Lesson 6. **THE MAKING OF A SCIENTIST**

INTRODUCTION

Richard H. Ebright has contributed significantly to Biochemistry and Molecular Biology. When Ebright was a little child, he used to collect butterflies, rocks, fossils and coins. He was an eager star-gazer also. But he was mainly interested in butterflies. During his school as well as college days, he did many experiments for which he was awarded many prizes. Most of his experiments were on butterflies. These experiments were a milestone in the world of science.

DETAILED SUMMARY

Richard H. Ebright is one of the leading scientists. He has contributed significantly to Biochemistry and Molecular Biology. He had been interested in science since his boyhood years. At the age of twenty two, he excited the scientific world with a new theory. It was concerned with the working of cells. Ebright and his college room-mate explained the theory in an article. It was published in the journal entitled 'Proceedings of the National Academy of Science'. It was first of his many achievements in the field of science. It started with his studies on 'butterflies'.

Ebright was the only child of his parents. They lived in the north of Reading, Pennsylvania. There was nothing for Ebright to do there. He had no companions. He was not a good player. But his hobby was collecting things. Ebright was fascinated by butterflies. He started collecting butterflies in kindergarten. He also collected rocks, fossils and coins. He also became a star-gazer and an eager astronomer.

Ebright's mother recognized his curiosity and encouraged him. She took him on trips. She also bought him telescopes, microscopes, cameras and other equipment so that he could follow his hobbies. Ebright's mother

was his friend until he started school. She would bring home friends to him. He was her whole life after her husband's death.

Ebright's mother would find work for Richie if he had nothing to do. She found learning tasks for him. He had a great hunger for learning. He earned top grades in school. By the time he was in second grade. He had collected 25 species of butterflies. These were found around in hometown. One day his mother gave him a children's book. It opened the world of science to Ebright.

That book was 'The Travels of Monarch X'. It described how monarch butterflies migrate to Central America. This book fascinated him. At the end of the book, readers were invited to help study butterfly migrations. They were asked to tag butterflies for research by Dr Frederick A. Urquhart of Toronto University. Canada. Anyone who found a tagged butterfly was asked to send the tag to Dr Urquhart. Ebright started tagging monarch butterflies. The butterfly collecting season around Reading lasts only six weeks in late summer. He realized that chasing the butterflies one by one won't enable him to catch many. So he decided to raise a flock of butterflies. He would catch a female monarch and take her eggs. He would raise them in his basement from egg to caterpillar to pupa to adult butterfly. Then he would tag the butterflies' wings and let them go.

However, soon Ebright began to lose interest in tagging butterflies. The reason was that there was no feedback. He was a little disappointed as only two butterflies had been recaptured. And they had been found not more than seventy-five miles from where he lived. By the time, Ebright reached the seventh grade. He got busy with other scientific experiments. He entered a county science fair. His entries were slides of frog tissues. But he did not win any prize He realised that the winners had tried to do real experiments. So he decided to do further research in his favourite field, that is, insects on which he had already been doing work.

Ebright wrote to Dr Urquhart for ideas. In reply, the famous scientist gave him many suggestions for experiments. These experiments kept Ebright busy all through high school. He also won many prizes in the county and international science fairs. For his eighth grade project, Ebright tried to find the cause of a viral disease that 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 in the science fair and won. The next year his science fair project was testing the theory that viceroy butterflies imitate monarchs. He said that viceroys look like monarchs because birds do not find monarchs tasty. By copying monarchs, the viceroys escape being eaten by birds. His project was to see if birds would eat monarchs. This project was placed first in the zoology division and third overall in the county science fair.

In his second year in high school, Ebright's research led to his discovery of an unknown insect hormone. Indirectly, it led to his new theory on the life of cells. He tried to answer a very simple question: What is the purpose of the twelve tiny gold spots on a monarch pupa? To find the answer Ebright and another student built a device that 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 county fair and 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.

Ebright's interest in butterflies never abated. As a high school junior, he continued his advanced experiments on the monarch pupa. His project won first place at the International Science Fair. 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 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 laboratory and at the U.S. Dept. of Agriculture's laboratory. The following summer Ebright went back to the Dept. of Agriculture's lab and worked on the hormone theory. Finally, he was able to identify the hormone's chemical structure.

A year-and-a-half later, one day, Ebright was seeing the X-ray photos of the chemical structure of cells. He got the idea for his new theory about cell life. Those photos provided him with the answer to one of biology's puzzles: 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. Ebright and his college room-mate James R. Wong drew pictures and constructed plastic models of molecules to show how it could happen.

No one was surprised when 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 if the theory proves correct it will be a big step towards understanding the life processes. It might also lead to new ideas for preventing some types of cancer and other diseases.

Ebright has many other interests also. He also became a champion debater and public speaker, a good canoeist and an all-around outdoor-Person. He was also an expert photographer of nature and scientific exhibits.

Ebright's social studies teacher, Richard Weiherer had high praise for him. Ebright said about his teacher 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. He said that Ebright was competitive, but not in a bad sense. In the end, the writer says Ebright possessed those traits which are necessary for the making of a scientist. These are: Start with a first-rate mind, add curiosity and mix in the will to win for the right reasons. Ebright had these qualities.

Main Characters

1.Richard H Ebright

- A multifaceted genius; a great scientist, debater, canoeist, etc.
- Collected butterflies since childhood
- Worked on monarch butterflies, the cell and its DNA
- Inspired by his mother, Dr Urquhart and his teacher RA Weiherer

2. Richard H Ebright's Mother

- Encouraged and inspired Ebright's interest in learning
- Bought him instruments, cameras; his only companions
- Got him the book The Travels of Monarch X that changed Richard Ebright's life

3. Dr Urquhart

- Famous for work on monarch butterflies
- Taught at University of Toronto, Canada
- Helped Ebright with new ideas and suggestions

4. Richard A Weiherer

- Social Studies teacher of Ebright
- Respected and admired by Ebright
- Turned Ebright's energy towards the Debating and Model United Nations clubs.

SHORT ANSWER QUESTIONS (30-40 Words)

Q1. Which project of Ebright won first prize in the county science fair?

Ans. Ebright didn't win anything at his first science fair, thereby realizing that actual experiments alone worked. Later, he started winning prizes. Ebright with his scientist friend first built a device that showed that the tiny gold spots on a monarch pupa were producing a hormone necessary for the butterfly's full development. This project won the first prize in the county science fair and third prize in zoology in the International science fair.

Q2. What were the factors which contributed to making Ebright a scientist?

Or

What are the essential qualities for becoming a scientist, according to Albright's teacher?

Ans. Sharp brain, d y observant, anal tic mind, driving curiosity, the keen interest in the subject and strong will for the right cause are some of the essentials for the making of a scientist. He should not run after prizes, have a competitive spirit but not in a bad sense.

Q3. What idea did Ebright get when he was looking at the X-ray photos of cells?

Ans. One day, Ebright was seeing the X-ray photos of the chemical structure of cells. He got the idea for his new theory about cell life. Those photos provided him with the answer to one of biology's puzzles: how the cell can 'read' the blueprint of its DNA.

LONG ANSWER QUESTIONS: (100-150 words)

1. 'Success is failure turned inside out'. Prove the above statement with instances from the journey taken by Richard Albright from losing at the science fair to winning at the international fair.

Ans. Success is the fruit of failure. It never comes straight but through failure. This can be seen in the life of Richard Albright. Although he earned top grades in school, on everyday things he was just like every other kid. He faced many failures in his life but every failure strengthened his will to succeed. When he was in seventh grade he participated in County Science Fair with his slides of frog tissues. But he could not win a prize. This made him determined to win the prize and in his eighth grade, he again participated in the science fair with the experiment of viral disease in monarch caterpillars and won the prize. The very next Year he participated with his experiment of whether viceroy butterflies copy the monarch butterflies in order to save their life from the birds and this project won Albright, third prize in overall county science fair.

His experiment regarding gold spots of monarch liar which he built a device that showed. That the spots produced hormones necessary for the full development of butterflies won third prize in international science and engineering fair.

Next year his advanced experiments on the monarch pupa won him first place at the international science fair. Thus, for Richard Albright, we can say that success is failure turned inside out.

Q2. Which book proved to be a turning point in Ebright's life?

Ans. One day, Ebright's mother gave him a book. That book was 'The Travels of Monarch X'. It described how monarch butterflies migrate to Central America. This book fascinated him. At the end of the book

readers were invited to help study butterfly migrations. They were asked to tag butterflies for research by Dr Frederick of Toronto University, Canada. Anyone who found a tagged butterfly was asked to send the tag to Dr Frederick. Ebright started tagging monarch, butterflies. The butterfly collecting season lasts only six weeks in late summer. He realized that chasing the butterflies one by one won't enable him to catch many. So he decided to raise a flock of butterflies.

Q3. What other interests, besides science did Richard Ebright pursue? Why did Ebright respect and praise his Social Studies teacher so much?

Ans. No doubt, first and foremost, Richard Ebright was a scientist. He was interested in science; he first began to collect butterflies. But this scientist found time for other interests too. He was a man of many parts — a multifaceted genius. Not only did he collect butterflies but also took a deep interest in other activities. He collected rocks, fossils, and coins. He became an eager astronomer. He would indulge in star-gazing sometimes all night. Ebright also became a champion debater and public speaker. In this field, his Social Studies teacher turned Ebright's tremendous energy towards the Debating and Model United Nations Clubs. He was a good canoeist and all-around outdoors-person. He was also an expert photographer. He excelled in nature and scientific exhibits. In brief, besides being a remarkable scientist, Richard Ebright enjoyed all pleasures, adventures, hobbies and entertainments that a happy and civilised living provided to him.

Unsolved Questions: Short Answer Questions:

a) Mention any two of Ebright's contributions to the world of Science.

b) What are the qualities that go into the making of a scientist?

c) How did Ebright's mother help him in becoming a scientist?

d) What lesson does Ebright learn when he does not win anything at a science fair?

Long Answer Questions:

a) Richard's mother had a great influence on him. Discuss.

b) Ebright's study of monarch pupas had a far reaching impact. Elaborate