

From the BESTSELLING author

Kate Pankhurst

FANTASTICALLY

GREAT

WOMEN

SCIENTISTS

and their
STORIES

BLOOMSBURY



Books by
Kate Pankhurst

*Fantastically Great Women
Who Saved the World*

*Fantastically Great Women
Who Made History*

*Fantastically Great Women
Who Worked Wonders*

*Fantastically Great Women
Who Saved the Planet*



Kate Pankhurst

FANTASTICALLY
GREAT
WOMEN

SCIENTISTS
and their
STORIES

BLOOMSBURY
CHILDREN'S BOOKS
LONDON OXFORD NEW YORK NEW DELHI SYDNEY

First published 2020 by Bloomsbury Publishing Plc
50 Bedford Square, London, WC1B 3DP
29 Earlsfort Terrace, Dublin 2
www.bloomsbury.com

Bloomsbury is a registered trademark of
Bloomsbury Publishing Plc

978 1 5266 1533 6

Copyright © 2021 Bloomsbury Publishing Plc
Text Copyright © Kate Pankhurst
with contributions from Kate Paice
Illustrations Copyright © Kate Pankhurst

A CIP record for this book is available from the British Library

The moral rights of the author and illustrator have
been asserted.

All rights reserved. No part of this publication may be
reproduced in any form or by any means – graphic, electronic
or mechanical, including photocopying, recording, taping or
information storage and retrieval systems – without the prior
permission in writing of the publishers.



Printed and bound by CPI Group (UK) Ltd, Croydon CRO 4YY

10 9 8 7 6 5 4 3 2 1

For Simon and Otto,
my fantastically great boys.



Contents

Women in Science	1
MAE JEMISON	5
Marie Curie	25
Elizabeth Blackwell	46
Janaki Ammal	64
Katia Krafft	80
Caroline Herschel	104
TU YOUYOU	123
Rosalind Franklin	147
Stupendously super scientists!	170
Other fantastically great people	172
Glossary	174
FURTHER READING	180
Thank yous	182
ABOUT THE AUTHOR:	183



Women have been responsible for many of the world's most groundbreaking scientific discoveries and adventures. They've worked tirelessly in laboratories, in the field, in the back of trucks during the war and even in spaceships – all because they wanted to find out more about the world we live in, and beyond.

Yet, lots of female scientists' stories don't get told. Most people have heard of **MARIE CURIE**, who discovered two new **elements**, leading to a treatment for **cancer**, and won two **Nobel Prizes**.



But they probably haven't heard of **Katia Krafft**, the fearless scientist who dedicated her whole life to studying **volcanoes** and even camped inside one! Or **TU YOUYOU**, the determined chemist who spent months on a remote island away from her family trying to invent a **medicine** for the life-threatening disease malaria – and succeeded.

Their achievements were extraordinary – so, why doesn't everyone know their names?

In the past, many people believed that science was a job for men. They didn't think that women could be **physicists** or **chemists**, **doctors** or **astronauts**, and they definitely didn't think women should be hanging around active volcanoes! They thought women just weren't as smart, and that it would be better if they stayed at home to look after their husbands and children.



Because of this, women were not always given the same **education** as men. Many schools and universities did not accept female students. And even when they did, some families still forbade their daughters from going.



As a child, **CAROLINE HERSCHEL**, who was the first professional female **astronomer**, wasn't allowed to go to school because her parents wanted her to be a servant instead. Women also faced **prejudice** because of where they came from, how much money they had and the colour of their skin.

Many women fought against these **stereotypes** and proved them wrong. Botanist **Janaki Ammal** called off her arranged marriage – she wanted to do a **Master's degree** instead.



Elizabeth Blackwell showed the world exactly why we need female doctors. And **MAE JEMISON** made history when she became the first African-American woman to soar into **space**.



But it wasn't always easy. Even once women were allowed to study and work at universities, often they weren't given proper laboratories to work in, weren't paid the same as male scientists and weren't always given the credit for their work.

It was **Rosalind Franklin** who first discovered the double helix structure of **DNA**, but most people think it was **James Watson** and **Francis Crick**.

This book tells the stories of just some of the most incredible female scientists the world has ever seen and the work they did. They lived at different times and came from many different countries and backgrounds. But they have a few things in common ...

They were **smart, inquisitive** and **persistent**.

They **NEVER GAVE UP** on their **DREAMS**.

And, not only did they change the world's understanding of science, they **transformed people's ideas** of what women can do.

Prepare to be inspired!



When **MAE JEMISON** watched the first **SPACE MISSIONS** on TV as a little girl, she knew that she'd become an astronaut one day.



Mae was born in Alabama, USA, in **1956**, just as the **Civil Rights Movement** was taking off. Black Americans had been treated badly for many years, particularly in the southern states. There were strict laws that kept white and black people separate. Black people often had to go to different schools and weren't allowed to work in certain jobs. This was called **segregation**. But now people like **ROSA PARKS** and **MARTIN LUTHER KING** were demanding equal rights for everyone. There were protests, arguments and fighting.

When Mae was eight, the US government finally passed laws saying that all Americans should have **EQUAL RIGHTS** – this meant women and people of colour should be treated the same way as white men. Now they could vote and get the same jobs. But even though the law had changed, lots of people **DIDN'T CHANGE THEIR MINDS**, and still thought black people were inferior.



Hardly anyone in the **1960s** imagined that a black woman could be a scientist. Mae's favourite TV programme, *Star Trek*, had a black female officer called Uhuru on board the Starship Enterprise, but that was science fiction. When **NASA** sent real astronauts into space, they were mainly all white men.



Some black women worked at NASA during the **Space Race**, like **KATHERINE JOHNSON**, **DOROTHY VAUGHAN** and **MARY JACKSON**, but it took years before they became famous for their amazing work.



Mae was cross that there weren't any female astronauts – and **VERY** cross that nobody could give her a good reason why not.

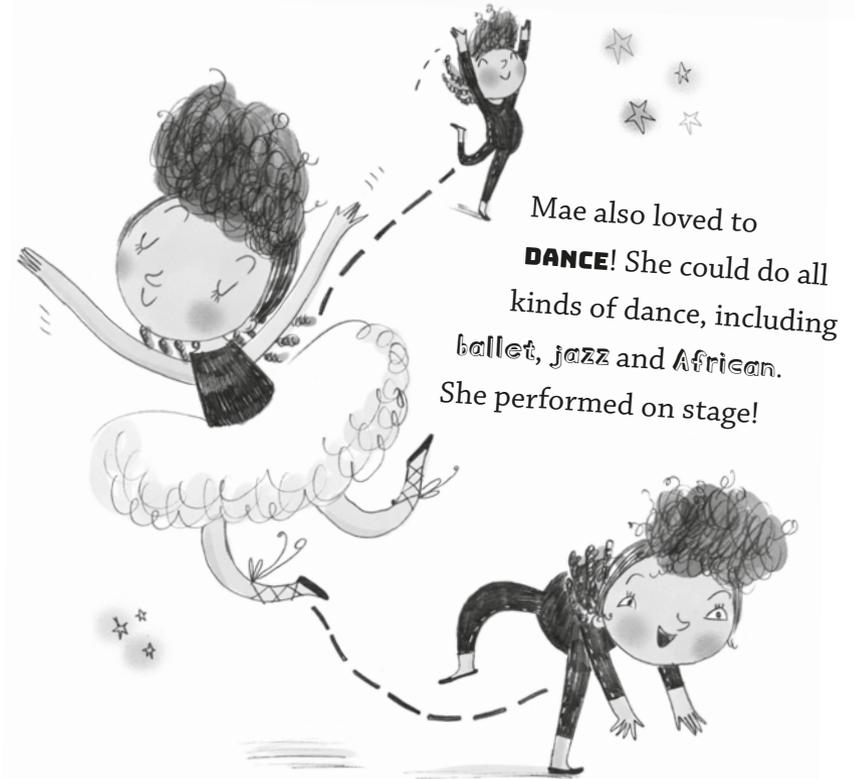


She spent ages in libraries, reading about **SCIENCE** and **astronomy**, and learning about black American scientists and doctors. She studied the world around her – not just the stars, but animals, flowers, plants and the human body. She was **curious** about all the amazing things our bodies do, even the things that some people thought were **DISGUSTING**.



Mae learned a lot of other **SKILLS** too.

She learned to **SEW** and to design clothes for her dolls and then for herself ...



Mae also loved to **DANCE!** She could do all kinds of dance, including ballet, jazz and African. She performed on stage!

Mae was a **brilliant student**. Aged **SIXTEEN**, she went to Stanford University, one of the top colleges in America, to study **ENGINEERING**. At the time, very few white or black women did engineering. Some of the teachers treated Mae worse than white men in the same class.



Mae didn't let unfair teachers put her off. She got her engineering degree and studied African and Afro-American history too.

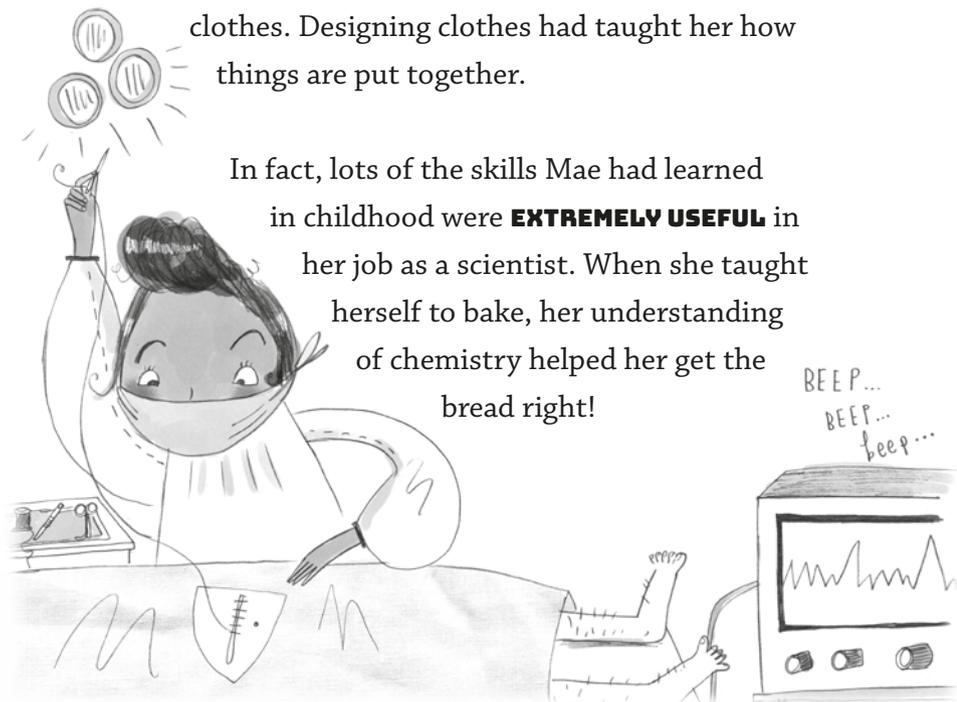
Then she had to make a decision. She wanted to train as a doctor, but she still loved dancing. Should she be a doctor or a dancer? As always, her mother had some **brilliant advice**.

Mae went to medical school – but she kept taking dance classes.

A black and white illustration of Mae's mother, a woman with a large bun hairstyle and hoop earrings, looking thoughtful. A speech bubble contains her advice: "You can always DANCE if you are a doctor, but you can't DOCTOR if you are a dancer."

"You can always DANCE if you are a doctor, but you can't DOCTOR if you are a dancer."

When Mae started to study surgery, she realised she could apply the **SKILLS** she'd learned from making clothes. Designing clothes had taught her how things are put together.



In fact, lots of the skills Mae had learned in childhood were **EXTREMELY USEFUL** in her job as a scientist. When she taught herself to bake, her understanding of chemistry helped her get the bread right!

Mae worked for a little while as a doctor, but she wanted to do more. She joined the **Peace Corps**, a US government programme that sends **VOLUNTEERS** to work with governments, charities and businesses. She spent a couple of years working as a doctor in Liberia and Sierra Leone, which are very poor countries in West Africa.



Just after Mae arrived in Sierra Leone, a volunteer fell ill. Mae quickly realised he had **MENINGITIS** with **DANGEROUS** complications. There were no local hospitals that could give him the treatment he needed,

so she ordered him to be taken to Germany

right away on a special plane. But

there was a problem – the US

Embassy staff didn't

believe this young

black woman

had the **RIGHT**

to order a

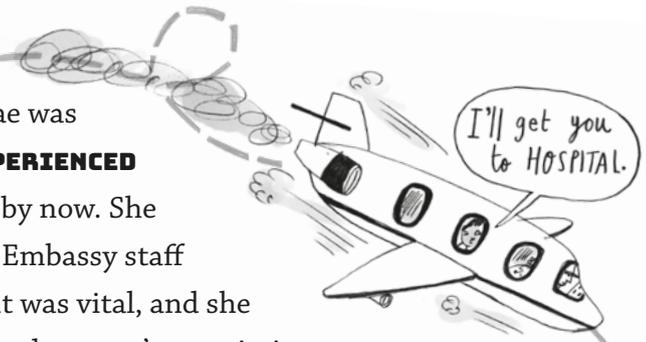
very expensive

emergency flight.



I NEED
a plane.
NOW!

Mae was an **EXPERIENCED DOCTOR** by now. She told the Embassy staff the flight was vital, and she didn't need anyone's permission to order it! She got her plane and stayed awake looking after her patient for **fifty-six hours** until they reached the German hospital. The patient survived.



Mae loved being a doctor, but she'd never forgotten her dream of **REACHING THE STARS**. In **1983, SALLY RIDE** became the first American woman to go into space. Now, at last, it seemed possible.

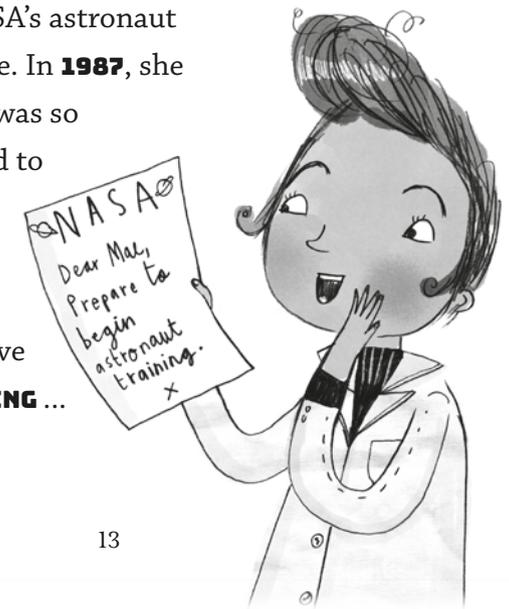
Mae applied to NASA's astronaut training programme. In **1987**, she was accepted. Mae was so excited! But she had to wait several years

before she was

sent on **A MISSION**.

First, she had to have

ASTRONAUT TRAINING ...



ASTRONAUT TRAINING

WELCOME TO ASTRONAUT SCHOOL. YOU WILL BE BUSY!

FIG 1: LEARN HOW THE SPACE SHUTTLE WORKS

Practise using space technology inside this life-size model shuttle.

SO MUCH to learn!

FIG 2: EXPERIENCE THE EFFECTS OF ZERO GRAVITY

NASA have a special reduced-**gravity** aircraft that goes into free fall so passengers can experience **weightlessness**. This makes people sick so often that the plane is nicknamed the Vomit Comet!



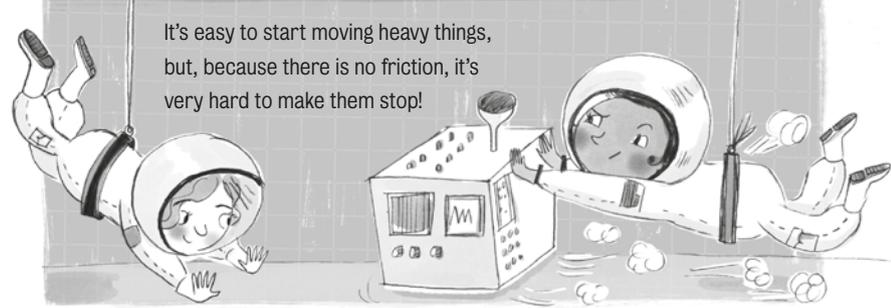
FIG 3: WALK LIKE AN ASTRONAUT

Astronauts practise space walks underwater in a huge swimming pool!

Walking UNDERWATER is like walking in ZERO gravity.

FIG 4: MASTER MOVING THINGS IN LOW GRAVITY

It's easy to start moving heavy things, but, because there is no friction, it's very hard to make them stop!



Don't PANIC!

FIG 5: CALMLY DEAL WITH EMERGENCIES IN SPACE



I know I can do this!

FIG 6: KNOW WHAT TO DO IF A CREW MATE BECOMES SICK



Finally, in **1992**, Mae stepped on board the space shuttle Endeavour and prepared herself for a **BIG ADVENTURE** ...

THREE ...

TWO ...

ONE

BLAST OFF!

It's
HAPPENING!

**MAE JEMISON WAS THE
FIRST BLACK WOMAN
ASTRONAUT!**

MISSION SPECIALIST

My space trip was a joint US and Japan mission called Spacelab-J, and I was a mission specialist. I launched **satellites** and went on space walks.



Launching a Satellite



SPACE WALKS

I also carried out special scientific experiments to do with gravity.

On Earth, we are weighed down by the force of GRAVITY all the time. But have you ever been in a roller coaster or a lift when it suddenly goes down and you feel like you are floating? That's the feeling of WEIGHTLESSNESS because you are in FREE FALL.

In space, weightlessness lasts all the time. There's no 'up' or 'down' when gravity isn't pulling you around! It is hard to get used to and can make astronauts feel tired, sick and dizzy.



MAE JEMISON'S LOG



There is SO much to learn about how weightlessness affects the human body!

Studying astronauts' motion sickness is important for future missions ...



I experimented on bone cells to see how weightlessness affected them.



I discovered that tadpoles developed normally in zero gravity ...

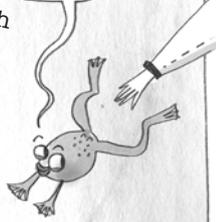
Back on Earth the tadpoles turned into healthy frogs!



We have LEGS!

And ARMS!

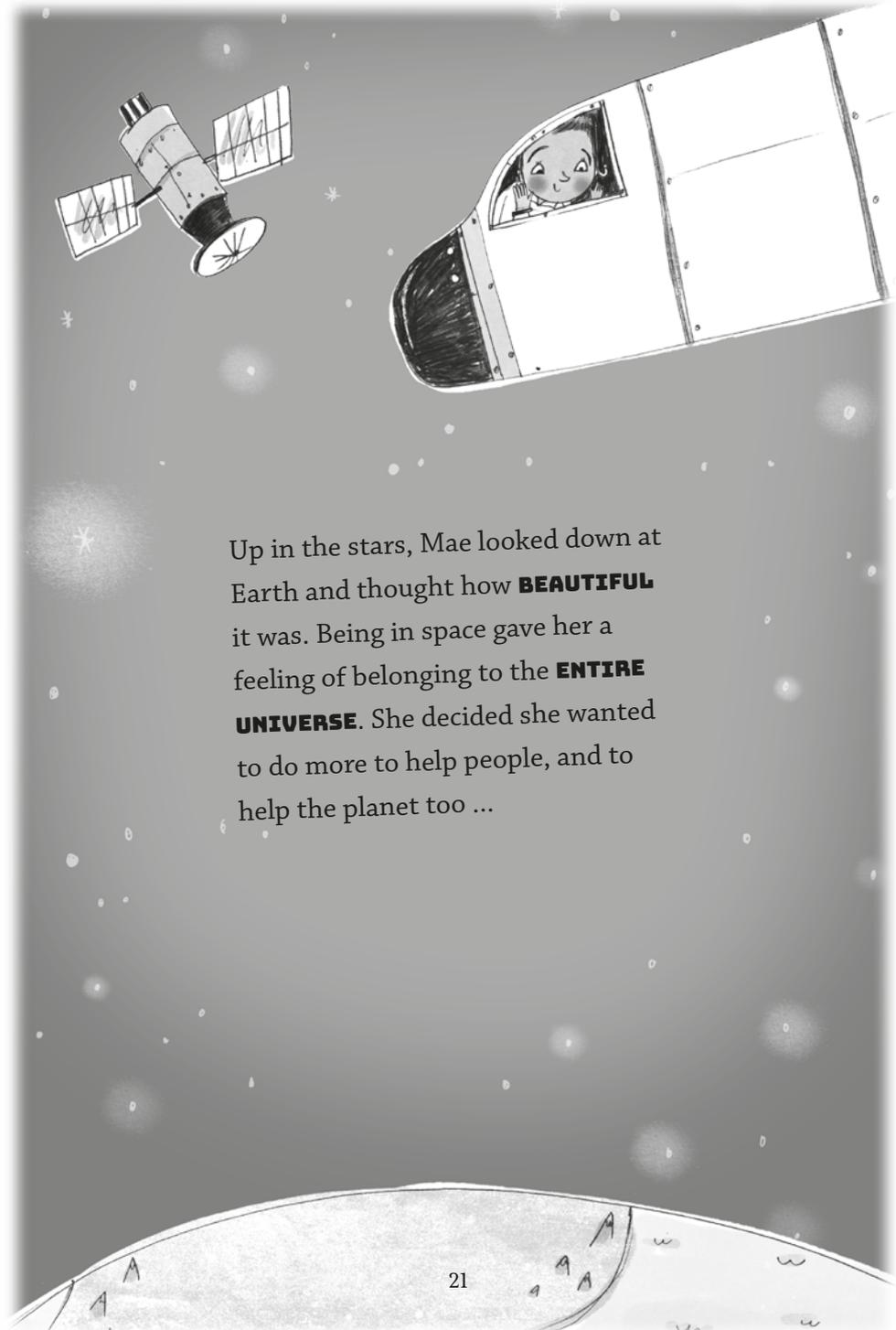
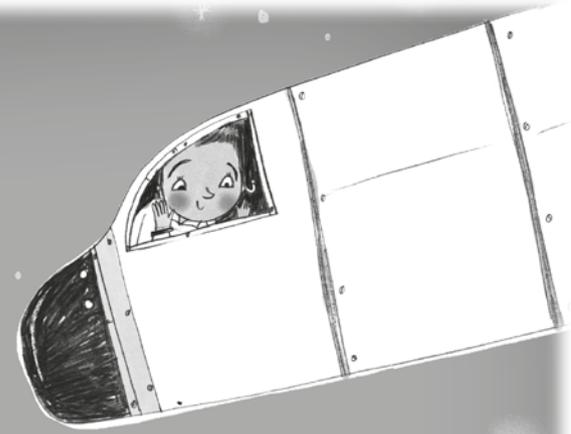
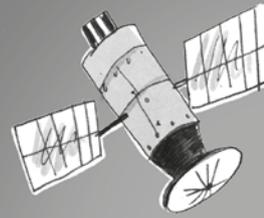
I'm a SPACE TRAVELLER!



A black and white illustration of a space station interior. Three astronauts are shown floating in zero gravity. One astronaut in the foreground is smiling and looking towards the viewer. Another astronaut in the middle is performing a backflip, with a speech bubble above her. A third astronaut is visible in the background. Dashed lines with arrows indicate the paths of movement. The station has various panels, windows, and equipment.

If people spend too long in space, their muscles and bones **GET WEAKER** because they aren't using them enough. Many astronauts stay fit by exercising on gym machines like fixed bikes. But Mae also danced! **SHE LOVED DANCING IN SPACE.**

I feel FREE!
I can do WONDERFUL
lifts and spins and
never come
down!

A black and white illustration of Earth from space. The Earth is shown as a large, curved horizon at the bottom of the page, with a city skyline visible. The rest of the page is filled with stars and a satellite in the upper left.

Up in the stars, Mae looked down at Earth and thought how **BEAUTIFUL** it was. Being in space gave her a feeling of belonging to the **ENTIRE UNIVERSE**. She decided she wanted to do more to help people, and to help the planet too ...



MAE'S MISSION



When Mae returned to Earth, lots of people asked her if she was happy to be the first black woman in space. She said, No! Mae thought other women should have had the chance too.



"I'm not the first woman of colour, the first African American woman, who had the skills, the talent, the desire to be an astronaut. I happen to be the first one that NASA selected."

Mae had made history aged just **THIRTY-TWO**, but she wanted to change the world in other ways. She wanted everyone to have a chance to **follow their dreams** and **use their talents**. And she wanted to do more to save the Earth. Mae left NASA in **1993**, and set up a company to find ways science and technology can work with people's daily lives. She thought that we could solve more problems if **PEOPLE** work together. Science isn't just for inside the lab – it can **IMPROVE THE LIVES AND HEALTH** of people all over the world.

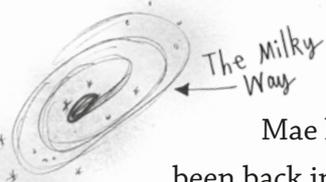


Mae also made it her mission to encourage more **CHILDREN** to study science. She set up an **international science camp** for children, where students learn to think like a scientist and tackle **BIG QUESTIONS** about how we live, how science works in our daily lives and the future of the planet. The children also play sports, games, do cultural activities and **WATCH THE SKY AT NIGHT**, just like Mae did when she was little.



She's now working on a big project to get children interested in where food comes from.





Mae has never been back into space. Instead, she is working on an international project to send people to a star outside of the **MILKY WAY**.



When Mae was a little girl, a lot of people didn't think a black girl could grow up to be a doctor, a scientist and an astronaut.

MAE NEVER LISTENED TO THOSE PEOPLE.

She always said ...



"NEVER be limited by other people's limited imaginations!"

If other people can't imagine you doing something, then they need more imagination. Mae Jemison imagined herself reaching the stars – and that's exactly what she did.



Marie Curie

The scientist in her element



Marie Curie was born Maria Skłodowska in Poland in 1867, the youngest child of five. Her family called her Manya. Her parents worked hard as teachers, but it was difficult for them to make enough money to support their BIG family. When Manya was just ten years old, her mother became very sick and died. Her father had to bring up five young children all on his own.

