

## HAND OUT

### CHAPTER – 6 THE MAKING OF A SCIENTIST

(TEXTBOOK: FOOTPRINT WITHOUT FFET)

CLASS – X

SUBJECT – ENGLISH

# The Making of a Scientist

## Summary

### **Ebright's achievement at young age**

A former 'scout of the year' excited the scientific world with a new theory. This he did at the age of 22 years. It was on how cells work. Richard H. Ebright and his college roommate explained the theory in an article. It was titled 'Proceedings of the National Academy of Science'. It was his first achievement. It started with butterflies.

### **Ebright as a child**

Ebright was the only child of his parents. They lived in north of Reading, Pennsylvania. Ebright wrote that there was nothing to do. He could not play football or baseball. But he could collect things.

### **As a collector of things**

Ebright started collecting butterflies in kindergarten. He also collected rocks, fossils and coins. He also became a star-gazer and an eager astronomer. His mother encouraged him. She took him on trips. She also bought him telescopes, microscopes, cameras and other equipment.

### **Ebright and his mother**

Ebright sold his article at 15 to a scientific journal. It was like a home

run scored in the game of baseball. Ebright's mother said that she was his friend until he started school. She would bring home friends for him. He was her whole life after her husband's death. Richie was in third grade then.

### **Ebright's collection**

Ebright's mother would find work for Richie if he had nothing to do. It was for learning, He wanted to learn. He earned top grades in school. When he was in second grade, he had collected 25 species of butterflies. These were found around his hometown.

### **Ebright gets a book**

Then Ebright's mother gave him a children's book. It was 'The Travels of Monarch X'. It told how monarch butterflies migrate to Central America. This opened the world of science to Ebright.

### **Tagging of butterflies**

At the end of the book, readers were invited to help study butterfly migrations. They were asked to tag butterflies for research. It was being done by Dr. Frederick A. Urquhart of Toronto University, Canada. Ebright started tagging monarch butterflies. Anyone who found a tagged butterfly was asked to send the tag to Dr. Urquhart.

### **Ebright rears butterflies**

The butterfly collecting season around Reading lasts six weeks in late summer. Chasing them one by one won't enable one to catch many. So Ebright raised a flock of butterflies. He would catch a female monarch and take her eggs. He would raise them in his basement from egg to adult butterfly. Then he would tag the butterflies' wings and let them go.

### **Loses interest**

Soon Ebright began to lose interest in – tagging butterflies. The

reason was that there was no feedback. Only two butterflies had been caught. Their distance was not more than seventy-five miles from where he lived.

### **Decides to do real experiments**

In seventh grade Ebright got a hint of what real science is. He entered a country science fair and lost. His entries were slides of frog tissues. He realised that the winners had tried to do real experiments. So he decided to do a real experiment. The subject was the insect work that he had already been doing.

### **Writes to Dr. Urquhart**

He wrote to Dr. Urquhart for ideas. Back came many suggestions for experiments. These kept Ebright busy all through high school. These also led him to prize projects in country and international science fairs.

### **His research wins**

For his eight-grade project, Ebright tried to find the cause of a viral disease. It killed all monarch caterpillars. He thought the disease might be carried by a beetle. He tried raising caterpillars in the presence of beetles. But he didn't get any real results. But he showed his experiment and won.

### **His theory on butterflies**

The next year his science fair project was testing the theory. The theory was that viceroy butterflies copy monarchs. The theory was that viceroys look like monarchs because monarchs don't taste good to birds. Viceroys taste good to birds. So the more they look like monarchs, the less likely they are to become a bird's food. His project was to see if birds would eat monarchs.

### **About gold spots on butterflies**

The question he tried to answer was simple. What is the purpose of

the twelve tiny gold spots on a monarch pupa? Everyone assumed the spots were just ornamental. But Dr. Urquhart didn't believe it.

### **About hormone**

To find the answer Ebright and another student built a device. It showed that the spots were producing a hormone. It was necessary for the butterfly's full development. This project won Ebright first place in the country fair. It also won an entry into the International Science and Engineering Fair. There he won third place for zoology. He also got a chance to work in Walter Reed Army Institute of Research.

### **Continues advanced experiments**

As a high school junior, he continued his advanced experiments on the monarch pupa. That year his project won first place at the International Science Fair.

### **Importance of cells**

In his senior year he grew cells from a monarch's wing in a culture. He showed that the cells would divide and develop into normal butterfly wing scales. This would be only if they were fed the hormone from the gold spots. That project won first place for zoology at the International Fair. He also worked at the army lab and at the U.S. Dept, of Agriculture's lab.

### **Identifies the hormone**

The following summer Ebright went back to the Dept, of Agriculture's lab. There he worked on the hormone theory. Finally he was able to identify the hormone's chemical structure.

### **About DNA**

A year-and-a half later, Ebright got the idea for his new theory about cell life. He did so while seeing the X-ray photos of this chemical structure. The photos gave him the answer to one of biology's puzzles. It was : how the cell can 'read' the blueprint of its DNA. DNA

is the substance in the nucleus of a cell that controls heredity. It is the blueprint for life.

### **Paper about the experiment**

Ebright and his college roommate James R. Wong drew pictures and constructed plastic models. They made them to show how it could happen. Together they later wrote the paper explaining the theory.

### **Testing the theory**

Surprisingly Richard Ebright graduated from Harvard with highest honours. He also became a graduate student researcher at Harvard Medical School. There he began experimenting to test his theory.

### **Advantages of the theory**

If the theory proves correct it will be a big step towards understanding life processes. It might also lead to new ideas . These would be new for preventing types of cancer and other diseases.

### **Ebright's other interests**

Ebright has other interests also. He became a champion debater and public speaker. He also became a good canoeist and all-round outdoors-person. He is also an expert photographer of nature and scientific exhibits.

### **Ebright and his teacher**

Ebright also found someone to admire. He was Richard A. Weiherer, his social studies teacher. Ebright said about him that he opened his mind to new ideas. Richard A. Weiherer also spoke highly of Ebright about his interests. He won because he wanted to do the best job.

### **Things which make a scientist**

These things are a necessity in the making of a scientist. Start with a first-rate mind. Add curiosity and mix in the will to win for the right reasons. Ebright had these qualities.

## **Conclusion of “The making of a scientist”**

The story teaches us that with perseverance, dedication and hard work any dream is achievable.

### **New words**

**Species: a group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding.**

**Ex: Frog is the species of amphibians.**

**Fossils: the remains or impression of a prehistoric plant or animal embedded in rock and preserved in petrified form.**

**Ex: Petrol is a kind of fossil fuel.**

**Pupa: an insect in its inactive immature form between larva and adult.**

**Ex: Pupa of a butterfly becomes an adult after its growth.**

**Hormone: a regulatory substance produced in an organism and transported in tissue fluids such as blood or sap to stimulate specific cells or tissues into action**

**Ex: Hormone plays a vital role in growth and development in an organism.**

**Caterpillar: the larva of a butterfly or moth**

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