

Annotated Bibliography: Women in Physics, Astronomy, and Related Disciplines

Abir Am, Pnina and Dorinda Outram, eds. *Uneasy Careers and Intimate Lives: Women in Science, 1787-1979*. New Brunswick, NJ: Rutgers University Press, 1987.

Abir Am and Outram's volume includes a collection of essays about women in science that highlight the intersection of personal and professional spheres. All of the articles argue that the careers of women scientists are influenced by their family lives and that their family lives are impacted because of their scientific careers. This text is significant in two ways: first, it is one of the earliest examples of scholarship that moves beyond the recovering women in science, but placing them in the context of their home and work environments. Second, it suggests that historians of science can no longer ignore the private lives of their historical subjects. This volume contains four articles relating to women in physics and astronomy: Marilyn Bailey Ogilvie's "Marital Collaboration: An Approach to Science" (pages 104-125), Sally Gregory Kohlstedt's "Maria Mitchell and the Advancement of Women in Science" (pages 129-146), Helena M. Pycior's "Marie Curie's 'Anti-Natural Path': Time Only for Science and Family" (pages 191-215), and Peggy Kidwell's "Cecelia Payne-Gaposchkin: Astronomy in the Family" (pages 216-238).

As a unit, the articles would constitute an interesting lesson on personal and professional influences. Individually, the articles could be incorporated into lessons on a single scientist, offering a new perspective on their activities at work and at home. It complements Pycior, Slack, and Abir Am's *Creative Couples in the Sciences* and Lykknes, Opitz, and Van Tiggelen's *For Better or For Worse: Collaborative Couples in the Sciences*, which also look at the intersection of the personal and professional.

Ajzenberg-Selove, Fay. *A Matter of Choices: Memoirs of a Female Physicist*. New Brunswick, NJ: Rutgers University Press, 1994.

A Matter of Choices: Memoirs of a Female Physicist offers a first-hand account of the life of Fay Ajzenberg-Selove, a German-American nuclear physicist. The book discusses the fate of her Jewish family around the Second World War, her difficulty adjusting to life in America, and ultimately her success in research. The majority of the book focuses on her experiences as a woman in the scientific community, rather than the technical details of her research career. Ajzenberg-Selove notes in the beginning of her book that teaching, not physics, is her true passion.

This autobiography could be read in its entirety for a lesson on Fay Ajzenberg-Selove or in excerpts as part of a comparative activity including the experiences of other women physicists.

Alic, Margaret. *Hypatia's Heritage: A History of Women in Science from Antiquity to the Late Nineteenth Century*. Boston: Beacon Press, 1986.

Alic's book provides a general account of women's role in science throughout history. It covers the time period from around 3300 BC (the Bronze Age) through

the nineteenth century. The book focuses on women in the life sciences and philosophy. Physics and astronomy are not prominently featured.

This book is useful as an overview of the circumstances in which it was socially acceptable for women to participate in science. It could be considered as background material for a lesson.

Ambrose, Susan A., Kristin L. Dunkle, Barbara B. Lazarus, Indira Nair, and Deborah A. Harkus. *Journeys of Women in Science and Engineering: No Universal Constants*. Philadelphia: Temple University Press, 1997.

This volume contains brief profiles (approximately 3-4 pages) of women scientists compiled from interviews with them. All are composed in the first person- some of the scientists prepared their own profiles, while the authors prepared the rest while trying to maintain the voice of the interview subject. Applied physicists in this volume include Esther Marly Conwell, Mildred Dresselhaus, Arati Prabhakar, and Susan Wood. Astrophysicists include Bonnie J. Dunbar, Vera Rubin, and Judith S. Young. Chemical physicists include Diana Garcia-Prichard. Condensed matter physicists include Judy R. Franz, Shirley Ann Jackson (also listed under elementary particle physics, nuclear physics, and optical physics), Sara Majetich, Luz J. Martinez-Miranda, and Bonnie Shulman. High energy physicists include Priscilla Auchincloss. Medical physicists include Rosalyn Sussman Yalow (also listed under nuclear physics). Aerospace engineers include Nancy Rhoads. Aeronautical engineers include Sheila Evans Widnall.

This book is a good starting point for biographical lessons and research projects. The profiles are interesting hybrid primary sources.

Bailey, Martha. *American Women in Science: 1950 to the Present: A Biographical Dictionary*. Santa Barbara, CA: ABC-CLIO, 1998.

The volume begins with a list of women by profession, as represented in the disciplines awarded membership in the National Academy of Sciences. The introduction includes a detailed discussion of the realms in which women made significant contributions to science, including astronomy and astrophysics, and the space program. The profiles include bullet points with the scientist's name, dates of birth/death, title, education, professional experience, marital status, and number of children. Astronomers included in this volume are Eleanor Margaret Burbidge (also listed under astrophysicists), Frances Cordova (also listed under astrophysicists), Debra Elmgreen, Sandra Faber, Margaret Geller (also listed under astrophysicists), Heidi Hammel, Sarah Lippincott, Lucy-Ann McFadden, Elizabeth Roemer, Nancy Roman, Vera Rubin, Carolyn Shoemaker, Elske Smith, and Beatrice Tinsley. Astrophysicists included are Devrie Intriligator (also listed under physicist) and Anne Underhill. Astronauts include Mary Cleave, Geraldine Cobb, Bonnie Dunbar, Anna Fisher, Mae Jemison, Shannon Lucid, Ellen Ochoa, Judith Resnik, Sally Ride (also listed under physicist), Margaret Seddon, Kathryn Sullivan, and Kathryn Thornton. Biophysicists include Evangelia Micheli-Tzanakou and Eugenie Mielczarek. Geophysicists include Gisela Dreschhoff (also listed under physicist), Lucy-Ann McFadden, Marcia McNutt, and Alexandra Navrotsky. Physicists include

Fay Ajzenberg-Selove, Betsy Ancker-Johnson, Evelyn Berezin, Renate Chasman, E. Gail De Planque, Cecile Dewitt-Morette, Mildred Dresselhaus, Helen T. Edwards, Mary Gaillard, Elsa Garmire, Caroline Herzenberg, Shirley Jackson, Joyce Kaufman, Evelyn Keller, Susan Kieffer, Doris Kuhlmann-Wilsdorf, Joanna Levelt-Sengers, Gloria Lubkin, Diana McSherry, Evangelia Micheli-Tzanakou, Eugenie Mielczarek, Diana Prichard, Dianne Prinz, Myriam Sarachik, Mary Spaeth, Kathryn Thornton, and Julia Weertman.

This volume is a useful starting point for lessons and research projects. It is also ideal for comparative activities that reveal trends and anomalies in women's experiences in the physical sciences.

Bailey, Martha. *American Women in Science: A Biographical Dictionary*. Santa Barbara, CA: ABC-CLIO, 1994.

This book offers brief biographies of American women in the physical and natural sciences active before 1950. The introductory chapter expounds on the places where women were employed in science: the university, federal government, state government, museums, arboreta and herbaria, business and industry, associations and society, and as editors, librarians, authors, artists, and explorers. The profiles include bullet points with the scientist's name, date of birth (and death), title, education history, employment history, marital status. A few paragraphs follow extrapolating on the woman's career, scientific research, and awards. The profiles appear alphabetically. Unfortunately they are not indexed by discipline.

This volume is a useful starting point for lessons and research projects. It is also ideal for comparative activities that reveal trends and anomalies in women's experiences in the physical sciences.

Bergland, Renee. *Maria Mitchell and the Sexing of Science: An Astronomer Among the American Romantics*. Boston: Beacon Press, 2008.

Bergland offers a detailed account of Maria Mitchell's personal life and career within the context of 19th Century American science. Mitchell, born into a Quaker family in a coastal village, was encouraged to pursue astronomy and worked alongside her father throughout the beginning of her career. Her discoveries of comets confirmed her own scientific merit and opened the door to two tours of European observatories and a position with the national *Nautical Almanac*. Later she became a professor of astronomy at Vassar College, where she worked hard to encourage the young women to pursue scientific careers. The book highlights the opportunities available to Mitchell and later the diminishing professional prospects for her students at Vassar. It is a window into a scientific community, and the opportunities for women, in flux.

This book could be read in its entirety for a lesson on Maria Mitchell or in excerpts as part of a comparative activity including the experiences of other women astronomers.

Bystydzienski, Jill and Sharon Bird. *Removing Barriers: Women in Academic Science, Technology, Engineering, and Mathematics*. Bloomington, IN: Indiana University Press, 2006.

Removing Barriers: Women in Academic Science, Technology, Engineering, and Mathematics is a collection of seventeen articles on a range of topics within the field of women in science. It is divided into four parts. The first part, titled “History of Women in STEM Fields,” focuses on women’s experiences in science and technology careers in the 20th century. The second section, “Institutional and Cultural Barriers for Women in STEM,” includes a number of articles on women’s current roles in STEM fields and the challenges that they face. The third part, “Feminist Study of Scientific Practice,” considers how feminism has impacted the practice of science. The final part, “Remedies and Change,” looks to the future and how STEM can be made more welcoming to women.

The articles in this volume do not focus specifically on physics and astronomy. Because of the general nature of the text, it would be most useful as background for lessons on professional discrimination and ways to address it.

Byers, Nina and Gary Williams, eds. *Out of the Shadows: Contributions of Twentieth-Century Women to Physics*. Cambridge, UK: Cambridge University Press, 2010.

Out of the Shadows: Contributions of Twentieth-Century Women to Physics presents profiles of forty female physicists active between 1876 and 1976. The biographical sketches focus heavily on the scientific work of each physicist and their contributions to their respective fields, rather than their home lives, although relevant personal information is provided. The volume contains women working in a variety of fields, including high energy physics, geophysics, surface physics, condensed matter physics, nuclear physics, astronomy, and many others. The women in this volume include (by order of birth): Hertha Ayrton, Margaret Eliza Maltby, Agnes Pockels, Marie Curie, Henrietta Swan Leavitt, Harriet Brooks, Lise Meitner, Emily Noether, Inge Lehmann, Marietta Blau, Hertha Sponer, Irène Joliot-Curie, Katharine Burr Blodgett, Cecelia Payne-Gaposchkin, Mary Lucy Cartwright, Bertha Swirles Jeffreys, Kathleen Yeardeley Lonsdale, Maria Goeppert Mayer, Helen Dick Megaw, Yvette Cauchois, Marguerite Catherine Perey, Dorothy Crowfoot Hodgkin, Gertrude Scharff Goldhaber, Chein-Shiung Wu, Eleanor Margaret Burbidge, Phyllis StCyr Freier, Rosalyn Sussman Yalow, Esther Conwell, Cécile DeWitt-Morette, Yvonne Choquet-Bruhat, Vera Cooper Rubin, Mildred Spiewak Dresselhaus, Myriam P Sarachik, Juliet Lee-Franzini, Helen Thom Edwards, Mary Katharine Gaillard, Renata Kallosh, Susan Jocelyn Bell Burnell, Gail Hanson, and Sau Lan Wu.

This volume is a useful starting point for lessons and research projects. It is also ideal for comparative activities that reveal trends and anomalies in women’s experiences in the physical sciences.

Cole, Jonathan: *Fair Science: Women in the Scientific Community*. New York: Free Press, 1979.

Cole writes from a sociological point of view on the attitudes towards women in science throughout history and the extent of their roles in the scientific community. He examines the proportions of degrees awarded to women, as well as the prestige

of universities that admitted women, as well as the traditional career paths accessible to women in academia and industry. His book focuses on women in biology, psychology and sociology.

Because of the general nature of the text, it would be most useful as background resource. It is written at a high reading level and is most appropriate for college students.

Creese, Mary. *Ladies in the Laboratory? American and British Women in Science, 1800-1900*. New York: Scarecrow, 1998.

Creese presents brief biographies of American and British women in science grouped by theme. Only two chapters are relevant to women in physics and astronomy. Chapter 9, titled "Ripple-Marks in the Sand, Images on the Screen, Unit Standardization: Studies by Women in Physics," addresses the educational background, research interests, careers, and publications of Caroline Baldwin, Mary Noyes, Mary Spencer, Alice Bruere, Isabella Stone, and Margaret Maltby. Chapter 10, titled "Observers, 'Computers,' Interpreters, and Popularizers: Women in Astronomy," offers similar information on Maria Mitchell, Mary Whitney, Caroline Furness, Anne Young, Mary Byrd, Sarah Whiting, Charlotte Willard, Anna Winlock, Williamina Fleming, Antonia Maury, Alice Lamb, Margareta Palmer, Elizabeth Brown, Flora Harpham, Mary Tarbox, Mary Wagner, Adelaide Hobe and Rose O'Halloran. The chapter concludes with graphical representation of publications by women astronomers by subject area.

Each chapter would be an excellent starting point for lessons about the roles available to women in physics and astronomy, as well as for research projects on the profiled women.

Des Jardins, Julie. *The Madame Curie Complex: The Hidden History of Women in Science*. New York: The Feminist Press at CUNY, 2010.

Des Jardins highlights select women in science, whose careers reveal significant patterns and themes of women's participation in the scientific workforce. Her analysis marries the personal and professional, and is embedded in larger social and cultural contexts. Des Jardins offers many examples of how gender shaped science. One recurrent theme is the success of women who conformed to the dominant masculine scientific culture. This history is not unduly laudatory or excessively victimizing; instead, it is a balanced and contextualized account of these women and their careers. Her accounts are organized into three eras: the professionalization of science up to WWII, the veneration of manly science after WWII, and the emergence of the second wave of feminism. The specter of Marie Curie looms large in many of Des Jardins stories; she argues that Curie's success, rather than inspiring women to pursue science and the community to welcome them, caused men and women to disqualify women from science because they could not follow Curie's extraordinary example. Five chapters are especially relevant to women in physics, astronomy, and related disciplines: Marie Curie's American Tours: Women and Science in the 1920s, To Embrace or Decline Marriage and Family: Annie Jump Cannon and the Women of the Harvard Observatory, 1880-1940, Those Science Made Invisible: Finding the Women of the Manhattan Project, Maria Goeppert Mayer and Rosalind Franklin: The

Politics of Partners and Prizes in the Heroic Age of Science, Generational Divides: Rosalyn Sussman Yalow, Evelyn Fox Keller, Barbara McClintock, and Feminism after 1963.

This volume is a useful starting point for lessons and research projects organized around the themes and individuals presented within. It is also ideal for comparative activities that reveal trends and anomalies in women's experiences in the physical sciences.

Fara, Patricia. *Scientists Anonymous: Great Stories of Women in Science*. London: Wizard Books, 2005

Fara's book highlights how and where women have been able to participate in science throughout history, beginning with salons and artisan workshops of the 17th century, through the Enlightenment science of the home, through growing women's networks in the 19th century, to women's fight for equality in modern universities and workplaces. The chapters include short (1-3 pages) biographies of the women active in each of the environments presented. The settings represent familiar themes, including collaboration with male relatives and under recognition. The physicists and astronomers featured include Margaret Cavendish, Elisabetha Hevelius, Maria Winkelmann, Emilie du Chatelet, Laura Bassi, Caroline Herschel, Mary Somerville, Agnes Clerke, Maria Mitchell, Hertha Ayrton, Grace Hopper, Marie Curie, Lise Meitner, and Mileva Einstein.

This volume is a useful starting point for lessons and research projects. The reading level is basic and the biographical entries are short; it would be most appropriate for middle school or advanced elementary school students.

Frize, Monique. *The Bold and the Brave: A History of Women in Science and Engineering*. Ottawa: University of Ottawa Press, 2010.

Frize divides her book into four main sections, which all focus on different aspects of women's roles in science throughout history: Views of Women's Intellectual Ability, Scientific Education of Women in the 17th-19th Centuries, Education and Careers in Science and Engineering, and Profiles of Mileva Maric Einstein, Sophie Germain, Rosalind Franklin. The book includes some information about women physicists, including Laura Bassi, Emilie du Chatelet, and Caroline Herschel, but this is not the primary focus of the book.

Because of the general nature of the text, it would be most useful as background resource. It may also be a useful starting point for lessons and research projects organized around physicists that fit the main themes of the book.

Gornick, Vivian. *Women in Science: Portraits from a World in Transition*. New York: Simon & Schuster, 1983.

Women in Science: Portraits from a World in Transition offers a glimpse into women's experiences in the scientific community. Gornick's interviews with women scientists shed light on women's changing opportunities in science in the 20th century. The book is divided into three sections reflecting the different stages of

women's participation in science: *Who Are These People, and What Do They Think They're Doing?*, *Half-In, Half-Out*, and *Women in Science: Demystifying the Profession*. The author changed all of the names, locations and fields of study so as to protect the identities of her interviewees.

This book provides very interesting first-hand accounts of women's experiences in science. Unfortunately none of the testimonials can be definitively associated with the physics and astronomy communities. Consequently, this fascinating book can only offer general background information on women's "progress" in the sciences.

Grinstein, Louise, ed. *Women in Chemistry and Physics: A Bibliographic Sourcebook*. Westport, CT: Greenwood, 1993.

Women in Chemistry and Physics: A Bibliographic Sourcebook provides brief biographies of international women in physics and chemistry. The 5+ page profiles include information on early life, career, family, research and awards. Each entry concludes with a bibliography. A list of women by profession, nation of origin, and nation of workplace is located in Appendix B. The women physicists who were born in or worked in the USA include Fay Ajzenberg-Selove, Gladys Anslow, Joan Berkowitz, Marietta Blau, Katharine Burr Blodgett, Emma Perry Carr, Renate Wiener Chasman, Cecile Dewitt-Morette, Mary Lowe Good, Joannette Gecsy Grasselli, Anna Jane Harrison, Caroline Stuart Littlejohn Herzenberg, Leone Woods Libby, Margaret, Elizabeth Maltby, Maria Goeppert-Mayer, Louise Sherwood McDowell, Helen Vaughn Michel, Ceclia Payne-Gaposchkin, Melba Phillips, Beatrice Tinsley, Frances Gertrude Wick, Chien-Shiung Wu, Rosalyn Sussman Yalow.

This volume is a useful starting point for lessons and research projects. It is also ideal for comparative activities that reveal trends and anomalies in women's experiences in the physical sciences. The biographies go into great depth on the women's scientific contributions. It is best suited for a college-aged audience.

Haber, Louis. *Women Pioneers of Science*. San Diego: Harcourt, 1979.

Haber presents biographies of women scientists who he has deemed role models. Around 10 pages in length, the biographical entries feature Lise Meitner, Maria Goeppert-Mayer, and Rosalyn Yalow.

This volume is a useful starting point for lessons and research projects. The individual profiles are overly flattering; this book should be used in conjunction with other biographies.

Haines, Catherine. *International Women in Science: A Biographical Dictionary to 1950*. Santa Barbara, CA: ABC-CLIO Ltd, 2001.

Haines offers brief profiles of "international" women in science. The volume begins with a list of women by profession. Each profile includes bullet points with the scientist's name, date of birth (and death), title, education history, employment history, and marital status. A few paragraphs follow extrapolating on the woman's career, scientific research, and awards. Each entry concludes with a bibliography. Astronomers in this volume include Madge Gertrude Adam, Mary Adela Blagg,

Eleanor Margaret Burbidge, Caroline Herschel, Lady Margaret Huggins, Nicole-Reine Lepaute, Annie Scott Dill Russell, Mary Ward, and Fiammetta Wilson. Physicists include Pheobe Sarah (Hertha) Ayrton, Laura Maria Bassi, Caroline Bleeker, Yvonne Choquet-Bruhat, Marie Curie, Johanna Eymers, Rosalind Franklin, Joan Freeman, Ellen Gleditsch, Emmeline Jean Hanson, Lady Margaret Huggins, Joan Heywood, Irene Joliot-Curie, Jean Laby, Lise Meitner, Ruby Violet Payne-Scott, Hertha Sponer, Xide Xie, and Toshio Yuasa.

Despite the “international” focus of the book, American women are excluded from its pages. Nevertheless, this volume is a useful starting point for lessons and research projects.

Hooker, Claire. *Irresistible Forces: Australian Women in Science*. Melbourne: Melbourne University Press, 2004.

Hooker presents the history of Australian women in science from the early 19th century to the present. Her book is organized by discipline and includes a section on “hard” sciences (primarily physics, but also math and chemistry). In this section, Hooker examines the proportion of women obtaining degrees in physics and how that has changed in the last century, in comparison to the proportion of women earning degrees in all areas. She then discusses some of the common attitudes to women in research throughout the 20th century and why so few women seem to go in to physics. Some of the explanations offered are the lack of encouragement from childhood and a hostile learning environment in coeducational schools. The section includes a list of prominent Australian women in physics.

This volume is a useful starting point for lessons and research projects on Australian women in physics.

Jack, Jordynn. *Science on the Home Front: American Women Scientists in World War II*. Champaign, IL: University of Illinois Press, 2009.

This book argues the importance of “genres of communication” in scientific culture. The focus of the book is on women and their relationships with the genres. Jack suggests that ethical and personal concerns are not readily expressed in these forms and that women are consequently made uncomfortable in scientific environments.

This book combines history with literary theory and sociology. It is written at a very high reading level most suitable to graduate students with specific interests and skills.

Johnson, George. *Miss Leavitt's Stars: The Untold Story of the Woman Who Discovered How to Measure the Universe*. New York: W. W. Norton and Company, 2006.

Miss Leavitt's Stars: The Untold Story of the Woman Who Discovered How to Measure the Universe focuses on Henrietta Swan Leavitt and her career at Harvard Observatory. Johnson also discusses Leavitt's relationship with Observatory director Edward Pickering and the other women “computers” employed there. Very little information is known about Leavitt and there are barely more than five known

photos of her. Johnson primarily used her correspondence and obituary to piece together a timeline of her life.

This book could be read in its entirety for a lesson on Henrietta Leavitt or in excerpts as part of a comparative activity including the experiences of other Harvard “computers.”

Kass-Simon, G. and Patricia Farnes, eds. *Women of Science: Righting the Record*. Bloomington: Indiana University Press, 1990.

Women of Science: Righting the Record covers the lives and studies of women in ten major fields of science, including physics, astronomy and crystallography. Astronomy and crystallography are included specifically due to the high proportion of women working in those fields. The physics section is made up of short biographies of ten female physicists, ranging from the extremely familiar such as Marie Curie and Lise Meitner, to the lesser known, including Yvette Cauchois about whom very little information is known. In the section on astronomy, two major factors that facilitated women’s progress in the field are discussed. The first is the “Seven Sisters” group of women’s colleges, originally a parallel to the all-male Ivy League. Special emphasis is given to Vassar College and its alumni and staff, including Maria Mitchell. The second is the opportunities for women at observatories in the late 19th and early 20th centuries. The book highlights the Harvard College Observatory and the women employed there as computers, hired due to their apparent predisposition towards repetitive tasks requiring precise attention to detail. Although these jobs were badly paid and often dull, some of these women – such as Henrietta Swan Leavitt – made huge discoveries while working in the observatories.

This volume is a useful starting point for lessons and research projects organized around the main themes of the book.

Kiernan, Denise. *The Girls of Atomic City: The Untold Story of the Women Who Helped Win World War II*. New York: Touchstone, 2013.

Kiernan’s book follows a handful of women and their families as they negotiate the secretive and primitive life of the Clinton Engineer Works in Oak Ridge, TN. These women represent different regions, education levels, religions, races, and socioeconomic classes. Each has her own priorities, which she must struggle to maintain on the “Reservation.” There are no women physicists in this story, but there are women doing physics. This is an interesting example of women’s competence and capabilities in the sciences.

This is a very interesting text to include in lessons about World War II and the atomic bomb. It provides a new perspective on the well-known narrative of the Manhattan Project. This book works well with biographies of Lise Meitner, Ida Noddak, and other women physicists who worked in nuclear physics in the early 20th century.

Kohlstedt, Sally Gregory, ed. *History of Women in the Sciences: Readings from Isis*. Chicago: University of Chicago Press, 1999.

This volume is compiled of articles about women in science appearing in the History of Science Society's *Isis* journal from 1976-1997. Articles relating to women in physics and astronomy include Londa Schiebinger's "Maria Winkelmann at the Berlin Academy: A Turning Point for Women in Astronomy" (pages 39-65), Paula Findlen's "Science as a Career in Enlightenment Italy: The Strategies of Laura Bassi" (pages 67-95), and Peggy Aldrich Kidwell's "Women Astronomers in Britain: 1780-1930" (pages 221-233).

The articles in this volume are useful in biographical and thematic lessons. They are suited for graduate and advanced undergraduate students.

Lykknes, Annette, Donald L. Opitz, and Brigitte Van Tiggelen, ed. *For Better or For Worse? Collaborative Couples in the Sciences*. Basel: Birkhäuser, 2012.

This volume examines collaborative partnerships in their social, personal, and political contexts. Only one article is relevant to women in physics, Donald Opitz's "Not Merely Wifely Devotion': Collaborating in the Construction of Science at Terling Place" (pages 33-56), which discusses the scientific collaboration of Lord and Lady Rayleigh in the setting of their estate.

It is suited for graduate and advanced undergraduate students. It complements Abir Am and Outram's *Uneasy Careers and Intimate Lives: Women in Science, 1787-1979* and Pycior, Slack, which also look at the intersection of the personal and professional.

McGrayne, Sharon Bertsch. *Nobel Prize Women in Science: Their Lives, Struggles, and Momentous Discoveries*. Washington, DC: Joseph Henry Press, 2001.

Nobel Prize Women in Science: Their Lives, Struggles, and Momentous Discoveries describes the lives of fourteen women closely connected with Nobel prizes, including nine recipients and five whose research contributed significantly to work which was awarded a prize. The book is divided into three sections, "The First Generation Pioneers," "The Second Generation," and "The New Generation." The women in this volume include Marie Curie, Lise Meitner, Emmy Noether, Irène Joliot-Curie, Maria Goeppert-Mayer, Dorothy Crowfoot Hodgkin, Chien-Shiung Wu, Rosalyn Sussman Yalow, and Jocelyn Bell Burnell.

This volume is a useful starting point for lessons on under recognition, as well as research projects on the women profiled in the book.

Mulvihill, Mary. *Lab Coats and Lace: The Lives and Legacies of Inspiring Irish Women Scientists and Pioneers*. Dublin: WITS, 2009.

Lab Coats and Lace: The Lives and Legacies of Inspiring Irish Women Scientists and Pioneers is a collection of 13 essays on women scientists and campaigners in Ireland. The essays cover a wide range of subjects including women in medicine, the struggle for women's right to work, as well as accounts of the lives of Irish female scientists.

The volume includes two essays on women in astronomy and physics. The first, "Torch-Bearing Women Astronomers," presents biographies of Annie Dill Russell (Maunder) and Alice Everett, thought to be two of the first employed female astronomers in Britain or Ireland. They were both employed at the Greenwich Observatory in London after attending Girton College, Cambridge, one of the first all-female colleges in the UK. Their experiences offer a parallel to the path taken by the women who studied at Radcliffe College before gaining employment at the Harvard College Observatory at almost the exact same time. The second essay, "The Stuff of Diamonds," covers the life and work of X-ray crystallographer Kathleen Lonsdale. The article is equally split between focusing on her work in crystallography and her work promoting both science education and pacifism.

This volume is a useful starting point for lessons and research projects on Australian women in physics and astronomy.

Neely, Kathryn. *Mary Somerville: Science, Illumination, and the Female Mind*. Cambridge: Cambridge University Press, 2001.

Neely had four primary objectives in writing her biography of Mary Somerville. First, she aims to offer a comprehensive account of Somerville's life and work which, to date, cannot be found in a single volume. Second, she wishes to explore Somerville's "eminence" and the forces that allowed her to achieve acclaim. Third, Neely hopes this story will serve as a reminder of the power and fluidity of gender and science as historical entities. Fourth, she desires to write a history of women in science that is fully integrated into the history of science. Neely's analysis is built on how Somerville was perceived by her contemporaries, as well as popular ideas about the female mind at the time.

This book could be read in its entirety for a lesson on Mary Somerville or in excerpts as part of a comparative activity including the experiences of other women astronomers.

Oakes, Elizabeth. *International Encyclopedia of Women Scientists*. New York: Facts on File Inc., 2001.

The *International Encyclopedia of Women Scientists* contains profiles of around 350 female scientists working in a variety of fields. Each entry includes a photograph and a short (approximately four paragraphs) biography. The volume also includes lists of scientists sorted by – amongst other things – country of birth versus country of major scientific work.

This volume is a useful starting point for lessons and research projects. It is also ideal for comparative activities that reveal trends and anomalies in women's experiences in the physical sciences.

Ogilvie, Marilyn. *Marie Curie: A Biography*. Amherst, NY: Prometheus Books, 2010.

Ogilvie gives an account of the life of Marie Curie and the lives of those that influenced her. She covers – in very basic terms – the science of her work along with the scandal that went along with her research and her private life. The book focuses

mostly on Curie's professional activities, but it also addresses her early life in Poland, the difficulties she faced in seeking higher education, her relationship with Pierre Curie, and the gossip surrounding her affair with married physicist Paul Langevin five years after her husband's death. It describes a duel between two journalists, Henri Chervet and Leon Daudet, who maintained opposing views on the Curie-Langevin affair, which has been preserved on film (see <http://www.youtube.com/watch?v=4QIUw1k0ItE>). Ogilvie also describes Curie's life during WWI, her trip to the United States in 1921, and her last few years spent in France.

This book could be read in its entirety for a lesson on Marie Curie or in excerpts as part of a comparative activity including the experiences of other women physicists.

Ogilvie, Marilyn. *Searching the Stars: The Story of Caroline Herschel*. Charleston, SC: The History Press, 2008.

Ogilvie presents a comprehensive and complex biography of astronomer Caroline Herschel, most remembers as a helpmeet to her brother William, but also an accomplished observer in her own right. Ogilvie offers an account of Heschel's upbringing, personal life, and career that is deeply embedded in the context of 18-19th century British society and astronomy. Ogilvie draws heavily on the Herschel family's journals and correspondence.

This book could be read in its entirety for a lesson on Caroline Herschel or in excerpts as part of a comparative activity including the experiences of other women astronomers.

Ogilvie, Marilyn. *Women and Science: An Annotated Bibliography*. New York: Routledge, 1996.

Ogilvie's *Bibliography* is an excellent guide to the literature on women in science from antiquity through the 20th century. Especially useful are indices that organize the sources by field, time period, person/institution, reference, and themes.

This source will help teachers and students locate additional research materials after they have selected a topic.

Ogilvie, Marilyn. *Women in Science: Antiquity through Nineteenth Century: A Biographical Dictionary with Annotated Bibliography*. Cambridge, MA: MIT Press, 1986.

Ogilvie's *Biographical Dictionary* presents brief biographical sketches (approximately 1 paragraph – 2 pages) of women engaged in science from antiquity to the 20th century, including highlights of various achievements and references to additional resources. There is an especially useful table in the rear, listing time period, field, and nationality alongside each woman's name.

This volume is a useful starting point for lessons and research projects. It will help teachers and students locate additional research materials after they have selected a topic.

Ogilvie, Marilyn and Joy Harvey, eds. *The Biographical Dictionary of Women in Science: Pioneering Lives from Ancient Times to the Mid-20th Century*. New York: Routledge, 2000.

The Biographical Dictionary of Women in Science includes profiles of around 2000 female scientists from ancient times through the late 20th century. Each entry consists of a short biography (between one paragraph and two pages) and bibliography of primary and secondary sources. The book also includes lists of all the scientists in the volume, sorted by country, field of study, time period, and associated individuals (i.e. collaborators, family members, and friends).

This volume is a useful starting point for lessons and research projects. It will help teachers and students locate additional research materials after they have selected a topic.

Opfell, Olga. *The Lady Laureates: Women Who Have Won the Nobel Prize*. Langham, MD: Scarecrow Press, 1986.

This book provides long biographies (approximately 15-20 pages) of every female recipient of the Nobel Prizes in all five prize categories through the late 1980s. Each of the biographies begins with the story of how the woman was notified of her award. Four physicists are included in the book: Marie Curie, Irene Joliot-Curie, Rosalyn Yalow, and Maria Goeppert-Mayer. The biographies include clear descriptions of the women's scientific research and accomplishments, while also addressing their personal lives.

This volume is a useful resource for lesson plans and research projects organized individual historical figures.

Pycior, Helena, Nancy Slack, and Pnina Abir-Am, eds. *Creative Couples in the Sciences*. New Brunswick, NJ: Rutgers University Press, 1996.

This volume includes a collection of essays about women in science and their collaborative work with their husbands. There is interesting discussion of assigning credit based on the limited historical resources. There are seven articles relating to women in physics and astronomy: Helena Pycior's "Pierre Curie and 'His Eminent Collaborator Mme Curie': Complementary Partner" (pages 39-56), Bernadette Bensaude-Vincent's "Star Scientists in Nobelist Family: Irene and Frederic Joliot-Curie" (pages 57-71), Barbara Becker's "Dispelling the Myth of the Able Assistant: Margaret and William Huggins at Work in the Tulse Hill Observatory" (pages 98-111), Marianne Gosztonyi Ainley's "Marriage and Scientific Work in Twentieth Century Canada: The Berekelys in Marine Biology and the Hoggs in Astronomy" (pages 143-155), Maureen Julian's "Kathleen and Thomas Lonsdale: Forty-Three Years of Spiritual and Scientific Life Together" (pages 170-181), John Stachel's "Albert Einstein and Mileva Maric: A Collaboration That Failed to Develop" (pages 207-219), and Marilyn Bailey Ogilvie's "Patterns of Collaboration in Turn-of-the-Century Astronomy: The Campbells and the Maunder's" (pages 254-266).

As a unit, the articles would constitute an interesting lesson on marital collaboration. Individually, the articles could be incorporated into lessons on a single scientist or scientific couple, offering a new perspective on their activities at

work and at home. It complements Abir Am and Outram's *Uneasy Careers and Intimate Lives: Women in Science, 1787-1979*, which also looks at the intersection of the personal and professional.

Rayner-Canham, Marelene. *A Devotion to their Science: Pioneer Women of Radioactivity*. Philadelphia: Chemical Heritage Foundation, 1997.

Rayner-Canham's book describes the lives and work of twenty three women at the forefront of the burgeoning fields of radioactivity and nuclear physics. The author divides the women into three groups (French, British and Austro-German), which she compares and contrasts with one another. Each chapter includes in-depth biographies of the key figures in each group, along with a few shorter profiles of the others. All of the biographies address the subject's personal life and provide descriptions of their research. The French group was largely led by Marie Curie and includes those that did the majority of their research either at the Institut Curie or elsewhere in France. The British group is defined as women who worked with or were influence by Ernest Rutherford, the central figure in the group of scientists performing radioactivity research in Britain in the 19th Century. The Austro-German group is centered in Vienna and Berlin.

This book is useful for lessons on the development of radioactive research in different contexts, as well as the opportunities and challenges for women across borders.

Reynolds, Moira Davidson. *American Women Scientists: 23 Inspiring Biographies, 1900-2000*. Jefferson, NC: McFarland & Co Inc., 2004.

This volume includes short biographies (approximately 3 pages) of women in science. The astronomers and physicists profiled include Annie Jump Cannon, Maria Goeppert-Mayer, Rosalyn Yalow, and Chien-Shiung Wu.

The short entries are good starting points for comparative lessons or research projects on the individual scientists.

Rife, Patricia. *Lise Meitner and the Dawn of the Nuclear Age*. Boston: Birkhaeuser, 1999.

Rife offers an in depth look in to the life of one of the most notable female scientists. From her childhood in an academic and supportive family, Meitner was determined to pursue a scientific education but faced many obstacles along the way. She eventually went on to study at the University of Vienna where she was greatly inspired by her mentor Ludwig Boltzmann. She then started work at the University of Berlin where she eventually became Max Planck's assistant, a position which allowed her to carry on with her own research with German chemist Otto Hahn, with whom she collaborated for 30 years. Much of the book focuses on Meitner's life and the lives of those around her during World War II. It also includes Hahn's post-war Nobel Prize, which many have argued should have been shared with Meitner.

This book could be read in its entirety for a lesson on Lise Meitner or in excerpts as part of a comparative activity including the experiences of other women physics, a

lesson on WWII, or a lesson on under recognition and Nobel prizes. Rife's book complements Kiernan's *Girls of Atomic City*.

Rossiter, Margaret. *Women Scientists in America: Before Affirmative Action, 1940-1972*. Baltimore: Johns Hopkins University Press, 1995.

In the second volume of her trilogy on women scientists in America, Rossiter continues her discussion of women in science in 20th century America. She notes that despite the mid-century prosperity, opportunities formerly open to women, even at women's colleges, began to disappear. She suggests that increased anti-nepotism rules and attempts to increase institutional prestige are to blame. She also notes that women themselves lacked perspective of the situation and the vocabulary to explain it, and were thus unable to halt or reverse their receding prospects.

This information-packed tome is filled with tables and statistical analysis. It is most suited for graduate or advanced undergraduate students. It can provide useful background information for lessons or research projects on opportunities available to women in physics and astronomy.

Rossiter, Margaret. *Women Scientists in America: Forging a New World Since 1972*. Baltimore: Johns Hopkins University Press, 2012.

Rossiter completes her trilogy with the triumphs and tribulations of women scientists in America after 1972. This is a story of marginal figures banding together, forming organizations, and mounting campaigns against sexist practices. It is also a story of influential legislation including the Equal Employment Opportunities Act and Education Amendments Act (also known as Title IX) in 1972 and the Equal Opportunity Act in Science and Technology in 1980. She concludes with an epilogue on the MIT and Larry Summers controversies in the early 2000s.

This information-packed tome is filled with tables and statistical analysis. It is most suited for graduate or advanced undergraduate students. It can provide useful background information for lessons or research projects on opportunities and discrimination in physics and astronomy.

Rossiter, Margaret. *Women Scientists in America: Struggles and Strategies to 1940*. Baltimore: Johns Hopkins University Press, 1982.

Rossiter's trilogy begins with a history of American women in science through the first four decades of the 20th century. She focuses on higher education, employment (academic and federal), professional organizations, and recognition.

This information-packed tome is filled with tables and statistical analysis. It is most suited for graduate or advanced undergraduate students. It can provide useful background information for lessons or research projects on opportunities and discrimination in physics and astronomy.

Shearer, Benjamin and Barbara Shearer. *Notable Women in the Physical Sciences: A Biographical Dictionary*. Westport, CT: Greenwood, 1997.

This work includes brief biographical sketches of 96 women working in the physical sciences, with an emphasis is on 20th century practitioners. The goal of the work is to inspire girls to pursue science. Each entry includes a bulleted timeline of educational achievements, professional positions, and prizes, as well as a brief biography and bibliography. The astronomers in this volume are Ida Barney, Jocelyn Bell Burnell, Annie Jump Cannon, Allie Vibert Douglas (also listed under astrophysics), Sandra Moore Faber, Williamina Paton Fleming, Wendy Laurel Freedman, Catharine D. Garmany, Margaret Joan Geller, Heidi Hammel, Margaret Harwood, Caroline Herschel, E. Dorrit Hoffleit, Helen Sawyer Hogg, Henrietta Swan Leavitt, Antonia Maury, Maria Mitchell, Cecelia Payne-Gaposchkin, Helen W. Dodson Prince, Dorothea Klumpke Roberts, Elizabeth Roemer, Nancy Grace Roman, Vera Cooper Rubin, Mary Fairfax Somerville, Henrietta Hill Swope, Paula Szkody, Beatrice Muriel Hill Tinsley, Emma T. R. Williams Vyssotsky, Sarah Frances Whiting, Lee Anne M. Willson, and Judith Sharn Young. Astrophysicists include E. Margaret Burbidge, Charlotte Emma Moore Sitterly, and Rosemary Wyse. Physicists include Laura Bassi, Katharine Burr Blodgett, Marie Skłodowska Curie, Ingrid Daubechies, Helen T. Edwards, Maria Goeppert-Mayer, Gertrude Scharff Goldhaber, Irene Joliot-Curie, Vera E. Kistiakowsky, Leona Woods Marshall Libby, Margaret Eliza Maltby, Lise Meitner, Vandana Shiva, Sarah Frances Whiting, Chien-Shiung Wu, and Xide Xie.

This volume is a useful starting point for lessons and research projects. It is also ideal for comparative activities that reveal trends and anomalies in women's experiences in the physical sciences.

Schiebinger, Londa. *The Mind Has No Sex? Women in the Origins of Modern Science*. Cambridge, MA: Harvard University Press, 1991.

Schiebinger's book examines the historical conflict between science and "femininity" and how it led to women's exclusion from science. She looks at the interplay of four factors to explain women's failures and successes in science: institutional organizations, individual biographies, scientific definitions of female nature, and cultural meanings of gender. She contends that the interplay between social, personal, biological, and philosophical factors opened and closed the doors of science to women. Women working in physics and astronomy appear in the chapters Noble Networks and Scientific Women in the Craft Tradition. In these chapters Margaret Cavendish, Emilie du Chatelet, Maria Winkelmann, and other German women astronomers are prominently featured.

This text provides context for the work of women physicists and astronomers. It would complement biographical lessons and research projects. The high-reading level makes the text most suited for graduate or advanced undergraduate students.

Sime, Ruth Lewin. *Lise Meitner: A Life in Physics*. Berkeley, CA: University of California Press, 1996.

Lise Meitner: A Life in Physics is a biographical work detailing Meitner's life and work in nuclear physics. Much of the book is focused towards her work during the Second

World War, after having been forced to emigrate to Sweden due to her Jewish heritage. Meitner's colleagues and contemporaries are also featured. Her professional relationship with Otto Hahn is examined in detail due to the significant impact it had on their work. The book includes personal letters between Meitner and Hahn, which suggest that Hahn deliberately tried to disassociate his work from longtime collaborator Meitner. Her feelings on fission and the atomic bomb are also presented.

This book could be read in its entirety for a lesson on Lise Meitner or in excerpts as part of a comparative activity including the experiences of other women physics, a lesson on WWII, or a lesson on under recognition and Nobel prizes. Sime's book complements Kiernan's *Girls of Atomic City*.

Sullivan, Otha Richard. *Black Stars: African American Women Scientists and Inventors*. San Francisco, CA: Jossey Bass, 2012.

Black Stars: African American Women Scientists and Inventors includes profiles of twenty six African American women who worked in science or engineering between the late 19th and early 20th century. Women working in physics, astronomy, and related disciplines include Valerie Thomas, Shirley Ann Jackson, Mae Jemison, and Aprille Joy Ericsson Jackson.

This volume is a useful starting point for lessons and research projects. It is also ideal for comparative activities that reveal trends and anomalies in African American women's experiences in the physical sciences.

Tang, Joyce. *Scientific Pioneers: Women Succeeding in Science*. Lanham, MD: University Press of America, 2006.

Scientific Pioneers: Women Succeeding in Science examines the factors which have contributed to women's success in science, along with the challenges they have faced. It begins by examining what we mean by "pioneer" and how success is measured within the scientific community. Tang then examines the factors which would lead someone to have a predisposition for success in science (for example, an academic family, or a significant cultural or political change). She takes up the argument of nature versus nurture in the careers of the women scientists. Tang also notes the importance of professional collaborations and that many of the early female scientists had a male colleague or partner who would "breach the gap" between the woman and the scientific community. The book concludes that although there are a number of characteristics shared between the ten female "pioneers", they all succeeded despite various difficulties and against the odds. The discussion and analysis are built on case studies of the lives and work of ten major female scientists including Marie Curie, Irene Joliot-Curie, Maria Goeppert-Mayer, Fay Ajzenberg-Selove, and Rosalyn Yalow.

This text a useful starting point for lessons and research projects organized around the main themes of the book, as well as individual physicists.

Wasserman, Elga. *The Door in the Dream: Conversations with Eminent Women in Science*. Washington, D.C: Joseph Henry Press, 1999.

The Door in the Dream: Conversations with Eminent Women in Science gives accounts of the lives of 27 female scientists, including six working in physical sciences in academia and industry, through interviews with the author. The book also includes a list of all of the female members of the National Academy of Sciences, sorted by field of work. The women profiled included Isabella L. Karle, Esther M. Conwell, Cathleen S. Morowitz, Vera C. Rubin, Myriam P. Sarachik, and Mary K. Gaillard.

Wasserman's text, full of primary source material, is a nice addition to lesson plans and research projects.

Weitekamp, Margaret. *Right Stuff, Wrong Sex: America's First Women in Space Program*. Baltimore: Johns Hopkins University Press, 2005.

Weitekamp's book examines the intersection of aviation, gender, American culture, and foreign relations in her story of the women's astronaut training program. She frames the saga of the Mercury 13, the women who were prepared for space travel but ultimately denied the opportunity to leave earth's orbit, in terms of women's aviation in the 1920-30s and the campaign to get Jerrie Cobb into space in 1999. This story provides insight into the early sexist years of the space program.

This book could constitute a lesson in and of itself or complement lessons and research projects on women astronauts, women at NASA, and science, gender, and politics. It is most suited for graduate or advanced undergraduate students.

Yost, Edna. *Women of Modern Science*. New York: Dodd Mead, 1959.

Women of Modern Science presents short biographies of eleven women working in science during the mid-20th century. Yost explains in the preface that she chose women with the aims of covering many different areas of science as well as different geographical areas. The women's personal lives and careers are the main focuses of the book, although their scientific research is presented briefly and clearly. Women physicists featured in the book include Lise Meitne, Helen Sawyer Hogg, Chien-Shiung Wu, and Edith Hinkley Quimby.

This text a useful starting point for lessons and research projects on organized around individual scientists.

Yount, Lisa. *Contemporary Women Scientists*. New York: Facts on File Inc., 1994.

Yount discusses careers and personal lives of ten female scientists of the 20th century. In-depth biographies of three physicists are presented: Maria Goeppert-Mayer, Chien-Shiung Wu, and Vera Cooper Rubin.

This text a useful starting point for lessons and research projects on organized around individual scientists.

Zinsser, Judith. *Emilie du Châtelet: Daring Genius of the Enlightenment*. New York: Penguin Group USA, 2007.

Zinsser gives an incredibly detailed account of the Marquis du Châtelet's life. Very little information is actually available about Madam du Châtelet (one biographer described her life as a series of "holes tied together with string"), so a large amount of the book is extrapolation or scenes imagined by Zinsser. Most of Châtelet's work in science was done in the last ten years of her life, and Zinsser's book focuses more heavily on her early life and education. Much of the book describes her father's life as well as those of her lovers, including Voltaire.

This book could be read in its entirety for a lesson on Emilie du Châtelet or in excerpts as part of lessons on Newtown, classical mechanics, or translation.

Zinsser, Judith. *Men, Women, and the Birthing of Modern Science*. DeKalb, IL: Northern Illinois University Press. 2005.

Zinsser's edited volume originated from a conference on gender and the birth of modern science. The articles within are grouped into three sections: Women Natural Philosophers, Shifting Language, Shifting Roles, and Women, Men, and the New Scientific Establishment. The most relevant chapters include Judith Zinsser's "The Many Representations of the Marquise du Châtelet" (pages 48-67) and Monika Mommertz's "The Invisible Economy of Science: A New Approach to the History of Gender and Astronomy in the Eighteenth-Century Berlin Academy of Sciences" (page 159-178).

This volume is useful for lessons and research projects on Emilie du Châtelet and women astronomers in Germany. It is suited for graduate and advanced undergraduate students.

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