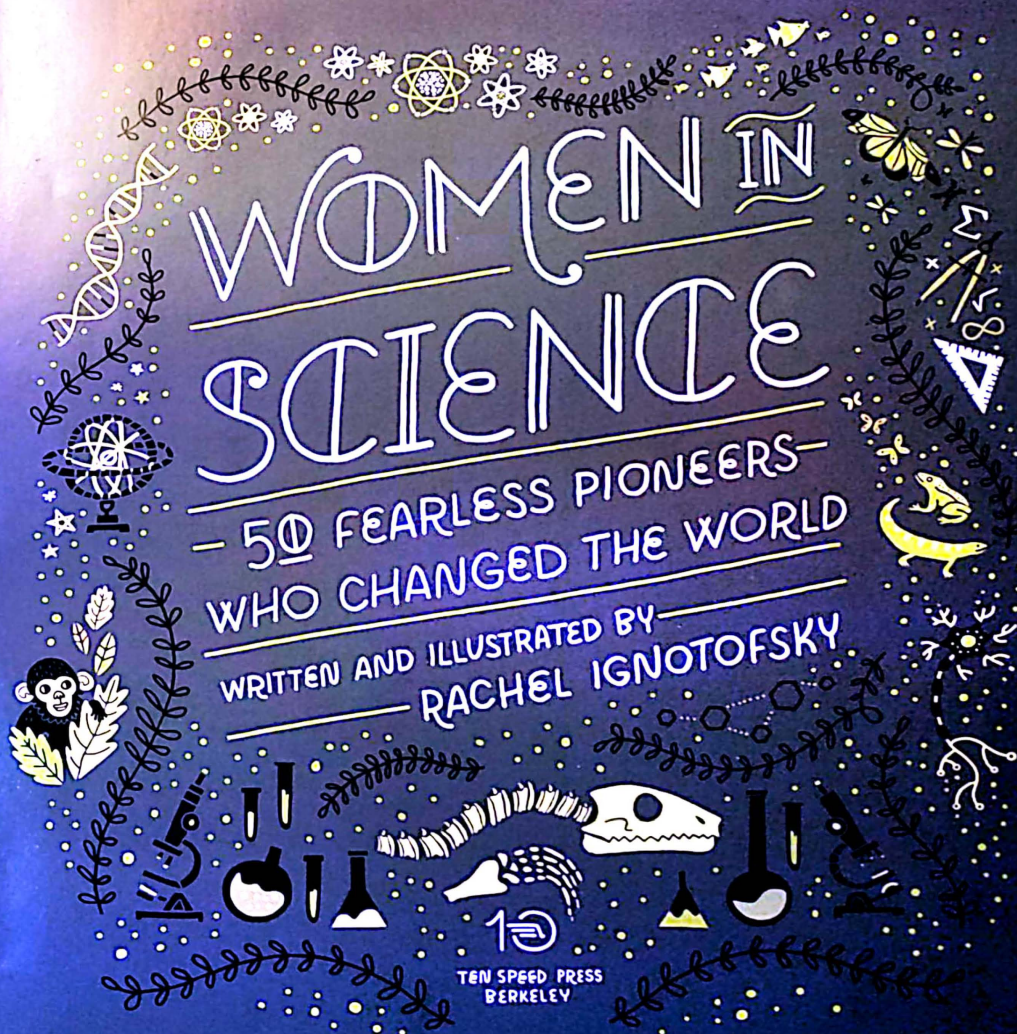


— 50 FEARLESS PIONEERS—
WHO CHANGED THE WORLD

WRITTEN AND ILLUSTRATED BY
RACHEL IGNOTOFSKY

TEN SPEED PRESS
BERKELEY



50 FEARLESS PIONEERS
WHO CHANGED THE WORLD

WRITTEN AND ILLUSTRATED BY
RACHEL IGNOTOFSKY

TEN SPEED PRESS
BERKELEY

CONTENTS

INTRODUCTION	6
HYPATIA (350-370CE – 415CE [?]).....	9
MARIA SIBYLLA MERIAN (1647–1717).....	11
WANG ZHENYI (1768–1797).....	13
MARY ANNING (1799–1847).....	15
ADA LOVELACE (1815–1852).....	17
ELIZABETH BLACKWELL (1821–1910).....	19
HERTHA Ayrton (1854–1923).....	21
KAREN Horney (1885–1952).....	23
NETTIE STEVENS (1861–1912).....	25
FLORENCE BASCOM (1862–1945).....	27
MARIE CURIE (1867–1934).....	29
MARY AGNES CHASE (1869–1963).....	31
TIMELINE.....	32
LISE MEITNER (1878–1968).....	35
LILLIAN GILBRETH (1878–1972).....	37
EMMY NOETHER (1882–1935).....	39
EDITH CLARKE (1883–1959).....	41
MARJORY STONEMAN DOUGLAS (1890–1998).....	43
ALICE BALL (1892–1916).....	45
GERTY CORI (1896–1957).....	47
JOAN BEAUCHAMP PROCTER (1897–1931).....	49
CECILIA PAYNE-GAPOSCHKIN (1900–1979).....	51
BARBARA MCCLINTOCK (1902–1992).....	53
MARIA GOEPPERT-MAYER (1906–1972).....	55
GRACE HOPPER (1906–1992).....	57
RACHEL CARSON (1907–1964).....	59
LAB TOOLS.....	60
RITA LEVI-MONTALCINI (1909–2012).....	63
DOROTHY HODGKIN (1910–1994).....	65



CHIEN-SHUNG WU (1912–1997).....	67
HEDY LAMARR (1914–2000).....	69
MAMIE PHIPPS CLARK (1917–1983).....	71
GERTRUDE ELION (1918–1999).....	73
KATHERINE JOHNSON (1918–).....	75
JANE COOKE WRIGHT (1919–2013).....	77
ROSALIND FRANKLIN (1920–1958).....	79
ROSALYN YALOW (1921–2011).....	81
ESTHER LEDERBERG (1922–2006).....	83
STATISTICS IN STEM.....	84
VERA RUBIN (1928–2016).....	87
ANNIE EASLEY (1933–2011).....	89
JANE GOODALL (1934–).....	91
SYLVIA EARLE (1935–).....	93
VALENTINA TERESHKOVA (1937–).....	95
PATRICIA BATH (1942–).....	97
CHRISTIANE NÜSSLEIN-VOLHARD (1942–).....	99
JOCELYN BELL BURNELL (1943–).....	101
SAU LAN WU (194?–).....	103
ELIZABETH BLACKBURN (1948–).....	105
KATIA KRAFFT (1942–1991).....	107
MAE JEMISON (1956–).....	109
MAY-BRITT MOSER (1963–).....	111
MARYAM MIRZAKHANI (1977–2017).....	113
MORE WOMEN IN SCIENCE.....	114
CONCLUSION.....	117
GLOSSARY.....	118
SOURCES.....	122
ACKNOWLEDGMENTS.....	124
ABOUT THE AUTHOR.....	125
INDEX.....	126



"I WAS TAUGHT THAT THE WAY OF PROGRESS IS NEITHER SWIFT NOR EASY." — MARIE CURIE

MARIE CURIE

PHYSICIST AND CHEMIST

Marie Curie was born in Warsaw, Poland, in 1867. After working as a governess to support her sister's education, it was Marie's turn. She traveled to Paris to study at the Sorbonne, where she met Pierre Curie, a fellow scientist and her greatest love.

Scientist Henri Becquerel had discovered a mysterious glow coming from uranium salts. Scientists didn't seem too interested in the effect, but Marie was fascinated by the glow and wanted to know what it was and why it was happening. In a stuffy shed, Marie and Pierre went to work. Using Pierre's electrometer, Marie examined "glowing" compounds and discovered that the energy being produced came from the uranium atom itself! We now know that atoms with an unstable nucleus emit particles and release energy. Marie started calling the effect "radioactivity." To find the source, she and Pierre ground up and filtered down other radioactive materials, like the mineral ore uraninite. Through this process Pierre and Marie discovered 2 new radioactive elements: polonium and radium. Together, the Curies received a Nobel prize in physics in 1903 for the discovery of radiation. Later, in 1911, Marie won a second Nobel prize in chemistry for her discovery of and research into polonium and radium.

Pierre and Marie made an amazing team. Sadly, they realized that the radiation from their experiments was making them sick. Pierre would do tests with radium on his own arm that left large burns. Their long-term exposure made them both tired and achy—we now understand that the effects of radiation poisoning are deadly. In 1906, Pierre was killed in a horse-carriage accident. Despite her grief and the danger involved, Marie continued their important work and discovered that radium could be used as a cancer treatment. She spent hours collecting radon gas to send to hospitals even though it left her feeling weak.

In 1914, France was invaded during World War I. With her daughter Irène, she created a unit of mobile medical X-ray trucks, which they heroically drove onto the battlefields to help wounded soldiers.

Marie Curie did scientific work because she loved it and dangerous work because the world needed it. Her life and work continue to inspire scientists today.

FIRST WOMAN TO GET
A DOCTORATE IN FRANCE.



POLONIUM WAS NAMED
AFTER POLAND.



RADIUM WAS NAMED
AFTER THE SUN.



MOTHER OF 2 GIRLS.

FIRST WOMAN TO BE
HONORED FOR HER
OWN ACHIEVEMENTS
WITH HER BURIAL IN
THE PANTHEON
IN PARIS.



FIRST PERSON TO
WIN A NOBEL IN TWO
DIFFERENT DISCIPLINES.

COINED THE WORD
"RADIOACTIVITY."



ALL OF HER RESEARCH
IS KEPT IN LEAD-
LINED CASES. THE
MATERIALS ARE
STILL RADIOACTIVE.



KEPT VIALS OF GLOWING
RADIUM IN HER POCKET
A DANGEROUS PRACTICE



INHERITED PIERRE'S
CHAIR AT THE SORBONNE



BECOMING THEIR FIRST
FEMALE PROFESSOR

