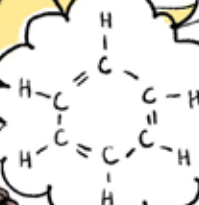
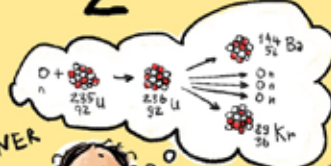


PIONEERS OF PROGRESS 2

ELIZABETH
GARRETT
ANDERSON

LISE
MEITNER

ROSA
BEDDINGTON



KATHERINE
JOHNSON

KATHLEEN
LONSDALE

EVA
CRANE

ELSIE
WIDDOWSON

BARBARA
MCLINTOCK





1908

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 addition 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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geco@lms.mrc.ac.uk

ROSA BEDDINGTON

AND THE FATE OF CELLS





I DON'T KNOW WHAT TO DO WITH HER. SHE IS BRILLIANT AT SCIENCE, SPORTS, ART. BUT THIS IS THE THIRD TIME I CATCH HER SNEAKING OUT OF SCHOOL TO THE PUB. THAT CAN'T BE TOLERATED!

CUT HER SOME SLACK. SHE HAD A DIFFICULT CHILDHOOD.

1974. BRASENOSE COLLEGE, OXFORD

I REALLY WOULD LOVE
TO UNDERSTAND THE
DEVELOPMENT OF THE
MAMMALIAN EMBRYO.

I LOVE
YOU.

AND A GREAT
SCIENTIST TOO

SHE IS
SOO COOL!





WHEN THE EMBRYONIC CELLS
ARE MOVED TO A DIFFERENT
POSITION ALONG THE AXIS OF
THE EMBRYO, WILL THEY BECOME
LIKE THE CELLS IN THEIR NEW
LOCATION OR ARE THEY
ALREADY SPECIFIED?

I NEED TO LEARN
HOW TO TRANSPLANT
CELLS IN THE EARLY
EMBRYO SO THAT THEY
CAN BE TRANSFERRED
BACK.



COLD SPRING HARBOR, MOUSE COURSE

HOW NICE!
ROSA MADE ME
A MOUSE
BIRTHDAY CARD.

HOW IS
WORK ?
GOING.

OH, WE HAD
SOME TROUBLE
TRANSPLANTING
EARLY EMBRYOS...

YOU NEED A
ROSA BEDDINGTON
TO DO THAT.

ROSA BEDDINGTON



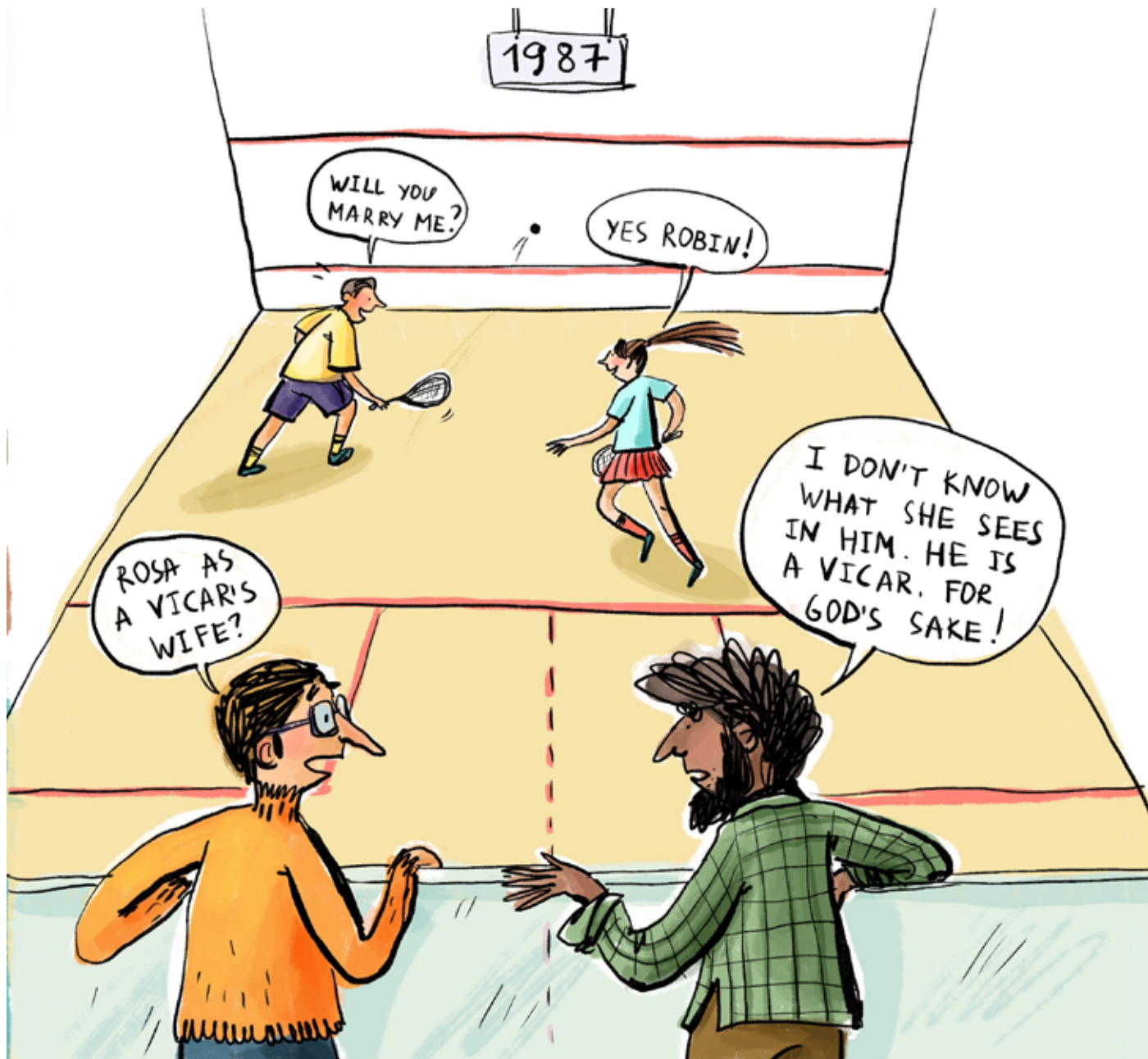
1987

WILL YOU
MARRY ME?

YES ROBIN!

ROSA AS
A VICAR'S
WIFE?

I DON'T KNOW
WHAT SHE SEES
IN HIM. HE IS
A VICAR. FOR
GOD'S SAKE!



1993, HEAD OF MAMMALIAN DIVISION, NIMR, MILL HILL

THE 'NODE' OF THE
MOUSE EMBRYO CAN
INDUCE A SECOND
NEURAL AXIS WHEN
TRANSPLANTED IN A
HOST EMBRYO.

YES, BUT...

SO IT DOES
THE SAME AS
THE ORGANISER
IN FROG
EMBRYOS?



DEARLY
BELOVED...

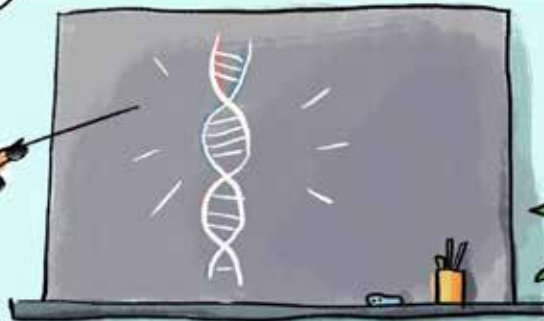
CAN I HAVE
SOME TEA?

PSSS! WE SHOULDN'T
DISTURB THE VICAR.
HE'S CONCENTRATING
ON HIS SERMON.

FROGS...
MICE...



GENETIC
MODIFICATIONS...



?

... I THINK THE HEAD OF
THE EMBRYO IS INDUCED
BY ONE OF THE TISSUES
SURROUNDING IT.

I WONDER
IF MY CHICKS
HAVE HATCHED?



1997

IT'S LATE ROSA.
DON'T YOU WANT
TO GO TO BED?

THEY ASKED ME TO DESIGN
THE WADDINGTON MEDAL FOR
DEVELOPMENTAL BIOLOGY.
WADDINGTON SAW THE SNAKE
EATING ITS TAIL AS AN EMBLEM.
FOR HIS WORK "THE ONE, THE ALL".
I PUT IN REPRESENTATIONS OF
ALL THE DEVELOPMENTAL SYSTEMS
HE WORKED ON: CHICK EGGS
DROSOPHILA WINGS
AND CHROMOSOMES.





I BROUGHT YOU
THE MANUSCRIPT
OF 'MANIPULATING
THE MOUSE EMBRYO.'

THANKS... YOU KNOW...
I'VE HAD REASON TO
CONTEMPLATE MY LIFE
RECENTLY, AND I HAD
A BLOODY GOOD ONE!

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2020

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



