THE MAKING OF A SCIENTIST

CLASS - 10 **SUBJECT - ENGLISH**

About Author

Robert W Peterson was a famous American newspaper writer who later became a freelance author of magazine articles. He wrote with authority, particularly on the topics of sports and scouting. He was born in 1925 in Pennsylvania in the USA and died of lung cancer on 11 February 2006.

INTRODUCTION

Richard H. Ebright is one of the leading scientists. He 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.

Lesson

At the age of twenty-two, a former ‘scout of the year’ excited the scientific world with a new theory on how cells work. Richard H. Ebright and his college room-mate explained the theory in an article in the Proceedings of the National Academy of Science. It was the first time this important scientific journal had ever published the

work of college students. In sports, that would be like making the big leagues at the age of fifteen and hitting a home run your first time at bat*. For Richard Ebright, it was the first in a long string of achievements in science and other fields. And it all started with butterflies. An only child, Ebright grew up north of Reading, Pennsylvania. “There wasn’t much I could do there,” he said. “I certainly couldn’t lay football or baseball with a team of

one. But there was one thing I could do — collect things.” So he did, and did he ever! Beginning in kindergarten, Ebright collected butterflies with the same determination that has marked all his activities. He also collected rocks, fossils, and coins. He became an eager astronomer, too, sometimes stargazing all night.

Former- having previously been a particular thing.

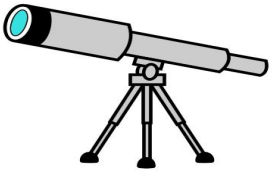
Scout- a member of the Scout Association or a similar organization

Proceedings- a published report of a set of meetings or a conference.

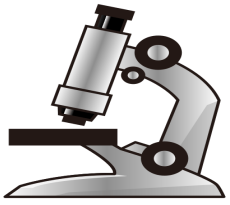
Journal- a newspaper or magazine that deals with a particular subject or professional activity.

making the big leagues- in a field of tough competition and high rewards, the largest or foremost of its kind. For example- winning an Oscar put the actress in the big league.

Fossils- the remains or impression of a prehistoric plant or animal embedded in rocks. Astronomer- an expert in or student of astronomy.



From the first he had a driving curiosity along with a bright mind. He also had a mother who encouraged his interest in learning. She took him on trips, bought him telescopes, microscopes, cameras, mounting materials, and other equipment and helped him in many other ways. “I was his only companion until he started school,” his mother said. “After that I would bring home friends for him. But at night we just did things together. Richie was my whole life after his father died when Richie was in third grade.” She and her son spent almost



every evening at the dining room table. “If he didn’t have things to do, I found work for him — not physical work, but learning things,” his mother said. “He liked it. He wanted to learn.” And learn he did. He earned top grades in school. “On everyday things he was just like every other kid,” his mother said. By the time he was in the second grade, Ebright had collected all twenty five species of butterflies found around his hometown. “That probably would have been the end of my butterfly collecting,” he said. “But then my mother got me a children’s book called The Travels of Monarch X.” That book, which told how monarch butterflies migrate to Central America, opened the world of science to the eager young collector.

Curiosity- a strong desire to know or learn something.

Encouraged- give support, confidence, or hope to (someone).

Equipment- the necessary items for a particular purpose.

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

Monarch butterflies- a large migratory orange and black coloured butterfly that occurs mainly in North America.

Collector- a person who collects things of a specified type, professionally or as a hobby.

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 the University of Toronto, Canada. Ebright's mother wrote to Dr Urquhart, and soon Ebright was attaching light adhesive tags to the wings of monarchs. Anyone who found a tagged butterfly was asked to send the tag to Dr Urquhart. The butterfly collecting season around Reading lasts six weeks in late summer. If you're going to chase them one by one, you

won't catch very many. So the next step for Ebright was to raise a flock of butterflies. He would catch a female monarch, take her eggs, and raise them in his basement through their life cycle, from egg to caterpillar to pupa to adult butterfly. Then he would tag the butterflies' wings and let them go. For several years his basement was home to thousands of monarchs in different stages of development. "Eventually I began to lose interest in tagging butterflies. It's tedious and there's not much feedback," Ebright said. "In all the time I did it," he laughed, "only two butterflies I had tagged were recaptured — and they were not more than seventy-five miles from where I lived."

Migrations- seasonal movement of animals from one region to another.

Adhesive- able to stick fast to a surface or object; sticky.

Flock- a number of birds of one kind feeding, resting, or travelling together.

Life cycle- the series of changes in the life of an organism including reproduction.

Tedious- too long, slow, or dull; tiresome or monotonous.

Then in the seventh grade he got a hint of what real science is when he entered a county science fair — and lost. “It was really a sad feeling to sit there and not get anything while everybody else had won something,” Ebright said. His entry was slides of frog tissues, which he showed under a microscope. He realised the winners had tried to do real experiments, not simply make a neat display. Already the competitive spirit that drives Richard Ebright was appearing. “I knew that for the next year’s fair I would have to do a real experiment,” he said. “The subject I knew most about was the insect work I’d been doing in the past several years.” So he wrote to Dr Urquhart for ideas, and back came a stack of suggestions for experiments. Those kept Ebright busy all through high school and led to prize projects in county and international science fairs. For his eighth grade project, Ebright tried to find the cause of a viral disease that kills nearly all monarch caterpillars every few years. Ebright thought the disease might be carried by a beetle. He tried raising caterpillars in the presence of beetles. “I didn’t get any real results,” he said. “But I went ahead and

showed that I had tried the experiment. This time I won.” The next year's science fair project was testing the theory that viceroy butterflies copy monarchs. The theory was that viceroys look like monarchs because monarchs don’t taste good to birds. Viceroys, on the other hand, do taste good to birds. So the more they look like monarchs, the less likely they are to become a bird’s dinner. Ebright’s project was to see whether, in fact, birds would eat monarchs. He found that a starling would not eat ordinary bird food. It would eat all the monarchs it could get. (Ebright said later research by other people showed that viceroys probably do copy the monarch.) This project was placed first in the zoology division and third overall in the county science fair.

County- region

Subject- a person or thing that is being discussed, described, or dealt with.

Stack- a pile of objects, typically one that is neatly arranged.

Viral- of the nature of, caused by, or relating to a virus or viruses.

Starling- a gregarious Old World songbird with a straight bill, typically with dark lustrous or iridescent plumage but sometimes brightly coloured.

Zoology- the scientific study of the behaviour, structure, physiology, classification, and distribution of animals.

In his second year in high school, Richard Ebright began the research that led to his discovery of an unknown insect hormone. Indirectly, it also led to his new theory on the life of cells. 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,” Ebright said. “But Dr Urquhart didn’t believe it.” To find the answer, Ebright and another excellent science student first had to build a device that showed that the spots were producing a hormone 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 during the summer at the entomology laboratory of the Walter Reed Army Institute of Research. As a high school junior, Richard Ebright continued his advanced experiments on the monarch pupa. That year his project won first place at the International Science Fair and gave him another chance to work in the army laboratory during the summer. In his senior year, he went a step further. He grew cells from a monarch’s wing in a culture and 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 spent the summer after graduation doing further work at the army laboratory and at the laboratory of the U.S. Department of

Agriculture. The following summer, after his freshman year at Harvard University, Ebright went back to the laboratory of the Department of Agriculture and did more work on the hormone from the gold spots. Using the laboratory's sophisticated instruments, he was able to identify the hormone's chemical structure.

A year-and-a-half later, during his junior year, Ebright got the idea for his new theory about cell life. It came while he was looking at X-ray photos of the chemical structure of a hormone. When he saw those photos, Ebright didn't shout, 'Eureka!' or even, 'I've got it!' But he believed that, along with his findings about insect hormones, the photos gave him 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 determines the form and function of the cell. Thus DNA is the blueprint for life.

Research- the systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions.

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.

Assumed- suppose to be the case, without proof.

Ornamental- serving or intended as an ornament; decorative.

Sophisticated- advanced

Blueprint- a design plan or technical drawing.

Nucleus- the central and most important part of an object, movement, or group, forming the basis for its activity and growth.

Heredity- the passing on of physical or mental characteristics genetically from one generation to another.

Ebright and his college room-mate, James R. Wong, worked all that night drawing pictures and constructing plastic models of molecules to show how it could happen. Together they later wrote the paper that explained the theory. Surprising no one who knew him, Richard Ebright graduated from Harvard with highest honours, second in his class of 1,510. Ebright went on to become a graduate student researcher at Harvard Medical School. There he began doing experiments to test his theory. If the theory proves correct, it will be a big step

towards understanding the processes of life. It might also lead to new ideas for preventing some types of cancer and other diseases. All of this is possible because of

Ebright's scientific curiosity. His high school research into the purpose of the spots on a monarch pupa eventually led him to his theory about cell life. Richard Ebright has been interested in science since he first began collecting butterflies — but not so deeply that he hasn't time for

other interests. Ebright also became a champion debater and public speaker and a good canoeist and all-around outdoors-person. He is also an expert photographer, particularly of nature and scientific exhibits. In high school Richard Ebright was a straight-A student. Because learning was easy, he turned a lot of his energy towards the Debating and Model United Nations clubs. He also found someone to admire — Richard A. Weiherer, his social studies teacher and adviser to both clubs. "Mr Weiherer was the perfect person for me then. He opened my mind to new ideas," Ebright said. "Richard would always give that extra effort," Mr Weiherer said. "What pleased me was, here was this person who put in three or four hours at night doing debate research besides doing all his research with butterflies and his other interests. "Richard was competitive," Mr Weiherer continued, "but not in a bad sense." He explained, "Richard wasn't interested in winning for winning's sake or winning to get a prize. Rather, he was winning because he wanted to do the best job he could. For the right reasons, he wants to be the best." And that is one of the ingredients 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 has these qualities. From the time the book, The Travels of Monarch X, opened the world of science to him, Richard Ebright has never lost his scientific curiosity.

Room mate- a person occupying the same room as another.

Researcher- a person who carries out academic or scientific research.

Debater- a person who argues about a subject, especially in a formal manner.

Canoeist- A canoeist is someone who is skilled at racing and performing tests of skill in a canoe.

Exhibits- manifest clearly (a quality or a type of behaviour).

Admire- regard with respect or warm approval.

Competitive- relating to or characterized by competition.

Ingredients- a component part or element of something.

Summary

The chapter, 'The Making of a Scientist' is a story about the famous scientist Richard Ebright. Richie as his mother used to call him was a very curious child right from his childhood. He had started collecting butterflies in his childhood and when he was 2 years old, he had already collected all the 25 species found near his hometown. He thought it to be an end of butterfly collection until one day his mother bought him a book named 'The Travels of Monarch X'. This was a turning point in his life and he got much more interested in dealing with science. He started with tagging butterflies which a task given at the end of the book that his mother bought for him. Then, when he first entered the county science fair with a slide of the frog tissue he lost. Everybody won something but his project did not win any prize. He was sad but also understood that to win, he needed to do real experiments and not just make neat and clean models. Then he wrote down to Dr. Urquhart at the University of Toronto, asking him for ideas to make projects. He

stayed busy during his high school, working on the long list sent to him by Dr. Urquhart. Then, for the next year's fair, he chose the project of looking at the viral disease that killed nearly all the monarch caterpillars every few years. He thought that the reason for this could be a beetle, so he started raising caterpillars in the presence of beetles but could not get any results. So, when he showed his trial experiment at the county science fair, his project won a prize. Then for the next year he made an experiment to show that the viceroy butterflies copied monarchs. This project also made him win prizes. Then he started his research as to the purpose of the 12 golden spots on the back of a monarch pupa. Everybody believed that it was just a design but Dr. Urquhart thought otherwise. Then Ebright and another brilliant science student got together and made a device that could show that the gold spots were responsible for releasing a hormone that was necessary for its growth. With the help of sophisticated instruments at one of the labs, he got a chance to work and found the chemical structure of the hormone in the gold spots. Then, one day, while looking at the photo of the chemical structure, he solved one of the biggest puzzles of life. He came to know how a cell blueprints its DNA. It was a big breakthrough and was published in a magazine. He also had many other interests and also admired his social studies teacher as he was the one who used to give him new ideas. He was good at debating, public speaking and a great canoeist. He never used to win for the sake of winning or for prizes but because he wanted to be the best at whatever he used to do. It is shown in this chapter that with the right amount of curiosity, a bright mind and the will to win for right reasons are the qualities needed to be a scientist. His mother also played a big role in making him what he was as it was she who supported him throughout his journey and bought him the book 'The Travels of Monarch X' which aroused his curiosity in the field of science.

Question and Answers

Q1) How did a book become a turning point in Richard Ebright's life?

Ans) After Richard had collected all the 25 species of butterflies that were found in his surroundings, he thought that it would be an end to butterfly collection when his mom bought him a book named 'Travels of Monarch X' which told him about how butterflies migrated to Central America. This book aroused an interest in him for exploring more of what was to come and started studying more about monarch butterflies.

Q2) How did his mother help him?

Ans) His mother played a turning role in the life of the scientist as she used to buy him telescopes, microscopes, cameras, mounting equipment and used to try to help him by getting him things to learn in the evening when he used to be free. She also used to take him out on field trips and the book Travels of Monarch X was also bought by her. So we can say that the mother played a very important role in the making of what he was.

Q3) What lesson does Ebright learn when he does not win anything at a science fair?

Ans) He learnt that just by showing neat and clean simple slides won't make him win anything but the actual experiment that he will perform will help him win the prize at any fair.

Q4) What experiments and projects does he then undertake?

Ans) He did an experiment to see the cause of the viral disease that kills nearly all the monarchs after a few years and also took up a project to prove that the viceroy butterflies copy monarchs to survive by behaving like them.

Q5) What are the qualities that go into the making of a scientist?

Ans) According to the chapter, there are three qualities that a person needs to have to be a scientist. Firstly, a first - rated mind, secondly, curiosity and thirdly, the will to win for the right reasons.