WOMEN SCIENTISTS

PAST PRESENT FUTURE

THE COMIC

THIS COMIC IS AN ADAPTATION OF CIENTÍFICAS: PASADO, PRESENTE Y FUTURO,
A STAGE PLAY BASED ON AN ORIGINAL IDEA BY FRANCISCO VEGA NARVÁEZ. THE SCRIPT WAS CREATED BY ISABEL FERNÁNDEZ DELGADO, CLARA GRIMA RUIZ, MARÍA JOSÉ JIMÉNEZ RODRÍGUEZ, ADELA MUÑOZ PÁEZ, MARÍA DEL CARMEN ROMERO TERNERO AND FRANCISCO VEGA NARVÁEZ. REGISTRATION: 04/2019/1294.

@CIENTIFICASUS

THE STAGE PLAY CIENTÍFICAS: PASADO, PRESENTE Y FUTURO WON THE EQUIT@T PRIZE 2017 (OPEN UNIVERSITY OF CATALONIA), THE SCIENCE IN ACTION PRIZE 2018, THE UNIVERSITY OF SEVILLE PRIZE FOR SCIENTIFIC COMMUNICATION 2018, THE MERIDIANA PRIZE 2020 AWARDED BY THE REGIONAL GOVERNMENT OF ANDALUSIA, AND THE PIONERAS_IT 2020 SPECIAL MENTION FOR EDUCATIONAL INSTITUTIONS, AWARDED BY THE OFFICIAL COLLEGE OF TELECOMMUNICATIONS ENGINEERS.

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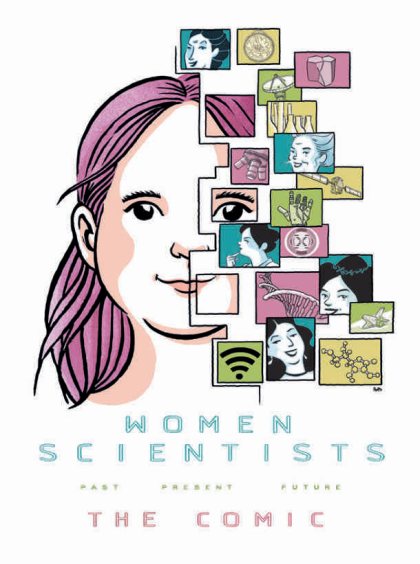


THE PLAY *CIENTÍFICAS: PASADO, PRESENTE Y FUTURO (WOMEN SCIENTISTS: PAST, PRESENT AND FUTURE)* WAS PREMIERED IN MARCH 2016 AT THE ESCUELA TÉCNICA SUPERIOR DE INGENIERÍA INFORMÁTICA AT THE UNIVERSITY OF SEVILLE (SPAIN). FIVE LECTURERS AND RESEARCHERS – ISABEL FERNÁNDEZ, MARÍA DEL CARMEN ROMERO, ADELA MUÑOZ, CLARA GRIMA AND MARÍA JOSÉ JIMÉNEZ – PERFORMED THE ROLES OF HYPATIA OF ALEXANDRIA, ADA LOVELACE, MARIE CURIE, ROSALIND FRANKLIN AND HEDY LAMARR, RESPECTIVELY.

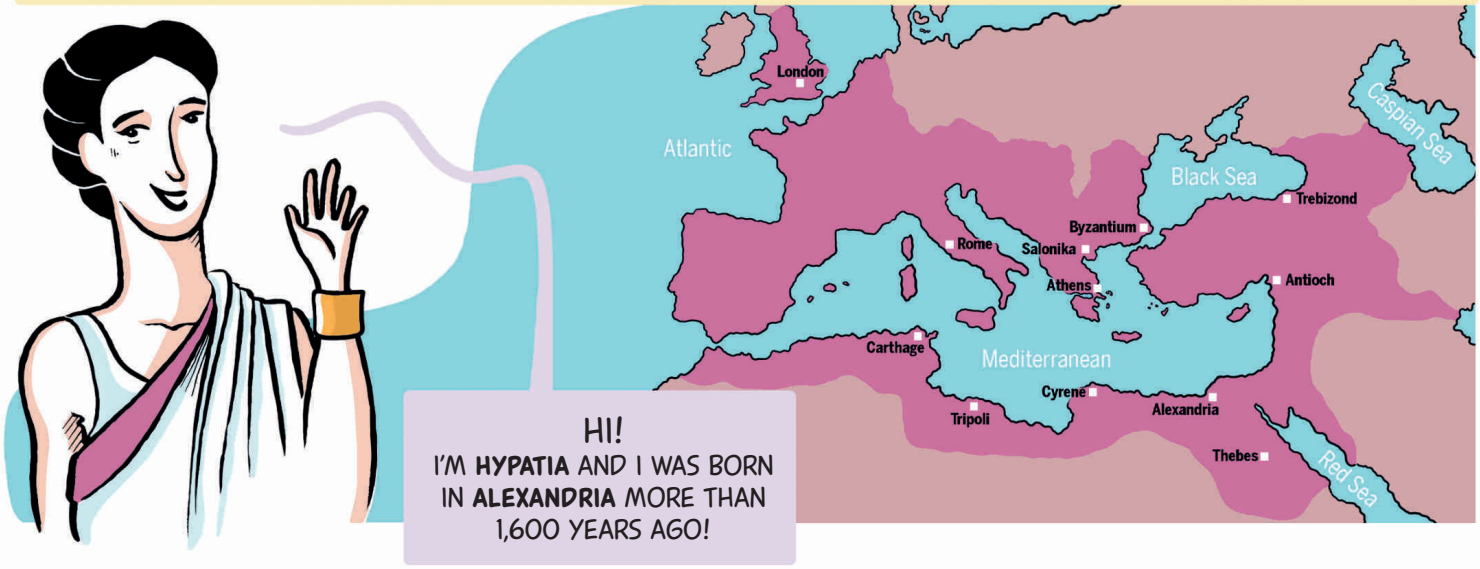
THE IDEA HAD FIRST BEEN FLOATED A FEW MONTHS BEFORE. FRANCISCO VEGA, A LABORATORY TECHNICIAN AT THE UNIVERSITY, THOUGHT IT WOULD BE GOOD IF HIS DAUGHTER AND OTHER GIRLS HAD FEMALE ROLE MODELS IN THE WORLD OF SCIENCE, SO THEY WOULDN'T FEEL THAT SCIENCE WAS NOT FOR THEM JUST BECAUSE THEY WERE GIRLS. AND HE ALSO WANTED HIS SON AND OTHER BOYS TO LEARN ABOUT WOMEN IN SCIENCE. AFTER ALL, SCIENTIFIC PROGRESS IS ACHIEVED BY ALL SORTS OF PEOPLE, REGARDLESS OF GENDER, AGE, RACE OR NATIONALITY.

AFTER SEVERAL MONTHS WORKING ON THE SCRIPT, CHOOSING COSTUMES AND IMAGES, AND WITH HELP FROM LOTS OF PEOPLE, WE PUT ON THE FIRST PERFORMANCE. WHAT WE THOUGHT WOULD BE A ONE-OFF EVENT BECAME TWO, THEN THREE. AND HERE WE STILL ARE, PUTTING ON THE SHOW ALMOST FOUR YEARS LATER. WE'VE EVEN WON A PRIZE OR TWO!

MARÍA DEL CARMEN ESCÁMEZ, AT THE UNIVERSITY OF SEVILLE'S SCIENTIFIC CULTURAL AND INNOVATION CENTRE (UCC+I) SUGGESTED WE CREATE A COMIC TO MAKE OUR WORK ACCESSIBLE TO THOSE UNABLE TO ATTEND THE LIVE SHOW. WE APPROACHED RAQUEL GU, A TALENTED ILLUSTRATOR, AND SHE PRODUCED THE MARVELLOUS WORK YOU ARE ABOUT TO READ.

WE HOPE YOU ENJOY THIS COMIC... AND LEARN A LOT FROM IT.

THERE WAS ONCE A WOMAN IN **ALEXANDRIA** BY THE NAME OF **HYPATIA,** WHOSE ACHIEVEMENTS IN BOTH **SCIENCE** AND **LITERATURE** FAR SURPASSED THOSE OF THE PHILOSOPHERS OF THE AGE. A SUCCESSOR TO THE SCHOOL OF PLATO AND PLOTINUS, SHE EXPLAINED THE PRINCIPLES OF **PHILOSOPHY** TO HER LISTENERS, MANY OF WHOM TRAVELLED VAST DISTANCES TO LEARN FROM HER.



HI!
I'M **HYPATIA** AND I WAS BORN IN **ALEXANDRIA** MORE THAN 1,600 YEARS AGO!

YOU'RE PROBABLY THINKING "YOU DON'T LOOK BAD FOR SOMEONE WHO'S MORE THAN 1,600 YEARS OLD!"... BUT I DIED A WHILE AGO AND, SAY WHAT YOU LIKE ABOUT DEATH, IT CERTAINLY STOPS THE AGEING PROCESS!

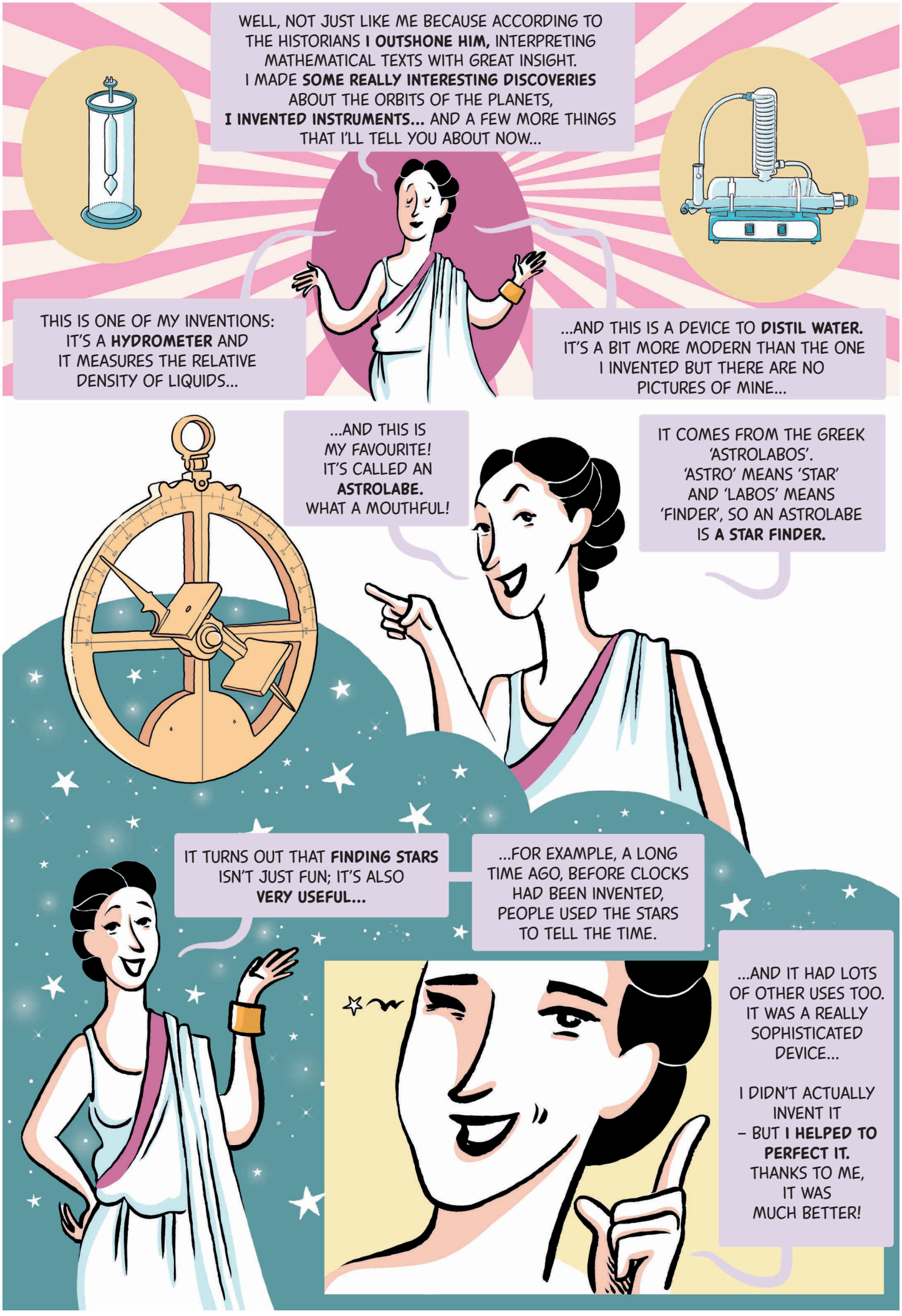
WHEN I WAS BORN, **ALEXANDRIA** WAS A FASCINANTING CITY. IT HAD A **LIGHTHOUSE,** THE FIRST IN THE WORLD, AND A **LIBRARY** THAT CONTAINED EVERY SINGLE LAST ONE OF THE IMPORTANT BOOKS OF THE ERA.

I LOVED VISITING THE **LIBRARY.** MY FATHER, **THEON,** WAS THE DIRECTOR AND MY MOTHER WAS A MUSIC TEACHER. THEY DECIDED I SHOULD BE EDUCATED AT THE LIBRARY.

YOU WON'T BELIEVE IT BUT IN MY TIME **GIRLS WEREN'T ALLOWED TO GO TO SCHOOL!** HOW DUMB IS THAT?

FORTUNATELY MY PARENTS WERE SENSIBLE PEOPLE WHO WANTED ME TO LEARN.

AND WHERE BETTER THAN IN THE LIBRARY WITH MY DAD! HE WAS A BRILLIANT **PHILOSOPHER, MATHEMATICIAN AND ASTRONOMER.** JUST LIKE ME!


WELL, NOT JUST LIKE ME BECAUSE ACCORDING TO THE HISTORIANS I **OUTSHONE HIM,** INTERPRETING MATHEMATICAL TEXTS WITH GREAT INSIGHT. I MADE **SOME REALLY INTERESTING DISCOVERIES** ABOUT THE ORBITS OF THE PLANETS, **I INVENTED INSTRUMENTS...** AND A FEW MORE THINGS THAT I'LL TELL YOU ABOUT NOW...
THIS IS ONE OF MY INVENTIONS: IT'S A **HYDROMETER** AND IT MEASURES THE RELATIVE DENSITY OF LIQUIDS...
...AND THIS IS A DEVICE TO **DISTIL WATER.** IT'S A BIT MORE MODERN THAN THE ONE I INVENTED BUT THERE ARE NO PICTURES OF MINE...
...AND THIS IS MY FAVOURITE! IT'S CALLED AN **ASTROLABE.** WHAT A MOUTHFUL!
IT COMES FROM THE GREEK 'ASTROLABOS'. 'ASTRO' MEANS 'STAR' AND 'LABOS' MEANS 'FINDER', SO AN ASTROLABE IS **A STAR FINDER.**
IT TURNS OUT THAT **FINDING STARS** ISN'T JUST FUN; IT'S ALSO **VERY USEFUL...**
...FOR EXAMPLE, A LONG TIME AGO, BEFORE CLOCKS HAD BEEN INVENTED, PEOPLE USED THE STARS TO TELL THE TIME.
...AND IT HAD LOTS OF OTHER USES TOO. IT WAS A REALLY SOPHISTICATED DEVICE...
I DIDN'T ACTUALLY INVENT IT – BUT **I HELPED TO PERFECT IT.** THANKS TO ME, IT WAS MUCH BETTER!

AS WELL AS INVENTING THINGS, **I WROTE BOOKS.** MOST OF THEM HAVE BEEN LOST AND THAT'S A SHAME BECAUSE THEY WERE REALLY INTERESTING...

BACK IN MY DAY, PEOPLE RAVED ABOUT THEM, AND MY READERS LEARNED A LOT I ALSO GAVE CLASSES IN **MATHEMATICS, ASTRONOMY** AND **PHILOSOPHY...**

...YES, PHILOSOPHY TOO BECAUSE, JUST LIKE MATHS AND ASTRONOMY, **IT TEACHES US TO THINK,** TO UNDERSTAND THE WORLD AROUND US, TO TRY TO IMPROVE IT WITH OUR IDEAS.

I TAUGHT SOME VERY IMPORTANT PEOPLE: NOBLES, POLITICIANS, COMMANDERS... SOME OF THEM RULED ALEXANDRIA...

...AND WHEN THEY HAD TO TAKE IMPORTANT DECISIONS, **THEY SOUGHT MY ADVICE.**

THEY SAID I WAS CALM, SENSIBLE, INTELLIGENT... BUT NOT EVERYONE AGREED. THERE WERE SOME WHO **WEREN'T KEEN ON A WOMAN HAVING SO MUCH POWER...**

...BUT I DIDN'T CARE. **I WAS HAPPY DOING RESEARCH, LEARNING – AND HELPING OTHERS TO LEARN.** I DEDICATED MY LIFE TO THAT.

I USED TO SAY:

"RESERVE YOUR RIGHT TO THINK, FOR EVEN TO THINK WRONGLY IS BETTER THAN NOT TO THINK AT ALL."

I DON'T WANT TO SOUND IMMODEST...

...BUT THAT'S **ONE HELL OF A QUOTE.** DON'T FORGET IT!

IN THE END, THE WONDERFUL LIBRARY OF ALEXANDRIA **DISAPPEARED.** THE ODD BOOK-BURNING, A COUPLE OF WARS, A SIEGE OR TWO...

... AND AS NOBODY HAD INVENTED **COMPUTERS OR THE INTERNET,** WE COULDN'T STORE ALL THE INFORMATION IN THE CLOUD...

NOT THAT KIND OF **CLOUD!**

HOW DIFFERENT THE WORLD WOULD BE WITHOUT CREATIVE PEOPLE! PEOPLE WITH IMAGINATION, PREPARED TO FOLLOW THEIR IDEAS, THEIR DREAMS, THEIR HOPES... PEOPLE WITH A TOUCH OF MAGIC. PEOPLE LIKE THIS WOMAN, BORN IN LONDON AT THE BEGINNING OF THE 19TH CENTURY:

ADA LOVELACE.

HI!
I'M ADA!

WHAT'S UP?
WHY THE LONG FACES?

YOU WERE EXPECTING A MAGIC SHOW?

I'M NOT A MAGICIAN BUT THAT DOESN'T MEAN I CAN'T DO "MAGIC". JUST NOT THE KIND THAT YOU NEED A WAND TO PERFORM...

...BECAUSE **GETTING MACHINES TO DO THINGS ON THEIR OWN,** LIKE COMPUTERS CAN...

I'LL GET MY COAT...

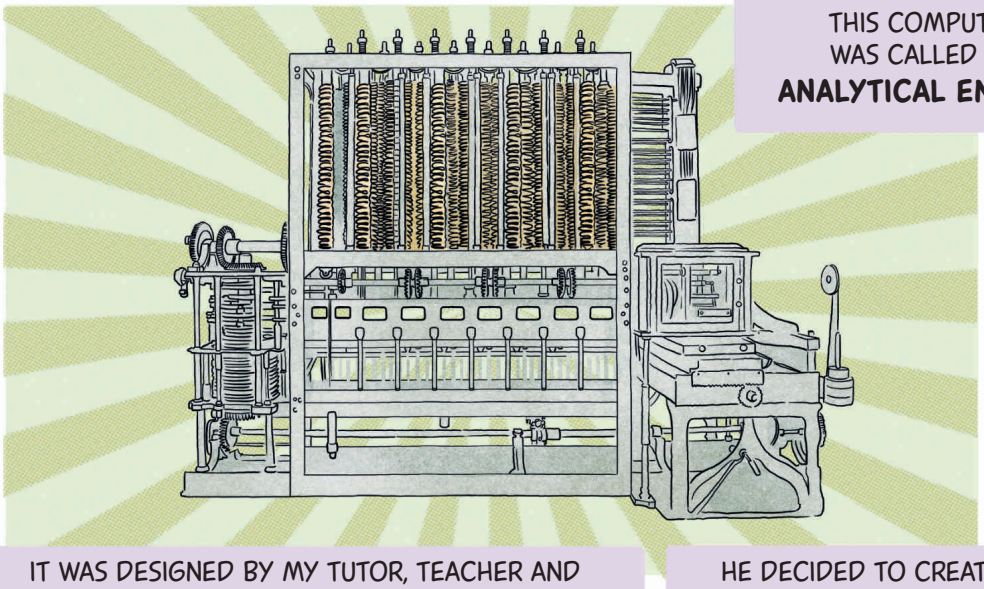
...IS PRETTY MAGICAL!

NOWADAYS, ALMOST ALL THE MACHINES WE USE NEED **A COMPUTER PROGRAM** TO MAKE THEM WORK. THIS PROGRAM IS WHAT WE CALL **SOFTWARE.**

AND DO YOU KNOW WHAT SOFTWARE IS?

IT'S WHAT WE USE IN OUR **TABLETS, COMPUTERS** OR **SMARTPHONES...** EVERYTHING WE DO WITH THEM DEPENDS ON A **PROGRAM.**

SO YOU COULD SAY I WAS THE FIRST PERSON IN THE WORLD TO WRITE A PROGRAM TO RUN ON A COMPUTER... AND THAT **WAS MORE THAN 175 YEARS AGO!**



THIS COMPUTER WAS CALLED AN **ANALYTICAL ENGINE.**

IT WAS HUGE!

IT WAS DESIGNED BY MY TUTOR, TEACHER AND FRIEND, **CHARLES BABBAGE,** THIS SERIOUS-LOOKING MAN WHO WAS A **MATHEMATICIAN AND AN ENGINEER.**

HE DECIDED TO CREATE **A CALCULATING MACHINE** BECAUSE IN THOSE DAYS...

...PEOPLE DID SUMS **BY HAND!**

617
295
691
3456
290
8617
445
783
563
1290

THE MACHINE COULD PERFORM NUMERICAL OPERATIONS, AND I WAS ONE OF THE FEW PEOPLE WHO UNDERSTOOD HOW.

I UNDERSTOOD IT SO WELL THAT I THOUGHT OF A WAY OF **INSTRUCTING IT TO PERFORM CALCULATIONS.**

CHARLES AND SOME FRIENDS CALLED ME **THE NUMBER CHARMER,** NOT BECAUSE I WAS A MATHEMATICIAN...

...ALTHOUGH I WAS...

...BUT BECAUSE I REALIZED A MACHINE LIKE THAT COULD DO MORE THAN JUST ADD AND SUBTRACT.

IT COULD PERFORM COMPLEX CALCULATIONS. AND EVEN **CREATE ART AND MUSIC.**

4
6
0
1
9
8
2

I LOVE MUSIC! AND DANCING!

ADA! WHAT ON EARTH ARE YOU DOING?

THIS IS NO WAY TO BEHAVE!

HYPATIA! DON'T BE SO OLD FASHIONED!

SCIENTISTS ARE ALLOWED TO DANCE, TOO!

GIVE IT A GO! IT'S FUN!

YOU'RE RIGHT! THIS IS GROOVY!

ANYWAY, I HAD **ART** IN MY BLOOD... DID I TELL YOU MY FATHER WAS **LORD BYRON**? HIS FULL NAME WAS GEORGE GORDON BYRON.

HE WAS A REALLY FAMOUS **ROMANTIC POET.** AND HANDSOME, TOO, WOULDN'T YOU SAY?

MY MOTHER, **ANNABELLA,** KNEW A LOT ABOUT **ALGEBRA, GEOMETRY AND ASTRONOMY;** AND SHE DREW UP QUITE THE CURRICULUM FOR ME...

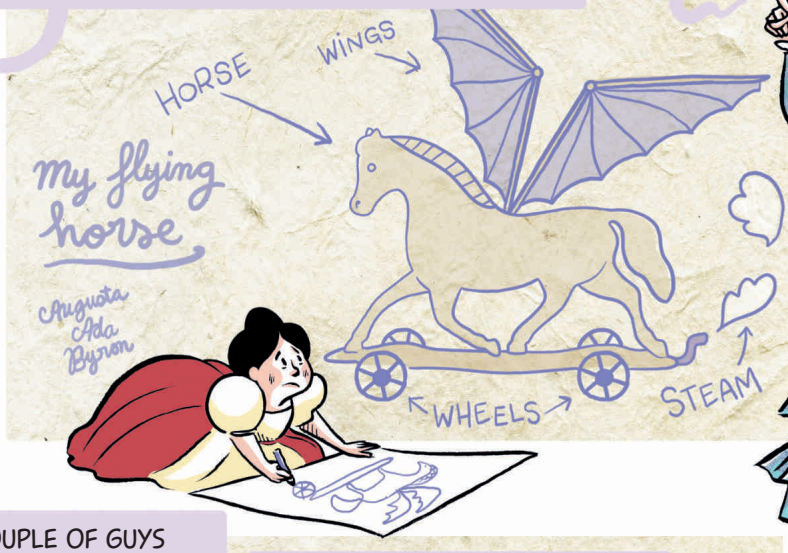
LET'S SEE IF I STILL REMEMBER IT BY HEART: **ARITHMETIC, READING, WRITING, DRAWING, FRENCH, MUSIC, GEOMETRY, HISTORY...**

...AND HANDCRAFTS!

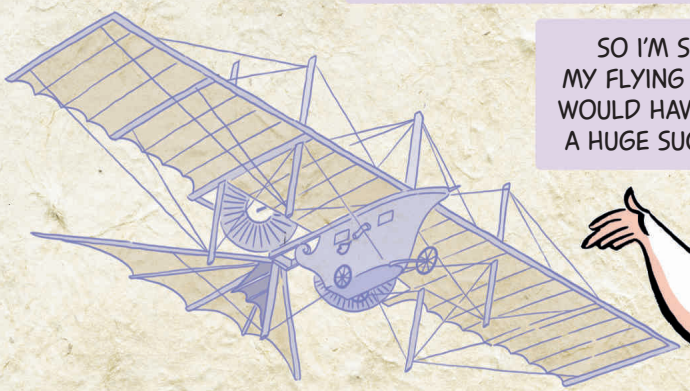
I LOVED MACHINES SO MUCH THAT, **WHEN I WAS 12, I DESIGNED A FLYING HORSE,** WITH TWO HUGE WINGS POWERED BY A STEAM ENGINE!

BUT MY MOTHER WOULDN'T LET ME BUILD IT BECAUSE SHE SAID IT COULD DISTRACT ME FROM MY STUDIES.

NO!



SOME TIME LATER, A COUPLE OF GUYS CALLED **STRINGFELLOW** AND **HENSON** PATENTED A DESIGN THAT WAS VERY SIMILAR TO MINE...

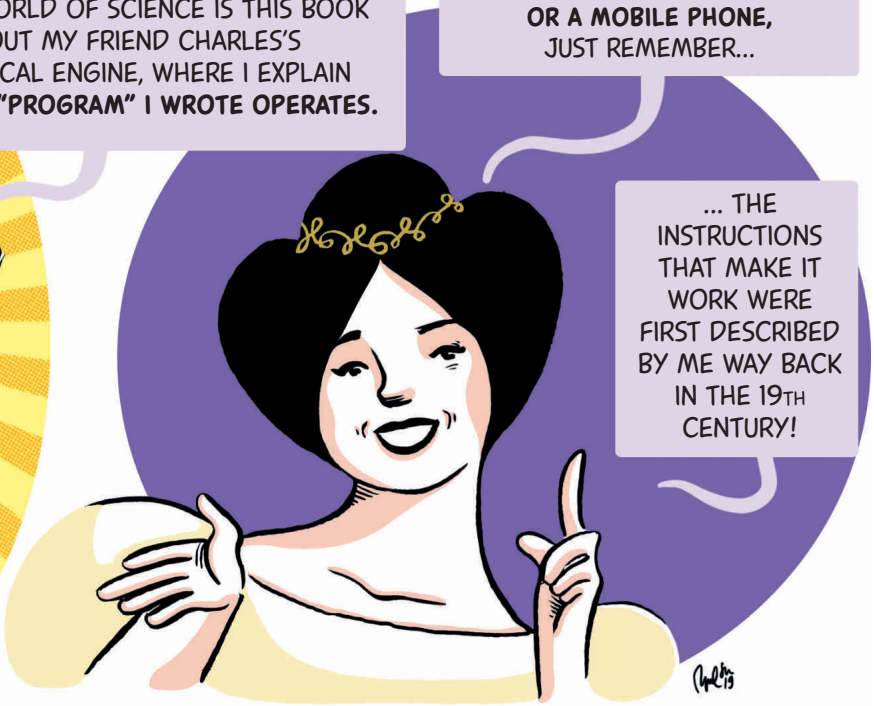


...AND IT WENT ON TO PROVIDE THE BASIS FOR THE DESIGN OF **MODERN AIRPLANES.**

SO I'M SURE MY FLYING HORSE WOULD HAVE BEEN A HUGE SUCCESS!

BUT WHAT I'M MOST FAMOUS FOR IN THE WORLD OF SCIENCE IS THIS BOOK ABOUT MY FRIEND CHARLES'S ANALYTICAL ENGINE, WHERE I EXPLAIN **HOW THE "PROGRAM" I WROTE OPERATES.**

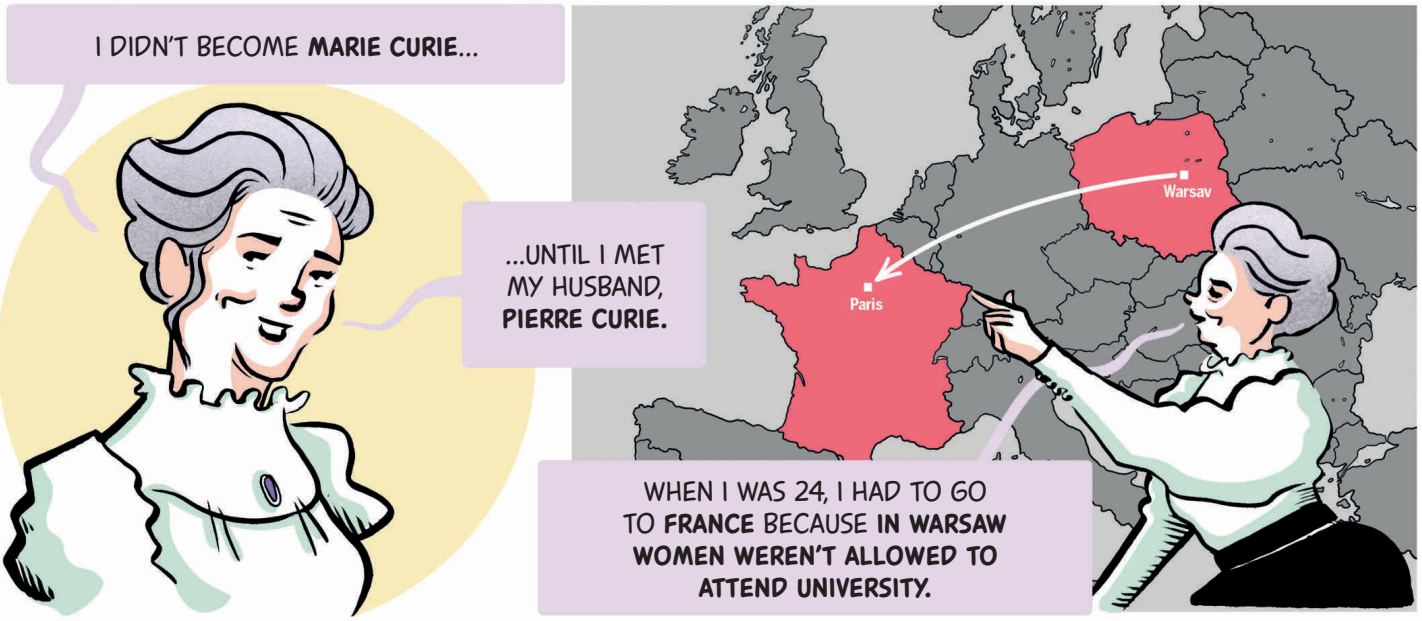
WHENEVER YOU USE **A COMPUTER, A TABLET OR A MOBILE PHONE,** JUST REMEMBER...

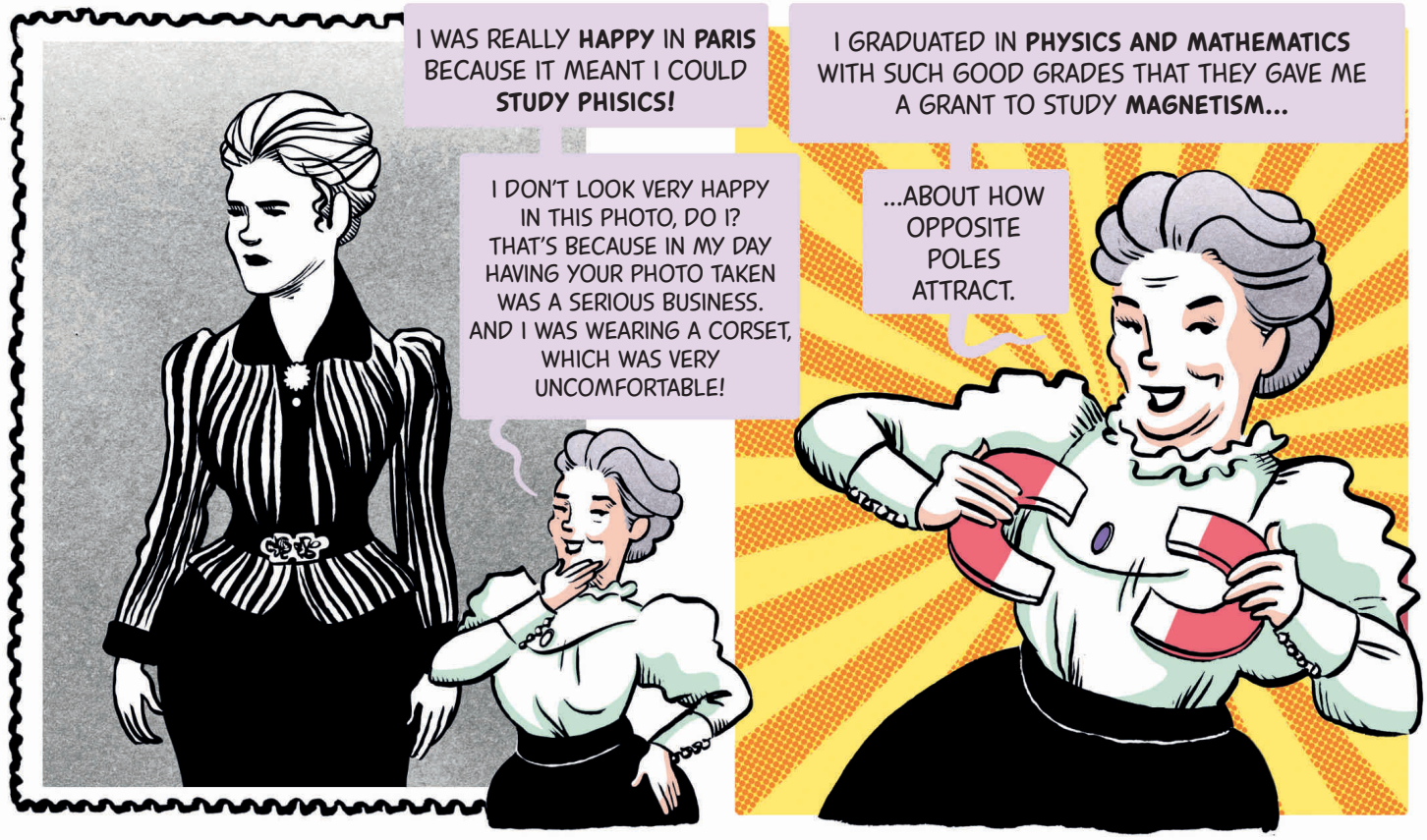


... THE INSTRUCTIONS THAT MAKE IT WORK WERE FIRST DESCRIBED BY ME WAY BACK IN THE 19TH CENTURY!

AT THE END OF THE 19TH CENTURY, PARIS WAS THE CAPITAL OF THE WORLD: A CAPITAL OF ART AND CULTURE, WITH IMPRESSIONIST PAINTERS, WRITERS SUCH AS ZOLA, INNOVATIVE ARCHITECTURE LIKE THE EIFFEL TOWER, AND THE MAGIC OF CINEMATOGRAPHY, WITH THE LUMIÈRE BROTHERS...
AND THERE WERE ALSO TWO OTHER PEOPLE WHO MADE PARIS THE CAPITAL OF SCIENCE: PIERRE AND

MARIE CURIE.





WELL, THIS POLE WAS CERTAINLY ATTRACTED TO **PIERRE CURIE,** WHO WAS AN EXPERT IN MAGNETISM...

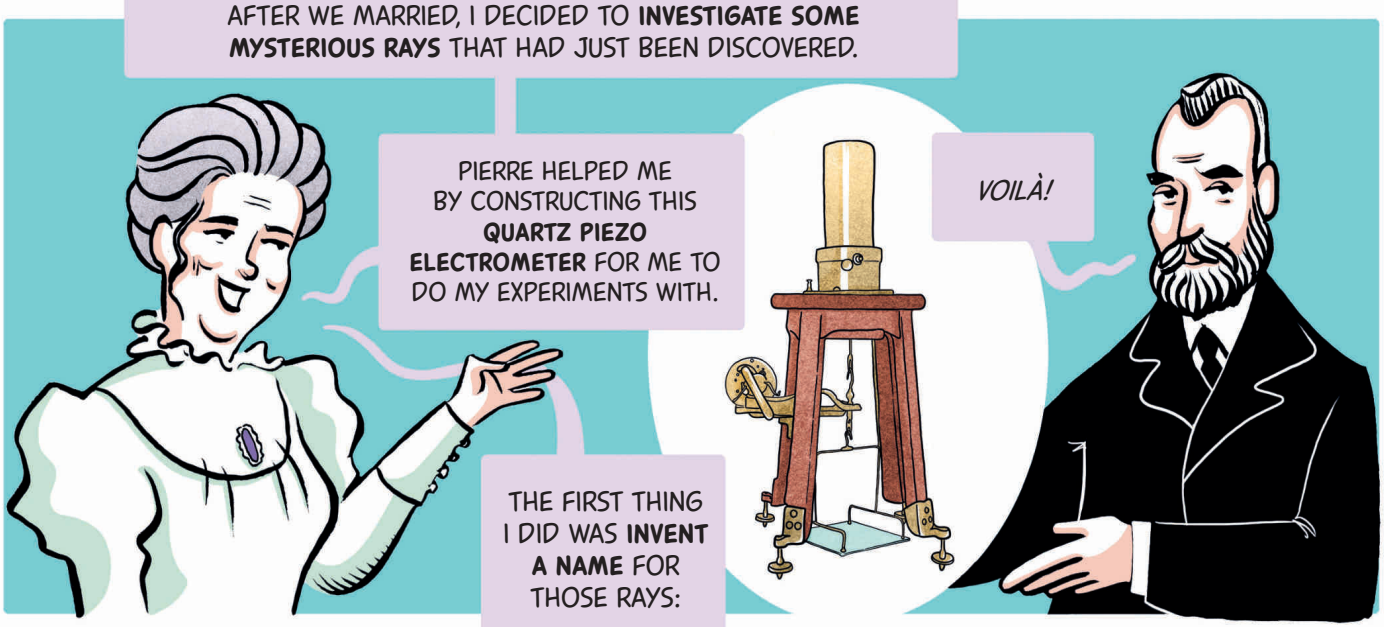
...AND **THE ATTRACTION** BETWEEN US WAS SO STRONG... THAT WE NEVER SEPARATED!

AFTER WE MARRIED, I DECIDED TO **INVESTIGATE SOME MYSTERIOUS RAYS** THAT HAD JUST BEEN DISCOVERED.

PIERRE HELPED ME BY CONSTRUCTING THIS **QUARTZ PIEZO ELECTROMETER** FOR ME TO DO MY EXPERIMENTS WITH.

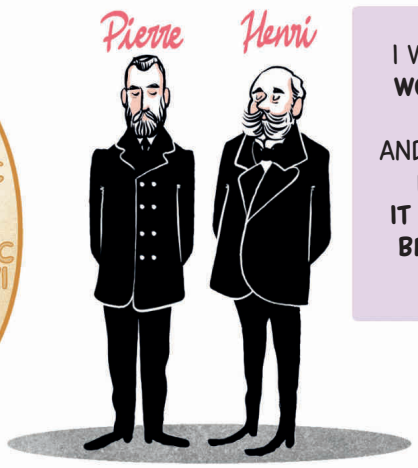
VOILÀ!

THE FIRST THING I DID WAS **INVENT A NAME** FOR THOSE RAYS:



RADIOACTIVITY

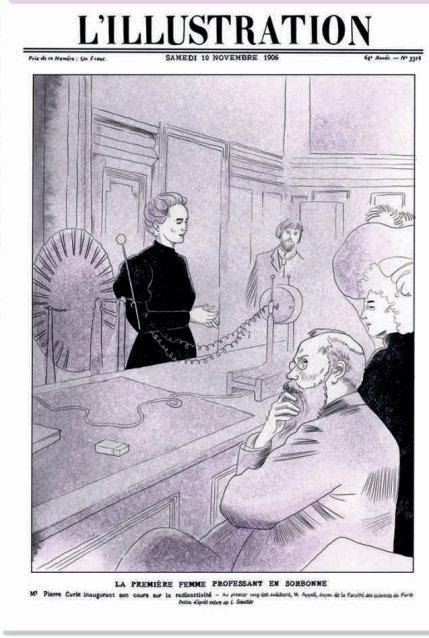
I KNEW MORE ABOUT RADIOACTIVITY THAN ANYBODY ELSE, AND THEY GAVE ME THE **NOBEL PRIZE IN PHYSICS,** WITH MY HUSBAND, **PIERRE CURIE,** AND **HENRI BECQUEREL,** THE MAN WHO DISCOVERED IT.



I WAS **THE FIRST WOMAN TO WIN THE PRIZE,** AND **THEY NEARLY DIDN'T GIVE IT TO ME** – JUST **BECAUSE I WAS A WOMAN!**

THEN, JUST WHEN EVERYTHING WAS PERFECT, **PIERRE DIED.** I WAS DEVASTATED, BUT I CARRIED ON WITH MY RESEARCH.

I WAS THE **FIRST WOMAN TO TEACH AT THE UNIVERSITY OF PARIS** IN OVER 600 YEARS. I EVEN APPEARED IN THE PRESS!


L'ILLUSTRATION

SAMEDI 10 NOVEMBRE 1906

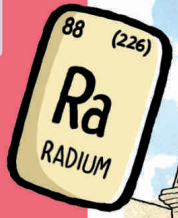
LA PREMIÈRE FEMME PROFESSANT EN SORBONNE

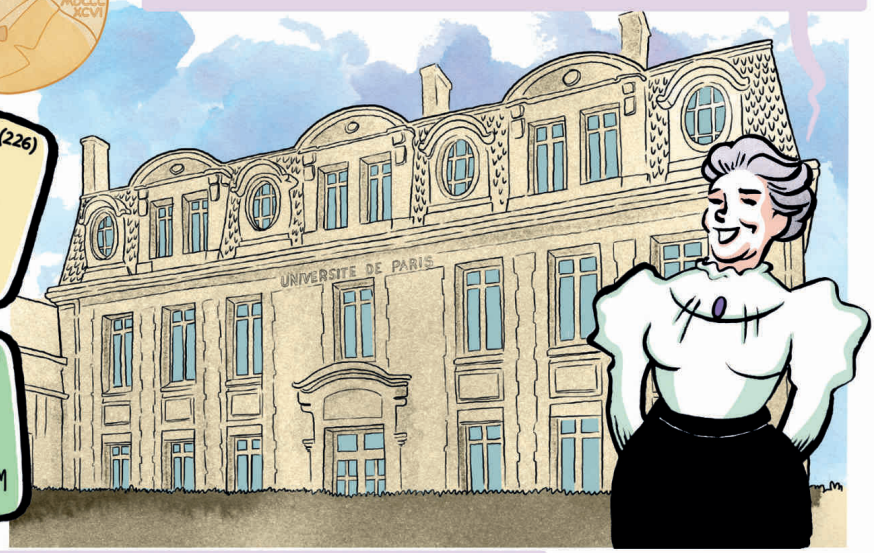
AND A FEW YEARS LATER I FELL IN LOVE AGAIN. HIS NAME WAS PAUL, HE'D BEEN A STUDENT OF PIERRE. AND HE HAD AN IMPRESSIVE MOUSTACHE.

THEY GAVE ME **ANOTHER NOBEL PRIZE,** THIS TIME JUST FOR ME, **FOR DISCOVERING TWO NEW CHEMICAL ELEMENTS: RADIUM AND POLONIUM.**

I WAS **THE FIRST PERSON EVER TO WIN TWO NOBEL PRIZES.** AND FOR A LONG TIME I WAS THE ONLY PERSON TO DO SO. THEY MADE ME **DIRECTOR OF THE RADIUM INSTITUTE** IN PARIS BUT WHEN WE WERE JUST ABOUT TO OPEN OUR DOORS, IN 1914...

I NAMED THE SECOND ONE AFTER MY COUNTRY, **POLAND.**





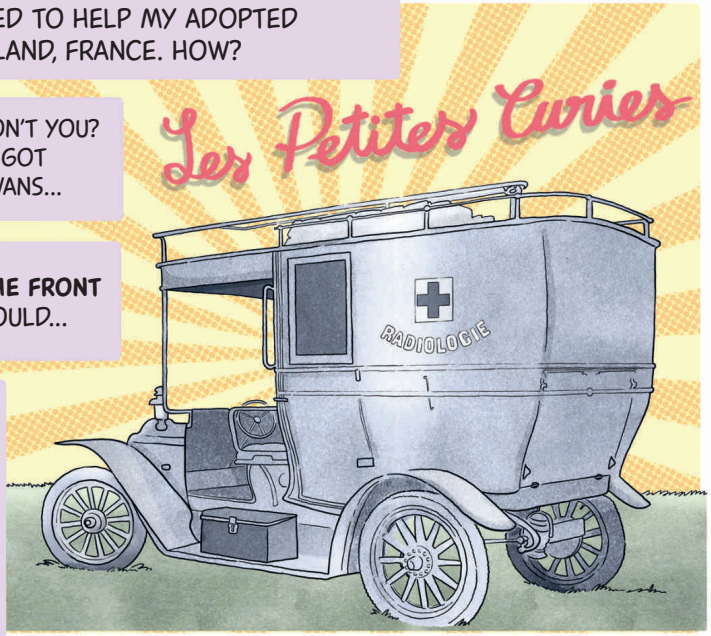
...A TERRIBLE WAR BROKE OUT: **THE FIRST WORLD WAR.**

SO I DECIDED TO HELP MY ADOPTED HOMELAND, FRANCE. HOW?

YOU KNOW WHAT AN **X-RAY MACHINE** IS, DON'T YOU? THE ONES THEY USE TO SEE IF YOU'VE GOT A BROKEN BONE. I INSTALLED SOME IN VANS...

...I LEARNED TO DRIVE, AND **I WENT TO THE FRONT** TO TAKE X-RAYS SO THE SURGEONS COULD...

...EASILY FIND THE BULLETS IN WOUNDED SOLDIERS. MY ELDEST DAUGHTER, IRENE, ACCOMPANIED ME, EVEN THOUGH SHE WAS ONLY 17. IN OUR HONOUR, THE SOLDIERS CALLED OUR VANS **LES PETITES CURIES:** THE LITTLE CURIES.



DURING THE WAR, MY DAUGHTER **IRENE** ALSO FOUND TIME TO STUDY PHYSICS AT THE UNIVERSITY OF PARIS. SHE BECAME A **SCIENTIST,** LIKE ME, **AND HELPED ME IN THE LABORATORY.**

THE YEARS WENT BY AND SHE WON A **NOBEL PRIZE** WITH HER HUSBAND, FRÉDÉRIC JOLIOT...

...JUST LIKE **PIERRE AND ME.**

YOU PROBABLY THINK ALL MY FAMILY WERE SCIENTISTS AND NOBEL PRIZE WINNERS, DON'T YOU? WELL, MY YOUNGEST DAUGHTER, ÈVE, DIDN'T WANT ANYTHING TO DO WITH SCIENCE.

...ÈVE WAS A GREAT PIANIST AND SHE WENT ON TO BECOME A JOURNALIST AND A WRITER.

WANT TO KNOW A SECRET? I'M NOT FAMOUS BECAUSE OF WHAT I DID OR WHAT I DISCOVERED. MY FAME IS REALLY DUE TO A LOVELY BOOK THAT ÈVE WROTE ABOUT ME.

AS YOU'VE SEEN, MY LIFE WAS FULL OF **DRAMATIC EVENTS.** AND I HOPE YOURS WILL BE TOO.

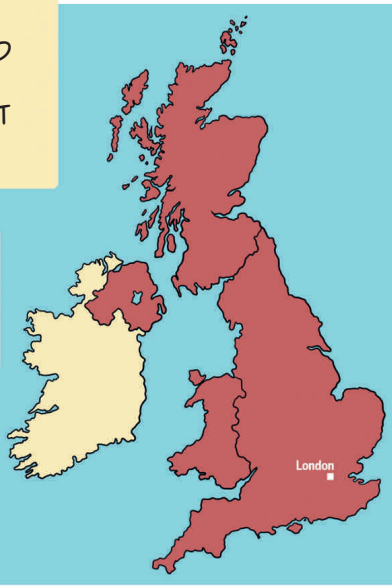
Madame Curie
a biography by
Ève Curie

THIS SCIENTIST WAS BORN IN LONDON IN 1920 AND HER DISCOVERIES WOULD CHANGE THE LIVES OF HER CONTEMPORARIES AND OF THE GENERATIONS TO COME. DURING HER LIFE SHE NEVER RECEIVED THE RECOGNITION SHE DESERVED AND EVEN NOW SHE ISN'T REMEMBERED FOR HER GREATEST ACHIEVEMENT BUT IF YOU READ ON, YOU'LL LEARN SOME VERY INTERESTING THINGS ABOUT HER. MEET

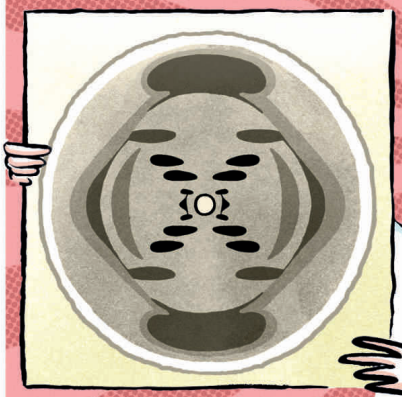
ROSALIND FRANKLIN.

HI, I'M **ROSALIND FRANKLIN,** AND I'M FAMOUS FOR HAVING TAKEN **A PHOTO...**

...BUT NOT WITH THIS CAMERA!



THIS IS THE PICTURE, THE FAMOUS **PHOTO 51.** I TOOK IT USING A TECHNIQUE CALLED **X-RAY CRYSTALLOGRAPHY,** AND IT ENABLED TWO SCIENTISTS OF THE ERA TO DESCRIBE **THE MOLECULAR MODEL OF DNA.**



WHAT A LOT OF TECHNICAL WORDS!

CRYSTALLOGRAPHY!

DNA!

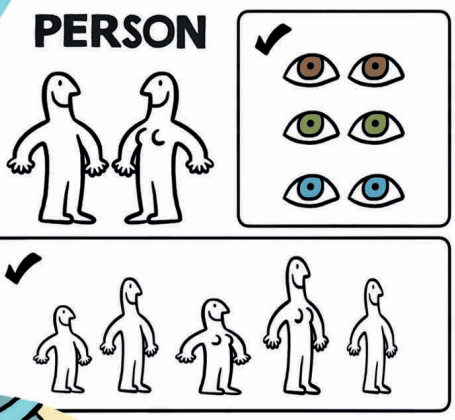
X-RAYS!

MOLECULAR!

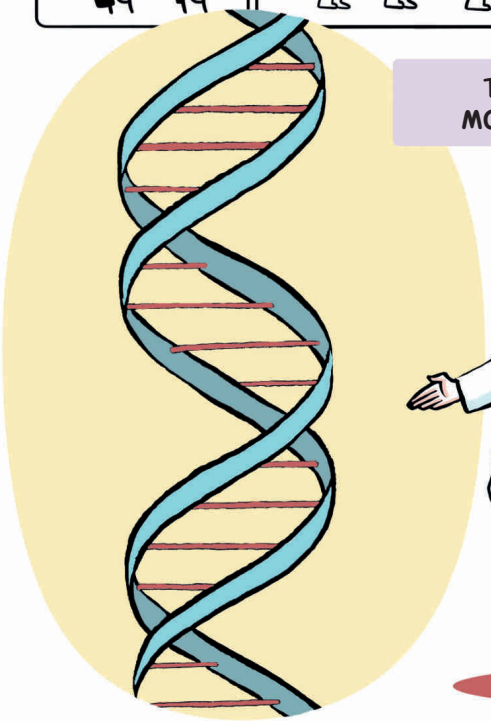
X-RAY CRYSTALLOGRAPHY IS AN INSTRUMENTAL METHOD THAT ALLOWS US **TO SEE WHAT SOLIDS ARE LIKE INSIDE.** HAVE YOU EVER HAD AN **X-RAY** AT THE HOSPITAL? WELL, IT'S A BIT LIKE THAT. THEY TAKE **"AN X-RAY PHOTOGRAPH"** AND THAT'S MORE OR LESS WHAT HAPPENS WITH X-RAY CRYSTALLOGRAPHY: **PHOTOGRAPHS OF THE INSIDE OF A SOLID STRUCTURE.**

DNA IS LIKE AN **INSTRUCTION MANUAL** THAT WE CARRY AROUND IN EACH OF **OUR CELLS,** WHICH TELLS THOSE CELLS HOW THEY SHOULD **"MANUFACTURE"** US: WHAT COLOUR OF EYES TO GIVE US, WHAT HAIR COLOUR WE'LL HAVE...

... IF WE'LL BE TALL OR SHORT...



HAVE YOU EVER SEEN A **DNA MOLECULE?** IN A DRAWING, OBVIOUSLY, BECAUSE **YOU CAN'T SEE DNA WITH THE NAKED EYE...**



THIS IS WHAT A **DNA MOLECULE** LOOKS LIKE.

I'M SURE A LOT OF YOU HAVE SEEN THIS DRAWING. NOWADAYS, ALMOST EVERYONE KNOWS THIS IS WHAT A DNA MOLECULE LOOKS LIKE. TWO TWISTING STRIPS JOINED BY "RUNGS": **A DOUBLE HELIX.**

EVERYONE KNOWS THAT NOW, **BUT BEFORE I TOOK PHOTO 51, NOBODY HAD A CLUE.** THE "BRIGHT SPARKS" OF THE TIME THOUGHT THERE WOULD BE THREE STRIPS...

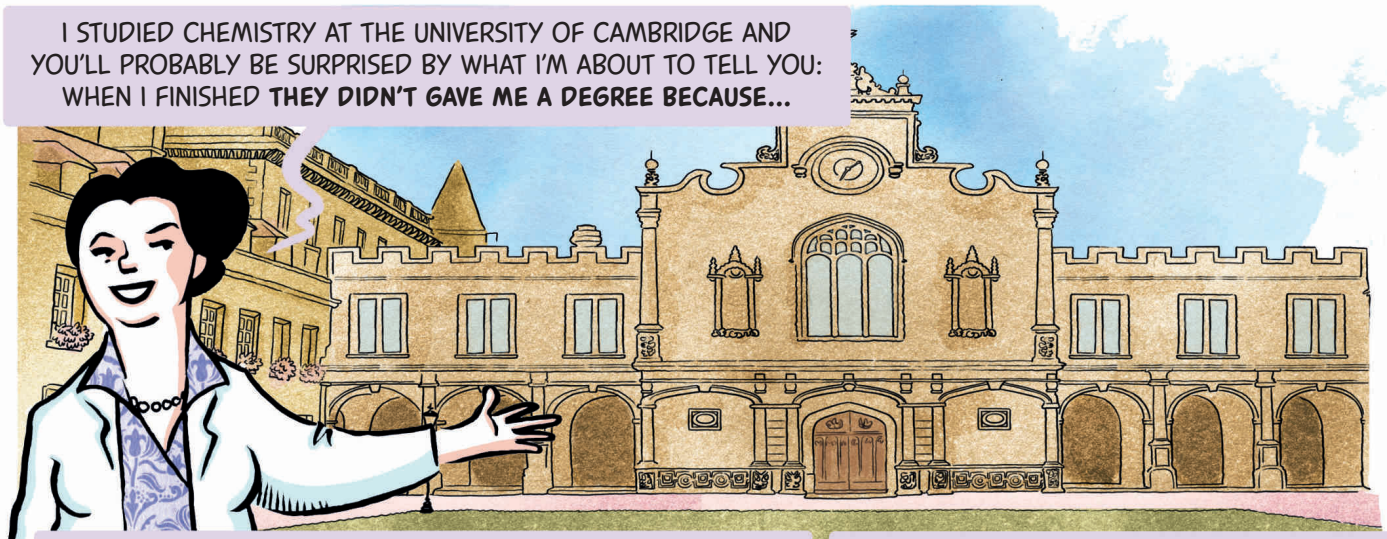
...UNTIL I CAME ALONG WITH MY PHOTO AND: BINGO! THEY REALIZED THERE WERE ONLY TWO STRIPS.

THE GUYS WHO USED MY PHOTO (WITHOUT MY PERMISSION) AND DESCRIBED DNA... RECEIVED THE **NOBEL PRIZE.** I WAS ALREADY DEAD BY THEN SO THEY COULDN'T HAVE GIVEN IT TO ME ANYWAY (LIKE THEY SAY, "YOU'VE GOT TO BE IN IT TO WIN IT").

BUT **I ALSO DID LOTS OF OTHER REALLY INTERESTING, IMPORTANT THINGS FOR SCIENCE** THAT HAD NOTHING TO DO WITH DNA.

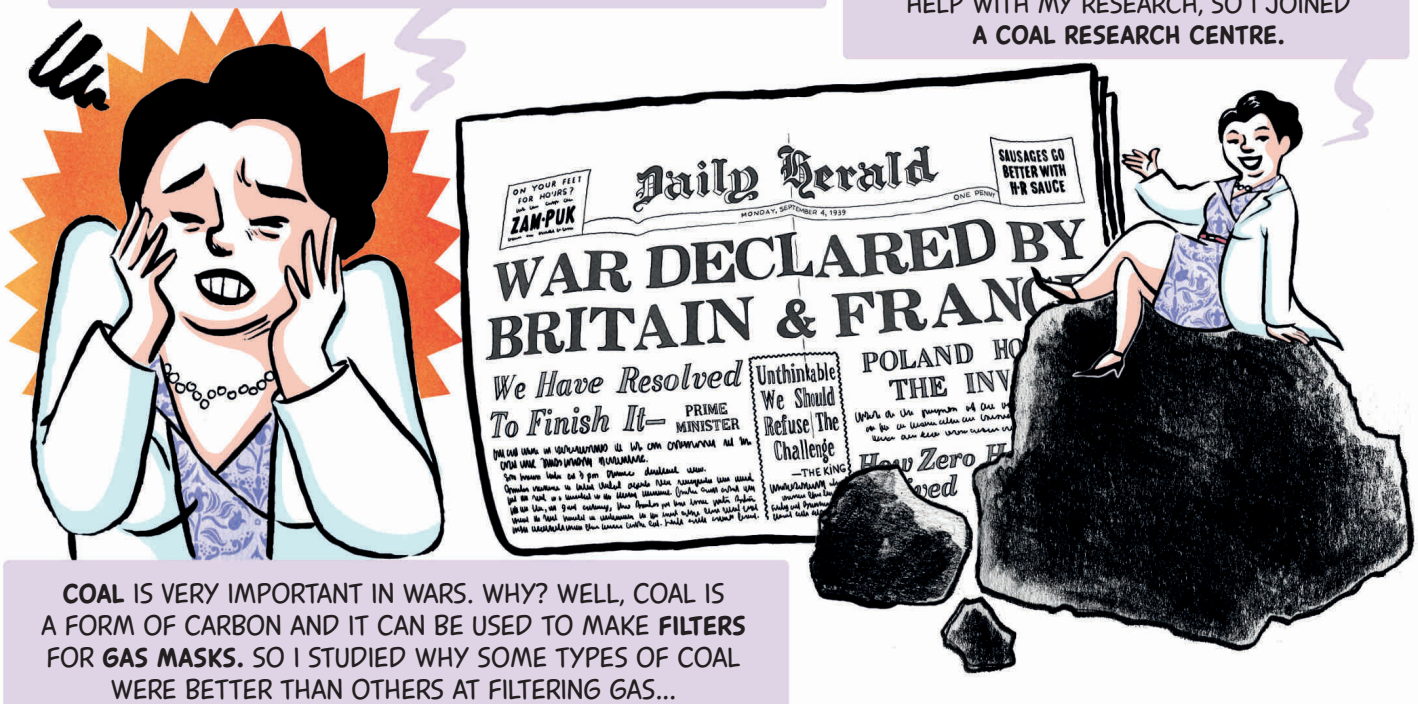
IT'S A PITY MOST PEOPLE DON'T KNOW ABOUT IT, BUT WHAT REALLY MATTERS IS THAT **I ENJOYED MYSELF DOING RESEARCH,** WHICH WAS WHAT I LIKED MOST.

I STUDIED CHEMISTRY AT THE UNIVERSITY OF CAMBRIDGE AND YOU'LL PROBABLY BE SURPRISED BY WHAT I'M ABOUT TO TELL YOU: WHEN I FINISHED **THEY DIDN'T GAVE ME A DEGREE BECAUSE...**



...BACK THEN, CAMBRIDGE DIDN'T GIVE DEGREES TO WOMEN! CAN YOU BELIEVE THAT? CRAZY, RIGHT? THEY AWARDED IT TO ME LATER.

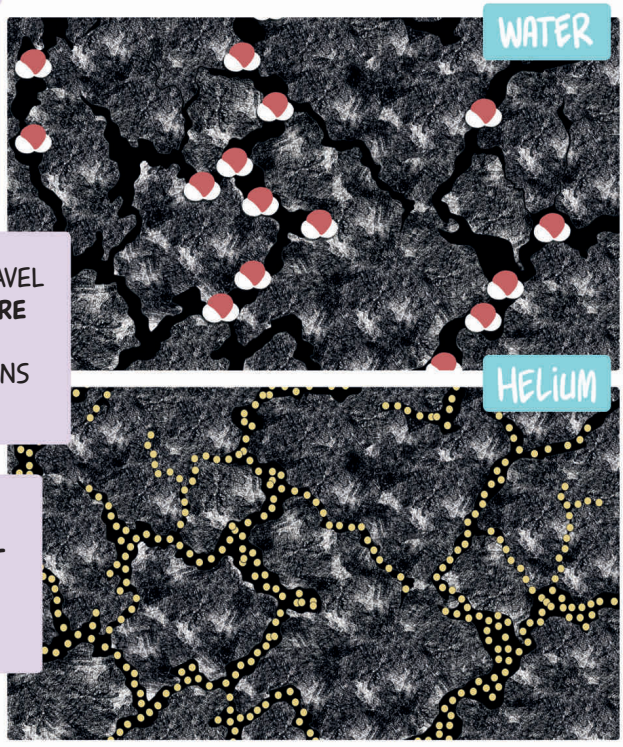
BY THE TIME I FINISHED MY STUDIES, IN 1941, MY COUNTRY WAS FIGHTING THE **SECOND WORLD WAR** AND I WANTED TO HELP WITH MY RESEARCH, SO I JOINED **A COAL RESEARCH CENTRE.**



COAL IS VERY IMPORTANT IN WARS. WHY? WELL, COAL IS A FORM OF CARBON AND IT CAN BE USED TO MAKE **FILTERS** FOR **GAS MASKS.** SO I STUDIED WHY SOME TYPES OF COAL WERE BETTER THAN OTHERS AT FILTERING GAS...

IF YOU WANT TO KNOW HOW POROUS COAL IS YOU HAVE TO KNOW HOW MANY **"TUNNELS"** IT HAS AND HOW FAR THEY GO. YOU CAN TEST THIS BY SEEING HOW FAR DIFFERENT **LIQUIDS OR GASES** TRAVEL THROUGH THE COAL.

SOME LIQUIDS OR GASES WON'T TRAVEL FAR BECAUSE **THEIR MOLECULES ARE TOO LARGE** TO PASS THROUGH THE SMALL TUNNELS. THAT HAPPENS WITH **WATER,** FOR EXAMPLE...



...BUT IF WE USE **HELIUM,** FOR EXAMPLE, WHICH HAS **VERY SMALL MOLECULES,** THEN IT CAN GO THROUGH ALL THE TUNNELS... **AND THAT'S WHAT I DISCOVERED!**

I WAS **THE FIRST ONE TO USE HELIUM TO MEASURE THE POROSITY OF COAL** – A TECHNIQUE THAT IS STILL USED TODAY.

I DID MY **PHD** ABOUT IT AT CAMBRIDGE AND THEN **I WENT TO PARIS** TO CARRY ON DOING RESEARCH INTO COAL.

THOSE WERE THE BEST YEARS OF MY LIFE. IN PARIS, STUDYING COAL, I DESIGNED **THE X-RAY TECHNIQUES** THAT WOULD LATER ALLOW ME TO TAKE **PHOTO 51.**

BUT *C'EST LA VIE!* I SPENT MORE THAN NINE YEARS WORKING WITH **COAL** AND ONLY THREE WITH **DNA** BUT IN THE END MOST PEOPLE **ONLY REMEMBER ME FOR PHOTO 51.**

UNFORTUNATELY, CANCER CUT SHORT MY CAREER WHILE I WAS STILL YOUNG, MAYBE CAUSED BY TAKING ALL THOSE X-RAYS WITHOUT THE RIGHT PROTECTION.

IT'S DIFFERENT NOW: THERE ARE LOTS OF PROTECTIVE MEASURES IN PLACE.

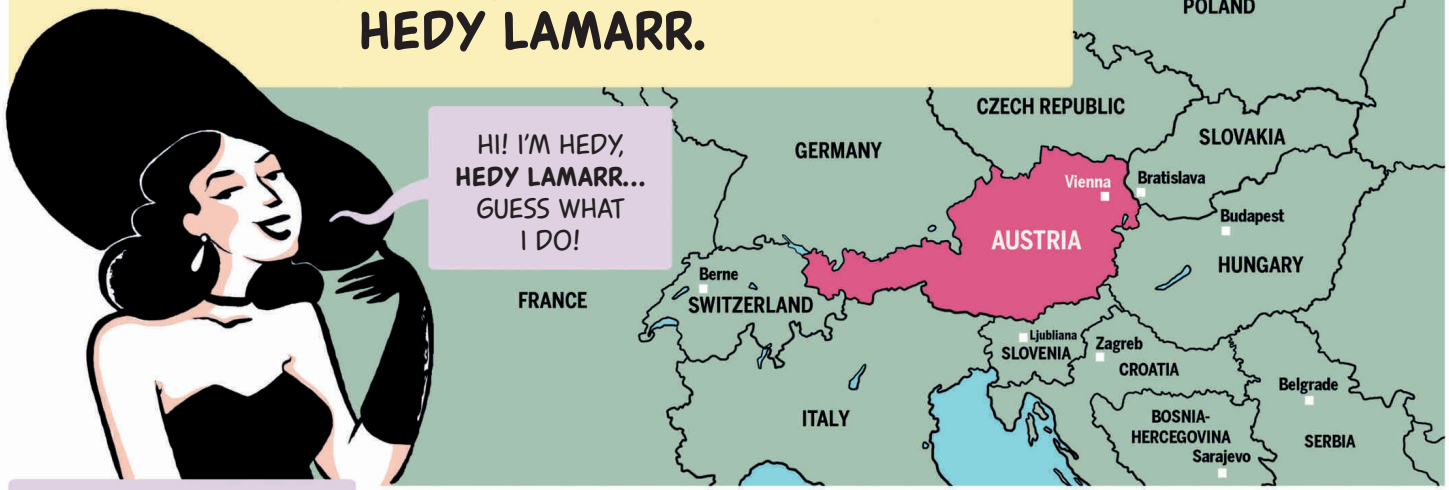
I USED TO SAY THAT **SCIENCE AND LIFE SHOULD NOT BE SEPARATED.** I REFUSED TO BE SEPARATED FROM IT WHEN I WAS ALIVE AND I PROMISE YOU THAT **EACH AND EVERY ONE OF MY DISCOVERIES,** LARGE OR SMALL, **MADE ME VERY HAPPY.**

SCIENCE AND EVERYDAY LIFE CANNOT AND SHOULD NOT BE SEPARATED.

ROSALIND FRANKLIN

SOME PEOPLE'S LIVES ARE FULL OF DRAMA. THEY PASS THROUGH THE WORLD LIKE A SHOOTING STAR, LEAVING A TRAIL OF LIGHT BEHIND THEM. ONE SUCH PERSON – A PIONEER IN VERY DIFFERENT FIELDS AND A FREE SPIRIT – WAS

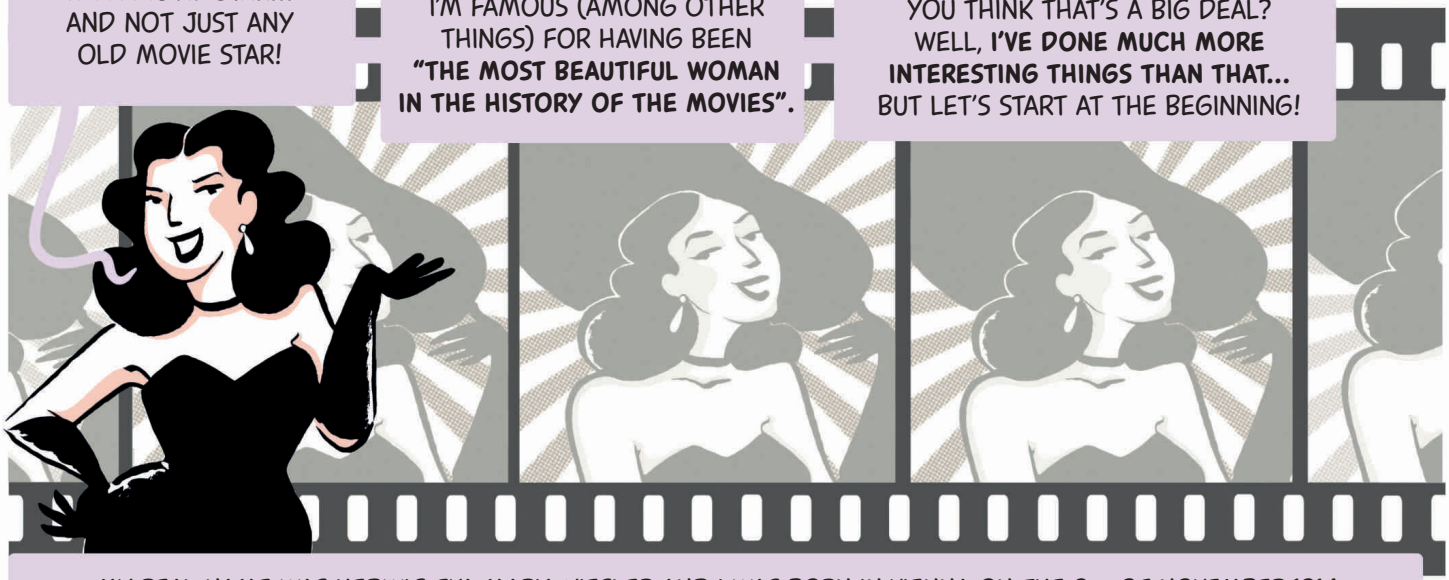
HEDY LAMARR.



I'M A **MOVIE STAR...** AND NOT JUST ANY OLD MOVIE STAR!

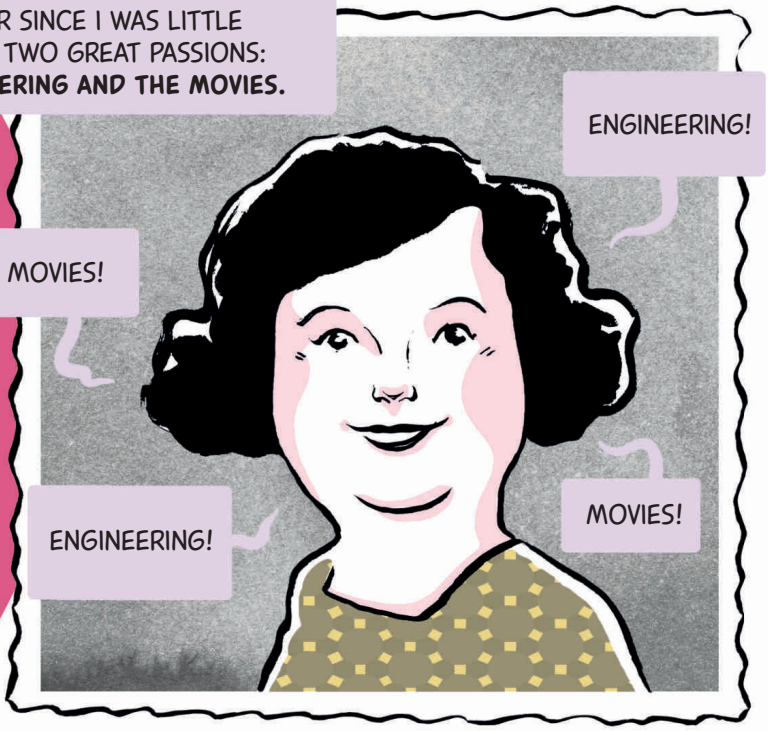
I'M FAMOUS (AMONG OTHER THINGS) FOR HAVING BEEN **"THE MOST BEAUTIFUL WOMAN IN THE HISTORY OF THE MOVIES".**

YOU THINK THAT'S A BIG DEAL? WELL, **I'VE DONE MUCH MORE INTERESTING THINGS THAN THAT...** BUT LET'S START AT THE BEGINNING!



MY REAL NAME WAS HEDWIG EVA MARIA KIESLER AND I WAS BORN IN VIENNA ON THE 9TH OF NOVEMBER 1914. MORE THAN 100 YEARS AGO! DO YOU KNOW WHAT'S CELEBRATED ON THAT DATE? IT'S **INTERNATIONAL INVENTOR'S DAY** AND THE DATE WAS CHOSEN IN MY HONOUR... AND NOT BECAUSE I WAS BEAUTIFUL OR AN ACTRESS!

EVER SINCE I WAS LITTLE I HAD TWO GREAT PASSIONS: **ENGINEERING AND THE MOVIES.**



WHEN I WAS 15, I WENT TO GERMANY AND BECAME A MOVIE ACTRESS, BUT MY PARENTS WEREN'T SO KEEN. I MET AN OLDER MAN, FRIEDRICH MANDL, A RICH **ARMS MANUFACTURER** WHO WAS ALWAYS SENDING ME GIFTS AND FLOWERS... **AND I MARRIED HIM.**

I THINK I'M MAKING A BIG **MISTAKE...**

I HAD TO ACCOMPANY HIM WHENEVER HE SOCIALIZED WITH HIS BUSINESS PARTNERS... THEY WERE ALWAYS GOING ON ABOUT **HOW DIFFICULT IT WAS TO GUIDE A TORPEDO WITHOUT THE ENEMY INTERCEPTING IT.**

BLAH, BLAH

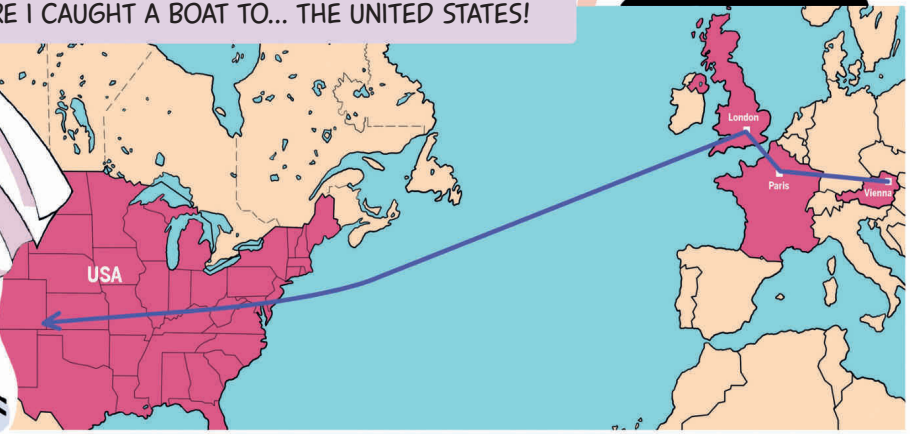
BLAH, BLAH

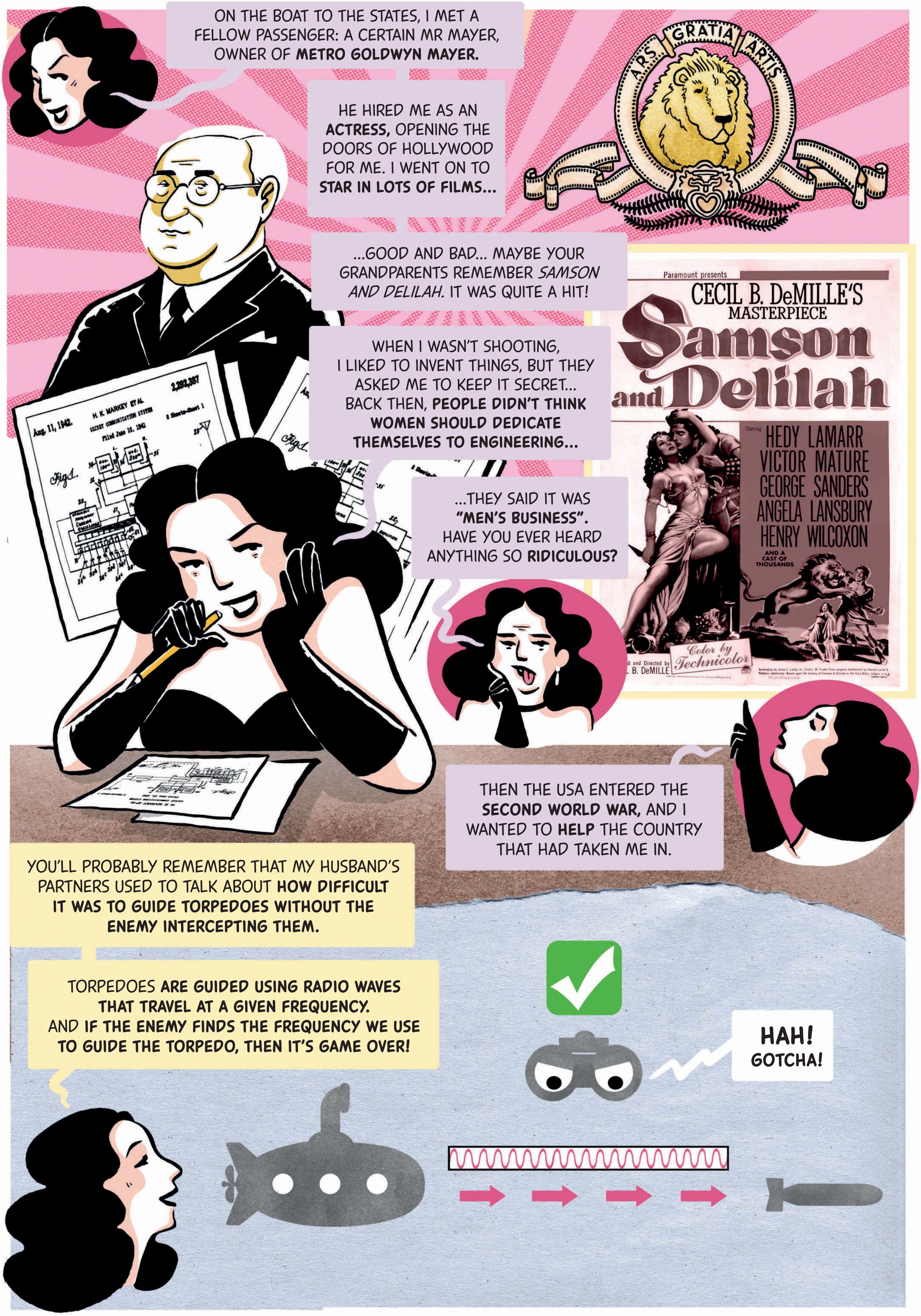
BLAH, BLAH

I LISTENED, SMILED AND ASKED THEM QUESTIONS. I WAS REALLY INTERESTED - BUT NOT BECAUSE I WAS INTO WAR. **IT WAS THE ENGINEERING THAT FASCINATED ME...**

...SO I LEARNED ALL SORTS OF THINGS. I LIVED **A LIFE OF LUXURY** BUT MY HUSBAND WANTED TO KEEP ME ALL TO HIMSELF, AND I'M MY OWN BOSS! SO ONE DAY I GRABBED A LOAD OF JEWELS...

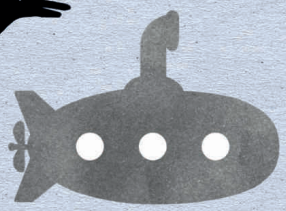
...AND I CLIMBED OUT OF THE BATHROOM WINDOW! I WENT FROM VIENNA TO PARIS BY CAR, THEN FROM PARIS TO LONDON. THERE I CAUGHT A BOAT TO... THE UNITED STATES!

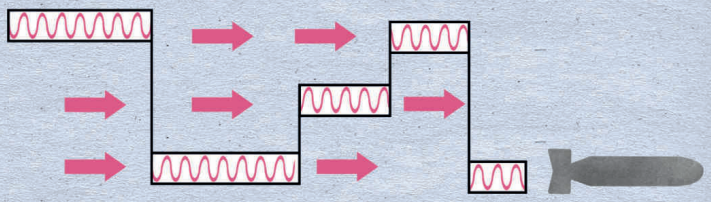



ON THE BOAT TO THE STATES, I MET A FELLOW PASSENGER: A CERTAIN MR MAYER, OWNER OF **METRO GOLDWYN MAYER.**
HE HIRED ME AS AN **ACTRESS,** OPENING THE DOORS OF HOLLYWOOD FOR ME. I WENT ON TO **STAR IN LOTS OF FILMS...**
ARS GRATIA ARTIS
...GOOD AND BAD... MAYBE YOUR GRANDPARENTS REMEMBER *SAMSON AND DELILAH*. IT WAS QUITE A HIT!
Paramount presents
CECIL B. DeMILLE'S MASTERPIECE
Samson and Delilah
Starring HEDY LAMARR VICTOR MATURE GEORGE SANDERS ANGELA LANSBURY HENRY WILCOXON
AND A CAST OF THOUSANDS
Color by Technicolor
WHEN I WASN'T SHOOTING, I LIKED TO INVENT THINGS, BUT THEY ASKED ME TO KEEP IT SECRET... BACK THEN, **PEOPLE DIDN'T THINK WOMEN SHOULD DEDICATE THEMSELVES TO ENGINEERING...**
...THEY SAID IT WAS **"MEN'S BUSINESS".** HAVE YOU EVER HEARD ANYTHING SO **RIDICULOUS?**
THEN THE USA ENTERED THE **SECOND WORLD WAR,** AND I WANTED TO **HELP** THE COUNTRY THAT HAD TAKEN ME IN.
YOU'LL PROBABLY REMEMBER THAT MY HUSBAND'S PARTNERS USED TO TALK ABOUT **HOW DIFFICULT IT WAS TO GUIDE TORPEDOES WITHOUT THE ENEMY INTERCEPTING THEM.**
TORPEDOES **ARE GUIDED USING RADIO WAVES THAT TRAVEL AT A GIVEN FREQUENCY.** AND **IF THE ENEMY FINDS THE FREQUENCY WE USE TO GUIDE THE TORPEDO, THEN IT'S GAME OVER!**
HAH! GOTCHA!

I THOUGHT OF **A WAY OF DEALING WITH THAT** AND A FRIEND, GEORGE ANTHEIL, A COMPOSER, HELPED ME TO WORK OUT THE DETAILS.

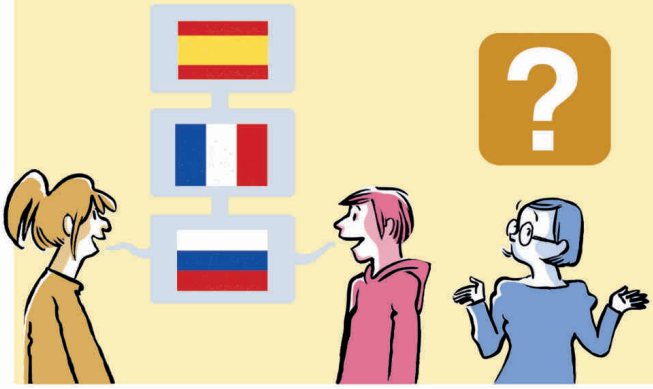
THE IDEA WAS THAT BOTH THE TORPEDO AND THE "REMOTE CONTROL" DIRECTING IT **WOULD REGULARLY CHANGE FREQUENCY AT THE SAME TIME.**



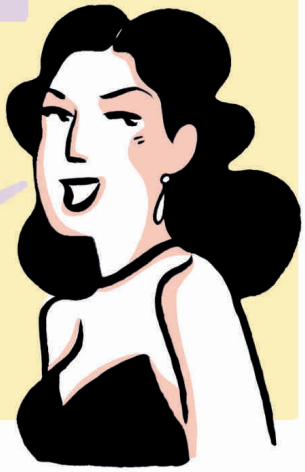


MAYBE IT'S EASIER TO EXPLAIN WITH AN EXAMPLE.

IMAGINE YOU WANT TO TALK TO A FRIEND AND YOU DON'T WANT ANYONE ELSE TO UNDERSTAND WHAT YOU'RE SAYING. IF SOMEONE LISTENS TO YOU AND YOU ARE SPEAKING ENGLISH...



...THEY'LL UNDERSTAND YOU. BUT IF YOU AGREE TO SPEAK SPANISH FOR 5 SECONDS, THEN FRENCH FOR 6 SECONDS, THEN RUSSIAN FOR 3 SECONDS... THE EAVESDROPPER WON'T BE ABLE TO TUNE IN TO ALL THOSE DIFFERENT LANGUAGES.



GEORGE AND ME INVENTED A SYSTEM LIKE THAT AND IT'S CALLED:

FREQUENCY-HOPPING SPREAD SPECTRUM.

WE PROPOSED IT TO THE **US GOVERNMENT** BUT THEY DIDN'T SHOW MUCH INTEREST. BACK THEN IT WAS A BIT COMPLICATED TO ACTUALLY MAKE.

IT WOULD BE **ANOTHER 20 YEARS** BEFORE SOMEBODY TOOK MY IDEA AND STARTED TO USE IT...

Wi Fi

Bluetooth®

...AND IT WOULD BE A LOOOONG TIME BEFORE PEOPLE RECOGNIZED THAT **MY IDEA WAS TRULY REVOLUTIONARY.**

BECAUSE **MOBILE PHONES, WIFI, BLUETOOTH AND LOTS OF OTHER THINGS ARE BASED ON THE IDEA** THAT ME AND MY FRIEND GEORGE CAME UP WITH.

THAT'S WHY THEY CALL ME **THE GRANDMOTHER OF WIFI...** BUT HAVE YOU EVER SEEN SUCH A GLAMOROUS GRANNY?

IN THE PAST, VERY FEW WOMEN WERE SCIENTISTS BECAUSE **THEY WEREN'T ALLOWED TO BE...**

ADELA

MARÍA DEL CARMEN

...AND **THE FEW THERE WERE** HAD TO MAKE LOTS OF **SACRIFICES.**

LUCKILY, NOWADAYS **A WOMAN CAN BE A SCIENTIST AND LEAD A NORMAL LIFE!**

IT'S POSSIBLE TO BE A SCIENTIST AND HAVE **A LIFE WITH HOBBIES, A FAMILY...**

ISA

MARÍA JOSÉ

CLARA

JUST LIKE US!

NOW WE'RE GOING TO TELL YOU A BIT ABOUT **OUR WORK.**

YOU'RE PROBABLY WONDERING, **WHAT'S THE USE OF SCIENCE?**

SCIENCE IS ALL AROUND US, **IN EVERYTHING WE DO.** FOR EXAMPLE, **IN SPORT.**

THANKS TO SCIENCE, ATHLETES CAN IMPROVE THEIR PERFORMANCE!

IMAGINE YOU'RE A TENNIS PLAYER AND YOU WANT TO **IMPROVE** YOUR BACKHAND, WHICH IS YOUR WEAKEST STROKE. SO YOU RECORD YOURSELF IN TRAINING TO SEE WHAT YOU'RE DOING WRONG...

...BUT THE TRAINING SESSION IS THREE HOURS LONG. IF ONLY THE COMPUTER COULD PICK OUT ALL THE BACKHANDS IN THOSE THREE HOURS OF VIDEO.

HOW CAN IT RECOGNIZE THEM WITHOUT CONFUSING THEM WITH FOREHANDS? **I'VE DEVELOPED AN ALGORITHM THAT ENABLES THE COMPUTER TO IDENTIFY EACH DIFFERENT STROKE!**

ADA ALWAYS SAID THAT COMPUTERS WOULD BE ABLE TO DO MORE THAN JUST PERFORM SIMPLE CALCULATIONS!

I'M A **COMPUTER ENGINEER:** I DO RESEARCH INTO HOW TO **SOLVE PROBLEMS USING ARTIFICIAL INTELLIGENCE.**

ONE OF THE AREAS I'M INTERESTED IN IS CALLED **AFFECTIVE COMPUTING,** WHICH IS USED TO **CREATE APPLICATIONS** FOR TABLETS, SMARTPHONES AND OTHER DEVICES **WHICH CAN IDENTIFY** IF YOU FEEL ANXIOUS...

...STRESSED OR SAD, BY ANALYSING YOUR FACE, YOUR VOICE OR YOUR HEARTBEAT. THEN, **USING ARTIFICIAL INTELLIGENCE, THE APPLICATION PERFORMS ACTIONS TO HELP YOU RELAX AND FEEL BETTER.** THIS HAS **LOTS OF POTENTIAL USES IN HEALTH AND WELL-BEING.**

BUT DON'T ASSUME WE ONLY WORK ON AN IDEA IF IT HAS AN **IMMEDIATE APPLICATION...**

...SOMETIMES WE JUST WANT TO UNDERSTAND THE THINGS WE SEE AROUND US...

WHY BE A PRINCESS... WHEN I COULD BE A SCIENTIST!?

FOR EXAMPLE,
WHY ARE SOAP BUBBLES ALWAYS ROUND?

IS IT BECAUSE WE MAKE THEM BY BLOWING THROUGH A **STRAW** WITH A **CIRCULAR** HOLE?

WILL THEY COME OUT AS **CUBES** IF WE USE A STRAW WITH A **SQUARE** HOLE?

WELL, LOOK AT THAT! **THEY'RE STILL ROUND!**

IT TURNS OUT THAT **A SPHERE IS THE BEST WAY TO ENCLOSE THE AIR INSIDE A BUBBLE** BECAUSE **IT HAS THE SMALLEST SURFACE AREA.**

AND THAT'S WHAT I DO: **I TRY TO FIND OUT WHY SOME SURFACES** THAT APPEAR **NATURALLY TAKE THE SHAPE THEY DO INSTEAD OF ANOTHER ONE.**

BUT THE REALLY COOL THING IS THAT, **ALTHOUGH WE DO THIS OUT OF CURIOSITY,** IN THE END THESE **PROPERTIES** OF SOAP BUBBLES OR OTHER SIMILAR SURFACES **CAN BE USED IN ARCHITECTURE** TO MAKE ROOFS THAT ARE LIGHT BUT VERY STRONG.

AND THAT'S THE GREAT THING ABOUT SCIENCE: YOU **ASK ONE QUESTION BUT YOU END UP DISCOVERING THE ANSWERS TO ALL SORTS OF OTHER COMPLETELY DIFFERENT ONES!**

THAT'S EXACTLY WHAT HAPPENED TO ME! I WAS WORKING ON SOME STRUCTURES CALLED **VORONOI DIAGRAMS.**

IN ADDITION TO RESEARCH, I'M ALSO A **SCIENCE COMMUNICATOR.** THAT MEANS I TALK ABOUT SCIENCE TO THE GENERAL PUBLIC. **ON TV, THE RADIO, IN THE PRESS...**

WHY BE A PRINCESS... WHEN I COULD BE A SCIENTIST!?

AS PART OF MY COMMUNICATION WORK I MET A BIOLOGIST, **LUISMA ESCUDERO,** AND WE REALIZED THAT MY RESEARCH **HELPED EXPLAIN THE SHAPE OF SOME OF THE CELLS IN OUR BODIES...**

SCUTOIDS

...AND WE DISCOVERED A NEW GEOMETRIC SHAPE, THE SCUTOID. ISN'T IT COOL?

WELL... IT WASN'T JUST THE TWO OF US, **IT WAS TEAMWORK,** WITH MORE MATHEMATICIANS, BIOLOGISTS, COMPUTER SCIENTISTS, A PHYSICIST...

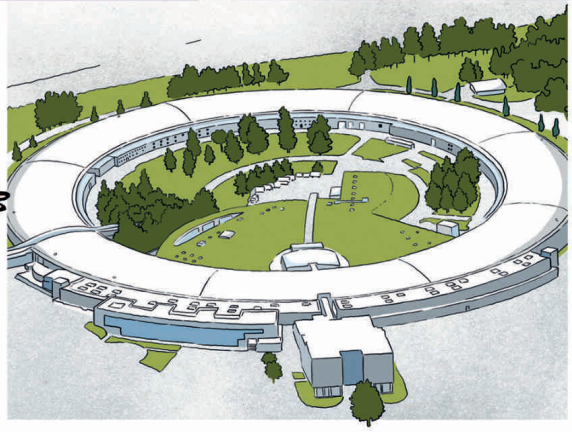
THAT WHOLE IDEA THAT PEOPLE WHO DO SCIENCE ARE **REALLY BORING AND WORK ON THEIR OWN IN A LABORATORY** COULDN'T BE FURTHER FROM THE TRUTH.

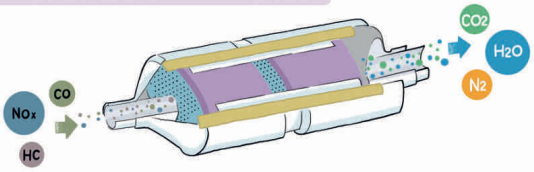
SCIENTISTS ALMOST **ALWAYS WORK WITH COLLEAGUES,** OFTEN FROM OTHER COUNTRIES...

...AND THAT'S THE OTHER FUN PART OF OUR JOB: **WE TRAVEL ALL OVER THE WORLD.**

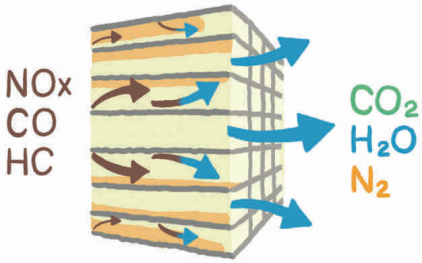
FOR EXAMPLE, I WORK AT A **EUROPEAN RESEARCH CENTRE** IN FRANCE...

...WHERE **SCIENTISTS FROM LOTS OF DIFFERENT COUNTRIES** COME TO DO RESEARCH AND EVERYONE WORKS ON THEIR OWN PROJECTS.





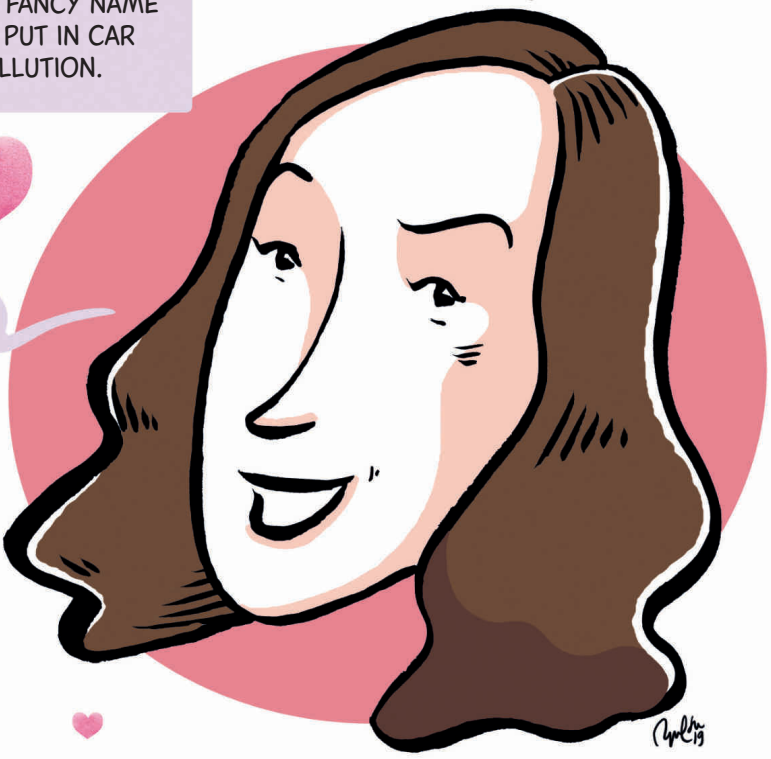
CATALYSTS



I STUDY **CATALYSTS,** WHICH IS A FANCY NAME FOR THE SPECIAL DUST THEY PUT IN CAR EXHAUST PIPES TO CUT POLLUTION.

BUT YOU KNOW **WHAT WE LOVE MOST ABOUT OUR WORK** AS SCIENTISTS?

IT'S THAT FEELING YOU GET WHEN YOU FINALLY...



...FIND THE SOLUTION TO THE PROBLEM YOU'VE BEEN WORKING ON FOR AGES!

IT'S LIKE PUTTING **THE LAST PIECE IN A JIGSAW PUZZLE.**

A REAL THRILL!

SO IF YOU LIKE WHAT YOU'VE HEARD, **IF YOU WANT TO KNOW MORE AND AREN'T AFRAID OF A LITTLE BIT OF HARD WORK, YOU COULD BECOME A SCIENTIST TOO...** AND IF NOT, THEN TELL MARÍA JOSE! WANT TO KNOW WHY SHE ENDED UP BECOMING A MATHEMATICIAN? GO ON MARY JO, TELL THEM!

AT HIGH SCHOOL **I LIKED ALL THE SCIENCE SUBJECTS** BUT IN THE LAST YEAR A FORMER STUDENT CAME AND SPOKE TO US. SHE'D ALREADY STARTED A **MATHS DEGREE...**

...AND SHE TOLD ME IT WAS **SUPER DIFFICULT.** "DON'T DO IT, IT'S IMPOSSIBLE" SHE WARNED ME.

...AND I THOUGHT TO MYSELF: **"I'M SURE I CAN HANDLE IT!"** SO I TRIED AND FOUND OUT... **THAT I COULD!**

SO NOW YOU KNOW A LITTLE BIT ABOUT US: **FIVE SCIENTISTS, FIVE RESEARCHERS AT THE UNIVERSITY OF SEVILLE.**

ADELA
CHEMIST

ISA
MATHEMATICIAN

CLARA
MATHEMATICIAN

MARÍA JOSÉ
MATHEMATICIAN

MARÍA DEL CARMEN
COMPUTER ENGINEER


WE'VE TOLD YOU ABOUT HYPATIA OF ALEXANDRIA, ADA LOVELACE, MARIE CURIE, ROSALIND FRANKLIN AND HEDY LAMARR.
THEY ARE THE PAST
WE'RE THE PRESENT
BUT THE BEST IS STILL TO COME!
YOU REPRESENT THE FUTURE!
THE END

ONE SPRING DAY IN 2015, PACO SAW A POSTER ADVERTISING A SERIES OF LECTURES ABOUT WOMEN SCIENTISTS THAT WAS BEING HELD AT THE UNIVERSITY OF SEVILLE... AND HE HAD AN IDEA. **ADELA** WAS ONE OF THE SPEAKERS. **CLARA, ISA, MARÍA DEL CARMEN** AND **MARÍA JOSÉ** ALL WORKED IN THE SAME CENTRE AS PACO. TO TURN HIS IDEA INTO A REALITY, PACO CONTACTED ALL OF THEM...

...AND THAT'S HOW *WOMEN IN SCIENCE: PAST, PRESENT AND FUTURE* CAME ABOUT.

THIS COULD BE A GOOD IDEA FOR A PLAY! THEN MY DAUGHTER AND HER FRIENDS COULD SEE IT!

AND INSTEAD OF ACTRESSES, WE COULD GET REAL SCIENTISTS TO PLAY THE PARTS!

I'M GOING TO MAKE A FEW PHONE CALLS!

HI, ADELA! I'VE HAD AN IDEA YOU MIGHT BE INTERESTED IN!

I SHOULD TALK TO MARÍA JOSÉ JIMÉNEZ? THANKS, CLARA!

HI, MARÍA JOSÉ!

MARÍA DEL CARMEN!

HI, ISA!

OKAY, LET'S FOCUS ON HYPATIA OF ALEXANDRIA, ADA LOVELACE, MARIE CURIE, ROSALIND FRANKLIN AND HEDY LAMARR, AND WE CAN START ON THE SCRIPT.

OKAY!

YES!

HISTORICAL AND SCIENTIFIC RESEARCH. COSTUME DESIGNERS, HAIRDRESSERS, REHEARSALS... IS THAT EVERYTHING?

MARÍA DEL CARMEN, COULD YOUR FRIEND RAÚL TAKE CARE OF THE POSTER? WILL HE COME AND HELP US WITH THE REHEARSALS?

WE'VE GOT LOADS OF FRIENDS, RELATIVES AND COLLEAGUES AT THE UNIVERSITY WHO'LL BE HAPPY TO HELP US PUT ON THE FIRST SHOW!

AT OUR FIRST PERFORMANCE THE MAIN THEATRE WAS FULL TO BURSTING POINT! IT WAS AMAZING! BUT BEST OF ALL WAS WHEN WE ASKED:

"DOES ANYONE HAVE ANY QUESTIONS?"

WE THOUGHT IT WOULD ALL END THERE, ON THE 11TH OF MARCH 2016, BUT ***WOMEN SCIENTISTS: PAST PRESENT, AND FUTURE*** IS STILL HERE!

ACTIVITIES

1. PEOPLE AT WORK.

DRAW PEOPLE DOING DIFFERENT JOBS. YOU CAN DRAW PEOPLE WORKING AT HOME OR IN AN OFFICE; IN A FACTORY OR WORKING WITH THE PUBLIC. TRY TO INCLUDE SOME JOBS THAT ARE RELATED TO SCIENCE, TECHNOLOGY AND ENGINEERING.

2. WOMEN IN SCIENCE QUIZ.

TEAM UP WITH THREE OR FOUR FELLOW STUDENTS AND PLAY THIS SCIENCE-THEMED QUIZ:
HTTP://INSTITUCIONAL.US.ES/CIENTIFICAS/EN/

3. MEETING WOMEN SCIENTISTS FROM THE PAST.

HYPATIA OF ALEXANDRIA, MARIE CURIE, ROSALIND FRANKLIN, HEDY LAMARR AND ADA LOVELACE ARE ALL WOMEN SCIENTISTS FROM THE PAST. MAKE A WALLCHART TO DISPLAY THE FOLLOWING INFORMATION:

A) WHEN AND WHERE THEY LIVED
B) IMAGES OF THE WOMEN AND THEIR SCIENTIFIC ACHIEVEMENTS
C) SOME OF THE THINGS THEY ARE BEST KNOWN FOR

4. INTERVIEWING A WOMAN SCIENTIST, ENGINEER OR TECHNOLOGIST.

INTERVIEW A SCIENTIST, AN ENGINEER OR A TECHNOLOGIST TO FIND OUT WHAT LIFE IS FOR PEOPLE WHO WORK IN THOSE FIELDS. FIND OUT IF THEY HAVE ENCOUNTERED OBSTACLES IN THEIR PROFESSIONAL CAREER BECAUSE THEY WERE WOMEN.

TEACHING GUIDE AND MATERIALS FOR SCHOOLS:
HTTP://INSTITUCIONAL.US.ES/CIENTIFICAS/EN/

WOMEN SCIENTISTS

PAST PRESENT FUTURE

THE COMIC

"...BUT THE BEST IS STILL TO COME: BECAUSE YOU REPRESENT THE FUTURE!"

FROM LEFT TO RIGHT: **MARÍA JOSÉ JIMÉNEZ, ISABEL FERNÁNDEZ, CLARA GRIMA, FRANCISCO VEGA, MARÍA DEL CARMEN ROMERO** AND **ADELA MUÑOZ,** CREATORS OF THE PLAY *WOMEN SCIENTISTS: PAST, PRESENT AND FUTURE.*

RAQUEL GU LOVES TO DRAW: SHE STARTED AS SOON AS SHE WAS OLD ENOUGH TO HOLD A PENCIL – AND HASN'T STOPPED SINCE! SHE IS THE AUTHOR OF ILLUSTRATED BOOKS FOR CHILDREN, COMICS AND HUMOROUS TITLES. HER CARTOONS AND DRAWINGS HAVE ALSO APPEARED IN NUMEROUS BOOKS BY OTHER AUTHORS, AND IN MEDIA OUTLETS INCLUDING *JOT DOWN, PRINCIPIA* AND *EL JUEVES.*

TIM GUTTERIDGE IS AN OMNIVOROUS TRANSLATOR, WHOSE WORK INCLUDES THRILLERS, LITERARY FICTION, THEATRE, TV SCRIPTS... AND COMICS. ORIGINALLY FROM SCOTLAND, HE NOW LIVES IN CÁDIZ (ANDALUSIA) WITH HIS WELL-BEHAVED CHILDREN AND HIS UNRULY LABRADORS.