



# SILENT SKY



# Get to Know the Real People Behind the Characters

## *Henrietta Leavitt*

HENRIETTA LEAVITT WAS BORN IN MASSACHUSETTS TO GEORGE ROSWELL LEAVITT AND HENRIETTA SWAN KENDRICK, FROM WHOM SHE TAKES THE VAST PORTION OF HER NAME. HENRIETTA WAS THE OLDEST OF SEVEN, THOUGH TWO OF HER SIBLINGS DIED IN INFANCY. THOUGH BORN IN MASSACHUSETTS, HENRIETTA GREW UP IN OHIO, WHERE SHE ATTENDED OBERLIN COLLEGE, AS WELL AS WISCONSIN, WHERE A PORTION OF THE PLAY TAKES PLACE. SHE RETURNED TO MASSACHUSETTS TO ATTEND RADCLIFFE COLLEGE, THE ALL-WOMEN COMPANION COLLEGE TO HARVARD UNIVERSITY, WHERE SHE EARNED A BACHELOR'S DEGREE IN 1882. SHE MADE PROGRESS TOWARDS A GRADUATE DEGREE IN ASTRONOMY BEFORE GOING TO WORK AS A COMPUTER IN THE HARVARD OBSERVATORY UNDER DR. CHARLES PICKERING. DURING THE COURSE OF HER WORK UNDER PICKERING (DETAILED BELOW), HENRIETTA STUDIED VARIABLE STARS, WHICH ARE STARS THAT SHOW DIFFERENT LEVELS OF BRIGHTNESS AT DIFFERENT TIMES. FROM THERE SHE WENT ON TO DEVELOP LEAVITT'S LAWS, WHICH STATE THAT THERE IS A STRAIGHT LINE RELATION BETWEEN A CEPHEID VARIABLE STAR'S INTRINSIC LUMINOSITY (TRUE BRIGHTNESS) AND THE LOG OF ITS PERIOD. ALTHOUGH SHE WENT UNCREDITED FOR SEVERAL DECADES AND WAS UNABLE TO CONTRIBUTE TO FOLLOW-UP RESEARCH, HER DISCOVERIES WENT ON TO INFLUENCE THE WORK OF EDWIN HUBBLE, PRECIPITATED SPACE TRAVEL, AND CONTRIBUTED TO NUMEROUS OTHER MEANS OF SCIENTIFIC DISCOVERY. HENRIETTA WAS A FAIRLY SICKLY INDIVIDUAL, HAVING NEVER QUITE RECOVERED FROM THE CHILDHOOD INFIRMITY (LIKELY SCARLET FEVER) THAT DAMAGED HER HEARING. SHE SUCCUMBED TO CANCER IN 1921 AT THE AGE OF 53 AND WAS BURIED THE THE LEAVITT FAMILY PLOT IN CAMBRIDGE, MASSACHUSETTS. HER GRAVESTONE LACKS ANY MENTION OF HER CONTRIBUTION THE THE FIELD OF ASTRONOMY.



## *Martha Almira Levitt*



MARGARET "MARGIE" LEAVITT IS NOT AN INDIVIDUAL WHO EXISTED IN REAL HISTORY. RATHER, MARGARET IS AN APPROXIMATION OF PERHAPS SEVERAL PEOPLE DESIGNED TO SERVE AS A FOIL OR COUNTER-NOTE TO HENRIETTA. IN TERMS OF COMPOSITION, MARGIE COULD BE DRAWN FROM A VARIETY OF PEOPLE—MOST LIKELY MARTHA ALMIRA LEAVITT (HENRIETTA'S OLDEST SISTER AND SECOND OF THE LEAVITT'S SIBLINGS) AND MARTHA SHAPLEY, NEE BETZ. IN TERMS OF SYMBOLISM, MARGARET IS A VEHICLE FOR TWO OF THE THREE PRIMARY CONCEPTS IN THIS PLAY: WHILE HENRIETTA REPRESENTS RELIGION AND SCIENCE, MARGARET REPRESENTS RELIGION AND ART. IT IS THROUGH DIRECT EXPOSURE TO MARGIE'S COMPOSITIONS THAT HENRIETTA HAPPENS UPON THE EPIPHANY WHICH FORMS THE CORNERSTONE OF HER THEORY. THIS INTERACTION IS NOT SUPPORTED BY ANY HISTORICAL EVIDENCE, BUT RATHER SERVES GUNDERSON'S MORE ABSTRACT CALL FOR THE MINGLING OF ARTS AND SCIENCES IN THE PLAY. SYMBOLICALLY, MARGARET ALSO REPRESENTS THE OBLIGATIONS OF FAMILY JUXTAPOSED WITH THE ALLURE OF DISCOVERY AND A FAR LESS INTRINSICALLY QUESTIONING VIEW OF THEOLOGY. IT IS SHOWN LATER THAT AS HENRIETTA SEES THE BEAUTY OF GOD IN THE STARS, MARGIE SEES IT IN MUSIC. AS A MATTER OF BEING A COMPOSITE CHARACTER, MARGIE OCCUPIES THE PLACE OF MARTHA ALMIRA STRONG, NEE LEAVITT. MARTHA WAS THE THIRD OF THE LEAVITT CHILDREN AND SADLY NOT MUCH HISTORICAL RECORD OF HER SURVIVES. SHE MARRIED WILLIAM HENRY JAMES STRONG, A DOCTOR OF DIVINITY FROM HARVARD UNIVERSITY LIKE HER FATHER, AND HAD ONE CHILD, WILLIAM LEAVITT STRONG. IN ADDITION, MARGIE MAY BE INSPIRED BY, OR AT LEAST INADVERTENTLY RELATED TO, MARTHA BETZ SHAPLEY. MARTHA WAS THE WIFE OF HARLOW SHAPLEY, DIRECTOR OF THE HARVARD OBSERVATORY IMMEDIATELY PROCEEDING EDWARD PICKERING. THOUGH SHE IS LARGELY UNCREDITED FOR HER VARIETY OF CONTRIBUTIONS TO THE FIELD OF ASTRONOMY, MARTHA CO-AUTHORED PAPERS ON CEPHEID VARIABLE STARS UTILIZING HENRIETTA'S RESEARCH WITH HER HUSBAND. IN ADDITION SHAPLEY WAS A CLASSICALLY TRAINED, MASTER PIANIST AND IS THE ONLY MUSICIAN OF NOTE IN ANY TANGENTIAL PROXIMITY TO HENRIETTA



# Get to Know the Real People

## Behind the Characters

ANNIE JUMP CANNON WAS BORN IN 1863, THE ELDEST OF THREE DAUGHTERS OF DELAWARE STATE SENATOR WILSON CANNON. SHE WAS COMPLETELY DEAF FOR MOST OF HER ADULTHOOD. CANNON WAS FIRST TAUGHT ABOUT CONSTELLATIONS AS A CHILD BY HER MOTHER, WHO LATER ENCOURAGED HER TO PURSUE SCIENTIFIC STUDIES. CANNON WENT ON TO STUDY MATHEMATICS, PHYSICS AND ASTRONOMY AT WELLESLEY COLLEGE WHERE SHE GRADUATED VALEDICTORIAN OF HER CLASS. AFTER GRADUATING, SHE RETURNED HOME TO DELAWARE, TOOK UP PHOTOGRAPHY AND TRAVELED THROUGHOUT EUROPE. SHORTLY THEREAFTER SHE CONTRACTED SCARLET FEVER, WHICH ROBBED HER OF HER HEARING. SOON HER MOTHER DIED AND CANNON SOUGHT TO GET OUT OF HER OLD HOME. SHE WROTE TO HER FORMER ADVISOR ABOUT JOB OPENINGS AT WELLESLEY WHERE SHE WAS ACCEPTED AS A PHYSICS TEACHER. FROM THERE SHE BEGAN TAKING GRADUATE COURSES AND STARTED WORKING TOWARDS A MASTER'S DEGREE. CANNON PURSUED PART OF HER GRADUATE DEGREE IN ASTRONOMY AT RADCLIFFE COLLEGE, WHERE SHE ENROLLED AS A "SPECIAL STUDENT" IN ORDER TO GAIN ACCESS TO THE HARVARD OBSERVATORY TELESCOPE. SHE RECEIVED HER DEGREE IN 1907. IN 1896, AS PART OF HER STUDIES, ANNIE WAS HIRED BY DR. CHARLES PICKERING, THEN THE DIRECTOR OF THE HARVARD OBSERVATORY. SHE WAS 33. WHILE WORKING FOR PICKERING, CANNON PUBLISHED SEVERAL ARTICLES ON STELLAR SPECTRA IN NUMEROUS JOURNALS, WORKED ON THE HENRY DRAPER CATALOGUE, RECEIVED THE DRAPER GOLD MEDAL, AND WAS THE RECIPIENT OF NUMEROUS GRANTS. CANNON DEVELOPED THE SYSTEM OF SPECTRAL CLASSIFICATION WHICH ORGANIZED STARS BY COLOR. LATER INTO HER WORK, THE O B A F G K M CATEGORIES WERE DISCOVERED. THEY DID NOT JUST RELATE TO COLOR, BUT ALSO TEMPERATURE AND SIZE, AS THESE THREE CHARACTERISTICS OF A STAR ARE INTRINSICALLY CONNECTED. TO THIS DAY, THE CLASSIFICATION SYSTEM SHE DEVELOPED IS ONE OF THE FOUNDATIONAL CONCEPTS IN ASTRONOMY EDUCATION. AND YES, THEY STILL USE "OH BE A FINE GIRL, KISS ME" TO REMEMBER THE STAR CLASSIFICATION CATEGORIES. AFTER PUBLISHING HER FIRST PAPER IN 1901, CANNON WAS MADE HEAD OF PHOTOMETRY, THE DEPARTMENT RESPONSIBLE FOR ANALYZING STAR PLATES, AT HARVARD AND BECAME ONE OF THE FIRST WOMAN TO RECEIVE AN HONORARY DOCTORATE FROM A EUROPEAN UNIVERSITY. SHE STILL HOLDS THE RECORD FOR MOST STARS CLASSIFIED IN A LIFETIME AT OVER 500,000, AT THE PEAK OF HER CAREER SHE COULD CLASSIFY THREE STARS A MINUTE. EVERY YEAR THE AMERICAN ASTRONOMERS' SOCIETY HANDS OUT THE ANNIE JUMP CANNON AWARD TO THAT YEAR'S MOST PROMINENT FEMALE ASTRONOMER. THOUGH CANNON RETIRED IN 1940, SHE CONTINUED HER WORK UNTIL A FEW WEEKS PRIOR TO HER DEATH IN 1944.

*Annie Cannon*



*Williamina Fleming*



WILLIAMINA FLEMING EMIGRATED TO AMERICA ALONGSIDE HER HUSBAND AND HER YOUNG CHILD AT THE AGE OF 21. SHE WAS SHORTLY THEREAFTER ABANDONED BY HER HUSBAND, JAMES ORR FLEMING, AND FORCED TO FIGURE OUT HOW TO MAKE A LIVING FOR HERSELF AND HER CHILD IN AMERICA ON HER OWN. AS A RESULT, SHE FOUND HERSELF WORKING IN THE HOUSE OF DR. CHARLES PICKERING, DIRECTOR OF THE HARVARD OBSERVATORY. ALLEGEDLY, DR. PICKERING USED TO TELL SUBSTANDARD EMPLOYEES THAT "HIS SCOTTISH HOUSEKEEPER COULD DO A BETTER JOB" AND SAID IT ENOUGH THAT EVENTUALLY HE GAVE HER A JOB AS A COMPUTER. HOWEVER, THIS MIGHT BE A HIGHLY OVER-REPORTED OFFICE TALL TALE. OVER HER TIME WORKING FOR PICKERING AND LATER HARLOW SHAPLEY, FLEMING CLASSIFIED 10,000 STARS, DISCOVERED 59 NEBULAE, AND PUBLISHED SEVERAL WORKS ON HER DISCOVERIES. SHE DISCOVERED THE HORSEHEAD NEBULA, THROUGH HER WORK WENT UNCREDITED. DESPITE HAVING MADE MASSIVE CONTRIBUTIONS TO THE DRAPER CATALOGUE, FLEMING'S NAME ALONG WITH ALL THE NAMES OF HER FEMALE PEERS WERE OMITTED IN FAVOR OF A SIMPLE "PICKERING" CITATION. FLEMING WAS PLACED IN CHARGE OF THE COMPUTING DEPARTMENT AFTER ANNIE CANNON'S PROMOTION TO HEAD OF PHOTOMETRY. SHE WAS LATER MADE THE CURATOR OF ALL SPECTRA IMAGES AT HARVARD UNIVERSITY. FLEMING PUBLISHED NUMEROUS PAPERS ON HER FINDINGS AND RECEIVED NUMEROUS AWARDS. SHE WAS MADE AN HONORARY FELLOW OF WELLESLEY COLLEGE IN THE EARLY 1900'S.

NOT MUCH HISTORICAL RECORD OF HER SURVIVES. SHE MARRIED WILLIAM HENRY JAMES STRONG, A DOCTOR OF DIVINITY FROM HARVARD UNIVERSITY LIKE HER FATHER, AND HAD ONE CHILD, WILLIAM LEAVITT STRONG. IN ADDITION, MARGIE MAY BE INSPIRED BY, OR AT LEAST INADVERTENTLY RELATED TO, MARTHA BETZ SHAPLEY. MARTHA WAS THE WIFE OF HARLOW SHAPLEY, DIRECTOR OF THE HARVARD OBSERVATORY IMMEDIATELY PROCEEDING EDWARD PICKERING. THOUGH SHE IS LARGELY UNCREDITED FOR HER VARIETY OF CONTRIBUTIONS TO THE FIELD OF ASTRONOMY, MARTHA CO-AUTHORED PAPERS ON CEPHEID VARIABLE STARS UTILIZING HENRIETTA'S RESEARCH WITH HER HUSBAND. IN ADDITION SHAPLEY WAS A CLASSICALLY TRAINED, MASTER PIANIST AND IS THE ONLY MUSICIAN OF NOTE IN ANY TANGENTIAL PROXIMITY TO HENRIETTA



# Events of Silent Sky

- 1882: BOTH THE U.S. HOUSE AND SENATE APPOINT COMMITTEES ON WOMEN'S SUFFRAGE; EACH REPORT FAVORABLY.
- 1884: THE U.S. HOUSE OF REPRESENTATIVES DEBATES WOMEN'S SUFFRAGE.
- 1886: THE SUFFRAGE AMENDMENT IS DEFEATED TWO TO ONE IN THE U.S. SENATE.
- 1890: THE NATIONAL WOMAN SUFFRAGE ASSOCIATION AND THE AMERICAN WOMAN SUFFRAGE ASSOCIATION MERGE TO FORM THE NATIONAL AMERICAN WOMAN SUFFRAGE ASSOCIATION. ITS FIRST PRESIDENT IS ELIZABETH CADY STANTON. THE FOCUS TURNS TO WORKING AT THE STATE LEVEL. WYOMING RENEWS GENERAL WOMAN SUFFRAGE.
- 1893: HENRIETTA BEGINS WORK AT HARVARD OBSERVATORY
- 1894: DESPITE 600,000 SIGNATURES, A PETITION FOR WOMAN SUFFRAGE IS IGNORED IN NEW YORK.
- 1895: THE NEW YORK STATE ASSOCIATION OPPOSED TO WOMAN SUFFRAGE IS FOUNDED.
- 1906: ELIZABETH CADY STANTON'S DAUGHTER, HARRIOT STANTON BLATCH, RETURNS FROM ENGLAND AND FORMS THE EQUALITY LEAGUE OF SELF SUPPORTING WOMEN WITH A MEMBERSHIP BASED ON PROFESSIONAL AND INDUSTRIAL WORKING WOMEN. IT INITIATES THE PRACTICE OF HOLDING SUFFRAGE PARADES.
- 1908: HENRIETTA FIRST PUBLISHES HER DATA, NOTING A PATTERN IN VARIABLE STARS (CEPHEIDS).
- 1910: EMULATING THE GRASSROOTS TACTICS OF LABOR ACTIVISTS, THE WOMEN'S POLITICAL UNION ORGANIZES AMERICA'S FIRST LARGE-SCALE SUFFRAGE PARADE, WHICH IS HELD IN NEW YORK CITY.
- 1911: IN NEW YORK CITY, 3,000 PEOPLE MARCH FOR WOMEN SUFFRAGE.
- 1912: HENRIETTA PUBLISHES A FULL PAPER DOCUMENTING HER PERIOD-LUMINOSITY RELATIONSHIP.
- 1913: EJNAR HERTZSPRUNG USES HENRIETTA'S FINDING TO MEASURE DISTANCE TO CEPHEIDS WITHIN THE MILKY WAY.
- 1913: THE SENATE VOTES ON A WOMEN'S SUFFRAGE AMENDMENT, BUT IT DOES NOT PASS.
- 1914: MONTANA GRANTS SUFFRAGE TO WOMEN.
- 1916: WOODROW WILSON PROMISES THAT THE DEMOCRATIC PARTY PLATFORM WILL ENDORSE WOMEN'S SUFFRAGE.
- 1916: MONTANA ELECTS SUFFRAGIST JEANNETTE RANKIN TO THE HOUSE OF REPRESENTATIVES. SHE IS THE FIRST WOMAN ELECTED TO THE U.S. CONGRESS.
- 1917: BEGINNING IN JANUARY, THE NATIONAL WOMAN'S PARTY POSTS SILENT "SENTINELS OF LIBERTY," ALSO KNOWN AS THE SILENT SENTINELS, AT THE WHITE HOUSE. THE NATIONAL WOMAN'S PARTY IS THE FIRST GROUP TO PICKET THE WHITE HOUSE. IN JUNE, THE ARRESTS BEGIN. NEARLY 500 WOMEN ARE ARRESTED, AND 168 WOMEN SERVE JAIL TIME.
- 1917: THE NEW YORK STATE CONSTITUTION GRANTS SUFFRAGE TO WOMEN. NEW YORK IS THE FIRST EASTERN STATE TO FULLY ENFRANCHISE WOMEN.
- 1917: THE UNITED STATES GOVERNMENT DECLARES WAR AGAINST GERMANY, ENTERING WWI.
- 1918: THE JAILED SUFFRAGISTS ARE RELEASED FROM PRISON. AN APPELLATE COURT RULES ALL THE ARRESTS WERE ILLEGAL.
- 1918: THE NINETEENTH AMENDMENT TO THE U.S. CONSTITUTION, WHICH EVENTUALLY GRANTED WOMEN SUFFRAGE, PASSES THE U.S. HOUSE WITH EXACTLY A TWO-THIRDS VOTE BUT LOSES BY TWO VOTES IN THE SENATE.
- 1918: WWI ENDS.
- 1920: HENRIETTA IS MADE HEAD OF STELLAR PHOTOMETRY AT HARVARD OBSERVATORY.
- 1920: THE NINETEENTH AMENDMENT TO THE U.S. CONSTITUTION IS RATIFIED, STATING, "THE RIGHT OF CITIZENS OF THE UNITED STATES TO VOTE SHALL NOT BE DENIED OR ABRIDGED BY THE UNITED STATES OR BY ANY STATE ON ACCOUNT OF SEX".
- 1921: HENRIETTA DIES OF OVARIAN CANCER.
- 1923-24: EDWIN HUBBLE MEASURES CEPHEIDS IN THE ANDROMEDA GALAXY, PROVING THAT THE UNIVERSE IS FAR BIGGER THAN THE MILKY WAY.
- 1926: UNAWARE OF HER DEATH FOUR YEARS PRIOR, THE SWEDISH MATHEMATICIAN GOSTA MITTAG-LEFFLER CONSIDERED NOMINATING HENRIETTA FOR THE 1926 NOBEL PRIZE IN PHYSICS.



# Lauren Gunderson



LAUREN GUNDERSON (BORN FEBRUARY 5, 1982) IS AN AMERICAN PLAYWRIGHT, SCREENWRITER, AND SHORT STORY AUTHOR, BORN IN ATLANTA. SHE LIVES IN SAN FRANCISCO, WHERE SHE TEACHES PLAYWRITING. GUNDERSON WAS RECOGNIZED BY AMERICAN THEATRE MAGAZINE AS AMERICA'S MOST PRODUCED LIVING PLAYWRIGHT AT THEATRE COMMUNICATIONS GROUP (TCG, THE MAGAZINE'S PUBLISHER) MEMBER THEATERS IN 2017, AND AGAIN IN 2019–20. GUNDERSON EARNED HER BACHELOR OF ARTS IN CREATIVE WRITING FROM EMORY UNIVERSITY IN 2004, AND HER MASTER OF FINE ARTS IN DRAMATIC WRITING FROM NEW YORK UNIVERSITY'S TISCH SCHOOL OF THE ARTS IN 2009, WHERE SHE WAS ALSO A REYNOLDS FELLOW IN SOCIAL ENTREPRENEURSHIP. SHE IS MARRIED TO VIROLOGIST NATHAN WOLFE AND HAS 2 SONS.

## Works

- 2001 PARTS THEY CALL DEEP
- 2004 LEAP
- 2005 BACKGROUND
- 2005 EYE OF THE BEHELD
- 2010 EMILIE: LA MARQUISE DU CHÂTELET DEFENDS HER LIFE TONIGHT
- 2011 THE AMAZING ADVENTURES OF DR. WONDERFUL AND HER DOG!
- 2011 ROCK CREEK: SOUTHERN GOTHIC
- 2011 SILENT SKY
- 2012 EXIT, PURSUED BY A BEAR
- 2012 WE ARE DENMARK
- 2013 BY AND BY
- 2013 TOIL & TROUBLE
- 2014 I AND YOU
- 2014 FIRE WORK
- 2015 ADA AND THE MEMORY ENGINE
- 2015 BAUER
- 2015 THE TAMING
- 2017 THE BOOK OF WILL
- 2017 MISS BENNET: CHRISTMAS AT PEMBERLEY
- 2017 THE REVOLUTIONISTS
- 2018 NATURAL SHOCKS
- 2019 JEANNETTE (MUSICAL)
- 2019 THE HALF-LIFE OF MARIE CURIE
- 2021 THE CATASTROPHIST
- 2023 "ANTHROPOLOGY"

## Activism

GUNDERSON HAS MADE SOME OF HER PLAYS AVAILABLE FOR ACTIVIST PURPOSES AND IS TOUTED AS AN ARTS MEETS ACTIVISM WRITER.

### THE TAMING

THE TAMING IS AN ALL-FEMALE POLITICAL FARCE WHICH PREMIERED AT CROWDED FIRE THEATER COMPANY IN 2013. INSPIRED BY SHAKESPEARE'S THE TAMING OF THE SHREW, THE TAMING EXPLORES WHAT HAPPENS WHEN A BEAUTY QUEEN WITH A CONSTITUTIONAL LAW DEGREE, A REPUBLICAN SENATOR'S AIDE, AND A LIBERAL ONLINE INFLUENCER ARE ALL LOCKED IN A HOTEL TOGETHER, TRYING TO MAKE A BETTER AMERICA. GUNDERSON MADE THIS PLAY FREE TO PRODUCE ON THE NIGHT OF THE 2017 PRESIDENTIAL INAUGURATION OF DONALD TRUMP, CITING HER BELIEF THAT THEATER, ART, AND STORIES HAVE THE ABILITY TO MAKE LASTING CHANGE.

### NATURAL SHOCKS

IN APRIL 2018, GUNDERSON CREATED A NATIONAL CAMPAIGN OF THEATER ACTIVISM WITH ROYALTY-FREE READINGS OF HER PLAY NATURAL SHOCKS TO ADDRESS DOMESTIC VIOLENCE AND GUN VIOLENCE AGAINST WOMEN. THEATERS ACROSS THE U.S. PARTICIPATED IN THESE READINGS INCLUDING, THE KNOW THEATRE AND CINCINNATI SHAKESPEARE COMPANY.

IN BOTH INSTANCES, GUNDERSON STIPULATED THAT ALL PROCEEDS FROM THE PRODUCTIONS BE GIVEN TO CHARITABLE CAUSES.

