

## Betsy Dresser

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**Betsy Dresser  
Physiologist**



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## **Who is Dr. Betsy Dresser?**

Betsy Dresser has dedicated her life to the preservation of endangered species through her study of controlled animal reproduction. Dr. Dresser's determination and innovation have allowed her to fulfill her dream of working in the field of wild animal reproduction.

## **What kind of obstacles did she face?**

Betsy had to overcome many hurdles to make her dream of working with animals come true. Betsy's mother died when she was 12 years old. Dr. Harold Dresser, her father, was a medical officer in the Navy. Because he traveled constantly, he was unable to care for Betsy and her younger brother, Mark. Betsy and Mark were sent to many foster homes before they finally went to live with their grandparents, Gertrude and Clarence Kruse, in Cincinnati, Ohio. At a young age, Betsy showed an interest in animals. While in high school, she worked at the Cincinnati Zoo and Botanical Garden as a teen zoo guide. She graduated from high school in 1968. Betsy's desire to receive additional education was of little importance to her grandparents. They felt Mark should attend college and Betsy should become a secretary. Betsy refused to give up her dream and began searching for a job involving animals. She applied for a job at Merrell Dow Pharmaceuticals as a research assistant, although she did not fulfill the requirements of having a college degree. She pleaded with the company for the job, and she received the position.



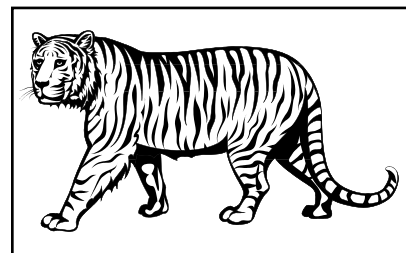
## **Betsy's pursuit of education**

Betsy Dresser left Merrell Dow Pharmaceuticals in 1971 to attend classes at the University of Cincinnati. After two years, she transferred to Ohio State University because of their program involving research in large animal reproduction. Betsy earned her bachelor's degree in zoology in 1975. She remained at Ohio State University to continue graduate studies and earned a master's degree in animal physiology. While at Ohio State University, her desire to work with exotic animals grew. Betsy was instrumental in the foundation of an interdisciplinary program at Ohio State University dealing with wild animal research. Many of the faculty members tried to dissuade her from entering the field of wild animal research. They warned her that there were too few jobs and too few grants in this area of research. Above all, she would find herself competing in a field dominated by men. Dr. Thomas Ludwick, one of Betsy's professors, encouraged her to continue in her work. His support and encouragement made Betsy even more determined to pursue her interests.

## **What is CREW and why is it important?**

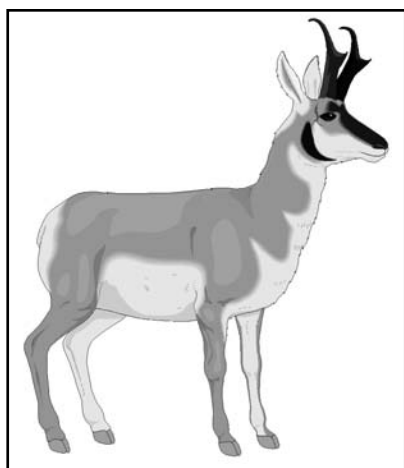
Dr. Dresser earned her doctorate in animal reproductive physiology in 1979. She found that her teachers were correct when they warned her that jobs were scarce in wild animal reproduction research. She proposed an animal research program at the Cincinnati Zoo, but was turned down due to lack of funding and because zoos did not usually do animal research. Still wanting to work in the field of animal reproduction, Dr. Dresser accepted a position at the University of Cincinnati's medical center where researchers worked with laboratory animals in order to learn more about human reproduction. In 1981 Dr. Dresser and several colleagues

convinced Carson Whiting, a businessman and former zoo board president, to fund a research department at the zoo. This project would combine the resources of the Cincinnati Zoo, the Kings Island Wild Animal Habitat, and the University of Cincinnati College of Medicine and Department of Biology. The project grew and became known as the Center for Reproduction of Endangered Wildlife (CREW). The purpose of CREW, located at the Cincinnati Zoo, is to combat the permanent loss of endangered wildlife. Dr. Dresser served as the program's research director until 1996. Then she became Senior Vice President of Research and Director of the Audubon Center for Research of Endangered Species and Freeport-McMoRan Audubon Species Survival Center in New Orleans, Louisiana.



### **High-tech babies**

Dr. Dresser spends her time in the lab developing animal newborns through high-tech techniques such as *in vitro fertilization*. During *in vitro fertilization*, egg and sperm are combined outside of the animal's body, usually in a sterile glass dish. Once the egg is fertilized, it is implanted in the uterus of the female, where it develops normally. In 1981 Dr. Dresser headed the first successful nonsurgical artificial insemination of a feline species that resulted in the birth of a Persian leopard cub. She also succeeded in *superovulation*, or the production of many eggs at one time, and the retrieval of embryos in the Bengal tiger. Dr. Dresser is responsible for creating a "frozen zoo," which contains the frozen germplasm (embryos) of about 500 animals representing 75 animal species.



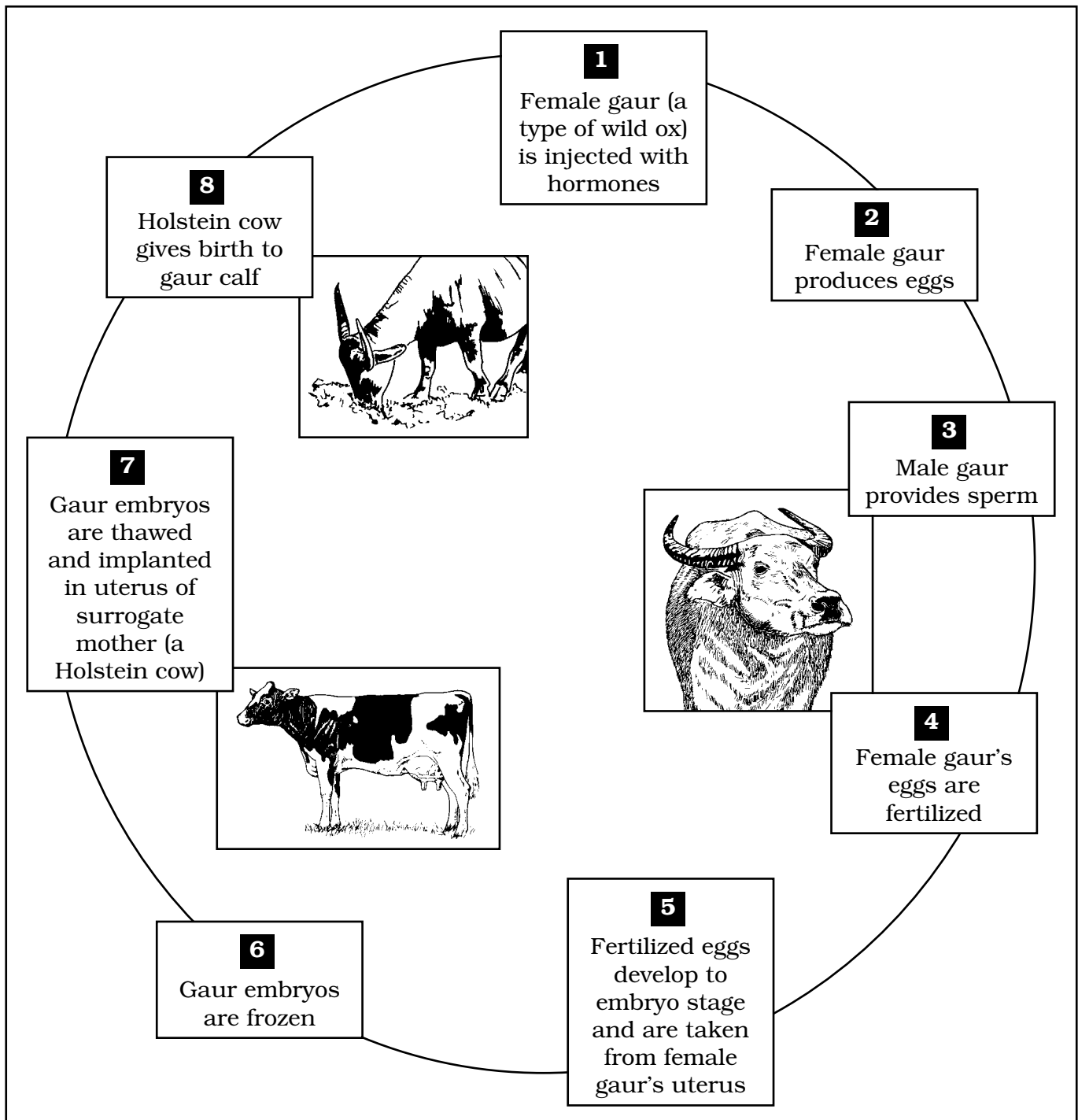
In 1984 Dr. Dresser performed the first transcontinental, interspecies *embryo transfer* after testing the technique first by doing a transfer within the same species. She took embryos from a rare African bongo antelope at the Los Angeles Zoo and transferred them to a surrogate mother — another species of antelope called an *eland* — at the Cincinnati Zoo. The surrogate eland gave birth to a bongo antelope. Since that time, Dr. Dresser has had many "firsts" in the area of wild animal reproduction including, the birth of a gaur calf (a type of wild ox) to a Holstein cow (see diagram on following page), the birth of an eland from the transfer of an embryo, and the birth of an Indian desert cat to a domestic house cat. More recently, the CREW program expanded to include research in plant cultivation. The program successfully produced the endangered trillium plant in 1986 through plant tissue cultures. Another project of Dr. Dresser's involved amphibian reproduction research.

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### **What are Dr. Dresser's goals concerning wild animals?**

Dr. Dresser's short-term goal is to ease the threat of extinction with the use of high-tech reproduction such as embryo transfers and *in vitro fertilization*. This kind of technology will prevent species from dying out. Dr. Dresser's ultimate goal is to boost endangered species populations so reproduction in a scientific lab is no longer needed.

## Embryo Transfer — A Diagram



## SUGGESTIONS FOR TEACHERS

### ACTIVITY #1: Saving the Black Rhino — A Debate

#### **Purpose**

To acquaint students with research techniques used to thwart the extinction of endangered species.

#### **Objectives**

- 1) To become familiar with efforts to restore the populations of some endangered species.
- 2) To prepare and debate positions on the distribution of funding toward conservation efforts or toward embryo transfer.

#### **Materials**

For each team of four students

- the Resource Sheets, “Embryo Transfer,” “Black Rhinos,” and “Conservation” on pages 32-34

#### **Before You Begin**

- 1) Divide students into teams of four. Hand out materials.
- 2) Discuss the information in the Resource Sheets prior to beginning the debate.
- 3) Have half of the teams argue for the Conservation Viewpoint. The other half will argue for the Embryo Transfer Viewpoint.
- 4) Take the class to the library so teams can conduct research in order to find information to support their viewpoint. Teams need to present at least one graph, chart, or illustration during the debate.
- 5) After conducting research, students should present their positions in a persuasive manner. Each member of the team should present an equal amount of information.
- 6) After each team has presented its viewpoint, the class should discuss the two viewpoints and reach a decision regarding the allocation of the money.
- 7) A final vote can be taken to determine how the class will vote regarding the funding.
- 8) Be sure to stress that there is no right answer to this situation. Students should also be aware that there is no one particu-

lar best effort to save the endangered species. Instead, this activity gives the students experience with making difficult decisions when limited resources (in this case, money) are available.

#### **Safety Considerations**

None.

#### **Questions to Ask**

- Why are so many plant and animal species becoming extinct? How can we prevent it?
- Suppose it is your job to reduce the number of animal species on the endangered list. How might you go about doing this?
- Predict what would happen to the Earth if most plant and animal species died out.
- Which animal extinction do you think would have the greatest impact on the planet — the harvester ant or the panda? Explain your reasoning.
- Should our government fund research on ways to prevent the extinction of species? Why? Why not?
- What do you think is the most challenging part of the embryo transfer technique?

#### **Ideas for Assessment**

- Use a checklist to evaluate understanding and participation during the debate.
- Have students prepare a letter to the editor advocating their position regarding the funding of reproductive technology versus conservation efforts.

#### **Where to Go From Here:**

- Read a current news article related to biotechnology.
- Create an advertisement for Dr. Betsy Dresser’s “Frozen Zoo.”
- Research other endangered species and create a priority list of animals that should be prime candidates for embryo transfer. Justify your selections.

#### **References and Resources**

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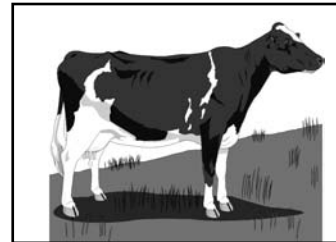
✓ *Photo credit:*

Photo on page 25 by Steve Feist. Courtesy of Cincinnati Zoo, Center for Reproduction of Endangered Wildlife, Cincinnati, OH.

## Resource Sheet #1 *Embryo Transfer*



Endangered species



Surrogate mother

- **What is embryo transfer?**

Frozen eggs, sperm, and developing embryos of endangered species promise to help in the battle against wildlife extinction. The frozen embryos are implanted into an animal that is not endangered — a surrogate mother — in order to replenish some of the earth's vanishing creatures.

- **How is embryo transfer accomplished?**

To perform an embryo transfer, Dr. Dresser first determines an animal's *estrus* (reproductive) cycle. Then she injects the female with hormones that enable the animal to produce up to 30 eggs. The animal then breeds naturally or is artificially inseminated. After the fertilized eggs drop into the uterus, they are harvested, or removed, by Dr. Dresser. The embryos are frozen. When a surrogate mother is located, one of the embryos is implanted into her uterus. The animal whose eggs were collected can be bred again within a week.

- **What animals have been successfully born using this technique?**

Bengal tigers, African bongo antelope, Indian desert cats, eland antelope, gorillas, and scimitar-horned oryx have been born through the use of embryo transfer. Efforts are also underway to work with amphibians using this technology.

- **Where else in the world is embryo transfer being done?**

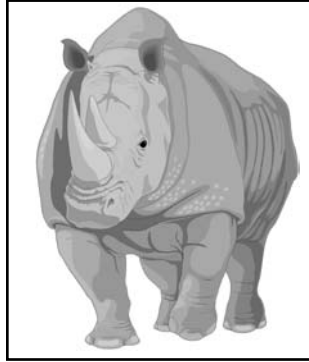
Embryo transfer is also being done at the zoos in the Washington, DC, San Diego, Dallas, St. Louis, and London. The Cincinnati Zoo is committing substantial financial resources toward it. In 1991, CREW moved into an 18,000-square foot facility at the Cincinnati Zoo and Botanical Garden. CREW currently houses the frozen germplasm (embryos) of about 500 animals representing 75 species.

- **What might be in the future for embryo transfer?**

At the current time, embryo transfer is still an experimental technique. In the future, Dr. Dresser believes that "someday a scientist in Kenya will take a little packet of frozen embryos, knock down a female rhino, and implant her with the frozen embryos." It is possible that replenishing the earth's endangered species could be as easy as restocking a lake with trout (Speart, 1990).

## Resource Sheet #2

### *Black Rhinos*



**Name:** Black Rhinoceros  
**Scientific Name:** *Diceros bicornis*  
**Length:** 10-12 feet  
**Height:** 4-6 feet  
**Weight:** 1,000-3,000 pounds

- **Where does the black rhino live?**

The black rhino lives on the edges of woodland areas in eastern and southern Africa. The rhino uses scent to mark its territory: it urinates along paths, and, after defecating, it scrapes its hind feet into its feces and carries the scent away with it.

- **What do black rhinos eat?**

The black rhino is an *herbivore* (eats only plants). It feeds on trees and shrubs. It is not well adapted to grazing but will occasionally eat clumps of grass. The black rhino eats fruit directly off trees as well as fallen fruit. It drinks water once a day from a nearby watering hole.

- **Why do black rhinos roll in the mud?**

Because black rhinos do not sweat, they roll in mud or dust to keep cool. The mud also provides the black rhino with insect-repelling protection during the hottest of days.

- **What are the breeding habits of the black rhino?**

The male rhino brushes his horns over the ground, sprays urine, and charges at bushes to get a female's attention. Mating can occur at any time during the year. Once a successful mating takes place, one newborn rhino is born 15 months later and drinks its mother's milk for two years. The males stop growing at seven years of age. The females mature earlier at four to five years. The life span of the black rhino is about 40 years in captivity.

- **How many black rhinos are left?**

In 1984, there were 8,800 black rhinos. By the end of 1989, only 3,300 black rhinos remained, primarily due to the enormous number killed by poachers. Poachers kill the animal for its horns.

**Resource Sheet #3**  
**Conservation**

● **What is conservation?**

Conservation is the wise use of natural resources, including plants, animals, soil, water, and minerals.

● **What are the benefits of establishing a reserve for protecting certain species?**

A reserve provides a natural environment in which animals thrive. Ample food, water, and shelter are provided with few predators, so the population can readily increase if the species is fertile. Most reserves have highly trained game wardens who protect the herds, patrol the reserve's borders where poachers may enter illegally, and monitor herd movements. Reserves often attract thousands of visitors a year. A small entrance fee is charged to collect money to maintain and enhance the reserve as well as provide funds for conducting important research on the animals and plants within the reserve.

● **Does raising the public's awareness of endangered animals really help to protect the animals?**

Yes! There are many conservation measures that involve public awareness campaigns. For example, campaigns alerted people to the following situations:

- 1) the slaughter of baby seals for their fur
- 2) the killing of dolphins caught in tuna nets
- 3) the slaughter of elephants for their ivory tusks
- 4) the poaching of gorillas for the removal of their hands to be used as ashtrays

These campaigns resulted in a public outcry demanding policy changes, the formation of foundations with funds to protect the animals, and changes in business practices. As a result, the destruction of some species has lessened a great deal.

**CONSERVE TODAY**  
**REAP THE REWARDS TOMORROW!**

## ACTIVITY #1: Saving the Black Rhino — A Debate

### Purpose

This debate will provide you with the opportunity to distinguish between two viewpoints — the **Conservation Viewpoint** or the **Embryo Transfer Viewpoint** — regarding the preservation of the black rhino, an endangered species.

### Your Mission

You will work in teams to conduct library research on the black rhino. Then your team will prepare a position for a debate regarding the best way to save the black rhino.

### Procedure

1. Read the hypothetical situation below.
2. Select one viewpoint to support during the debate from the “Viewpoint Worksheet.”
3. Read articles, books, and other references regarding the issues in this debate. Your team must display a poster, graph, table, or other visual aid during your presentation.
4. Prepare your argument for the debate. Refer to the following questions to assist you:
  - a. What research supports your claim?
  - b. What evidence do you have that your argument is valid?
  - c. What rebuttal can you expect from the opposing viewpoint teams?
  - d. What other information do you need to solidify your argument?

### The Hypothetical Situation...

Ima Rich just won \$350,000 in a sweepstakes. Ima, a black rhino lover, is going to donate the money to help preserve them. A decision must be made as to whether the money is donated toward conservation efforts or toward embryo transfer research to help save the black rhino. The money can only be donated to one of these and cannot be split in any way. Each viewpoint on the “Viewpoint Worksheet” provides ideas and rationales to support either conservation efforts or embryo transfer research. If you were Ms. Rich, to which endeavor would you donate? Why?



## Viewpoint Worksheet

### Conservation Viewpoint

The money should be spent on...

- supporting a small rhino preserve in Africa.
- helping to fight for better restriction laws and anti-poaching measures.
- creating a natural living area for black rhinos at one of the nation's best zoos.
- monitoring the international rhino trade.
- assisting rhinos to propagate naturally in the wild and not in a scientific lab.
- transporting several rhinos out of Africa to the safety of a U.S. zoo.

### Embryo Transfer Viewpoint

The money should be spent on...

- embryo transfer because it is easier to move rhino embryos than actual rhinos.
- embryo transfer research because it could offer a long-term solution to the decreasing rhino population.
- frozen repositories that provide a safe place for rhino embryos and those of other endangered animals.
- storing frozen embryos because it is far cheaper than housing rhinos in a zoo or paying for laws to protect them.
- this technology so we can better understand the reproductive cycles of these endangered animals in an attempt to perfect the embryo transfer process.

