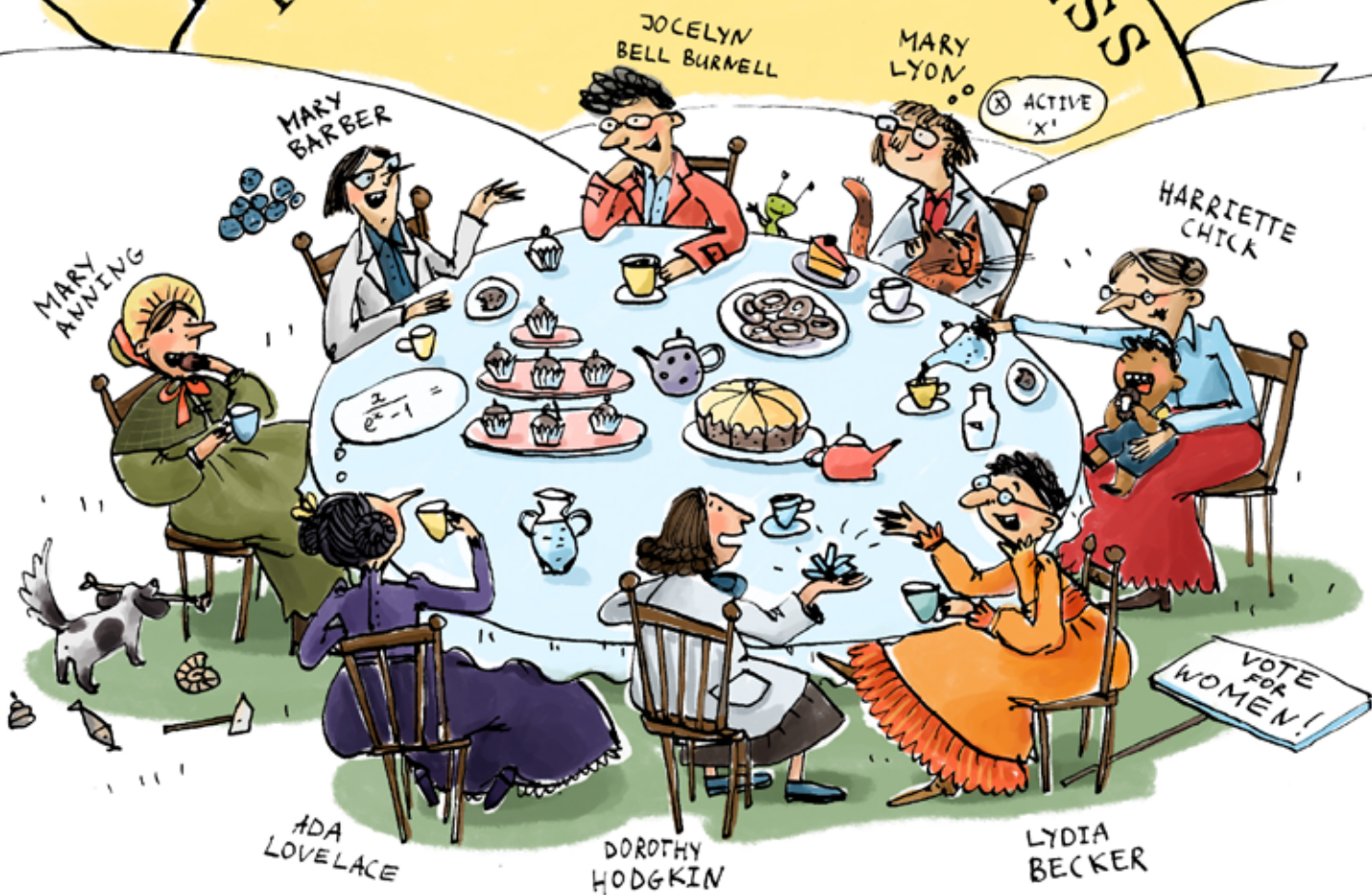


# PIONEERS OF PROGRESS





1908

WHAT DO  
THEY WANT NEXT?  
HALF OF THE  
WORLD?



Stories and research: Kirstin von Glasow  
Illustrators: Elina Ellis and Lindsay McBirnie

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# Pioneers of Progress

**Pioneers of Progress** tells the tales of eight women whose contributions to scientific discovery had huge impacts on the world we live in. Their work and the scientific legacies they left behind has often gone unrecognised.

These women were pioneers in the truest sense of the word, not only because of their scientific breakthroughs, but because they were advocates for female education and forerunners of women's suffrage.

One example is **Mary Anning**, who against all the odds became one of the world's most famous fossil collectors. She was a gifted palaeontologist despite receiving no formal education. **Ada Lovelace** was the first computer programmer and daughter of Lord Byron. While mentored by Charles Babbage she was educated by two women - her mother and the mathematician and astronomer Mary Somerville. Botanist **Lydia Becker** provided plant specimens for Charles Darwin, and at the same time was a leader of the early suffrage movement and a promoter of female education.

Many years later the research of two women, **Dorothy Crowfoot Hodgkin** and **Jocelyn Bell Burnell** was recognised by awards in Chemistry and Physics. Although Bell Burnell missed out on a Nobel Prize for her discovery of pulsars. Both aspiring scientists may not have attained their scientific successes if their parents hadn't campaigned for their daughters to study 'science' instead of 'domestic science' at school.

We tell the scientific stories of Harriette Chick, Mary Barber and Mary Lyon. **Harriette Chick**, co-founded the Medical Research Council and discovered that cod liver oil and sunshine were an essential cure for rickets in children affected by malnutrition after the war. **Mary Barber** encouraged the wearing of face masks in hospitals to prevent cross-infection and began to pioneer the restricted use of antibiotics. Geneticist **Mary Lyon**, first described a process called X-chromosome inactivation that transformed our understanding of epigenetics and how genes are turned on and off.

**Pioneers of Progress** is the sequel to **Heroes of Health**, a comic book that described how the Medical Research Council began more than 100 years ago. It told the stories of some of the ground-breaking discoveries that researchers have made that are transforming the way we live.

We hope you enjoy this book - get ready for the next instalment of **Pioneers of Progress**, as there are plenty more stories of pioneering women in science just waiting to be told...

For more information contact:

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# MARY ANNING

## PRINCESS OF PALAEOLOGY





YOU'LL FIND THE BEST PIECES  
AFTER A STORM WHEN LANDSLIDES  
HAVE LIBERATED THE FOSSILS BUT  
BE CAREFUL IT'S DANGEROUS WORK.

YES, FATHER.



MARY

JOSEPH









1819

I THINK I CAN HELP  
YOU. I WILL SELL THE  
FOSSILS YOU SOLD ME AT  
AUCTION IN LONDON  
AND GIVE THE PROCEEDS  
TO YOU.

I'M VERY SORRY  
MR. BIRCH. I HAVEN'T  
FOUND A DECENT FOSSIL  
FOR MONTHS. WE HAD  
TO SELL NEARLY ALL  
OUR FURNITURE.



RUBBISH!  
YOU ARE THE BEST FOSSIL  
COLLECTOR I KNOW AND  
WILL UNDOUBTEDLY MAKE  
GREAT DISCOVERIES. I  
WON'T LET THAT GO  
TO WASTE.



I DON'T KNOW  
IF I CAN ACCEPT...



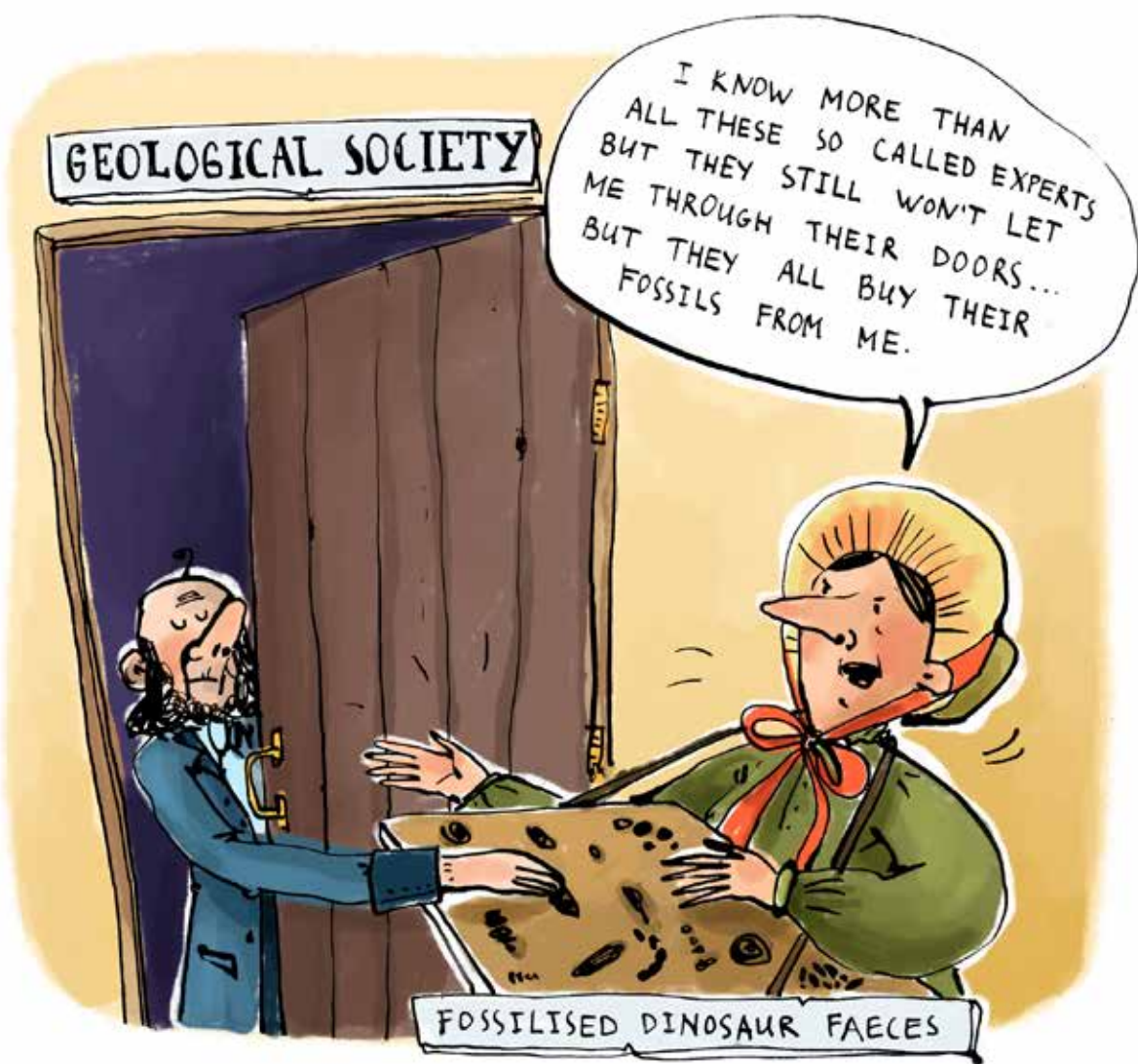




DECEMBER, 1823







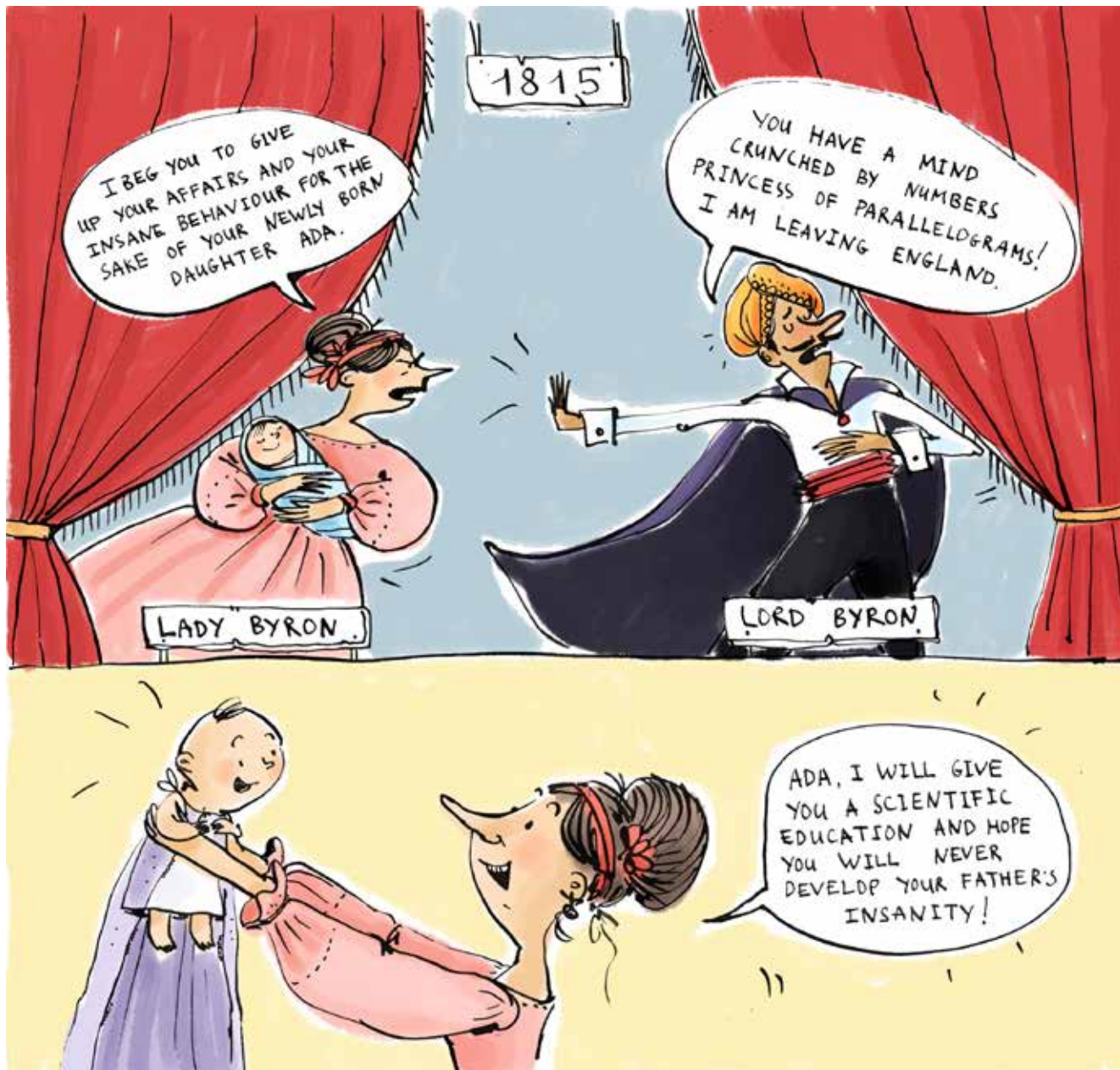


# ADA LOVELACE

THE POETICAL SCIENTIST  
AND THE ANALYTICAL ENGINE











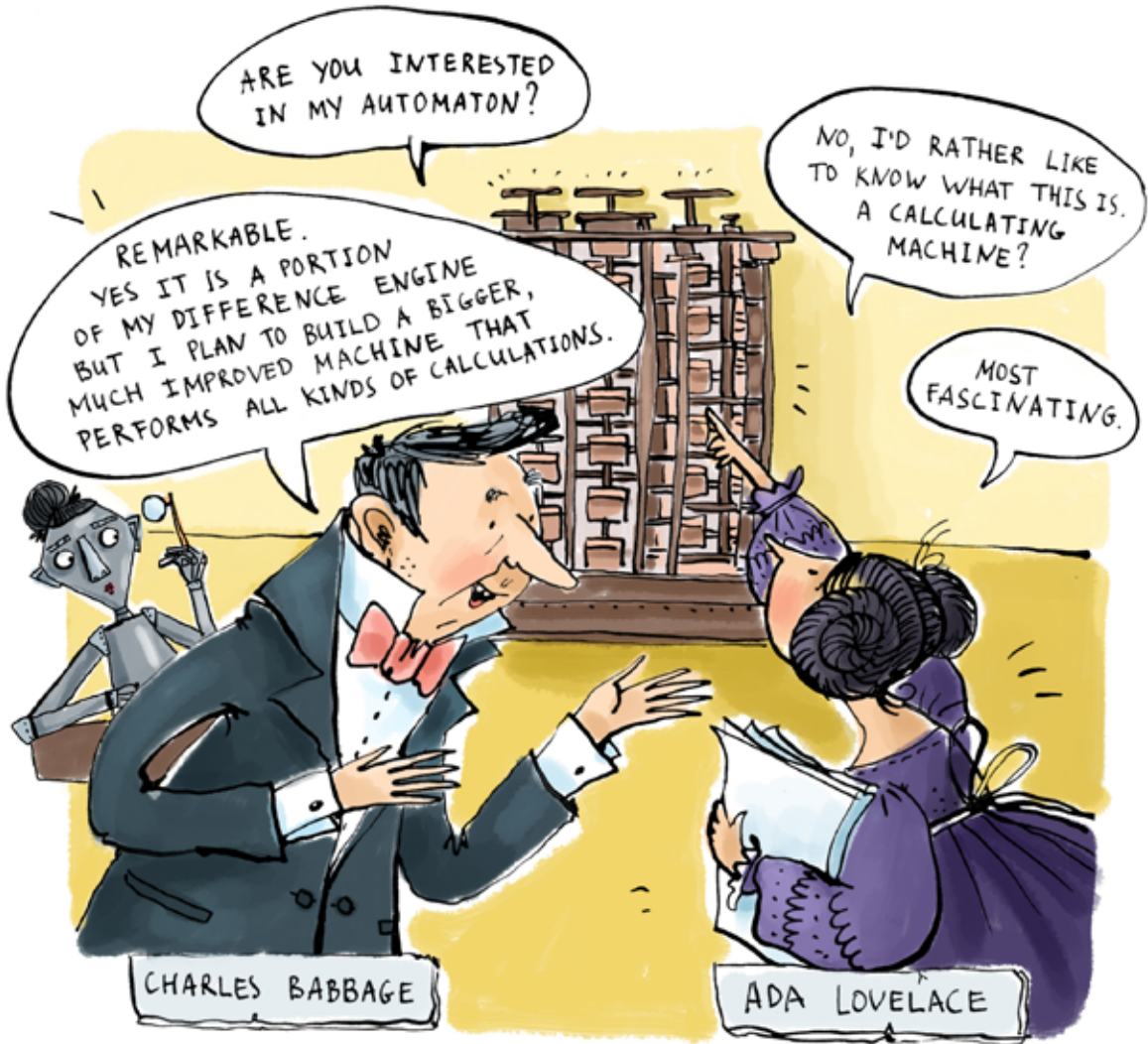
1833

I DON'T KNOW WHAT TO DO. ADA TRIED TO ELOPE WITH THE TUTOR. I FEAR SHE HAS DEVELOPED HER LATE FATHER'S MERCURIAL TEMPERAMENT.

SHE JUST HAS A LIVELY SPIRIT. SHE NEEDS SOMETHING TO OCCUPY HER MIND. I WILL INTRODUCE HER TO MY FRIEND CHARLES BABBAGE

LADY BYRON

MARY SOMERVILLE  
SCIENTIST AND  
ADA'S TEACHER









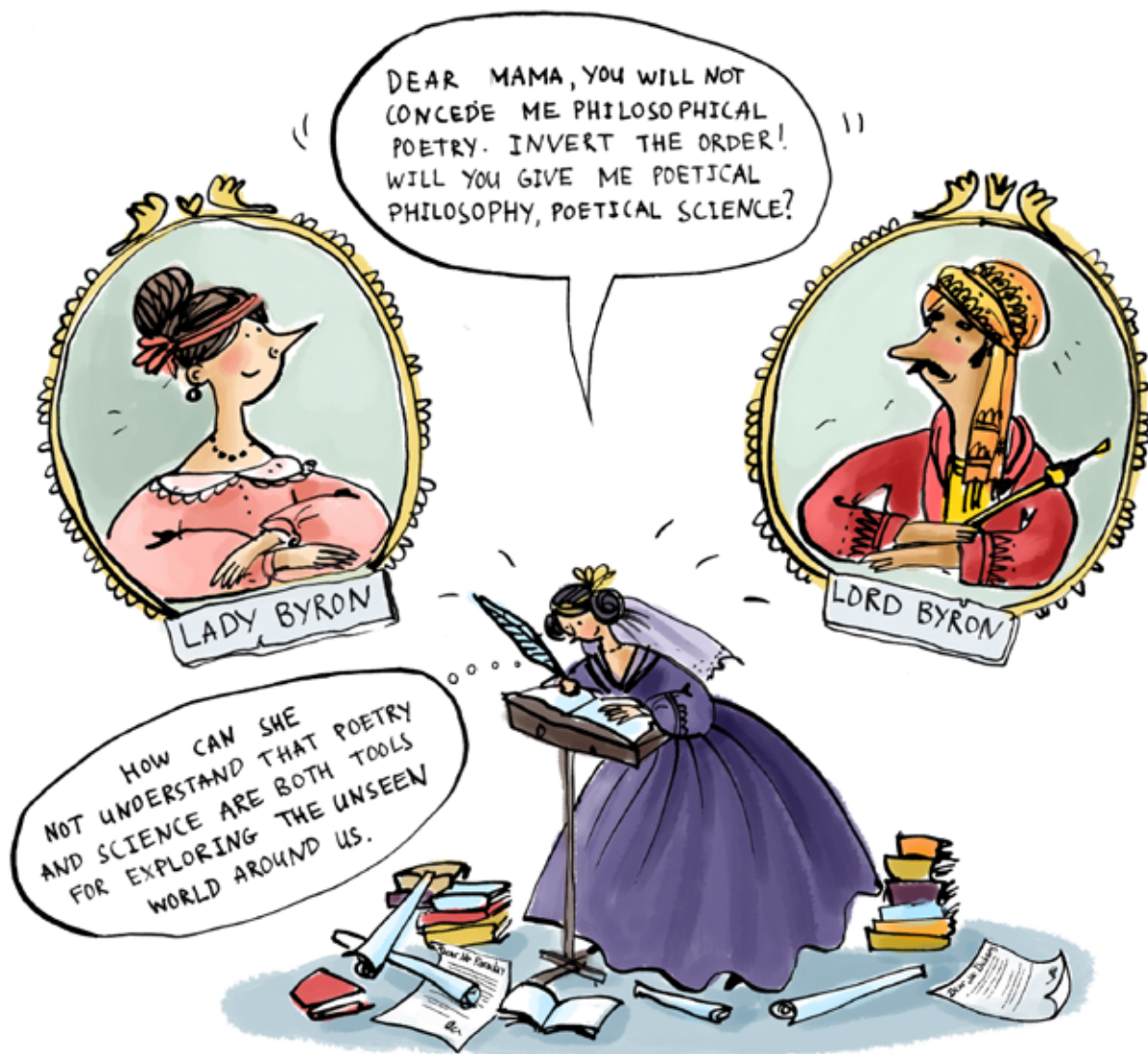












# LYDIA BECKER

## ONE HAND AND ONE MIND



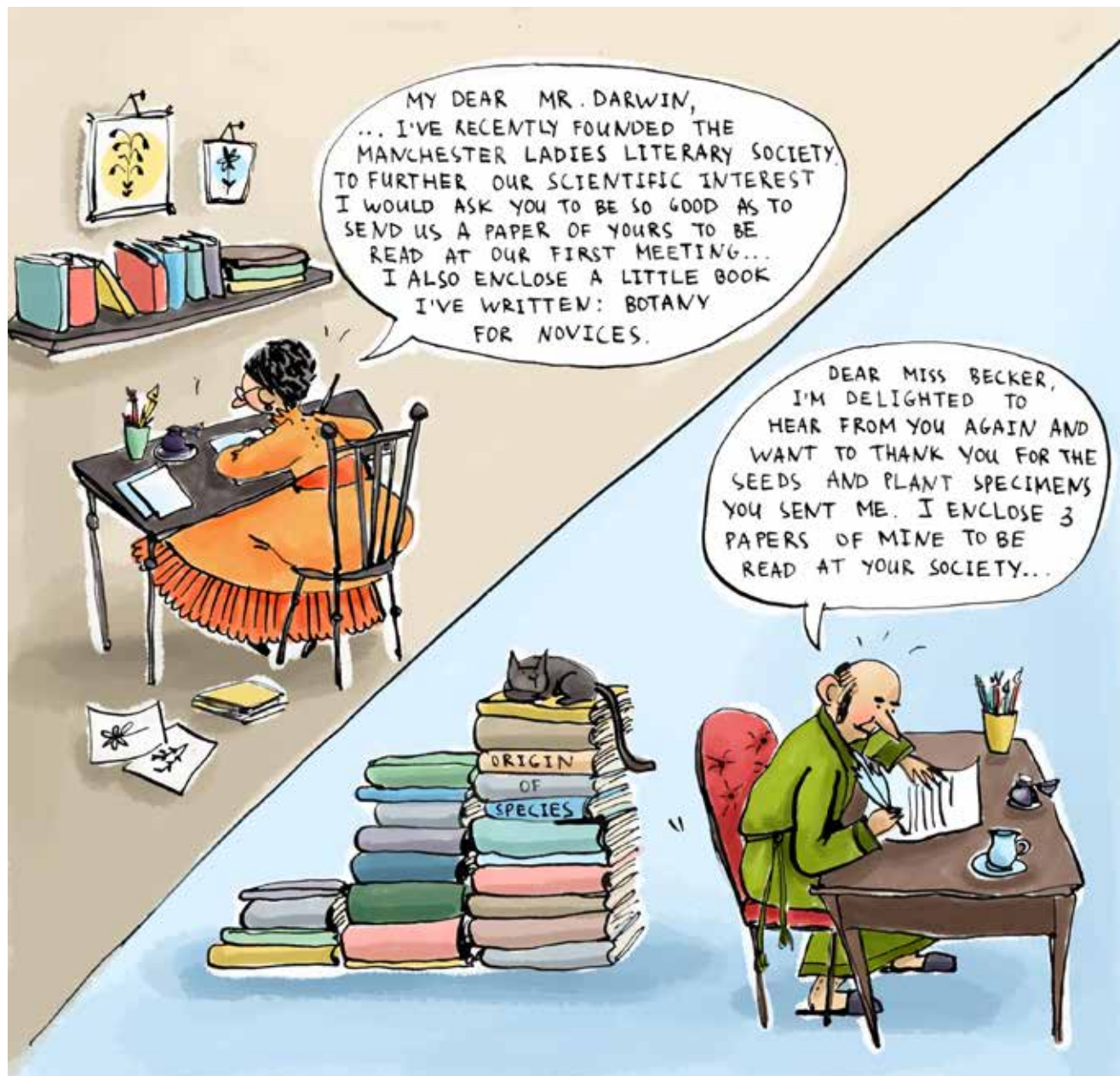






ROYAL HORTICULTURAL SOCIETY, 1864







NATIONAL ASSOCIATION FOR THE PROMOTION  
OF SOCIAL SCIENCE, 1866





1870

I WELCOME THE  
NEWLY ELECTED MEMBERS  
TO THE MANCHESTER SCHOOL  
BOARD WOULD YOU LIKE  
TO SAY SOMETHING?

I WISH I LEARNED  
HOW TO MEND MY  
OWN SOCKS.

YES. I THINK BOYS  
SHOULD BE TAUGHT TO  
MEND THEIR OWN SOCKS  
AND COOK THEIR OWN MEALS!  
AND GIRLS SHOULD  
LEARN SCIENCE.

HERESY!

YOU ARE  
RIGHT!

OUTRAGED





1890

# WOMEN'S SUFFRAGE JOURNAL

FINAL AND MEMORIAL NUMBER

VOL XXL-No

AUGUST 1890

PRICE ONE PENNY

## TO ALL READERS

FOR TWENTY YEARS AND FOUR MONTHS  
THIS JOURNAL HAS RECEIVED THE IMPRESS  
OF ONE HAND AND ONE MIND, SO THAT ITS  
LONG ROW OF VOLUMES FORMS ONE CONTINUOUS  
WORK, AND NOW WHEN THAT CAREFUL HAND  
IS LAID LOW AND THE ENERGIES OF THAT  
FARSEEING MIND ARE CARRIED BEYOND OUR  
MORTAL KEN, IT WOULD SEEM THE MOST  
FITTING COURSE TO CLOSE THESE PAGES  
WHERE MISS BECKER LEFT THEM.



# HARRIETTE AND THE SUNSHINE





AFTER THE WAR



## THE TRAIN TO VIENNA







HARRIETTE KNEW IT WASN'T THAT SIMPLE...











HARRIETTE WATCHES THE CHILDREN GETTING BETTER



BACK IN LONDON...





# DOROTHY CROWFOOT HODGKIN















1940 - 1945

THOMAS, PENICILLIN MUST  
HAVE A RING STRUCTURE  
OF THREE CARBON ATOMS  
AND ONE NITROGEN ATOM

JOHN CORNFORTH

IF THAT'S TRUE  
I'LL GIVE UP  
CHEMISTRY AND  
GROW MUSHROOMS

OH, AND  
YOUR  
DAUGHTER  
WEIGHS  
8  
POUNDS.













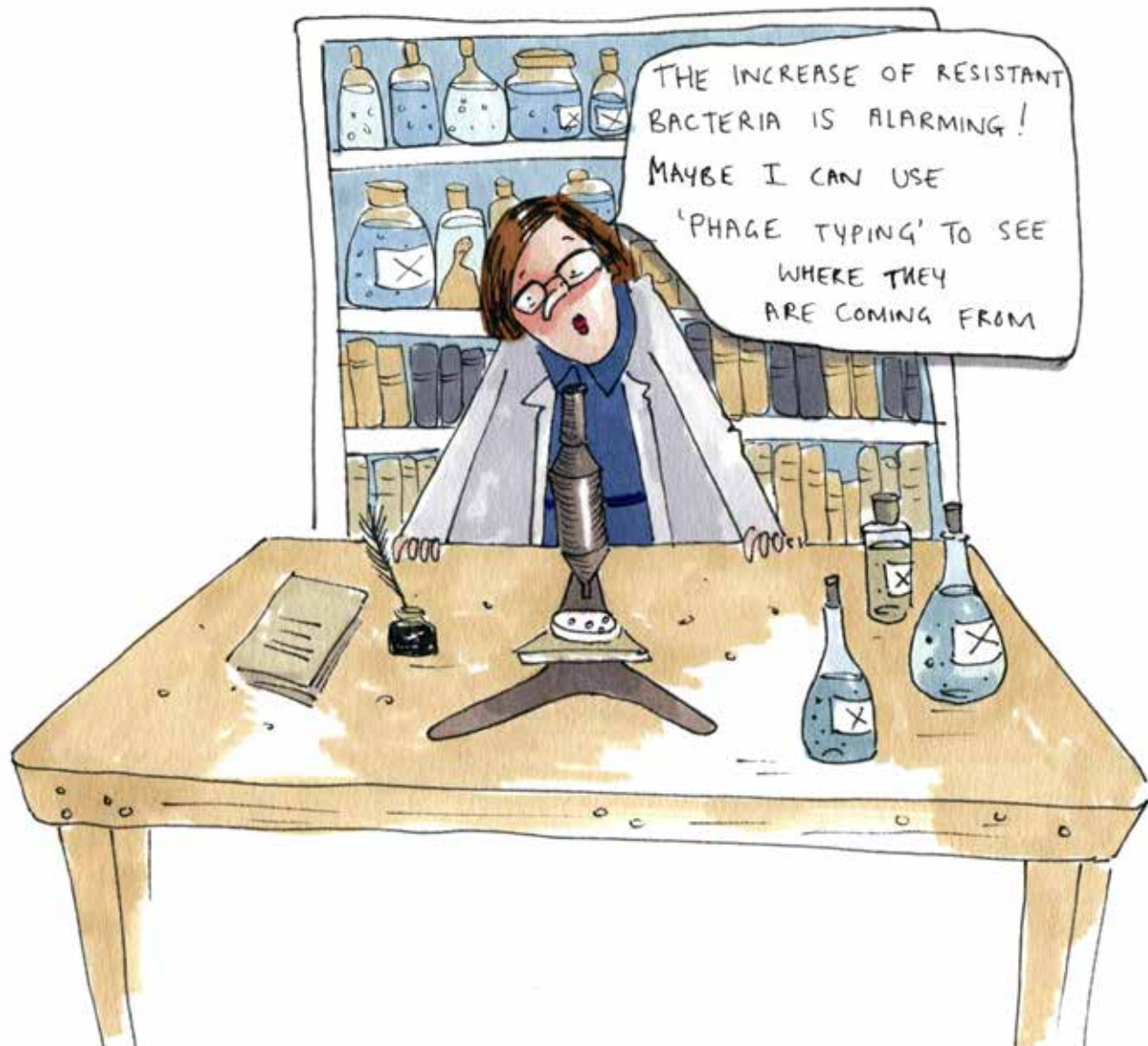


# MARY BARBER AND THE PERSISTENT BUG





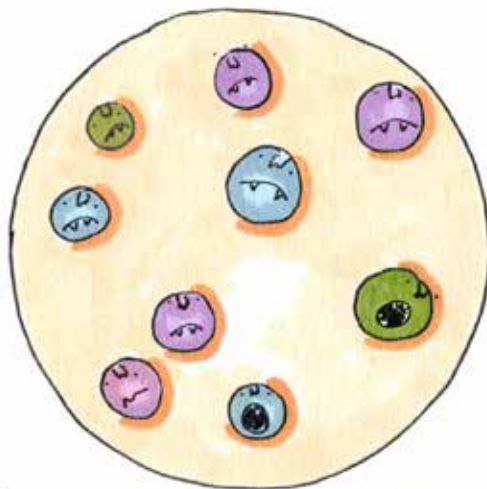
1947 HAMMERSMITH HOSPITAL



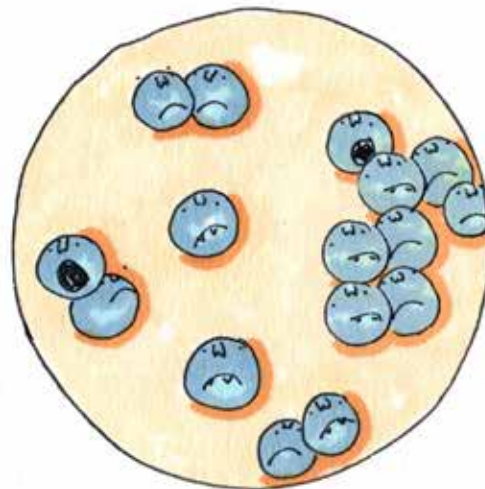


THE PENICILLIN KILLED  
OFF SOME BACTERIA

BUT THAT MAKES IT EASIER  
FOR A SINGLE RESISTANT  
STRAIN TO MULTIPLY AND  
SPREAD THROUGHOUT THE  
HOSPITAL...



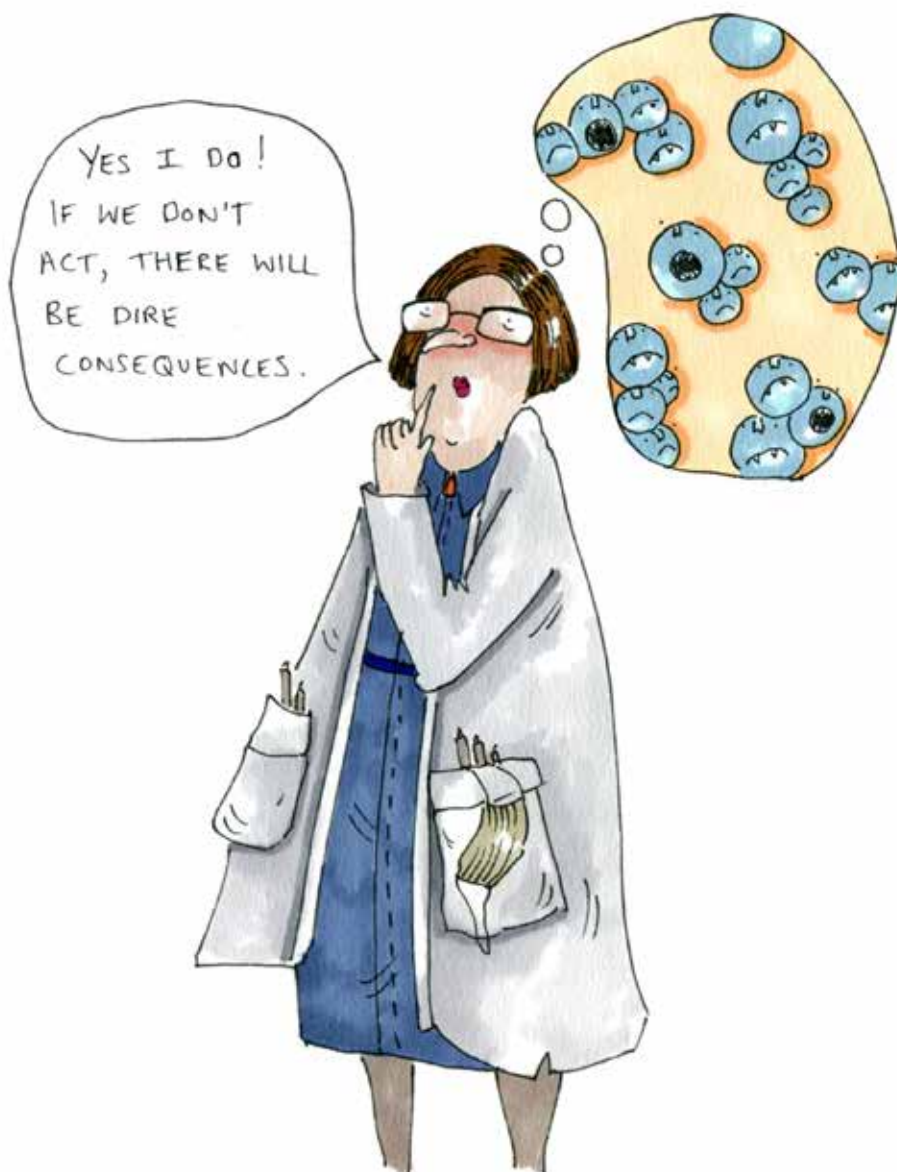
WITHOUT  
PENICILLIN



WITH PENICILLIN

















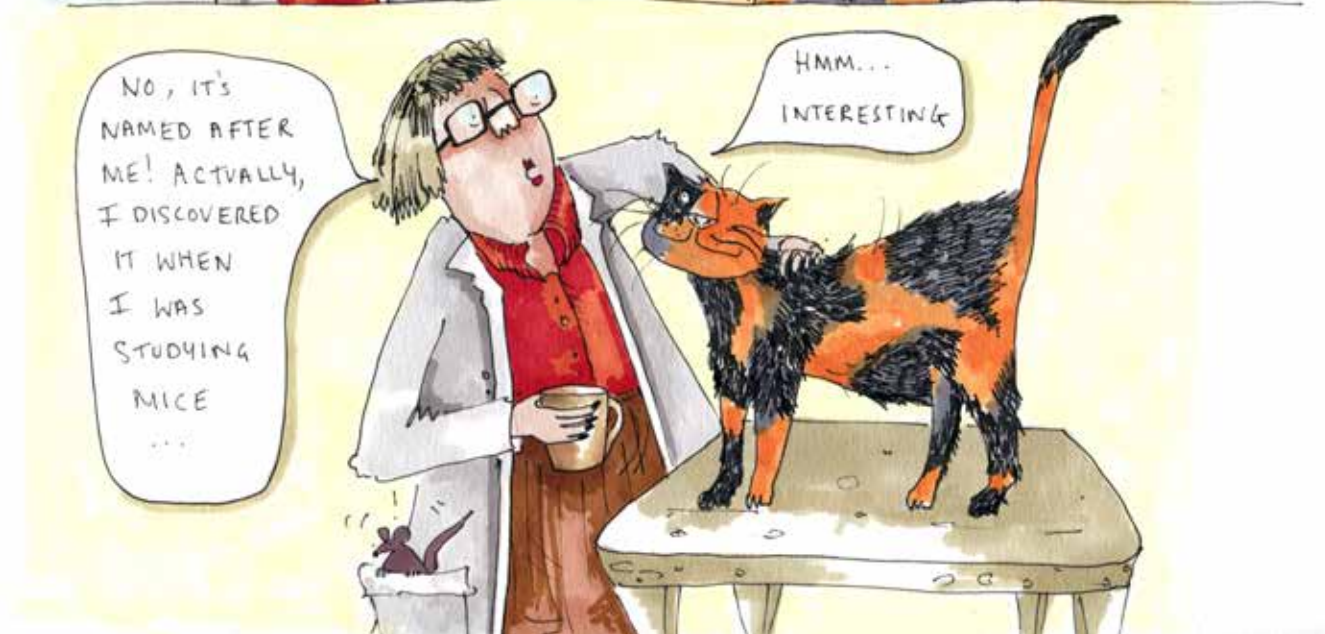


# MARY LYON AND THE TORTOISESHELL CAT



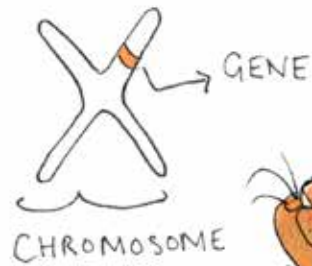




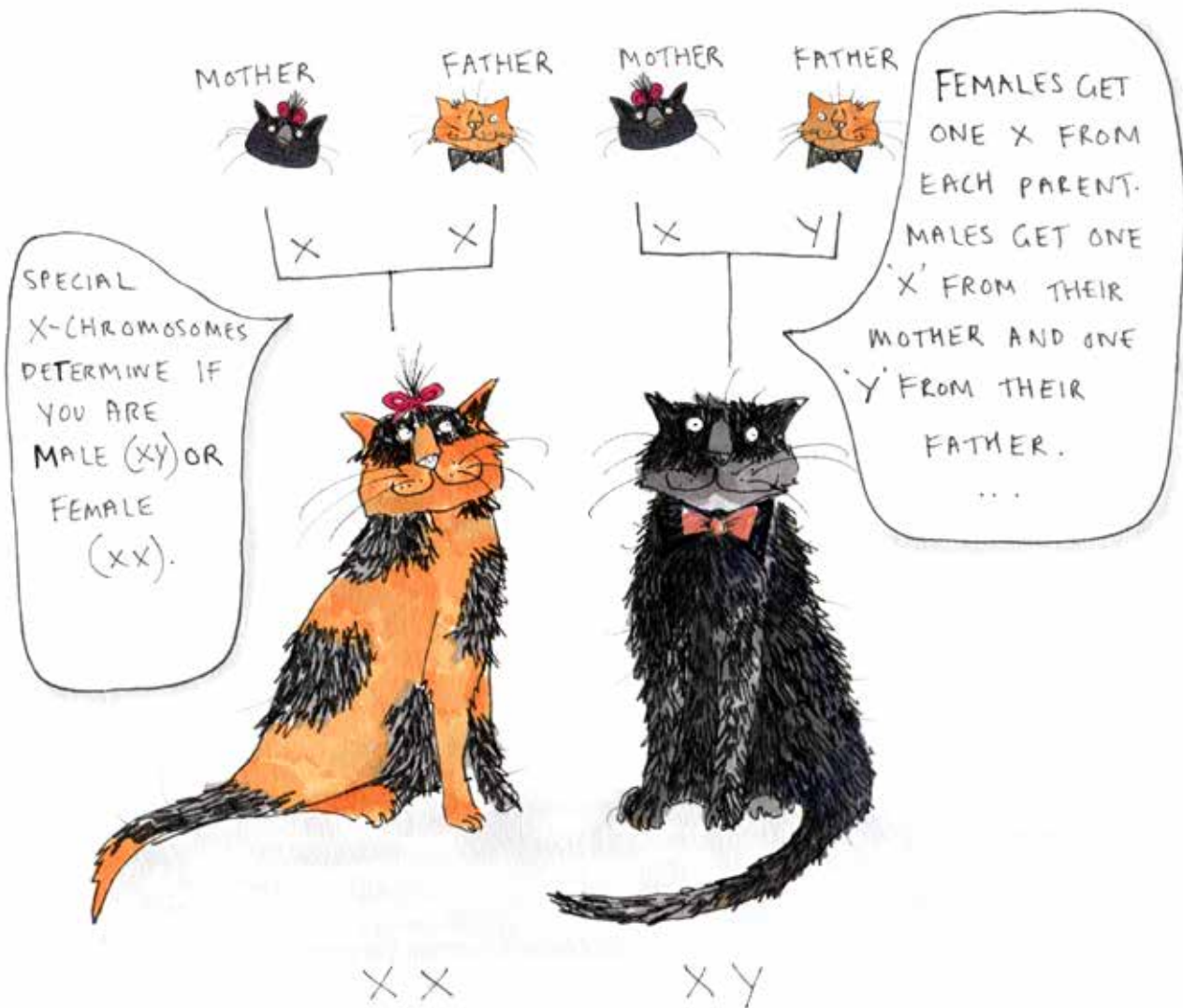




EACH CHROMOSOME  
CONTAINS MANY GENES  
WHICH ACT LIKE  
RECIPES, TELLING  
YOUR CELLS HOW TO  
FUNCTION AND MULTIPLY









MEANING THAT ONE OF  
THE CHROMOSOMES IS RANDOMLY  
CRUMPLED INTO A BALL TO  
MAKE A 'BARR BODY'  
THAT IS NOT USED ANYMORE.

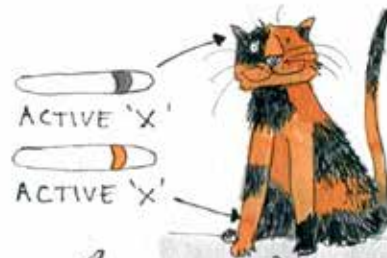


THIS PATTERN OF  
INACTIVATION IS INHERITED  
BY ALL THE CELLS THAT  
COME FROM THIS  
CELL.





AS THE GENES FOR  
ORANGE OR BLACK COAT  
COLOUR ARE ON THE X-CHROMOSOME  
THIS LEADS TO A MOSAIC PATTERN  
DEPENDING ON WHICH CHROMOSOME  
IS INACTIVATED.



YOU GET A TORTOISESHELL  
CAT WHICH IS ALMOST  
ALWAYS FEMALE.





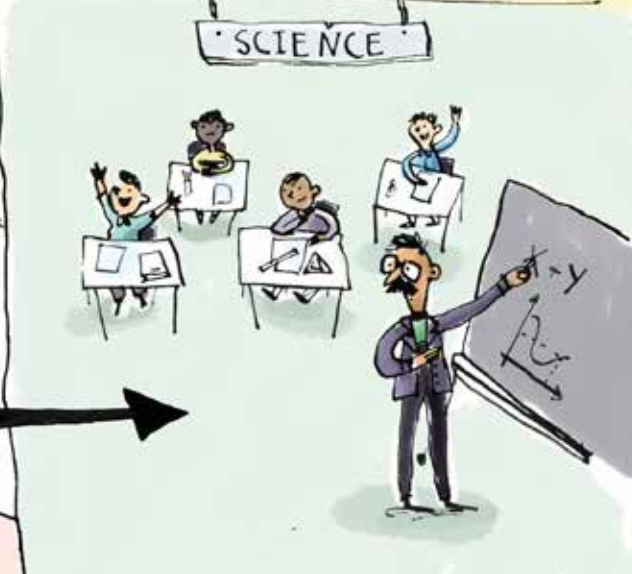
# JOCELYN BELL BURNELL

## AND THE LITTLE GREEN MEN





# LURGAN, NORTHERN IRELAND, 1954



1966, CAVENDISH LABORATORY, CAMBRIDGE











# PRESS CONFERENCE, 1968

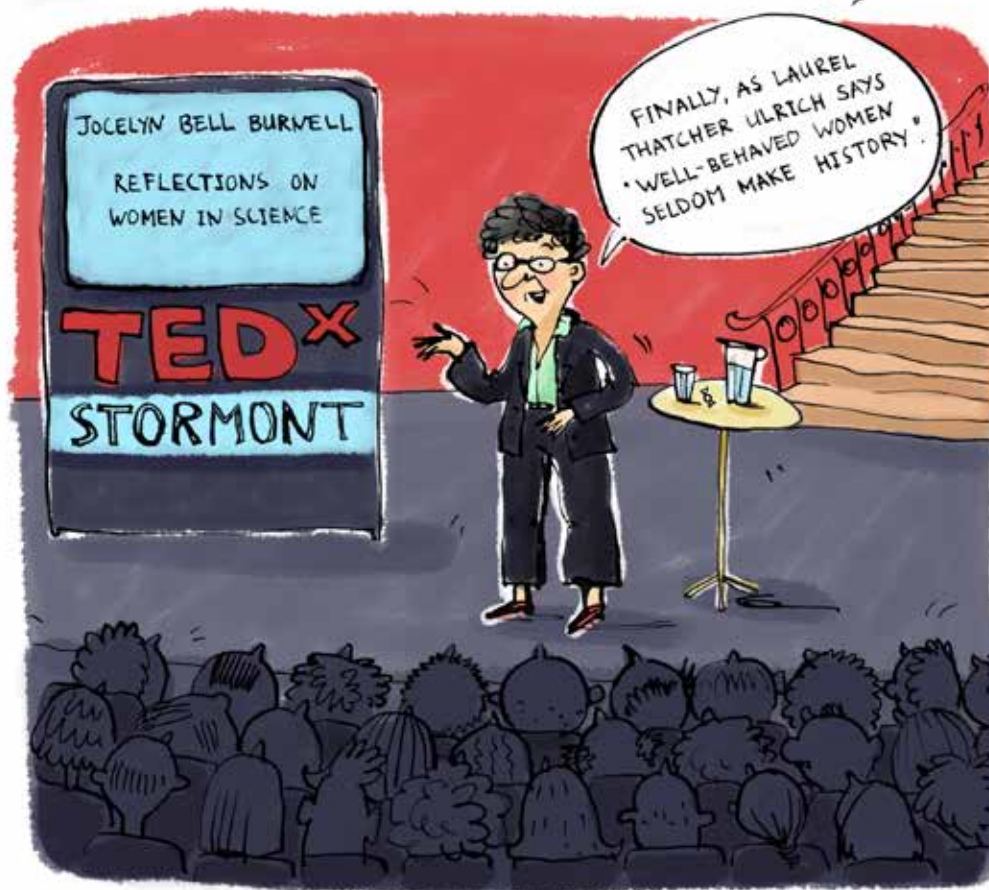




1974



2013



2018

YOU JUST GOT THE \$3 MILLION BREAKTHROUGH PRIZE FOR YOUR GROUNDBREAKING WORK ON PULSARS BUT OTHERS GOT THE NOBEL PRIZE FOR YOUR DISCOVERY. DOES THAT BOTHER YOU?

WHAT WILL YOU DO WITH THE MONEY?

THE MONEY WILL GO TO THE INSTITUTE OF PHYSICS TO FUND STUDENTSHIPS FOR PEOPLE UNDER-REPRESENTED IN PHYSICS.

I'M SPEECHLESS AND FEEL I HAVE DONE RATHER WELL OUT OF NOT GETTING A NOBEL PRIZE. IF YOU DON'T GET A NOBEL YOU GET EVERYTHING THAT MOVES. THAT'S MUCH MORE FUN!



# Acknowledgements and thanks

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The beautiful illustrations are by Elina Ellis (Anning, Lovelace, Becker, Bell Burnell) and Lindsay McBirnie (Chick, Hodgkin, Barber, Lyon), with the cover and title pages by Elina Ellis.

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2020

WHAT ARE  
THEY ON ABOUT?  
THEY ALREADY  
HAVE THE VOTE!



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of Medical Sciences



Medical  
Research  
Council

