic relationships between adult animals and their offspring using the most familiar pet: dogs.

Some of the many concepts of the Pet Show theme will first be taught through the comparison of pure-breed dogs. The characteristics of Dalmatians, Rottweilers and Collies will first be discussed since the students are familiar with those breeds. Photographs of each breed listed above will be displayed along with the specific characteristics of each breed. The students will determine the best breed for the purpose of protection and the purpose of friendship via a series of whole-class, webbing ¹² activities (See Illustration 1). Fiction and non-fiction books that contain examples of each breed-type will be read. The stereotyped characteristics will be used as a checklist for the class' determination of breed purpose. Actual Dalmatians, Rottweilers and Collies will be visited during a field trip to a local pet store. Other breeds present during the pet store field trip will also be compared in future lessons. Illustrations of the various breeds discovered during the pet store trip will be displayed in the classroom with name labels and characteristic lists. Body part templates, coat/hair illustrations and eye-color samples will also be displayed with breed characteristics webbed and listed for each illustration (See Sample Lesson Plans: Preparation).

(figure available in print form)

The concept of mixed-breed dogs will follow and a duplicate set of body part templates will be utilized in child-created, mixed-breed canines. All original breeds will be named and labeled with their appropriate characteristics and displayed with the pure-breed examples. Video footage ¹³ and photographs ¹⁴ of both the true-breed dogs and the inventive-breed dogs will be placed into a stack using *HyperStudio* ¹⁵. Each card in the stack will represent a breed of dog, provide a motion or still image of the animal and supply details of the breed's characteristics. The 'Breed Stack' will be copied onto each of the four classroom computers as well as any library computers (if compatible) for student reference via the use of a Zip disk and Iomega Zip drive. ¹⁶

A third and final set of canine body parts will be placed at a classroom center (See Sample Lesson Plans: Lesson One). The 'Kindergarten B Genetics Center' ¹⁷ will then develop, continuing the whole-class activity of inventive-breeding. Illustrations of class-invented and teacher-invented canines will become part of the Genetic Challenge Game where a Genetic Center visitor must copy the illustrated breed found in the 'Breed Book' using the provided set of canine body parts. Visual discrimination and characteristic identification will be reviewed through this exercise. The constant opportunity to copy existing inventive-breeds as well as the availability to create new inventive-breeds will facilitate genetic understanding in future Pet Show activities and future animal units.

Continued expansion of the Kindergarten B Genetic Center will include feline illustrations and manipulation of feline-type differences for the purpose of creating an inventive-breed of cat. Calico, Siamese and Angora cats will become the focus of study since most of the students are not generally familiar with such various types of felines. Cat templates will be added to the Genetic Center for a continuation of the Genetic Challenge Game. The possibility of breeding a cat-dog mix will be discussed in terms of reality and fantasy. Cat-dogs, albeit an impossibility, will be genetically created and a non-fiction book, to be entitled, "If Cats Were Dogs and Dogs Were Cats," will be written by the students with facts and illustrations for the fictitious cat-dog creature. A

second HyperStudio™ ‘Breed Stack’ will be created and linked to the original stack using a video camera, a QuickTake camera, and a color scanner.

As a postscript to the discussion of dogs and cats, the Pet Show unit will expand to include the introduction and discussion of the other types of house pets, especially those least familiar to the students: iguanas, boa constrictors, ball pythons, hermit crabs, parrots, chinchillas, ferrets, etc. ¹⁸ Characteristic lists and habitat charts will be developed and displayed. To further the children’s comprehension of the exhibited pet characteristics and habitats, fish, newts, ants and a rabbit will be introduced as class pets. Each week, a new class pet will be introduced to the students. The eating habits, the space requirements and the general characteristics of each pet’s habitat will be compared and charted. A list of habitat characteristics such as, “lives in water,” “sleeps on wood chips,” etc. will be composed for each pet.

A class pet show will be the culminating activity for the Pet Show unit, requiring the students with pets to state the pet’s name, type, diet, environment and age. Pets will then be judged in various categories ¹⁹ by those members of the class not having pets. All judges, in turn, are required to provide a fact about each pet selected for a prize. Each pet entered in the class pet show will receive a prize, preserving the true purpose of the pet show activity: to discuss pet types (not to compete for prizes). True determination of concept comprehension will take place when the pet owners and the judges describe each pet in the terms stated above. To add closure to the Pet Show unit, a parade of all class pet show participants will occur in or around the school building, with student-made ribbons being placed on each pet. Each student will then receive a videotaped copy ²⁰ of the HyperStudio™ ‘Breed Stacks’ created during the unit for home viewing without the use of a computer.

On the Farm

In the unit, On the Farm, which follows Pet Show, the students will begin the comparison of mammals and birds. Cows, horses, chickens, turkeys, ducks and quail will be the main creatures of discussion. The qualifications of being a mammal will be stated simply as a creature with a hard backbone and hair or fur, which drinks milk from its mother after birth and is warm-blooded. Parallels between animals defined as mammals and humans will be stressed. Milk production will be discussed and Three-Dimensional Cows ²¹ (See Description 1), with ‘milk-able’ teats and water-filled udders will be created by small groups of students. A series of field trips to area farms ²² will also enhance the discussion of mammals. Cows, horses and other farm mammals will be studied in a similar fashion to that found in the Pet Show unit. Similarities will be drawn between a cow’s teats and the nipple of a baby bottle.

Milking, having taken place in the classroom via a rubber glove and the three dimensional cows, will also take place during the field trip to the farm. Heavy cream will then be purchased at the farm to be churned into butter ²³ (See Description 2) in the classroom as a method of distinguishing farm animals from pets: farm animals are kept for the purpose of providing food, drink, or help to the farmer, pets are kept for companionship or protection. This discussion of purpose will lend to the introduction of domesticated fowl and eggs.

Description 1: Three-Dimensional Cows

Materials

1 latex examination glove white glue
1 white paper plate 1 straight pin
1 empty, cardboard box of average height, width and depth 7-10 sheets of 11x17" brown, black, or white paper
-OR-
brown, black or white tempera paint and paint brushes
5 paper towel tubes (4 full length, 1 cut in half)
brown, black or white yarn, braided to desired thickness
crayons, colored pencils, markers, etc.
1 jar (preferably a plastic peanut butter-sized jar)

scissor -OR- single-edged razor

Glue colored paper to all sides of the box (or paint with tempera).
Glue four paper towel tubes to the bottom side of the box to use as legs. Glue both pieces of the cut paper towel tube to the front side of the box. Decorate a white paper plate to resemble a cow's face.
Glue the plate to the cut tubes attached to the front of the box.
Glue a braided length of yarn to the rear side of the box.
Trace the mouth of the jar onto the bottom center of the box.
Cut the bottom of the box inside of the traced line.
Fill the jar with water until more than half full.
Prick a hole into each finger of a latex glove using a straight pin. Stretch the wrist of the pricked latex glove over the mouth of the jar. Place the jar into the hole at the bottom of the box.
Turn the box over so it stands on the paper towel tube 'legs'.
Gently pull and squeeze one of the fingers on the glove to milk the cow.

Eggs from chickens, turkeys, ducks, and quail will be illustrated, displayed and described following the discussion of mammals. The differences between mammal birth and bird hatching will be listed on chart paper for reference and comparison. A dozen or more chicken, turkey, duck and quail eggs will be placed in a classroom incubator for hatching. The characteristics of each of the four birds will be placed on charts or in webs and exhibited in the classroom. Through the use of illustrations, facts on egg size and length of incubation time, the students will be able to determine which bird will hatch from each egg in the incubator. Observations will be recorded daily during the incubation process by individual students and also by the whole class, forming a foundation for the egg-to-bird linking process. Once the birds are hatched, several days of post-incubation observations will be taken before environmental factors deem the classroom a poor environment for healthy future growth for the birds. The students, with assistance from the teacher, will conclude from past knowledge and from first-hand experience that the newly hatched birds should be returned to a more appropriate environment. A field trip to the birds' new home will be planned allowing the students to observe the differences in the birds once they are full grown. Differences between mammals and birds will become more pronounced with the discovery of the yolk sack and its purpose for the hatchling.

Description 2: Churning Butter from Heavy Cream

If you are lucky enough to acquire or borrow an antique/replica butter churn:

1. Pour 2 quarts of heavy cream into the churn.
2. Allow the students to take turns moving the churn stick up and down in a regular motion.

If you are unable to use an authentic butter churn:

1. Fill baby food jars or any small, sealed container one-half to two-thirds full with heavy cream.
2. Allow the students to take turns shaking the jars/containers until the heavy cream solidifies to butter.

The first clue that the heavy cream is becoming butter is the thickness of the cream and how it coats the churn/jar. Continued churning will convert the thick cream into two separate elements: butter and buttermilk. The churned butter is almost white in color. The buttermilk looks like a white water. Rinse the butter with water and spread onto bread. Encourage the students to drink the buttermilk!

Either process will yield butter in approximately 30 minutes or less.

To accelerate the process, allow the heavy cream to reach room temperature before churning.

Note: The butter you will churn will not taste like the salted butter purchased in a grocery store. The churned butter will be sweet.

Important: Churned butter has a very short shelf-life. It is recommended that churned butter be consumed

immediately and not saved for later consumption.

The culminating activity for the unit, *On the Farm*, will be a multi-media presentation of the incubation process. Through the use of a QuickCam[™],²⁴ an Apple[™] QuickTake 150 camera and a video camera, the incubation observations and the hatching process for each egg will be videotaped and photographed. The video/photos will be used for a HyperStudio[™] project. A detailed file for each egg will house audio, video, and photo observations sequenced through the use of Avid VideoShop[™].²⁵ The students will have the ability to run the video clips from incubation to hatching for presentation to other classes, supplying even the older students with an introduction to genetics.

Animals Animals

Animals Animals, the third unit of study, will further the children's comprehension of genetic concepts through the breeding of mice. The probability of specific characteristics occurring in offspring through the parents' genetic history will be made clear through the breeding of a black-haired mouse and a white-haired mouse. A genetic history of hair color will be provided by the mouse supplier and the probability of hair color type occurring in the offspring will be determined through simple probability lessons and discussions. A series of lessons using double-sided counters²⁶ will be implemented. One double-sided counter (red/yellow) will be flipped 10, 20, 50, and 100 times during several whole-group math lessons. The results of each lesson will be recorded in a bar graph to discriminate the number of times the counter landed on the yellow side or on the red side. The results will be translated into probabilities of flipping each color. Further lessons will use two double-sided counters, recording the results of each "flipping" as red/red, yellow/yellow, red/yellow, and yellow/red. The appropriate charts will display the final results of the two counter activity and the probability of each result will be calculated. The complexities that surround the concept of probability will not exist since the method of explanation is founded in the ability level of the students. The genetic concepts for determining the hair color of the offspring will be paralleled to the counter-flipping results. The appropriate definitions of dominant and recessive genes will also be introduced, once the concept of probability has been mastered.

The many genetic issues addressed during the mouse breeding experiment will be expanded upon through the inclusion of environmental effects. Two of the offspring from the mouse breeding experiment will be removed from their existing environment and placed in two differing environments. One environment will be similar to that from which they were removed, ie. an appropriate environment, and the other will not be appropriate to the needs of the mouse. Diet requirements and preferences will also be compared along with lifestyle or pursuit of exercise by each pet. Reflections from the Pet Show unit regarding the matching of a specific dog-breed type to a specific environment will enhance the comprehension of the mouse experiment.

Offspring 1, Merry, will be kept in an environment that allows for exercise and supplies the mouse with the proper nutrition via a healthy diet. Offspring 2, Terry, following Merry's placement, will be kept in an environment that lacks the exercise and nutrition necessary for a healthy mouse. Regular observations will be made by individual students, and the class as a whole, which will include the subjective definition of energy level for each mouse and the objective measurement of growth from head to end of tail. Environmental effects on the two mice will become obvious to the students as one mouse grows stronger and the other grows weaker. After a strong difference in growth is detected by the students, Terry, the weaker mouse will be provided with the appropriate environment to illustrate the ability to change poor health habits. A parallel to the students' personal exercise and eating habits will be drawn and the physical education teacher will be tapped for information regarding appropriate exercise and correct diet. Illustrations of Merry and Terry's habits, including growth charts, food lists and overall energy graphs will be displayed next to parallel

illustrations of children having similar habits. The publication ²⁷ of a moral-based, class-made book relating the health habits of Merry and Terry to the health habits of humans will complete the discussion of environment and eating habits in the Animals Animals unit.

The final expansion of the Animals Animals unit will be a *HyperStudio*™ project combining *QuickTake*™ photographs and videotaped or scanned images of Merry and Terry, their growth charts, food lists and energy graphs with audio and video clips of students reading and interpreting the information. This 'Merry and Terry Information' stack will then be linked to the *HyperStudio*™ version of the class-made book about the two mice, read by a parent volunteer. A videotaped copy of the 'Merry and Terry' stack linked to the 'Class-made Book' stack will be given to each student for home viewing without the use of a computer.

Splish Splash

The fourth and final unit, Splish Splash, will concentrate on water creatures. Genetic differences will be highlighted in this unit, since many children believe that all fish eat the same food and live in the same environment. The fish and newts introduced to the class as pets during the Pet Show unit will be the first creatures of study. A comparison of environment as well as a comparison of diet between the fish and the newts will be reviewed and discussed.

Tadpoles will be introduced into the classroom collection for growth observation and comparison to bird and mammal offspring. The use of the Frog Life Cycle ²⁸ illustrating the stages of life for a frog will aid the students in determining which stage of life the tadpole/frog has achieved. Once the tadpoles have reached maturity, a proper environment will be found outside of the classroom. Placement into the new environment will occur following a class-planned, farewell party for the frogs.

Records of the classroom tadpoles' growth will be compiled and placed into a *HyperStudio*™ stack through the use of an Apple™ *QuickTake 150* camera, a color *QuickCam* and a video camera. The cards in the stack will represent the records kept by each small observation group. This 'Frog Life' stack will be copied onto each of the Macintosh 5200/75LC computers in the classroom via an Iomega Zip disk and Zip drive for class viewing. Videotaped copies will also be made for each child to view at home.

As a continuation of the Splish Splash unit, a trip to the Whitney Water Center ²⁹ will take place, providing instruction to the students on how to catch, keep and observe fresh water creatures. A field trip to Schooner Incorporated ³⁰ will allow the students to touch saltwater creatures from the deep of the Sound. The methods learned during the Whitney Water Center trip and the Schooner trip will be utilized during future trips to a pond, the ocean and a river/stream. Field trips to Edgewood Park, ³¹ Todd's Pond, ³² the Southern Connecticut State University Wetlands, ³³ and the West Haven ³⁴ and New Haven ³⁵ shorelines will supply further hands-on knowledge of both fresh and saltwater life. Water life samples (living and dead) will be retrieved during each trip and placed in appropriate containers for classroom observation.

Fish having unique characteristics, like Piranha and certain types of Shark will be observed through film, video and a trip to the Norwalk Maritime Center. ³⁶ Many examples of underwater life will be viewed with diet and environment highlighted. Sea life available in the touch tanks during the trip will be compared to all previous water life collected, viewed and touched during the Splish Splash unit.

Concluding the unit, Splish Splash, *HyperStudio*™ will be utilized once more. Each student will attempt to create an original card containing audio and video facts and information reinforcing the topics studied during

the Splish Splash unit. A class-made reference book on fresh water and saltwater life will be published and scanned into a linked *HyperStudio*™ stack. A videotaped copy of the ‘Splish Splash’ stack and a hardcopy of the class-made book will be available to other students, classes and teachers in the school building who may not have access to *HyperStudio*™-compatible computers for stack viewing.

Culmination

The final project of this four month extended animal unit will be the physical creation of a genetically original creature. This creature, a Genome *asaurus* (See Description 3), will be the determinant for unit assessment. References to student-made charts, graphs and illustrations, as well as computerized, class-made programs, will supply the background necessary for listing the characteristics of the Genome *asaurus*. Poems, drama and creative movement will be incorporated in the unveiling of the class-made, wire and paper mache Genome *asaurus*.

Description 3: Genome asaurus

Materials

drawings and written descriptions of creature

tempera paints in various colors

newspapers, torn in 1-2" wide strips

chicken wire paintbrushes

metal paste -OR- wallpaper paste

Bend chicken wire to resemble the shape of the Genomeasaurus.

Dampen strips of newspaper with metal paste and apply strips to chicken wire skeleton.

Continue applying dampened strips until it resembles the Genomeasaurus.

Allow Genomeasaurus to dry completely and paint according to class description.

Allow Genomeasaurus to dry and display with description of creature.

Conclusion

The opportunities to introduce five and six year old children to the concepts

of genetics are few and far between. The unit, “I Wear my Genes Inside-Out: The Genetic Characteristics of Animals” will thoroughly fill the void of information through its discussion of how genetic information can be revealed, recorded and engineered in animals. “I Wear my Genes Inside-Out,” in conjunction with the

recommended curriculum in *The Treasure Tree* , will expand the four animal-centered themes to include the genetic relationship between adult animals and their offspring, the probability of specific characteristics occurring in offspring through the parents' genetic history, and the effects genetic characteristics have on a living being when combined with environmental changes. In turn, the seminar, "Genetics in the 21st Century," will provide the concept foundation, and will act as a catalyst for future expansion of this and similar units on animals.

Sample Lesson Plans

Pet Show: Kindergarten B Genetics Center

Materials

Color photographs of various dog breeds.
Computer Color Scanner Color Printer
Scanning Software scissors oak tag/cardboard
hot/cold laminating film laminating machine
hook and loop squares with adhesive backing
copies of Mixed Breed Characteristic Worksheet marker

Preparation

Using a scanner, scan the photographs and save each image separately.
Name each image for the name of the breed.
Create a series of image files for each breed by cropping the scanned image to show the following (See Examples of Breed Images):
legs only head/neck only
body only tail only
Name each cropped image for the breed it represents as well as the body part it has been cropped to illustrate, ie. Legs = Collie.
Print multiple, color copies of all scanned and cropped images.
Laminate the printed images to oak tag/cardboard.
Cut out each image, labeling* the image's breed and body part on the back of each print.
Attach hook and loop squares to the back of all body parts.
Attach opposing hook and loop squares to the front of the dog's body.
Place all body parts in envelopes and attach a full body image to the outside of the envelope with

the breed's name.

(figure available in print form)

Pet Show: Kindergarten B Genetics Center

Lesson One

Objective To create mixed breed dogs using paper illustrations of various breeds.

Materials An area to set up the Genetics Center.

All the teacher created materials found in the Preparation section above.

In One or More Lessons Clear a center area in the classroom.

Invite the students to sit near the cleared center area.

Tell the students that you will be creating a new center for the theme Pet Show.

Review the concepts and topics of the Pet Show theme and encourage the discussion of dog breeds and the purpose of genes.

Reveal the name of the center and ask the students what they might do in the center.

Reveal the animal envelopes and the contents of one or two of the envelopes and re-ask the students what they might do in the center.

Discuss the rules of the center and allow the students to watch you use the center for its purpose of creating new dog breeds.

Allow the students to use the center for several days to become familiar with the process.

***Note: Poor labeling will only result in student frustration!**

Naming each image is extremely important to the success of Lesson 2. The information you write on the back of each image will be copied by the students.

Please use the lines from the Mixed Breed Characteristics Sheet (Lesson 2) as label templates, writing the information on the line provided. The students will find the task of completing the sheet easier than if you label the images free-hand.

Also, attempt to find images in similar positions, ie. all standing, all sitting. Attempting to attach the legs of a sitting dog to the body of a standing dog will only confuse the students.

Pet Show: Kindergarten B Genetics Center

Lesson Two

Objective To label dogs created by students using the Genetics Center.

In One or More Lessons Invite the students to sit near the ‘Kindergarten B Genetics More Lessons:Center.’

Restate the rules and guidelines discussed in Lesson One.

Create a new dog breed using the body parts from the center and tell the students that they will now have to name their new mixed-breed dog and list the dog’s characteristics.

Show the students the Mixed-Breed Characteristic Sheet that will be completed after each new breed is created

(See Worksheet 1).

Tell the students that their creations will be placed in a Breed Book for future reference (See Pet Show section).

Read the directions for the Mixed Breed Characteristic Sheet.

As a class, complete a sheet for the new animal breed created earlier in the lesson.

Review the answers on the sheet and check the answers to the actual breed illustration.

Create a second mixed breed dog and provide a copy of the Mixed-Breed Characteristic Sheet for each student.

Allow the students to complete the sheet independently.

*Observe the results and restate Lesson Two if necessary at a later date.

*Note:If Lesson Two is too difficult for the students, encourage the students to draw a picture of the mixed breed dog for placement into the Breed Book.

Not all Kindergarten students will possess the ability/understanding necessary to find success in

Lesson Two. Please consider stretching Lesson Two over several days, or altering Lesson Two to match the abilities of your students.

(figure available in print form)

Notes

1. Harcourt Brace Jovanovich (HBJ) Volumes 1 and 2, 1993.
2. HBJ, Volume 1, Unit 6, page T317-T380.
3. HBJ, Volume 2, Unit 11, page T255-T318.
4. HBJ, Volume 2, Unit 7, page T1-T64.
5. HBJ, Volume 2, Unit 12, page T319-T382.
6. Webster's New Collegiate Dictionary, page 473.
7. Thorndike-Barnhart Children's Dictionary, page 253.
8. Francine C. Coss.
9. The complexities of genes have been simplified through the narrowed discussion of outer characteristics which are more easily modeled through the four sub-units.
10. Lyrics written by Francine C. Coss.
11. Lyrics written by Francine C. Coss.
12. Webbing can be considered an 'organized brainstorming of information' that can be referred to and elaborated upon at a future date.
13. Video footage will be recorded using a VHS video camera with a Macintosh 5200/75LC computer having audio-in and video-in cards. These cards are not standard to this model and must be added. The cards may be purchased through Unicom/MicroAge Computer Centers (279 Elmwood Avenue, Providence, RI 02907, 800-777-2749 Voice/401-467-5607 Fax) and are included in the package labeled B2493LL/B:Apple™ Video Solution Bundle. List price:\$309.00
14. Photographs will be taken with an Apple™ QuickTake 150 camera using the serial port of a Macintosh 5200/75L computer. This digital still camera may be purchased through MacWarehouse

- (1720 Oak Street, P.O. Box 3013, Lakewood, NJ, 08701-9917, 203-851-7200 Voice/203-855-1386 Fax) in the package labeled INP 0499:Apple™ QuickTake 150. List price: \$629.00
15. Roger Wagner Publishing, Incorporated, *HyperStudio*™ 3.0, 1995, using on a Macintosh 5200/75LC computer and/or an Iomega Zip Drive. This program may be purchased through Educational Resources (1550 Executive Drive, P.O. Box 1900, Elgin, IL, 60121-1900, 800-624-2926 Voice/847-888-8499 Fax) and is labeled 55470E. List price: \$112.95
 16. The Iomega Zip disk and Zip Drive provides 100MB of mobile storage, while a regular floppy disk stores only 1.4MB. *HyperStudio*™ stacks containing several minutes of audio/video would not fit on a regular floppy disk. Therefore, any *HyperStudio*™ stack larger than 1.4MB would be limited in use to the computer on which the stack was created. The Iomega Zip disk holds 100MB and can be used to copy the stack onto another computer's hard drive via a SCSI connection to an Iomega Zip Drive. Iomega Zip disks and an Iomega Zip Drive with SCSI cable connector can be purchased through MacWarehouse (1720 Oak Street, P.O. Box 3013, Lakewood, NJ 08701-9917 Voice/203-855-1386 Fax) in the package labeled BND 1430 Zip Drive Mega Kit. List price:\$299.95
 17. Original concept by Francine C. Coss.
 18. These atypical house pets actually were pets of former students, hence allowing for former students to visit my current students with an example of each pet.
 19. Pet show award category examples can be found in the book, *Pet Show!* by Ezra Jack Keats.
 20. To videotape a *HyperStudio*™ project from a Macintosh 5200/75LC, audio-out and video-out cards must be added, and audio-in and video-in ports must be present in the rear panel of the recording VCR (standard on modern Video Cassette Recorders). Audio-out and video-out cards may be purchased through Unicom/MicroAge Computer Centers (279 Elmwood Avenue, Providence, RI 02907, 800-777-2749 Voice/401-467-5607 Fax) in the package labeled B2493LL/B: Apple™ Video Solution Bundle. List price: \$309.00
 21. Original concept by Francine C. Coss.
 22. Field View Farm, Derby, CT, 203-795-3355. (Fee)
 23. Recipe and method from the New Haven Colony Historical Society, New Haven, CT, 203-562-4183.
 24. The Connectix Color QuickCam™, 1996, is a digital video camera that connects to the Macintosh 5200/75LC via a serial port. Although the quality of video is not as high as that from a video camera connected through audio-in and video-in ports, it is easy for a child to use. The Color QuickCam™ can be purchased through MacWarehouse (1720 Oak Street, P.O. Box 3013, Lakewood, NJ, 08701-9917, 203-851-7200 Voice/203-855-1386 Fax) in the package labeled INP 0676:Color QuickCam with FREE Quick Cards Lite. List price: \$199.95 (The Grayscale QuickCam package is labeled as INP0397. List price:\$99.95)
 25. Avid VideoShop™ is an audio/video editing tool which allows for multiple sections of audio and video to be sequenced and played in the order selected. Avid VideoShop™ may be purchased through Unicom/MicroAge Computer Centers (279 Elmwood Avenue, Providence, RI02907, 800-7772749 Voice/401-467-5607 Fax) in the package labeled B2493LL/B: Apple™ Video Solution Bundle. List price: \$309.00
 26. Original concept by David Howell.
 27. The students will author, illustrate and bind a book for use in the classroom and/or school library.
 28. Frog Life Cycle.sea is shareware downloaded from the internet. Visit <http://www.shareware.com> to download a copy.
 29. Whitney Water Center, Hamden, CY, 203-777-1142. (No Fee for NHPS)

30. Schooner Incorporated, New Haven, Ct, 203-865-1737. (Fee)
31. Edgewood Park, Corner of Edgewood and Yale Avenues, New Haven, CT.
32. Todd's Pond, Maple Avenue, North Haven, CT (known for duck population).
33. Southern Connecticut State University Wetlands, Crescent Street, New Haven, CT.
34. West Haven Public Beach, Ocean Avenue, West Haven, CT. (No Fee)
35. Lighthouse Park and Touch Tnk, Lighthouse Road, New Haven, CT. (No Fee)
36. Norwalk Maritime Center, Norwalk, CT, 203-852-0700 x206. (Fee)

Annotated Bibliography

Teacher Resources

Back, Christine. *Chicken and Egg* . Morristown, NJ: S. Burdett Company, 1986. 24p

Photographs, drawings, and text follow the development of a chick embryo from the fertilization and laying of the egg to the time the chick hatches. J598.61/B

Farr, Roger C. and Dorothy S. Strickland. *The Treasure Tree* . Volume 1. New York: Harcourt Brace Jovanovich, 1993. 380p

A kindergarten level, Language Arts curriculum book containing six integrated themes: Mostly Me!, Off to School, Family Time, What's for Lunch?, Best Friends, and Pet Show. [Currently used by Kindergarten teachers in New Haven Public Schools].

Farr, Roger C. and Dorothy S. Strickland. *The Treasure Tree* . Volume 2. New York: Harcourt Brace Jovanovich, 1993. 382p

A kindergarten level, Language Arts curriculum book containing six integrated themes: Animals Animals, Rain or Shine, Going Places, Nighttime,

On the Farm, and Splish Splash. [Currently used by Kindergarten teachers in New Haven Public Schools].

Gutnik, Martin J. *Genetics*. New York: F. Watts, 1985. 118p

A collection of science projects which demonstrate concepts and aspects of cell theory, cellular reproduction, and modern genetic theory. J575.1/G

Johnson, Sylvia. *Inside an Egg* . Minneapolis: Lerner Publications Co., 1982. 48p

Text and photographs trace the development of a chicken egg from the time it is laid until the chicken is born. J598.6/J

Paysan, Klaus. *Domestic Pets* . Minneapolis: Lerner Publications Company, 1972. 106p

Text and photographs introduce various species of dogs, cats, birds, fish, and other animals and the care they need as pets. 636/P

Pringle, Laurence P., comp. *Discovering Nature Indoors: A Nature and Science Guide to Investigations with Small Animals* . Garden City, NJ: The Natural History Press, 1970. 128p

Suggests scientific investigations which can be conducted in the home/school on guppy, goldfish, watersnail, housefly, cockroach, mouse, and other small animals. J591.08

Shuttlesworth, Dorothy Edwards. *Gerbils and Other Small Pets* . New York: E. P. Dutton, 1970. 130p

General instructions for raising a gerbil and other pet rodents such as hamsters, squirrels, mice, rats, guinea

pigs, and rabbits. J636/Sh

The Pet House Book: How to Build Housing, Accessories, and Playthings for Your Dogs, Cats, Birds, Lizards, Hamsters and Other Pets . New York: Butterick Publications, 1977. 200p

A very good resource for class projects and parent/child projects during the study of pets. Best hands-on reinforcement following discussions of habitat! 690.89/Liip

Annotated Bibliography

Children's Resources

Arnold, Caroline. *Pets Without Homes* . New York: Clarion Books, 1983. 46p

Text and photos present an animal shelter which cares for lost pets and also offers other pet health and safety services. A must book to read before a class trip to a local animal shelter. J636.083/Ar

Baker, Keith. *Who is the Beast?* . New York: Harcourt Brace Jovanovich, 1993.

Provides hidden illustrations of wild animals that encourage the children to guess where the animal(s) is located on the page and also provides text that involves the children in a discussion of which animal(s) are being illustrated.

Bare, Colleen Stanley. *Guinea Pigs Don't Read Books* . New York: Dodd, Mead, 1985. 28p

Points out that though guinea pigs don't read books or play checkers, they make good friends and are gentle and lovable. J636.93B

Brett, Jan. *The Mitten* . New York: Putnam, 1989.

Uses a child's lost mitten as a home for many different animals. Lends to a discussion of habitat.

Cole, Joanna. *A Chick Hatches* . New York: Morrow, 1976. 46p

Photographic presentation of what happens inside the chicken egg during its twenty-one day incubation period. J598.6/C

Heller, Ruth. *Chickens Aren't the Only Ones* . New York: Grosset and Dunlap, 1981. 44p

A pictorial introduction to the animals that lay eggs, including chickens, as well as other birds, reptiles, amphibians, fishes, insects, and even a few mammals! J591.3/Hel

Keats, Ezra Jack. *Pet Show!* . New York: Harcourt Brace Jovanovich, 1973.

A story of a neighborhood coming together for a pet show. Encourages the children to share their personal pets and hold a classroom pet show.

Martin, Bill Jr. *Brown Bear, Brown Bear, What Do You See?* . New York: Holt, Rinehart, and Winston, 1983. 27p

A repetitive story that names and illustrates several different animals. Can be easily used as a template for a class-made book of a similar purpose.

Martin, Bill Jr. *Polar Bear, Polar Bear, What Do You Hear?* New York: H. Holt, 1991. 25p

A repetitive story that names, illustrates and provides the sounds made by several different animals. Can also be used as a template for a class-made book of a similar purpose.

McDonald, Megan. *Is This a House for Hermit Crab?* . New York: Harcourt Brace Jovanovich, 1993.

Uses photograph-quality illustrations of many different "homes" for the hermit crab. Lends to a discussion of habitat/house/protection.

O'Donnell, Elizabeth Lee. *I Can't Get My Turtle to Move* . New York: Harcourt Brace Jovanovich, 1993.

A repeating/counting book that introduces the children to many types of creatures. A good book to introduce the study of animals.

Parker, Nancy Winslow. *When the Rooster Crowed* . New York: Harcourt Brace Jovanovich, 1993.

Illustrates the sounds made by many farm animals and briefly describes the many responsibilities of being a farmer.

Annotated Bibliography

Classroom Resources

Apple " Video Solution Bundle . Providence, RI: Unicom/MicroAge Computer Centers. Cost: \$309.00

Contains the following items:

Apple " Presentation System :

Video converter box cables power adapter

screen squeeze software.

Allows users to connect their Macintosh to a large television for presentations or to a VCR to record presentations on videotape.

Apple "V ideo/TV System :

Apple video-in card TV tuner remote control

Apple Video Player software Avid"VideoShop

Allows users to easily attach a video source to their Macintosh (camcorder, VCR, laserdisc, etc) and capture a still image, which can be included in a document, or an entire video sequence, and saved as a QuickTime movie, and to watch/capture television programs.

Apple External Video Connector :

External video port DB-15 connection

Allows connection of external monitors or LCD panels, mirroring the computer's screen for presentations.

Apple QuickTake 150 . Lakewood, NJ: MacWarehouse. Cost: \$629.00

Allows users to take digital, color, still images which can be included in a computer document without the use of film.

HyperStudio . Roger Wagner Corporation. Elgin, IL: Educational Resources. Cost: \$112.95

Allows users to take audio, video, scanned and text images and place them into a multimedia/interactive program stack. Easy to learn/use.

Iomega Zip Drive Mega Kit . Lakewood, NJ: MacWarehouse. Cost: \$299.95

Contains the following items:

Iomega Zip Drive Deluxe Carrying Case

11 *Iomega Zip disks* Connector cable 2 Zip disk Caddies

Allows users to copy documents requiring more than 1.4MB of storage. Also allows users to copy large documents to other computers for use.

Connectix Color QuickCam . Lakewood, NJ: MacWarehouse. Cost: \$199.95

Contains the following items:

Color QuickCam QuickCards Lite Connector cable

Allows users to record digital video and still images directly into the computer via a serial port. Easier to use than a camcorder for a small child. Also available in Grayscale, or Black and White, for \$99.95

Frog Life Cycle.sea . <http://www.shareware.com> Cost: See registration information.

Allows users to view a card stack of a frog's life. Can be downloaded via the internet.

Farm Animals Close Up and Personal . Videocassette. 1988. 30 min.

A video of farm life for any age group. Children's Room

Lifeforms, Animals and Animal Oddities . Videotape. 1987. 30 min.

A video containing tidbits on various types of animals and creatures of interest to children. Children's Room

Make Way for Ducklings . Sound Filmstrip. By Robert McCloskey.

Weston Woods.

Provides an example of parent/offspring relationship with ducks. Discusses planning for arrival of eggs and selection of habitat for hatched ducklings.

Milgrom, Harry. *Egg-Ventures* . New York: Dutton, 1974. 31p

Instructions for simple experiments that reveal the characteristics of an egg. J641.37/M

Bought Me a Cat . HBJ Recording, 1993.

A song which names various animals in its lyrics and which also lends to creative, class-made lyrics about other creatures.

How Much is that Doggy in the Window?

An old song that lends itself to new, child-composed lyrics that describe pets.

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