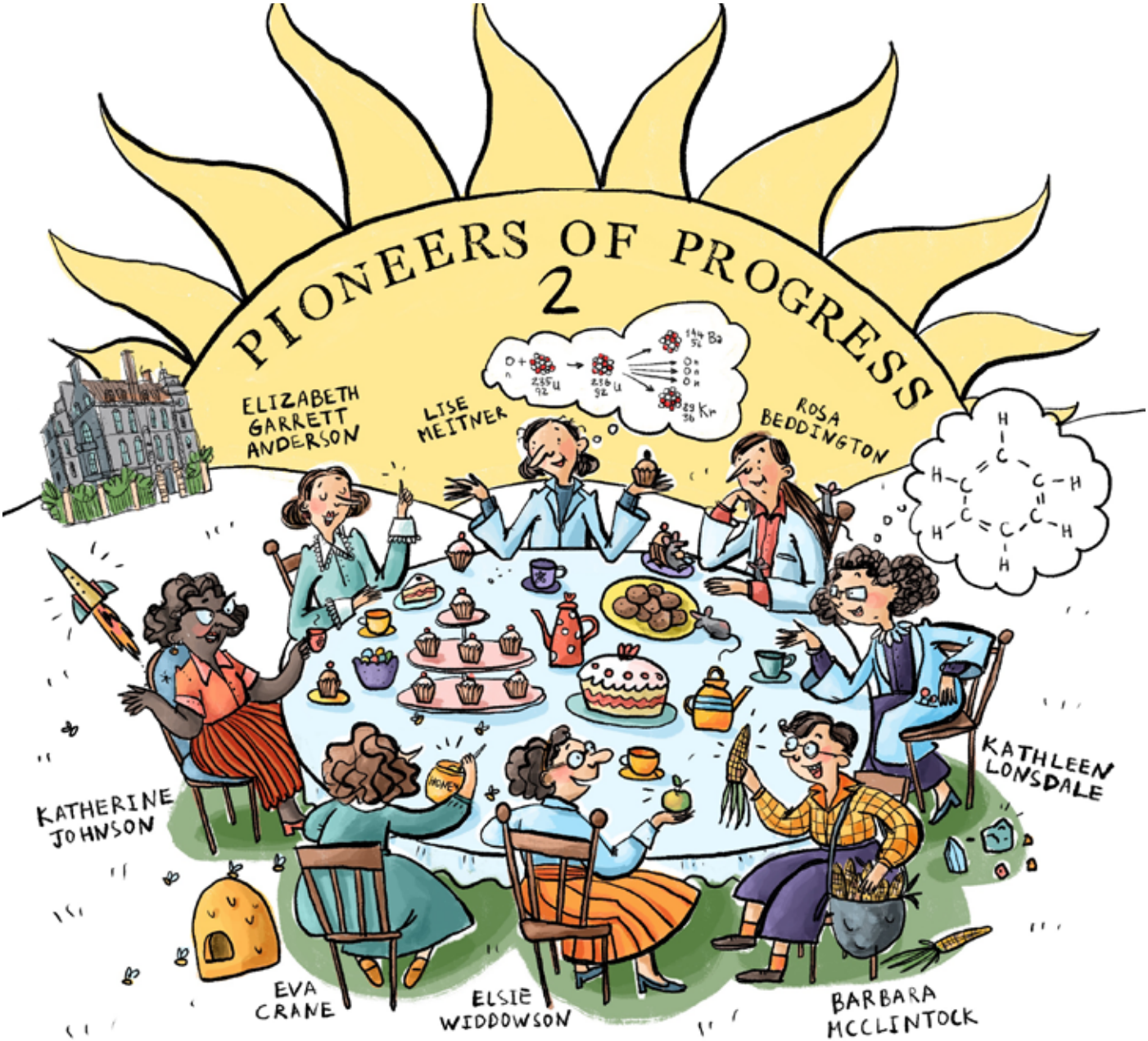
PIONEERS OF PROGRESS 2
ELIZABETH GARRETT ANDERSON
LISE MEITNER
ROSA BEDDINGTON
KATHERINE JOHNSON
KATHLEEN LONSDALE
EVA CRANE
ELSIE WIDDOWSON
BARBARA MCCLINTOCK
HONEY


1908
DEEDS NOT WORDS
DEEDS NOT WORDS
VOTES FOR WOMEN
VOTES FOR WOMEN
WHAT DO THEY WANT NEXT? HALF OF THE WORLD?

Pioneers of Progress II

Pioneers of Progress II continues to tell the tales of women whose contributions to scientific discovery made a huge impact on the world. Their work and scientific legacies have often gone unrecognised.

These eight women were pioneers in the truest sense of the word, and not only because of their scientific breakthroughs. Many were advocates for the education of women. All championed the proper recognition of the role of women in society, by acting as role models for those who have followed them.

These stories appear in chronological order. We begin with Elizabeth Garrett Anderson, who became the first woman to qualify as a physician in Britain, co-founded the first hospital staffed by women, and opened the medical profession to women. Physicist Lise Meitner contributed to the discovery of the element protactinium and of nuclear fission. She declined an offer to work on the Manhattan Project, and was described by her nephew as "a physicist who never lost her humanity". American geneticist Barbara McClintock was awarded the 1983 Nobel Prize in Physiology and Medicine. Her research focused on developing ways to visualise and characterise maize chromosomes. She discovered transposons and understood their role in evolution and genome change well before others. The crystallographer and prison reformer Kathleen Lonsdale was one of the first two women elected to the Royal Society (along with Marjory Stephenson). Lonsdaleite, an allotrope of carbon and a rare form of diamond formed when meteorites strike the Earth, was named after her. The nutritionist Elsie Widdowson, older sister to Eva Crane, studied chemistry at Imperial College. She oversaw the ad- dition of vitamins to food during rationing in Britain in World War II. Eva Crane, born Ethel Eva Widdowson and younger sister of Elsie, became one of the greatest writers on bees and beekeeping of the 20th century, though her original subjects were mathematics and quantum mechanics. Katherine Johnson was an American mathematician whose calculations of the mechanics of orbits as a NASA scientist were key to the success of crewed spaceflights. She earned a reputation for complex manual calculations and helped to pioneer the use of computers. She was one of the first African-American woman to work as a NASA scientist, and her life is the subject of the 2016 film Hidden Figures. The career of British biologist Rosa Beddington had a major impact on developmental biology and the understanding of the fate of cells in the early embryo.

Pioneers of Progress Book II is the second in a series that follows **Heroes of Health**, a comic book that describes how the Medical Research Council began, more than 100 years ago. It tells the stories of some of the ground-breaking discoveries that have transformed the way we all live. We hope you enjoy this book.

For more information contact:

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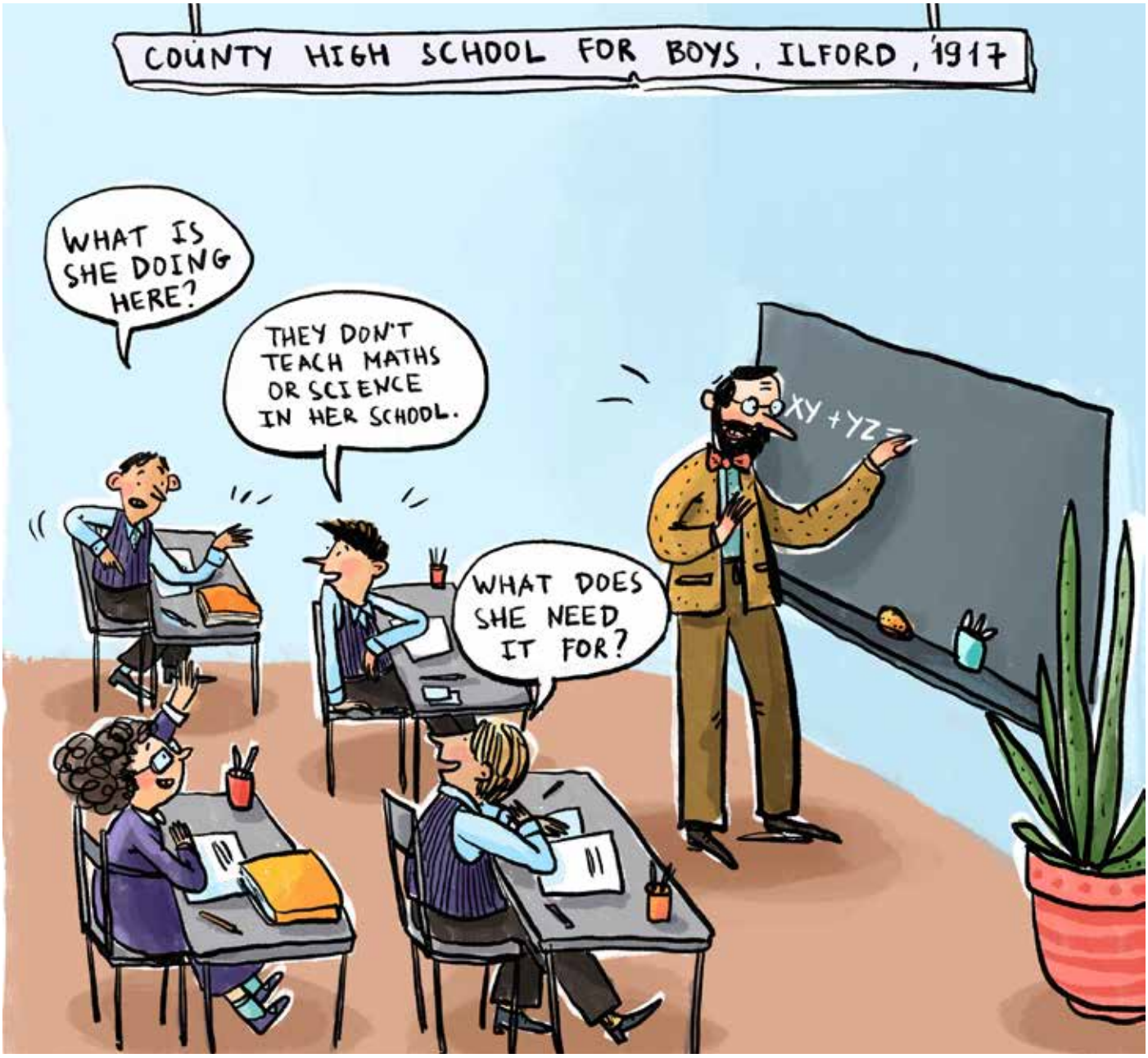
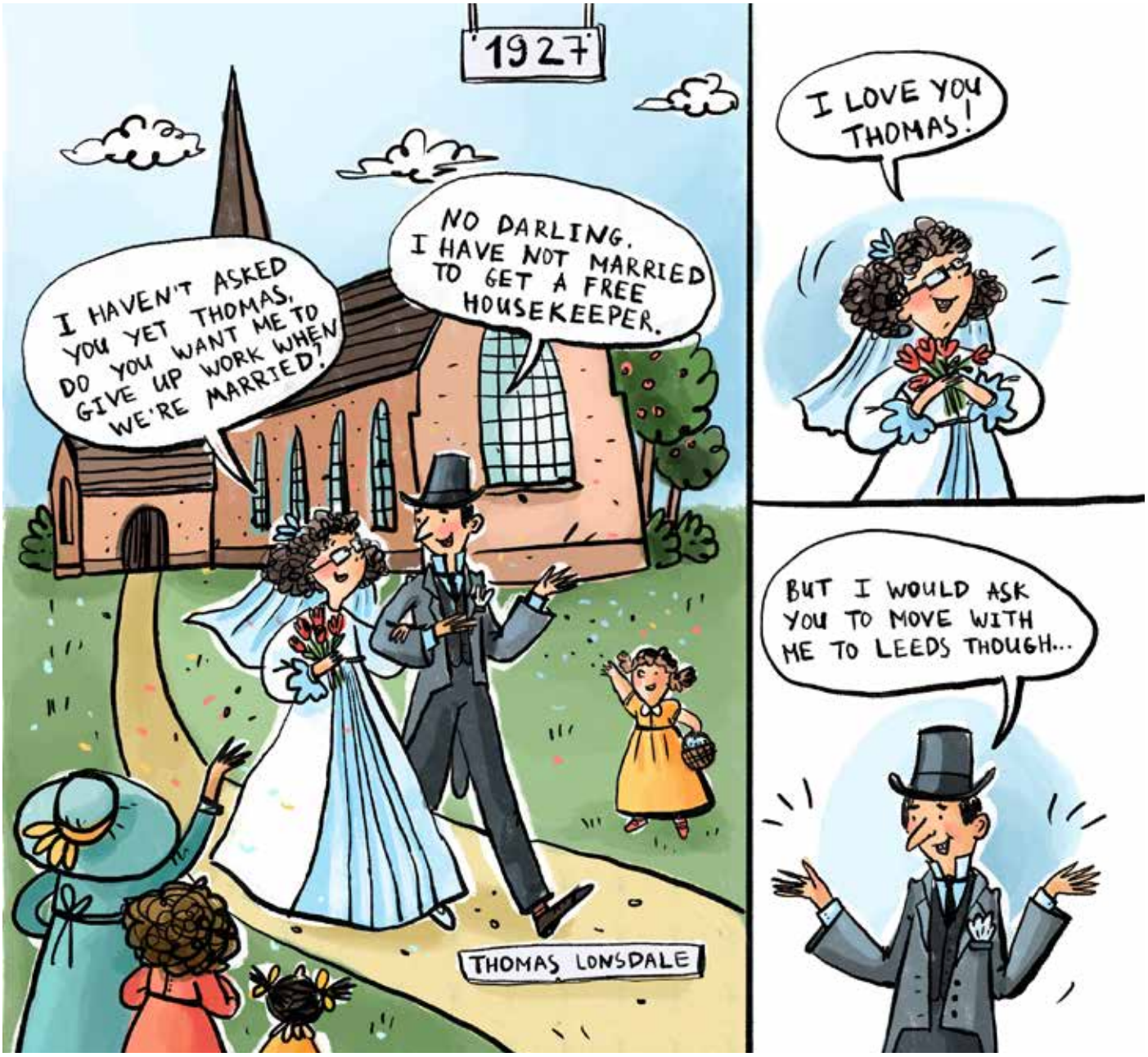
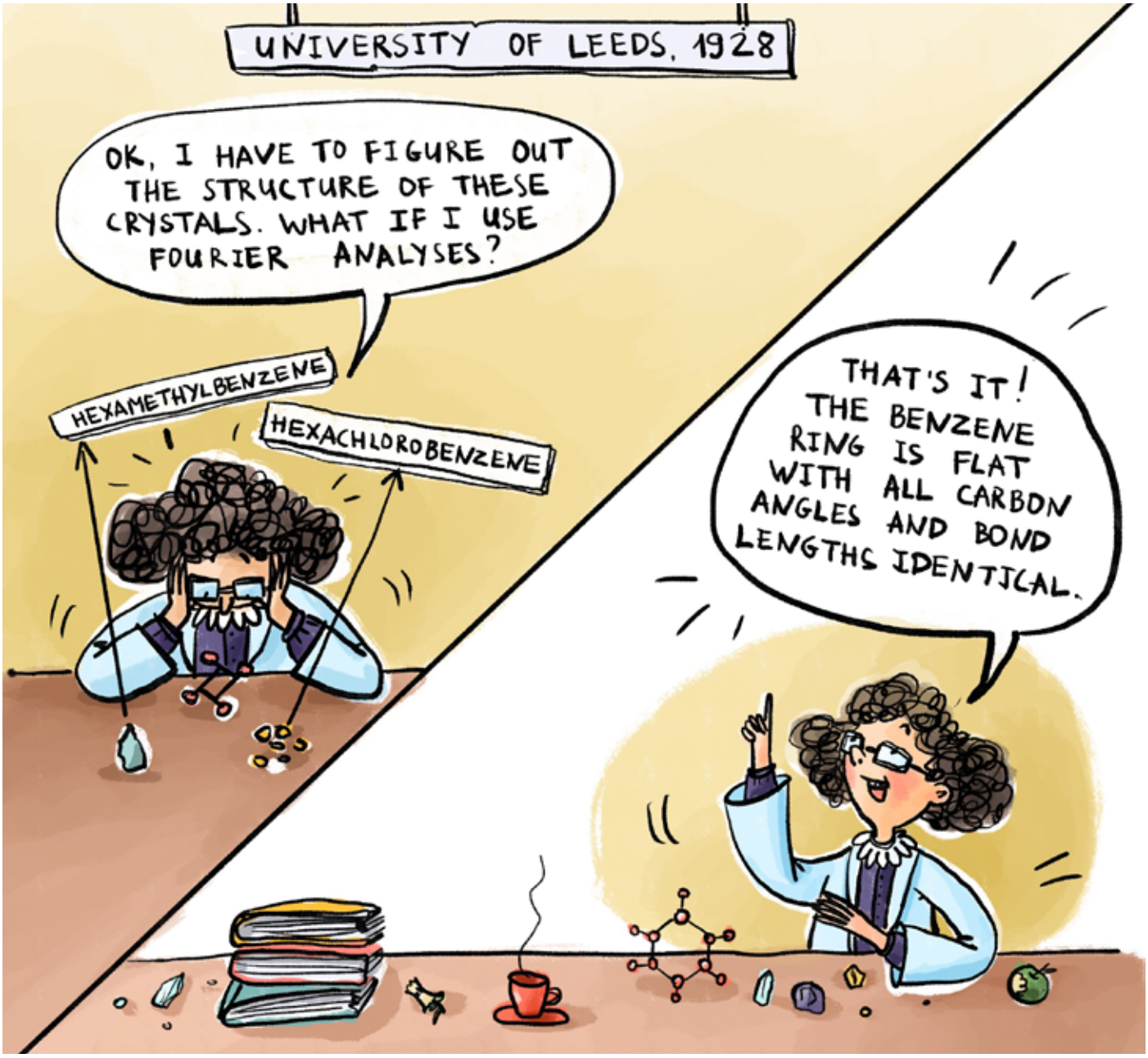
KATHLEEN LONSDALE

AND THE STRUCTURE OF CRYSTALS


COUNTY HIGH SCHOOL FOR BOYS, ILFORD, 1917
WHAT IS SHE DOING HERE?
THEY DON'T TEACH MATHS OR SCIENCE IN HER SCHOOL.
WHAT DOES SHE NEED IT FOR?
XY + YZ


1922
CONGRATULATIONS! YOU PASSED YOUR EXAM BRILLIANTLY. WOULD YOU LIKE TO COME TO MY LAB AND WORK IN X-RAY CRYSTALLOGRAPHY?
THANK YOU. I WOULD LOVE TO.
WILLIAM HENRY BRAGG


1927
I HAVEN'T ASKED YOU YET THOMAS, DO YOU WANT ME TO GIVE UP WORK WHEN WE'RE MARRIED?
NO DARLING. I HAVE NOT MARRIED TO GET A FREE HOUSEKEEPER.
THOMAS LONSDALE
I LOVE YOU THOMAS!
BUT I WOULD ASK YOU TO MOVE WITH ME TO LEEDS THOUGH...


UNIVERSITY OF LEEDS, 1928
OK, I HAVE TO FIGURE OUT THE STRUCTURE OF THESE CRYSTALS. WHAT IF I USE FOURIER ANALYSES?
HEXAMETHYLBENZENE
HEXACHLOROBENZENE
THAT'S IT! THE BENZENE RING IS FLAT WITH ALL CARBON ANGLES AND BOND LENGTHS IDENTICAL.


I HAD TO FINISH MY PAPER AT HOME. BUT NOW IT'S DONE!
ONE PAPER LIKE THIS BRINGS MORE CLARITY INTO ORGANIC CHEMISTRY THAN GENERATIONS OF ACTIVITIES BY US PROFESSIONALS.
C.K. INGOLD
PROFESSIONALS MY WORD!
WAAA..
WAA...


1943
YOU REFUSED TO REGISTER FOR CIVIL DEFENCE?
YES.
YOU REFUSE TO PAY THE FINE OF 2 POUNDS?
YES. YOU SEE, I'M A QUAKER.
YOU KNOW THAT YOU HAVE TO GO TO PRISON?
YES. CAN I TAKE MY SCIENTIFIC PAPERS AND INSTRUMENTS? I NEED TO WORK A BIT.


ONE MONTH LATER
YOU'RE FREE NOW. YOU CAN GO HOME
THANK YOU VERY MUCH. I GOT A GOOD AMOUNT OF WORK DONE. MAY I MAKE SOME SUGGESTIONS ON HOW TO IMPROVE THE CONDITIONS FOR THE PRISONERS?
HOLLOWAY PRISON


1945
CONGRATULATIONS LADIES. YOU ARE THE FIRST TWO FEMALE FELLOWS OF THE ROYAL SOCIETY.
SOMEONE HAS TO MAKE A START.
AFTER SPENDING TIME IN PRISON NOTHING SCARES ME ANY MORE.
MARJORY STEPHENSON


1966
THEY WANT TO NAME A HEXAGONAL DIAMOND AFTER ME, LONSDALEITE...
WELL YOU ACHIEVED ALOT: DISCOVERED THE STRUCTURE OF AROMATIC COMPOUNDS, WROTE THE 'BIBLE' FOR CRYSTALLOGRAPHERS, PUBLISHED MORE THAN 200 PAPERS, HEAD OF CRYSTALLOGRAPHY AT UCL, DAME OF...
...YES DARLING. I'D RATHER HAVE ANOTHER SLICE OF YOUR WONDERFUL CAKE...
PROBABLY I WILL REPLY THAT THE NAME SEEMS APPROPRIATE SINCE THE MINERAL ONLY OCCURS IN SMALL QUANTITIES AND IS GENERALLY RATHER MIXED UP!

Acknowledgements and thanks

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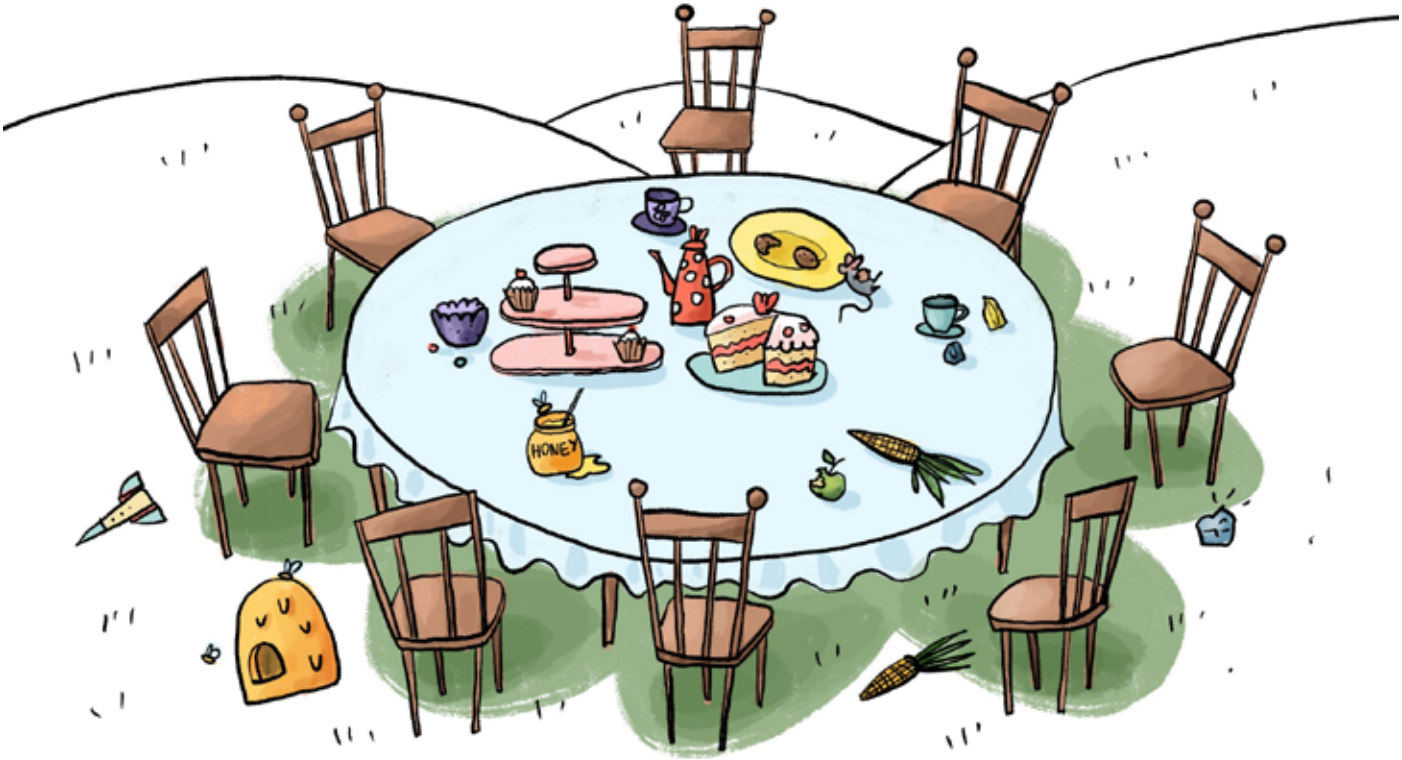
I AM A WOMAN. HEAR ME ROAR!
EQUAL WORK EQUAL PAY!
#EeachForEqual
THE FIGHT GOES ON!
GENDER PAY
CLOSE THE GAP
2020
WHAT ARE THEY ON ABOUT? THEY ALREADY HAVE THE VOTE!


HONEY