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# LITERATURE SELECTION from The Origin: A Biographical Novel of Charles Darwin by Irving Stone

This biographical novel by American author Irving Stone traces the life of English biologist Charles Darwin. The following excerpt takes place during Darwin's journey to the Galápagos Islands aboard a government ship, the H. M. S. Beagle. The scientific observations that Darwin made on his five-year trip led to the development of his theory of evolution. What different biological and geological samples does Darwin gather on the islands?

To Charles, at first sight, the islands appeared L utterly desolate, sloping symmetrical cones of black lava completely covered with leafless brushwood and stunted trees. That was the end of his discouragement, for when H.M.S. Beagle anchored in St. Stephen's Harbor off Chatham Island, he found the bay abounding with fish, sharks and turtles popping their heads up out of the sea. His line went over the side with the rest of the crew's and he immediately began pulling up fine fish, two to three feet long, the heavy catch flapping all over the deck. After the midday meal he climbed ashore with King and Stokes; the day was glowing hot, the black lava resembling Annie's stove at The Mount. He was astounded by the enormous family of reptiles living on the lava, not only the hard-shelled, slow-moving tortoises, the tiny head stuck out on its short thick neck from a stone-hard plated carapace, but the slithery creatures on the low-lying rocks, thousands heaped upon each other five and six deep: "Disgusting, clumsy lizards, black as the porous lava they're lying on," he exclaimed. "I didn't know they were living creatures until I came within a couple of feet of them."

Stokes grimaced at the uncanny sight:

"I've heard them described as 'imps of darkness."

Charles turned away without attempting to capture one. He preferred to botanize, climbing the slope of a dead volcano and gathering ten different specimens, "so insignificant and ugly," he cried, "that Professor Henslow will think I have been gathering in the arctic instead of the tropics."

They also smelled unpleasant.

What did delight him that first day was the variety of birds, species he had not seen before.

"All new, all different! My ornithology friends in England are in for a treat."

The birds were so innocent of man, and

unafraid, that King killed one with his hat, and Charles pushed a large hawk off a branch.

The finds on the following day, from a different Chatham anchorage, were equally overwhelming: the black rocks at the shore line crawled with an infinity of bright red crabs, the sandy areas were alive with sea lions honking great noises at each other between graceful swims in the sea.

He exclaimed:

"The island looked dead from a distance but what an immense variety of life has been created here."

He and Stokes walked to the top of a large but low crater. The country to the north was studded with small black cones which Charles described as ancient chimneys for the subterranean melted fluids. Using his hammer, he quickly ascertained that the volcano they had climbed had once been submarine. He chipped away samples of hard sandstone composed of volcanic dust.

Each day in the Galápagos provided separate adventures as the Beagle made its way from anchorage to anchorage surveying the different islands: Chatham, James, Charles, Narborough, Albermarle, the highest and boldest of the volcanic peaks, its east side black with lava, sterile and dry, studded with small craters which were appendages to the great volcanic mounts from which the black lava had flowed. Charles frequently took his bedroll and a tent ashore accompanied by one or more of his shipmates. They bivouacked under a miserable little spring of water in a small valley; crossed black sand which was disagreeable to pass over even in thick boots, and brown sand which registered 137° when they placed a thermometer in it, as high as the thermometer could register!

On James Island their walk was a long one. About six miles to an elevation of two thousand feet, very dry, very hot, the trees low and crooked and nearly leafless but of a larger size than he had thus far observed. At three thousand feet they found the only watering places on the island. Clouds hung over this highest land; the vapor condensed by the trees dripped down like rain. It was wonderfully refreshing. Sometimes they made "wet landings," onto narrow, shallow beaches, rolling their loose-bottomed trousers above the knees, tying their shoes around their neck by the laces, the socks stuffed inside, slipping off the side of the

whaleboat after waiting out the incoming wave to wade ashore, the water high on their legs as they picked their way over pumice rocks and pebbles. Sometimes they approached a sharply inclining lava cliff, fingernails and toes holding onto weathered crevices in the near perpendicular walls.

Since the crew members had been bringing back ten to fifteen giant tortoises a day, he and Syms tried to lift one. All they got for their pains was a solid hissing before the enormous antediluvian creature pulled in its head and began to move pachydermously

away. Charles stood on the tortoise's thick-crusted shell but this did not stop its inching forward.

"In fact," he said with a grin, "he hardly noticed! I wonder how old he is. It's said they can live for hundreds of years. This cactus they chew on must be Ponce de Leon's Fountain of Youth."

The geology was instructive and amusing: craters of all sizes and forms studded about in every direction; some so tiny they might properly be called specimen craters. There were layers of volcanic sandstone, streams of lava naked, black, rough and horrid, grand fields of trachytic lava containing large crystals of glassy, fractured feldspar. The streams were mostly naked of water, their age marked by the presence or absence of foliage; he now believed every plant or tree was in flower or leaf, brown being its prevalent color. Some of the craters were high hills, getting greener as one ascended the peaks, these upland green valleys frequently capturing a refreshing southerly trade wind.

He explored the black cones of craters which resembled the ironwork chimneys at

Wolverhampton, large circular pits, "which were probably produced by a volume of gas at the time when the lava was liquid."

He exclaimed joyfully:

He had failed to

anticipate the

breath-taking

beauty of the archi-

pelago: the brilliant

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and sea; the rich

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myriad birds.

"It's always delightful to behold anything which has long been familiar, but only by description."

One night he slept on the beach, then spent the next day collecting a variety of black basaltic lava, volcanic dust, ancient shells, insects he could describe but not name; cactus, brushwood, birds, the marine iguana which he had at first found dis-

gusting but now admired for the way it glided into the sea for sustenance, evaded its only enemy, the shark, and returned to bake in the hot sun. In this hot tropical sun Charles's hair became a goldish red, as in the cold of Tierra del Fuego the color had frozen out to leave it dark.

He had failed to anticipate the breath-taking beauty of the archipelago: the brilliant blueness of the sky and sea; the rich plumage of the myriad birds: frigates with their inflatable orange or red throat pouches, penguins, the clean white-masked and blue-foot-

ed boobies; the flightless cormorant with its truncated, useless wings, the waved albatross, lava and swallow-tailed gull, the red-billed tropic bird, the night heron, finches; the little pools where baby seals romped playfully, the massive bull sea lion flopping up to the best flat rock on the promontory, where his females could gather round him; the sea turtle digging a hole in the sand to deposit its eggs; the birds dropping their eggs on meager sticknests on the hard lava ground or in their mating places high on the pock-marked, scarified pumice cliffs; the thick, stumpy-legged tortoises looking like inhabitants of another planet; the sounds of birds, reptiles, fish and sea animals. And very high up, the green foliage where the palo santo, the button mangrove, matazarno had taken hold in the earth that the winds had blown in over the aeons; the tall, distorted cactus trees, a peculiar rugged cactus whose large oval leaves formed connecting branches. The blowholes where the sea erupted like geysers; the submarine cliffs descending as far as two miles to the bed of the ocean; circular lakes, cliffs sculptured by wind and sea into fantastic columnar shapes.

The several hundred species of fish were incredible; and on the shore line, in addition to the Sally Light-foot crabs, were starfish, sea urchins, sand dollars, sea cucumbers, all shimmering in the intensely white heat. . . .

It was not until H.M.S. Beagle anchored in a cove of Charles Island that he got his first glimpse of the true significance of the Galápagos Islands. Part of it was his own discovery; by studying the finches he had caught on two different islands, he found that they unexpectedly had differently shaped beaks. The second half of the awakening was provided by Nicholas Lawson, the acting British governor who had been appointed when Ecuador claimed ownership of the islands only a couple of years before. Lawson's hair and face were fried red by the sun but he loved the islands for the beauty of their stark black cliffs, clear lagoons, the variety of wild life.

He was at the port of Charles Island to visit a whaling vessel and offered to show Charles the way to the settlement of some two hundred exiles who had been banished from Ecuador for political crimes against the state. During the four-mile walk along the cinder path to the center of the island, they passed a number of tortoises moving at the rate of four miles in twenty-four hours.

Lawson commented:

"I maintain that I can at once tell from which island any one of these tortoises was brought."

Charles pulled up short.

"Are you suggesting, Mr. Lawson, that each island produces its own kind of tortoise?"

"No question about it, Mr. Darwin. I learned how to identify them more'n a year ago. The tortoises of the various islands differ chiefly in their carapaces, different island forms having consistently higher or lower domes on their shells, and distinctive flared margins at the front and back. The carapaces differ too in color and thickness. The tortoises on different islands also grow to a different size, have longer or shorter necks and legs."

Charles was confounded by the phenomenon, and asked Lawson, "Why and how would they change their characteristics?"

The consul's voice sounded as though his throat too had been blistered by the implacable sun.

"I couldn't say, Mr. Darwin. I only know what my eyes tell me."

The puzzle stuck in Charles's mind the way burrs had stuck in the fur of Pincher when he walked him along the river Severn. During the several hours that he spent with Lawson in the pueblo of thatched roofs, makeshift dwellings resting on poles, with patches of sweet potatoes and plantains, the riddle of the differing tortoises bedeviled him. He sat on a log near the natural spring where the turtles and tortoises got their fresh water, a scarcity in the islands because the porous lava rock would not hold the rainfall. Many of the prehistoric monsters traveled upward with outstretched neeks as another set returned, having drunk its fill. He watched the tortoises with their heads buried above the eyes sucking in great mouthfuls of water.

"I've been remiss," he decided. "I've put my finds from these islands in the same bag without identifying their place of origin. If there are differences in the beaks of the finches and the shells of the tortoises, I must exercise extreme care to label each island's collection quite scrupulously. In that way I can make comparisons, learn if all the species, birds, lizards, plants, vary from island to island. That could be the most important discovery of my journey. What causes these differences? 'Ay, there's the rub."

#### **Activity Options**

- Creating Charts and Graphs Create a chart to show what Darwin finds as he explores the Galápagos Islands. List different plants, animals, and geological features he observes. Share your chart with classmates.
- 2. Writing for a Specific Purpose Picture yourself as Charles Darwin. Write down your scientific observations on the Galápagos Islands in the form of field notes and share them with the class.
- 3. Writing Descriptive Paragraphs Use vivid details in this excerpt to help you visualize what the Galápagos Islands look like, what plants and animals live there, and so forth. Then work with a group of classmates to create a descriptive travel brochure about the islands. If possible, add sketches or photographs to your brochure.





### HISTORYMAKERS Marie and Pierre Curie

Dedicated to Science

"Whatever happens, even if one were to be like a body without a soul, one must work just the same."—Pierre Curie to his wife, Marie

Marie and Pierre Curie were dedicated and brilliant scientists. They shared with another scientist the Nobel Prize for Physics in 1903, and Marie won the Nobel Prize for Chemistry in 1911. The Curies won these and other awards because their work helped shape modern physics.

Marie Curie was born Maria Sklodowska in Poland in 1867. Her parents were intellectuals who, for political reasons, had difficulty finding jobs suitable to their training. Despite their struggles, they managed to pass their interest in education to their daughter, who proved herself a highly intelligent student. The family's poverty, though, forced young Marie to work to help send an older sister to college. Marie took a job as a governess for a wealthy family. Each day when she finished her work, she taught the poor peasants on the family's estate.

In 1891, Marie moved to Paris to continue her own education. She lived in an attic apartment and ate only bread and butter and tea. Studying hard, she finished first in a licensing exam in physics in 1893 and second in the mathematics exam in 1894. That year, she met Pierre Curie, a scientist from Paris who was eight years her senior and had done some important work in magnetism. He proposed to her in a few months, and the next year they wed.

The marriage came as modern physics was just beginning, and the two scientists were excited by new discoveries. Wilhelm Roentgen discovered x-rays in 1895. Henri Becquerel found that uranium radiated similar rays in 1896. Marie began experiments aimed at finding other materials that emitted this radiation.

Marie began using a piece of equipment that Pierre and his brother had made in order to measure weak electrical current. She learned that thorium was, like uranium, radioactive—a term that she coined. Soon, Pierre left his own research and joined his wife in this work. In 1898, they discovered a new radioactive element, which they named polonium after Marie's native country. That year they also discovered the element radium. They identified both elements from the radiation they gave off. While Pierre continued to study that radi-

ation, Marie focused on trying to isolate pure samples of the two elements. Working with a chemist, she was finally able to obtain a small sample of radium in 1902. She won two French science prizes for this work. The next year brought more rewards. Marie was granted her doctorate in science, and both Curies won an award from the British Royal Society and the Nobel Prize for Physics.

The Curies found fame unwelcome. They were generous with their time and knowledge for both scientists and business owners who hoped to find uses for radioactive substances. However, they complained about the "burden of fame" and reluctantly began to take shorter vacations and fewer bicycle rides, a favorite recreation. In 1906, tragedy struck when Pierre was killed by a cart on a Paris street. The next month, the faculty of the Sorbonne University voted to give Marie the professorship that Pierre had held. She became the first woman in the history of that school to teach classes.

Marie taught and worked in the laboratory for almost 30 more years. She also continued winning awards and was always generous. She used the money that came with her 1911 Nobel Prize for Chemistry for research or gave it to friends. During World War I she worked closely with the French army, teaching doctors how to use x-rays to help wounded soldiers.

After the war, Marie labored to build a supply of radioactive material. Some was used for medicine while other samples were taken for further research. In 1934, she died of leukemia, a disease caused by lifelong contact with radioactive elements.

#### Questions

- 1. **Determining Main Ideas** Give two examples of actions Marie Curie took that showed she was a humanitarian.
- 2. **Summarizing** How did Pierre's efforts contribute to the scientific success of the couple?
- 3. Following Chronological Order Outline the sequence of Marie Curie's career as a scientist.





# CONNECTIONS ACROSS TIME AND CULTURES Breakthroughs in Science and Technology

THEMATIC CONNECTION: SCIENCE AND TECHNOLOGY

Breakthroughs in science and technology marked the 1600s and 1700s and later the Industrial Age. How does the Scientific Revolution that began in the mid-1500s compare with the explosion of scientific knowledge some 300 years later? To make the comparison, answer the questions that follow.

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1. During the Scientific Revolution, Copernicus, Kepler, and Galileo challenged the	
long-held geocentric theory of the universe. For his beliefs, Galileo was tried by the	
Catholic Church and forced to refute the Copernican theory.	
a. What traditional theory of the 1800s did Charles Darwin challenge?	
b. How did Darwin's theory of evolution affect society?	
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2. The age of European exploration fueled a great deal of scientific research, especially	
in astronomy and mathematics. What advances in science and technology resulted	
from the demands of expanding industries?	
3. In 1661, the chemist Robert Boyle proposed that matter was made up of smaller primary particles joined together in different ways. How did Boyle's findings relate to those of John Dalton and Ernest Rutherford?	
4. During the Scientific Revolution, doctors learned a great deal about human anatomy.	
a. What medical breakthroughs occurred in the late 1800s?	
b. What were the long-term effects of these medical advances?	
5. In what way do you think the Scientific Revolution made possible the scientific discoveries of the Industrial Age?	
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## RETEACHING ACTIVITY Democratic Reform and Activism

**Reading Comprehension** Find the name or term in the second column that best matches the description in the first column. Then write the letter of your answer(s) in the blank.

]	. British legislative body composed of a House of	A. Third Republic
_	Commons and a House of Lords	B. Emmeline Pankhurst
2	2. Group that called for voting reform and the vote for all men in Britain in 1838	C. pograms
3	3. British monarch who came to the throne in 1837 and served for nearly 64 years	D. Zionism
		E. Émile Zola
4	4. Formed the militant Women's Social and Political Union in Britain in 1903	F. Parliament
5	5. The period of time after the Franco-Prussian War when	G. Dreyfus affair
	the National Assembly agreed on a new government	H. anti-Semitism
	6. Case in which a Jewish captain in the French Army was falsely accused of selling military secrets to the Germans	I. Second Reich
7	7. Prejudice against Jews	J. Chartist movement
8	3. French writer who wrote in support of Albert Dreyfus	K. Victor Hugo
10	). Movement seeking a homeland for the Jews in Palestine	L. Elizabeth I
		M Queen Viotoria



### RETEACHING ACTIVITY Self-Rule for British Colonies

**Determining Main Ideas** The following questions deal with the gradual development of self-rule in Britain's colonies. Answer them in the space provided.

	that with its colonies of Canada, Australia, and New Zealand?
•	What conflict within Canada made it difficult for it to gain self-rule?
•.	What reforms did Lord Durham recommend for Canada?
•	What relationship with Britain did Canada have when it joined with Nova Scotia and New Brunswick in 1867?
	Who were the original inhabitants of Australia and New Zealand?
•.	How did the British go about populating Australia?
	What industry developed into Australia's biggest business?
•	What political reforms did Australia and New Zealand pioneer?
•	What was the political impact of the Great Famine in Ireland?
	What would home rule for the Irish mean?

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## RETEACHING ACTIVITY War and Expansion in the United States

1. The idea that the United States had the right to rule North America from the Atlantic Ocean to the Pacific Ocean was	5. Which of the following was NOT a difference between the North and the South before the Civil War?
called a. imperialism. b. manifest destiny. c. divine right. d. westward expansion.  2. The Trail of Tears refers to a. the journey of the Cherokee from Georgia to Oklahoma. b. the route westward followed by thousands of pioneers. c. the slaughter of Native Americans in the West. d. the eviction of Native Americans from their tribal lands.  3. As a result of the Mexican-American War, Mexico ceded to the United States land	<ul> <li>a. the source of labor for farms and factories</li> <li>b. diversified economy vs. an economy based on a few cash crops</li> <li>c. commitment to extending its own way of life</li> <li>d. a belief in states rights vs. belief in a strong central government</li> <li>6. At the time of his election in 1860, Abraham Lincoln's position on slavery was</li> <li>a. that slavery should not exist at all.</li> <li>b. that the spread of slavery should be stopped.</li> <li>c. that slavery should be legalized in the South.</li> <li>d. that slavery should be allowed to</li> </ul>
including a. Texas. b. New Mexico. c. New Mexico and California. d. California and a huge area in the Southwest.  ———————————————————————————————————	spread into western territories.  7. The Confederate States of America formed when  a. Southern states seceded from the Union b. the Civil War started.  c. Jefferson Davis was elected president.  d. Lincoln issued the Emancipation Proclamation.  8. After the war, the U.S. Congress abolished slavery in the United States in the a. Bill of Rights.  b. 14th Amendment.  c. Emancipation Proclamation.  d. 13th Amendment.



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### RETEACHING ACTIVITY Nineteenth-Century Progress

Summarizing Complete the chart below by summarizing the contribution of each of the people, events, or inventions in the 19th century.

Person/Invention	Contribution
1. Thomas Edison	
2. Alexander Graham Bell	
3. Guglielmo Marconi	
4. Henry Ford	
5. Wright brothers	
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6. Louis Pasteur	
7. Joseph Lister	
7. Joseph Lister	
8. Charles Darwin	
or onarioo barvym	
9. Gregor Mendel	
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10. Marie and Pierre Curie	
11. Sigmund Freud	
12. mass culture	