

ISSUE
#8

THE ADVENTURES OF **HEMILIOS**

LET'S LEARN ABOUT HEREDITY



Scientific content editor:
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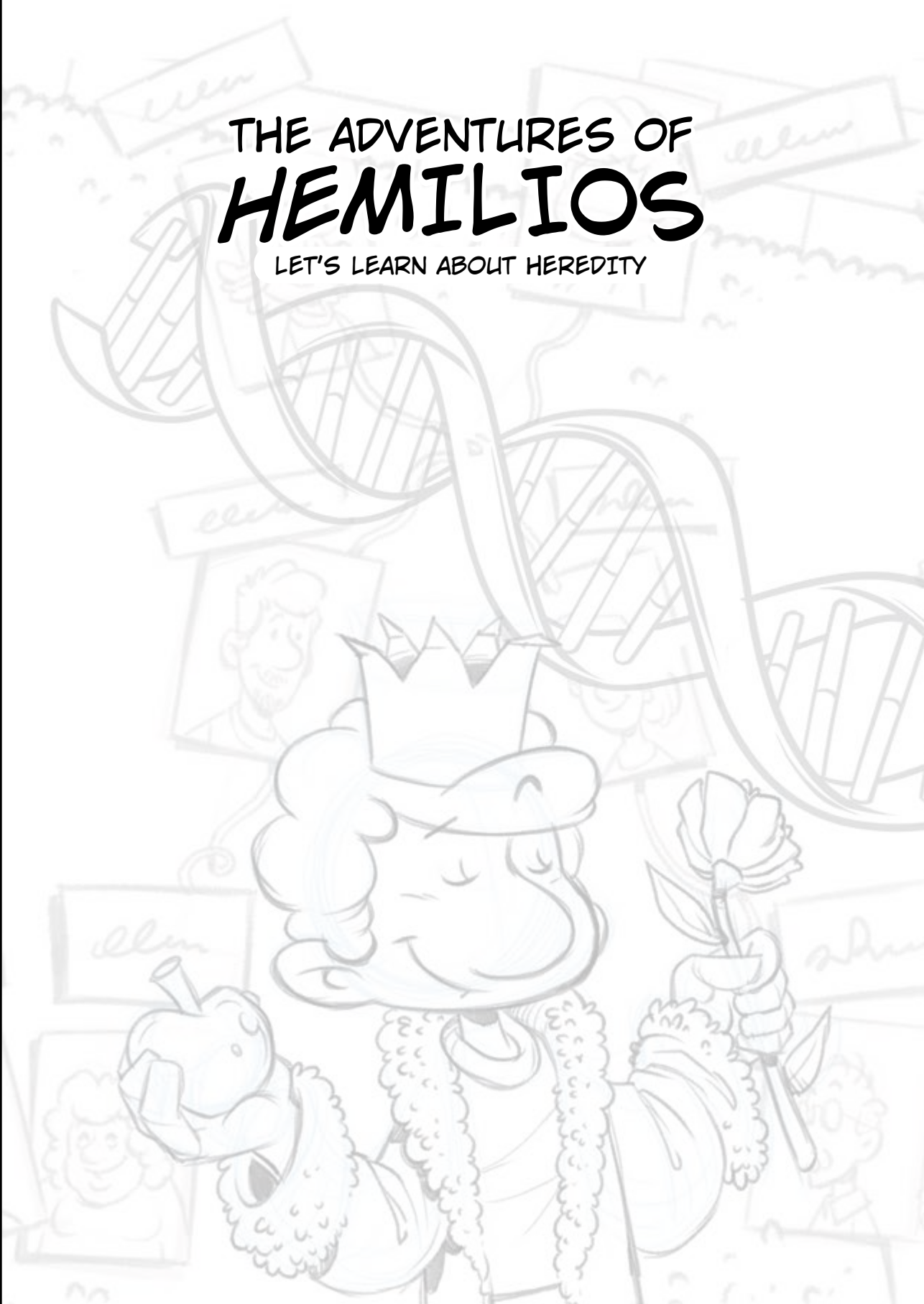
GREEK
HAEMOPHILIA
SOCIETY

Courtesy of

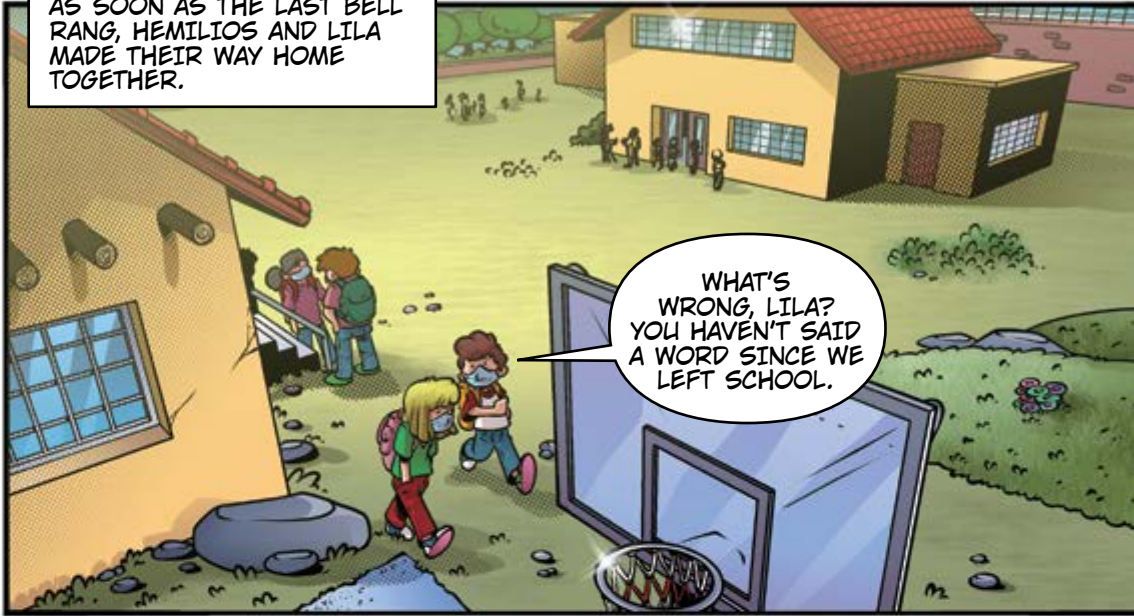


THE ADVENTURES OF **HEMILIOS**

LET'S LEARN ABOUT HEREDITY

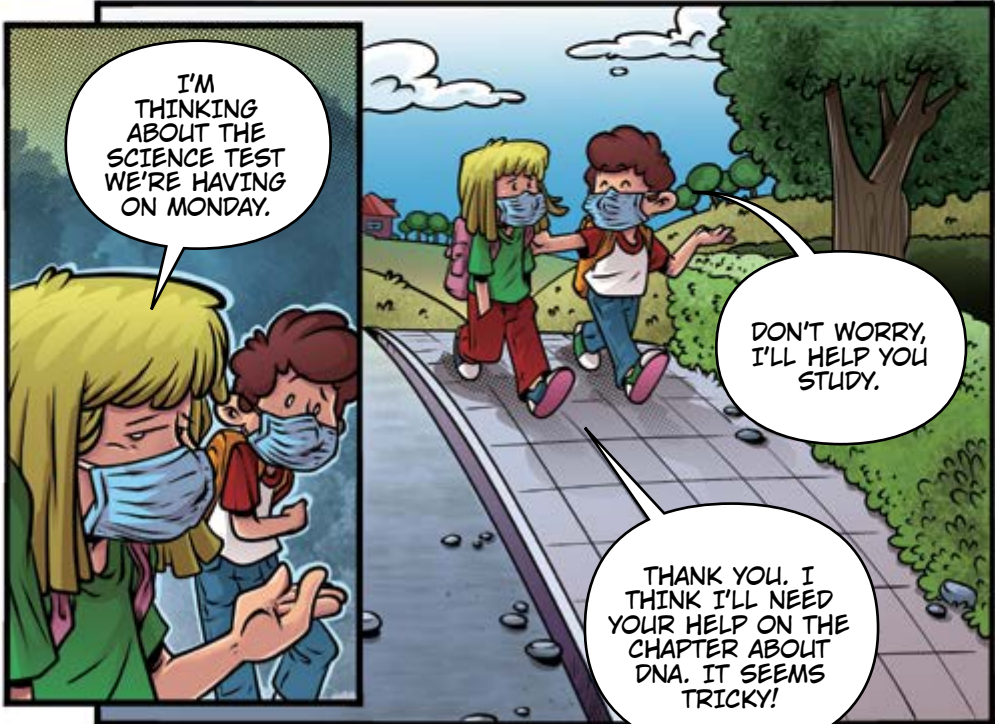


AS SOON AS THE LAST BELL RANG, HEMILIOS AND LILA MADE THEIR WAY HOME TOGETHER.



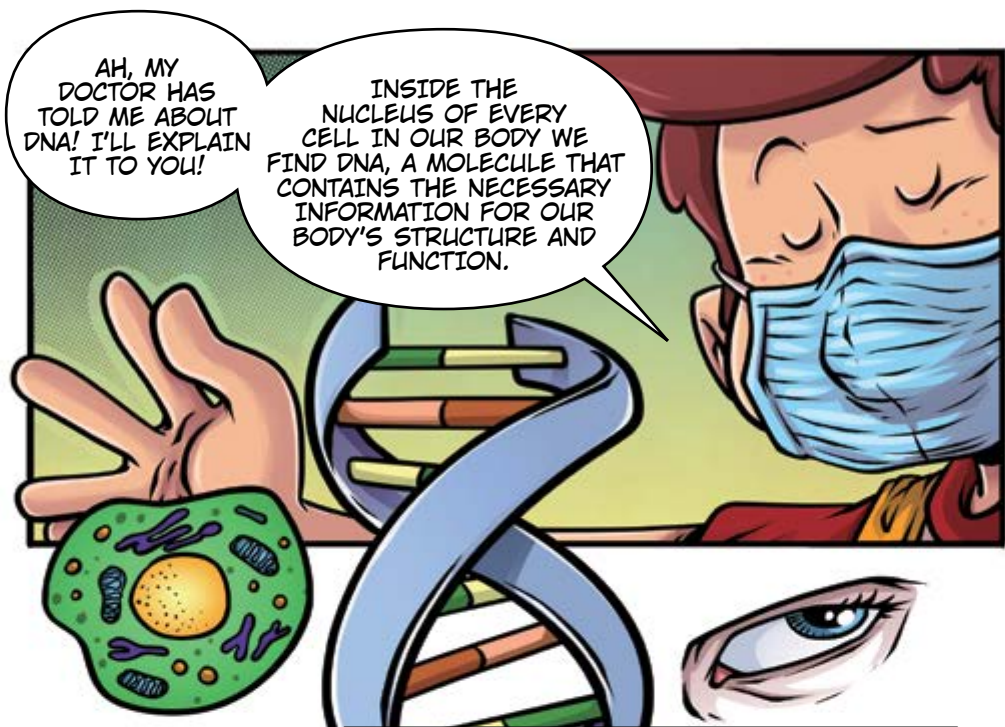
WHAT'S WRONG, LILA? YOU HAVEN'T SAID A WORD SINCE WE LEFT SCHOOL.

I'M THINKING ABOUT THE SCIENCE TEST WE'RE HAVING ON MONDAY.




DON'T WORRY, I'LL HELP YOU STUDY.

THANK YOU. I THINK I'LL NEED YOUR HELP ON THE CHAPTER ABOUT DNA. IT SEEMS TRICKY!




AH, MY DOCTOR HAS TOLD ME ABOUT DNA! I'LL EXPLAIN IT TO YOU!


INSIDE THE NUCLEUS OF EVERY CELL IN OUR BODY WE FIND DNA, A MOLECULE THAT CONTAINS THE NECESSARY INFORMATION FOR OUR BODY'S STRUCTURE AND FUNCTION.



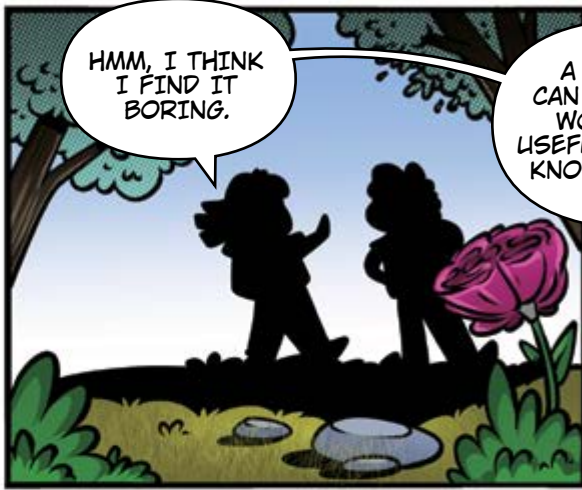
EVERY TRAIT, SUCH AS THE SHAPE OF OUR HAIR OR THE COLOUR OF OUR EYES, IS FORMED ACCORDING TO THE INFORMATION CONTAINED IN CERTAIN "REGIONS" OF THE DNA, THAT ARE CALLED GENES.



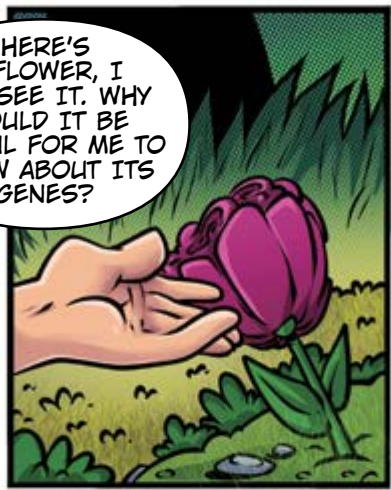
SO, ONE GENE CONTAINS THE INSTRUCTIONS FOR THE SHAPE OF MY HAIR AND ANOTHER FOR THE COLOUR OF MY EYES?



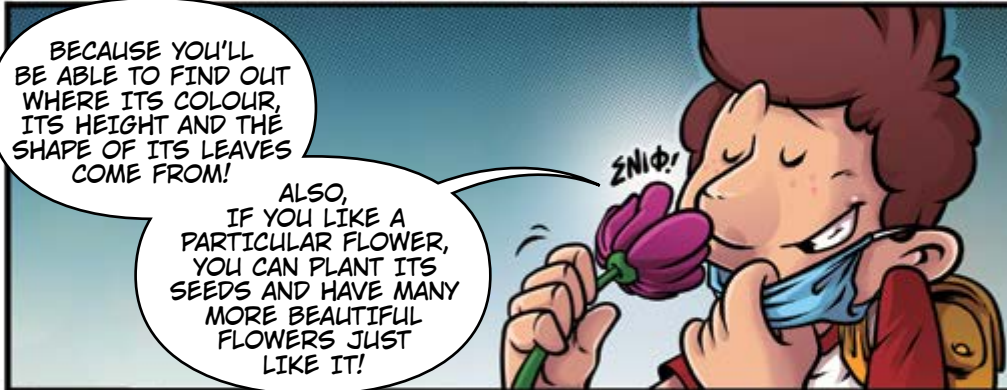
EXACTLY! AND ALL THESE GENES TOGETHER, CONTAIN THE "INSTRUCTIONS" FOR SHAPING OUR ENTIRE BODY! DON'T YOU FIND IT FASCINATING?



HMM, I THINK I FIND IT BORING.



HERE'S A FLOWER, I CAN SEE IT. WHY WOULD IT BE USEFUL FOR ME TO KNOW ABOUT ITS GENES?



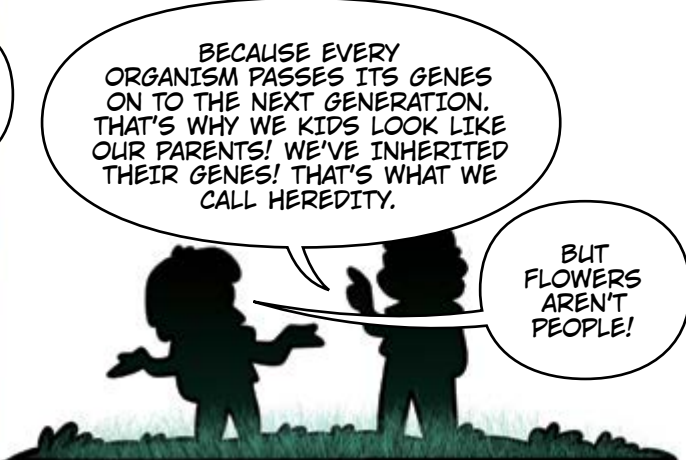
BECAUSE YOU'LL BE ABLE TO FIND OUT WHERE ITS COLOUR, ITS HEIGHT AND THE SHAPE OF ITS LEAVES COME FROM!

ALSO, IF YOU LIKE A PARTICULAR FLOWER, YOU CAN PLANT ITS SEEDS AND HAVE MANY MORE BEAUTIFUL FLOWERS JUST LIKE IT!

ZNIΦ!



HOW DO YOU KNOW THAT?



BECAUSE EVERY ORGANISM PASSES ITS GENES ON TO THE NEXT GENERATION. THAT'S WHY WE KIDS LOOK LIKE OUR PARENTS! WE'VE INHERITED THEIR GENES! THAT'S WHAT WE CALL HEREDITY.

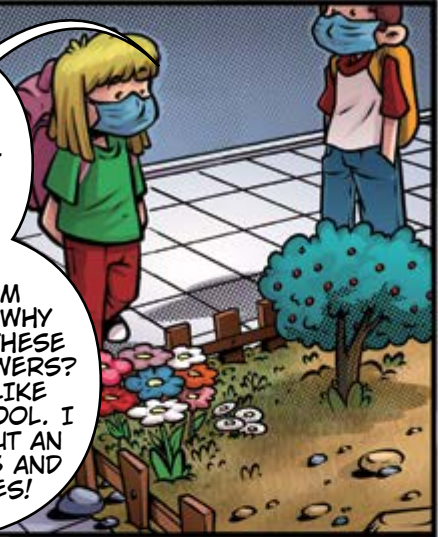
BUT FLOWERS AREN'T PEOPLE!

IT DOESN'T MAKE ANY DIFFERENCE. HEREDITY APPLIES TO ALL PLANTS AND ANIMALS, INCLUDING PEOPLE.



HMM, PERSONALLY, I'D BE MORE INTERESTED IN LEARNING ABOUT THE STORY OF THESE FLOWERS.

WHO PLANTED THEM AND WHEN, OR WHY DID THEY PICK THESE PARTICULAR FLOWERS? THAT'S WHY I LIKE HISTORY AT SCHOOL. I CAN LEARN ABOUT AN EVENT'S CAUSES AND CONSEQUENCES!



I DON'T KNOW, LILA. MAYBE IF...



AOYOYO!

WHAT WAS THAT?

IT SOUNDED LIKE WHIMPERING, LET'S GO SEE!

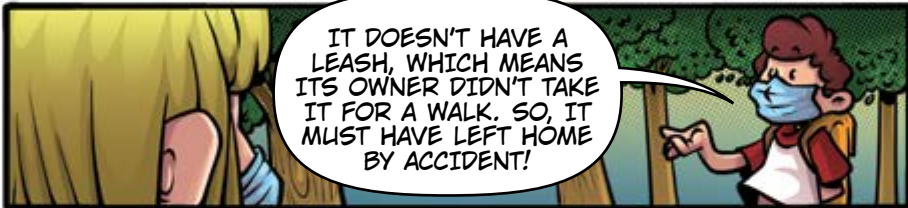




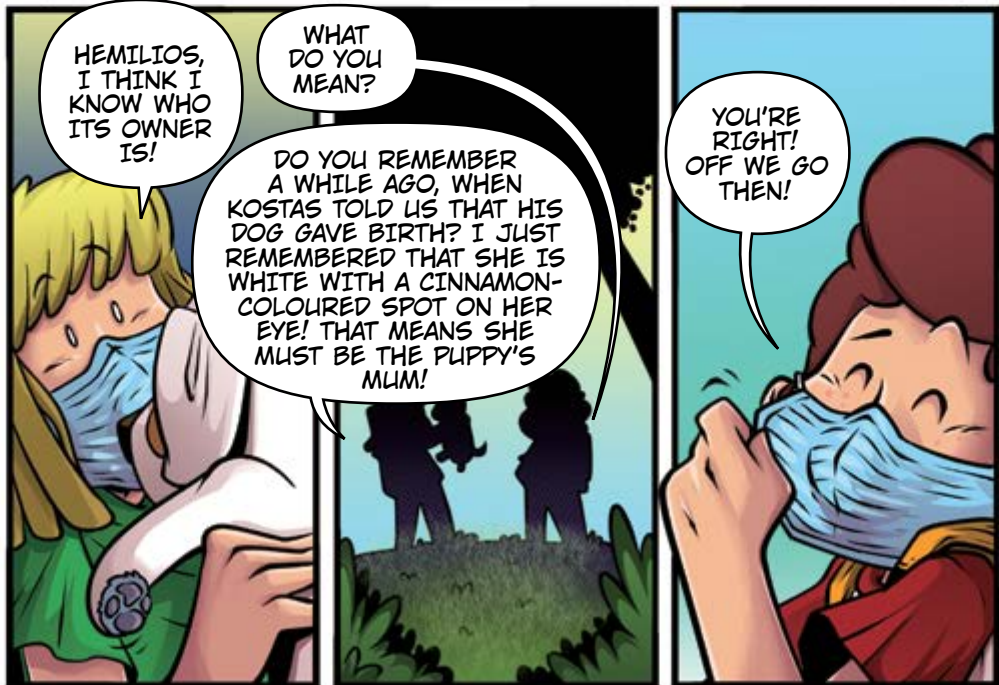
OH, HOW CLUTE! BUT, WHY IS IT ALONE? WHERE'S ITS OWNER?

IT'S WANDERED AWAY FROM ITS HOME!

HOW DID YOU REACH THAT CONCLUSION?



IT DOESN'T HAVE A LEASH, WHICH MEANS ITS OWNER DIDN'T TAKE IT FOR A WALK. SO, IT MUST HAVE LEFT HOME BY ACCIDENT!



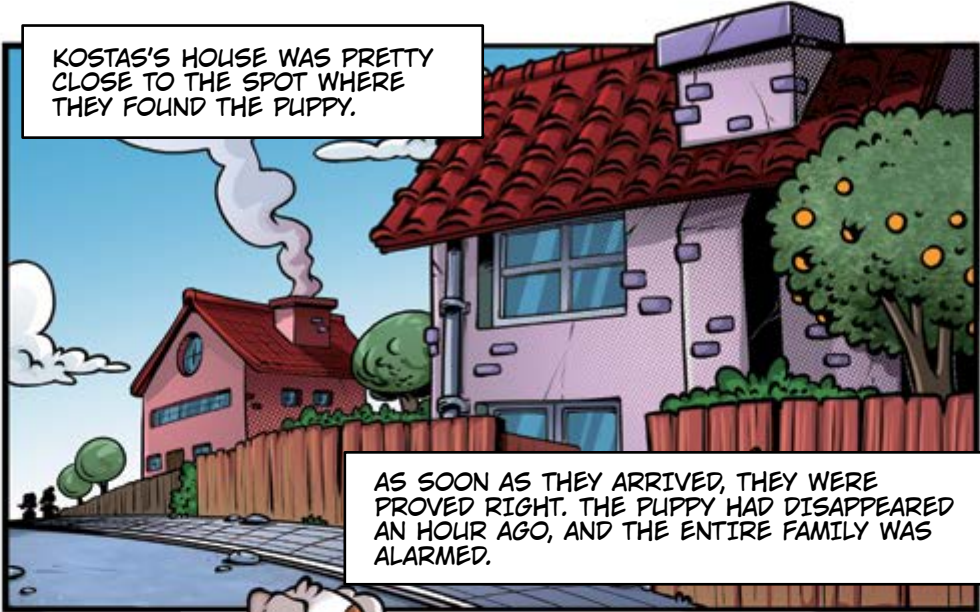
HEMILIOS, I THINK I KNOW WHO ITS OWNER IS!

WHAT DO YOU MEAN?

DO YOU REMEMBER A WHILE AGO, WHEN KOSTAS TOLD US THAT HIS DOG GAVE BIRTH? I JUST REMEMBERED THAT SHE IS WHITE WITH A CINNAMON-COLOURED SPOT ON HER EYE! THAT MEANS SHE MUST BE THE PUPPY'S MUM!

YOU'RE RIGHT! OFF WE GO THEN!

KOSTAS'S HOUSE WAS PRETTY CLOSE TO THE SPOT WHERE THEY FOUND THE PUPPY.



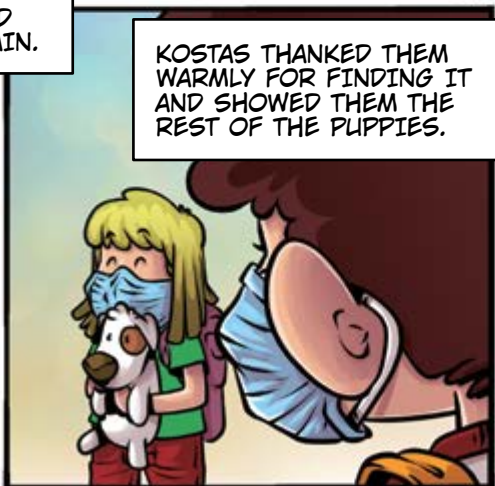
AS SOON AS THEY ARRIVED, THEY WERE PROVED RIGHT. THE PUPPY HAD DISAPPEARED AN HOUR AGO, AND THE ENTIRE FAMILY WAS ALARMED.

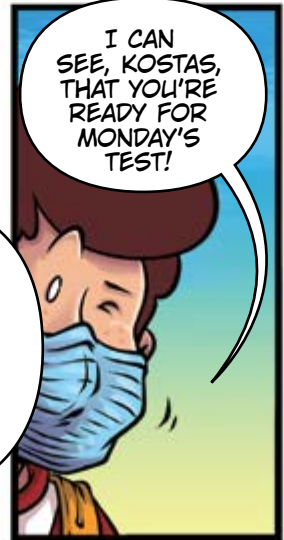
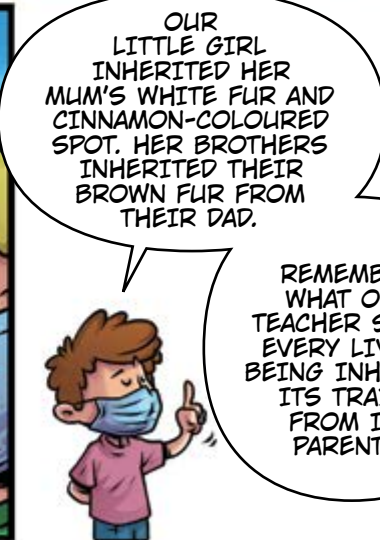
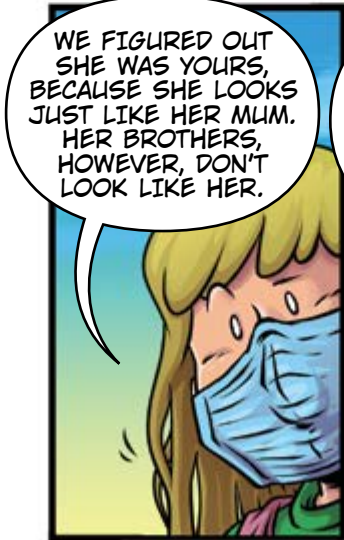
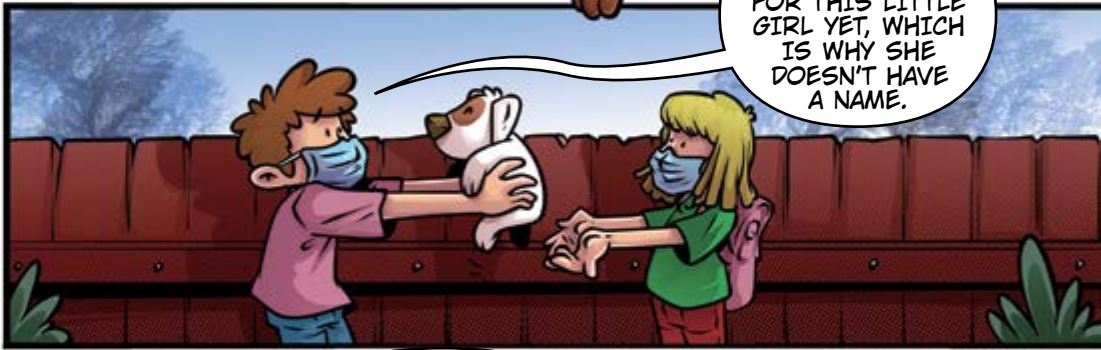


THEY HAD ALREADY SEARCHED WITHOUT SUCCESS AND THEY WERE GETTING READY TO PRINT SOME PHOTOS AND GO OUT AND SEARCH THE AREA AGAIN.



KOSTAS THANKED THEM WARMLY FOR FINDING IT AND SHOWED THEM THE REST OF THE PUPPIES.







I THINK, LILA, THAT THIS LITTLE ADVENTURE WAS THE PERFECT OPPORTUNITY TO REFRESH WHAT WE LEARNED ABOUT DNA!

YOU'RE RIGHT! IN FACT, I WAS JUST THINKING THAT I'VE INHERITED MY MUM'S HAIR AND MY DAD'S NOSE. EVERYONE SAYS SO.



I'M NOT SURE ABOUT MY FRECKLES. BUT I DEFINITELY HAVE MY DAD'S HAIR AND MY MUM'S EYES.



I ALSO INHERITED HAEMOPHILIA FROM MY MUM, REMEMBER I TOLD YOU WHEN WE FIRST MET?



YES, I DIDN'T KNOW WHAT IT WAS BACK THEN AND I WAS AFRAID I MIGHT CATCH IT FROM YOU!

HA, HA! YOU CAN'T CATCH SOMETHING THAT ISN'T CONTAGIOUS.

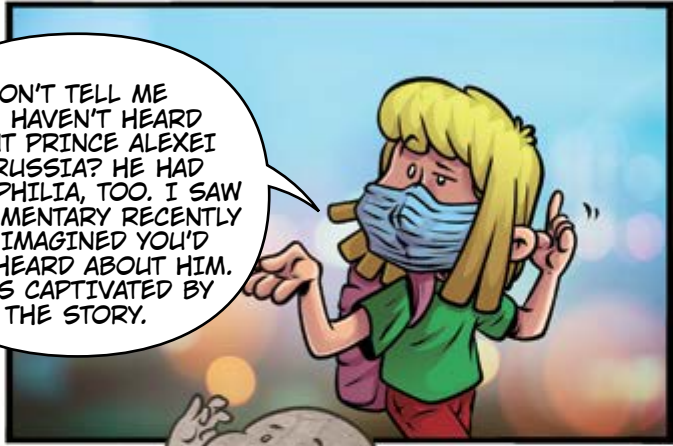


HAEMOPHILIA IS ALSO CAUSED BY A GENE, SO I WAS BORN THIS WAY BECAUSE I INHERITED THIS GENE FROM MY MUM.

I WONDER WHETHER PRINCE ALEXEI ALSO INHERITED IT FROM HIS MUM.



WHO?



DON'T TELL ME YOU HAVEN'T HEARD ABOUT PRINCE ALEXEI OF RUSSIA? HE HAD HAEMOPHILIA, TOO. I SAW A DOCUMENTARY RECENTLY AND IMAGINED YOU'D HAVE HEARD ABOUT HIM. I WAS CAPTIVATED BY THE STORY.



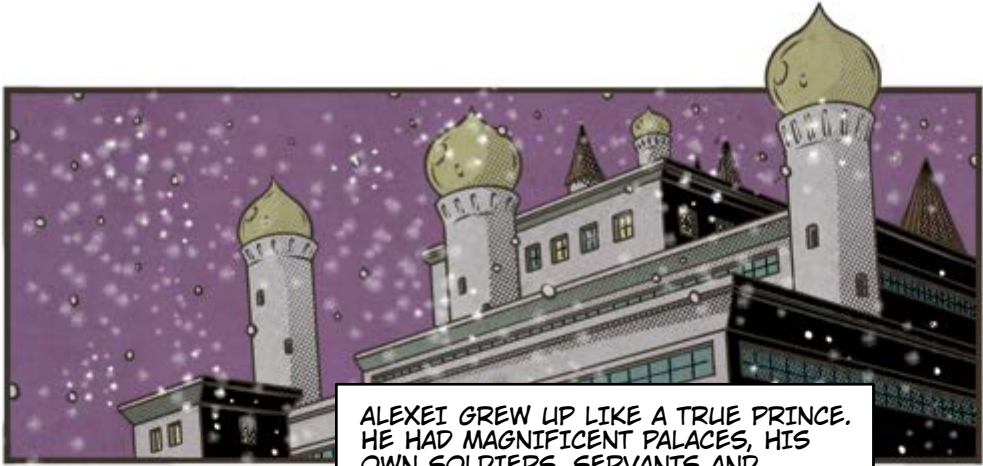
IN THE SUMMER OF 1904, A BOY WAS BORN IN RUSSIA. BUT IT WASN'T YOUR AVERAGE BABY.

IT WAS PRINCE ALEXEI, THE SON OF TSAR NICHOLAS OF RUSSIA. THIS LITTLE BOY WAS THE HEIR TO THE THRONE!



THAT DAY, THE WHOLE OF RUSSIA CELEBRATED.





ALEXEI GREW UP LIKE A TRUE PRINCE. HE HAD MAGNIFICENT PALACES, HIS OWN SOLDIERS, SERVANTS AND GUARDS.



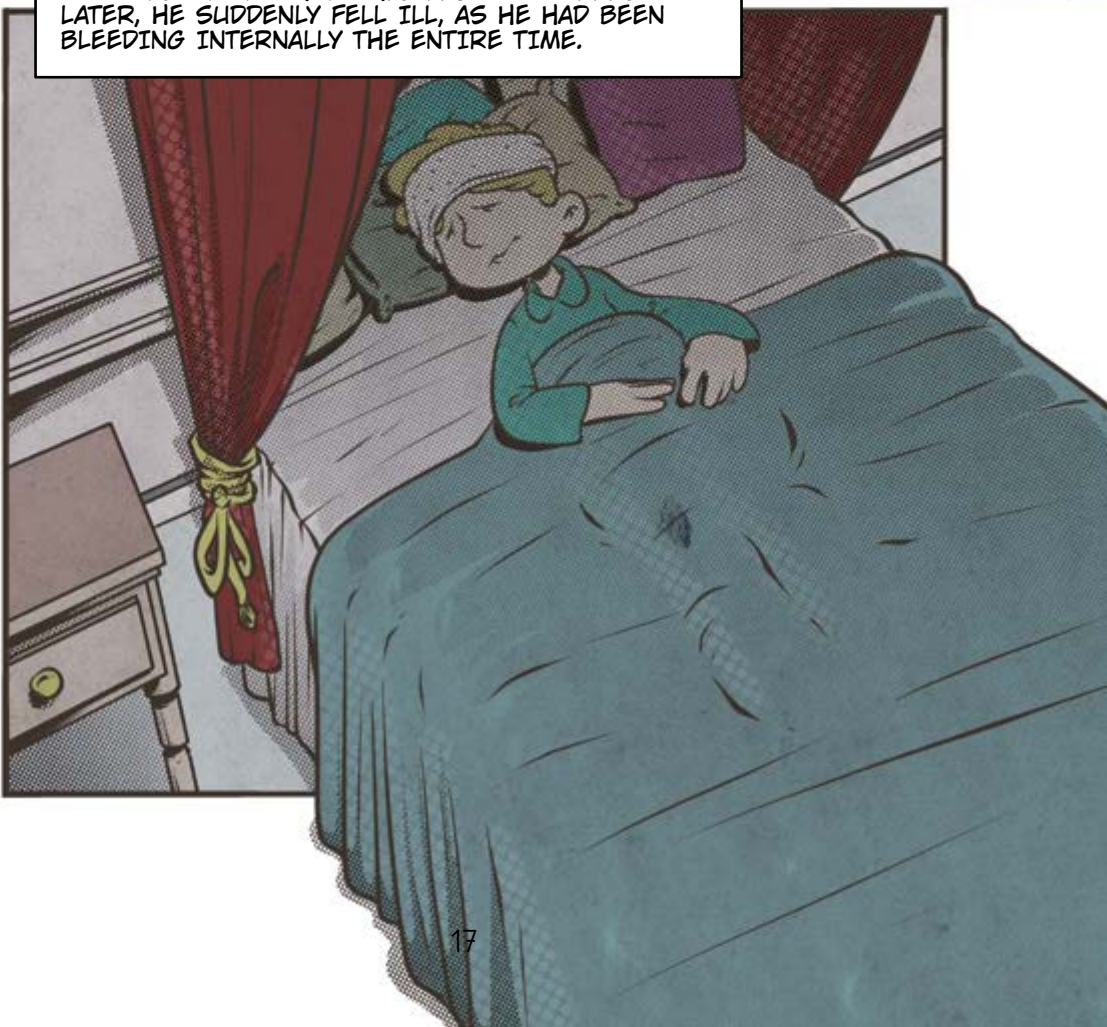
BUT HE WAS ALSO A NORMAL BOY THAT WANTED TO PLAY, TO RUN AROUND AND EXPLORE.

HIS MOTHER, ALEXANDRA, WAS WORRIED HE MIGHT GET HURT AND TRIED TO PROTECT HIM FROM ANY BRUISE OR SCRATCH.



A wooden boat is docked at a wooden pier on a pond. The water is blue with several green lily pads floating on the surface. The boat has two wooden oars resting inside it. The scene is set in a natural, outdoor environment.

BACK THEN, TREATMENT WITH CLOTTING FACTORS HADN'T BEEN DISCOVERED YET AND ANY BLEEDING COULD BE LIFE-THREATENING FOR THE YOUNG PRINCE.

A young boy with blonde hair is lying in a bed, looking unwell. He is wearing a green long-sleeved shirt and is covered up to his chest with a blue blanket. The bed has a white pillow and a red curtain is visible behind it. The room appears to be a bedroom or a hospital room.

WHEN HE WAS 8, ALEXEI SLIPPED WHILE CLIMBING ONTO A BOAT AND HURT HIS LEG. TWO WEEKS LATER, HE SUDDENLY FELL ILL, AS HE HAD BEEN BLEEDING INTERNALLY THE ENTIRE TIME.

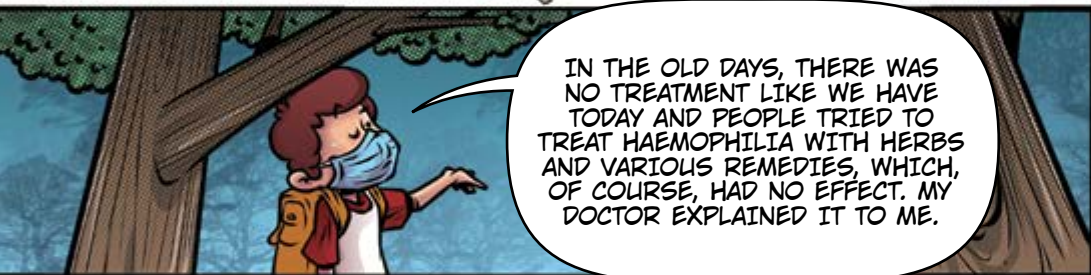
THEN, A MONK NAMED RASPUTIN GAVE HIM A HERB TO DRINK, WITH THE HOPE OF HEALING HIM.



I WONDER WHAT THAT HERB WAS.

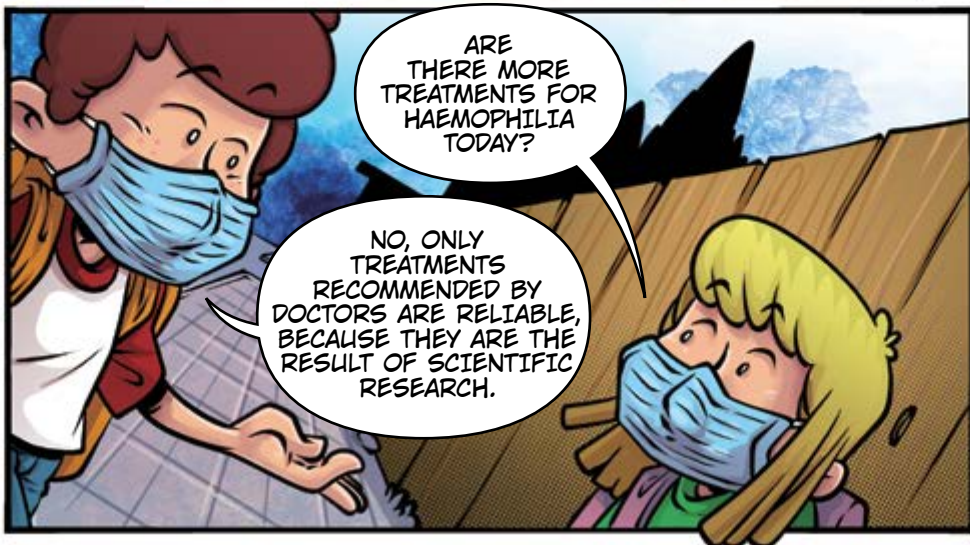


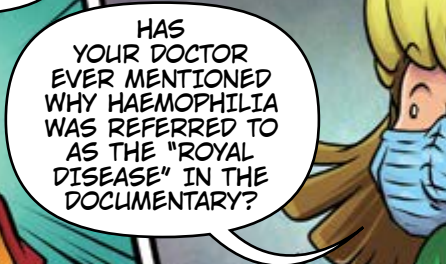
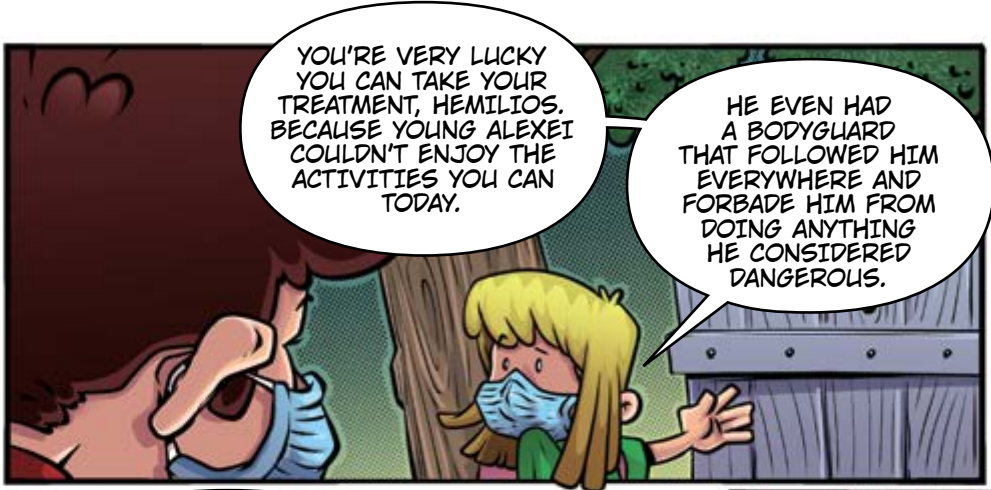
IN THE OLD DAYS, THERE WAS NO TREATMENT LIKE WE HAVE TODAY AND PEOPLE TRIED TO TREAT HAEMOPHILIA WITH HERBS AND VARIOUS REMEDIES, WHICH, OF COURSE, HAD NO EFFECT. MY DOCTOR EXPLAINED IT TO ME.



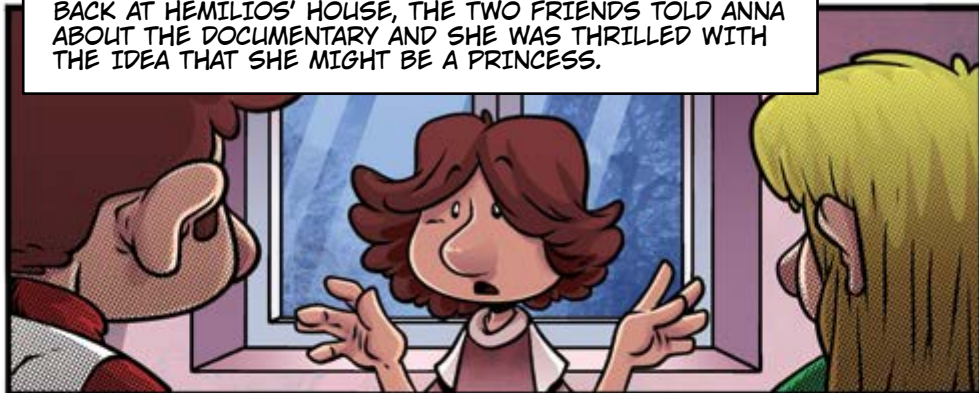
ARE THERE MORE TREATMENTS FOR HAEMOPHILIA TODAY?

NO, ONLY TREATMENTS RECOMMENDED BY DOCTORS ARE RELIABLE, BECAUSE THEY ARE THE RESULT OF SCIENTIFIC RESEARCH.





BACK AT HEMILOS' HOUSE, THE TWO FRIENDS TOLD ANNA ABOUT THE DOCUMENTARY AND SHE WAS THRILLED WITH THE IDEA THAT SHE MIGHT BE A PRINCESS.



ALL RIGHT, WE NEED A CROWN, A CAPE AND A BODYGUARD.

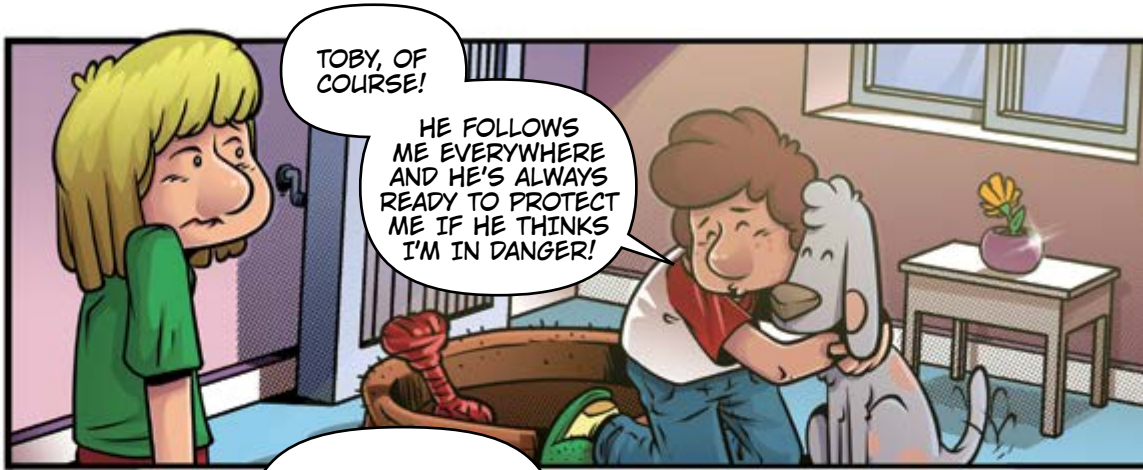


WELL, WE HAVE A BODYGUARD AND A MUCH BETTER ONE THAN ALEXEI'S.



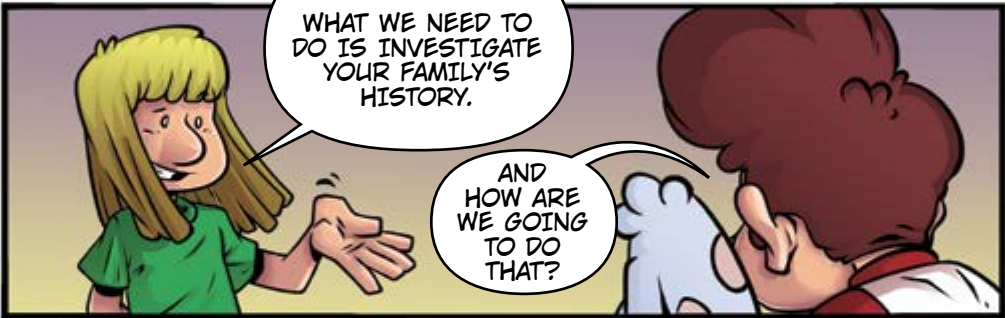
WHO?





TOBY, OF COURSE!

HE FOLLOWS ME EVERYWHERE AND HE'S ALWAYS READY TO PROTECT ME IF HE THINKS I'M IN DANGER!



WHAT WE NEED TO DO IS INVESTIGATE YOUR FAMILY'S HISTORY.

AND HOW ARE WE GOING TO DO THAT?

THE CHILDREN SEARCHED THE HOUSE FOR PHOTOS.



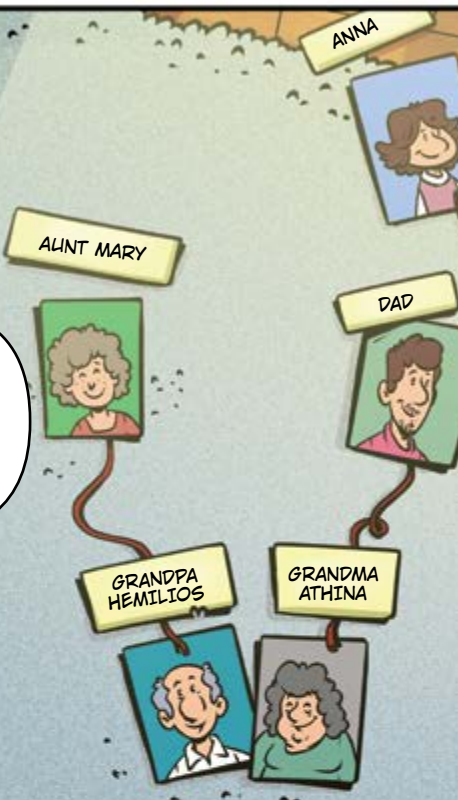
THEY FOUND PHOTOS OF THEIR GRANDPARENTS.

THEY FOUND PHOTOS OF THEIR AUNTIES AND OF THEIR COUSIN IN THE FAMILY ALBUMS.



IT TOOK A WHILE, BUT THEY PUT TOGETHER A ROUGH FAMILY TREE.

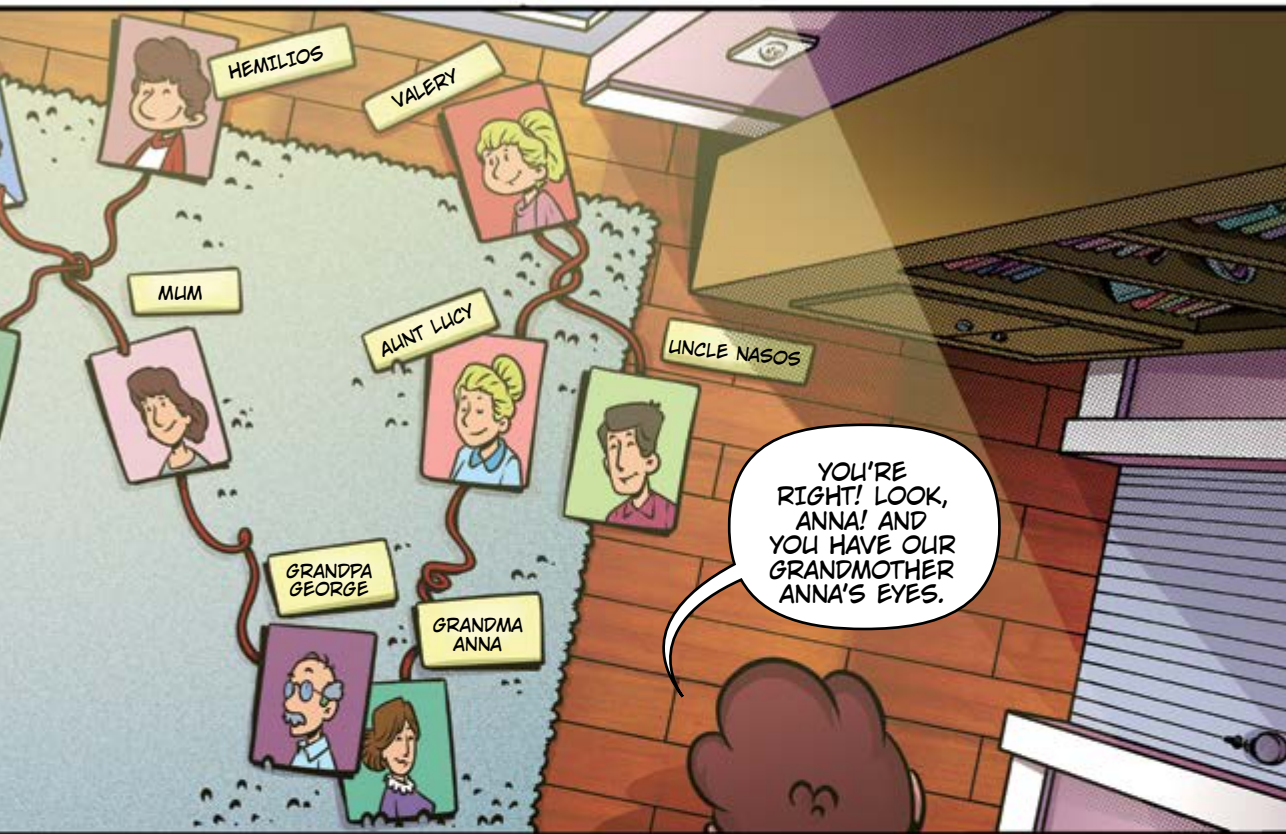
I THINK WE'VE SOLVED THE MYSTERY OF YOUR FRECKLES! SEE, YOU GET THEM FROM AUNTIE MARY.



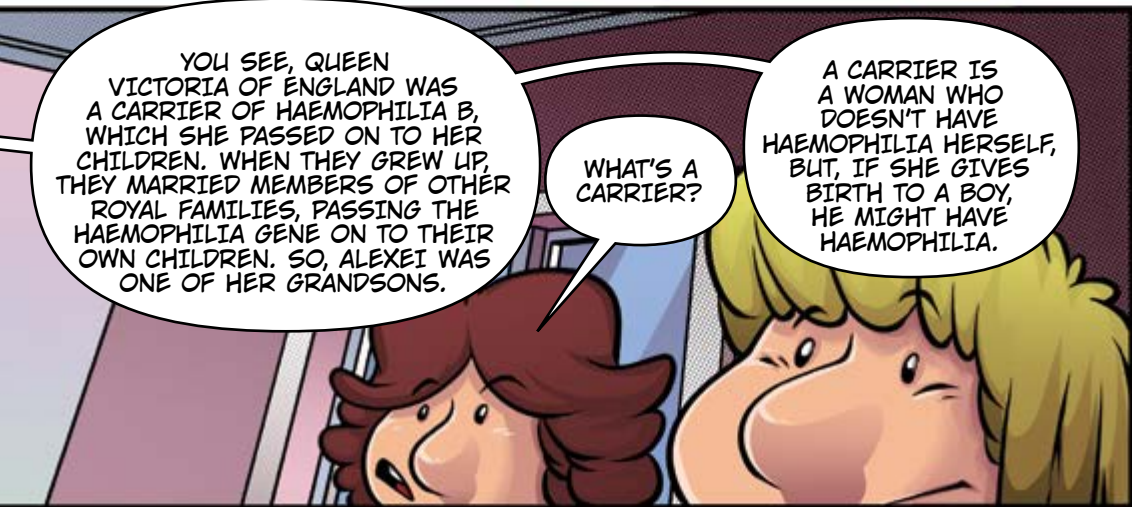
THAT'S WHEN HEMILIOS' MUM RETURNED AND THE CHILDREN SHOWED HER WHAT THEY'D MADE. THEY ANXIOUSLY ASKED HER IF THEY WERE DESCENDANTS OF PRINCE ALEXEI.

OF COURSE NOT! IT ISN'T JUST KINGS THAT HAVE HAEMOPHILIA.

BUT, IN THE PAST, THEY CALLED IT THE "ROYAL DISEASE" BECAUSE IT WAS COMMON AMONG EUROPE'S ROYAL FAMILIES.



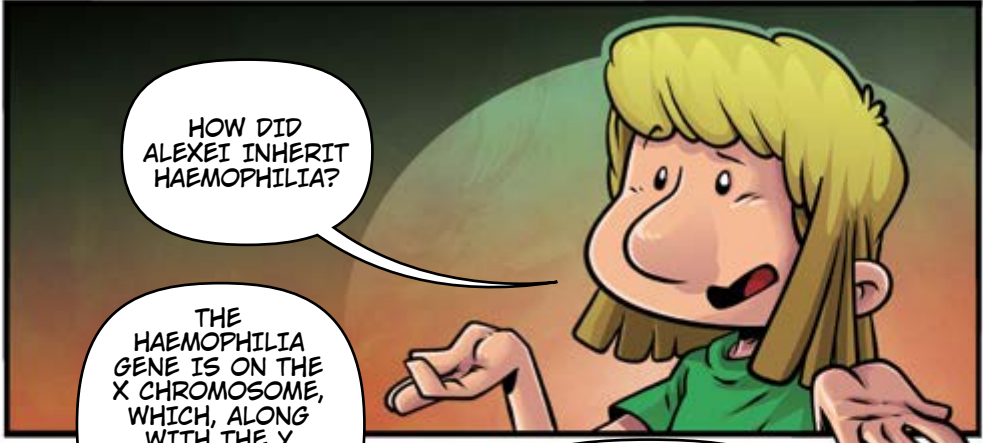
YOU'RE RIGHT! LOOK, ANNA! AND YOU HAVE OUR GRANDMOTHER ANNA'S EYES.



YOU SEE, QUEEN VICTORIA OF ENGLAND WAS A CARRIER OF HAEMOPHILIA B, WHICH SHE PASSED ON TO HER CHILDREN. WHEN THEY GREW UP, THEY MARRIED MEMBERS OF OTHER ROYAL FAMILIES, PASSING THE HAEMOPHILIA GENE ON TO THEIR OWN CHILDREN. SO, ALEXEI WAS ONE OF HER GRANDSONS.

WHAT'S A CARRIER?

A CARRIER IS A WOMAN WHO DOESN'T HAVE HAEMOPHILIA HERSELF, BUT, IF SHE GIVES BIRTH TO A BOY, HE MIGHT HAVE HAEMOPHILIA.



HOW DID ALEXEI INHERIT HAEMOPHILIA?

THE HAEMOPHILIA GENE IS ON THE X CHROMOSOME, WHICH, ALONG WITH THE Y CHROMOSOME, DETERMINE A PERSON'S SEX.

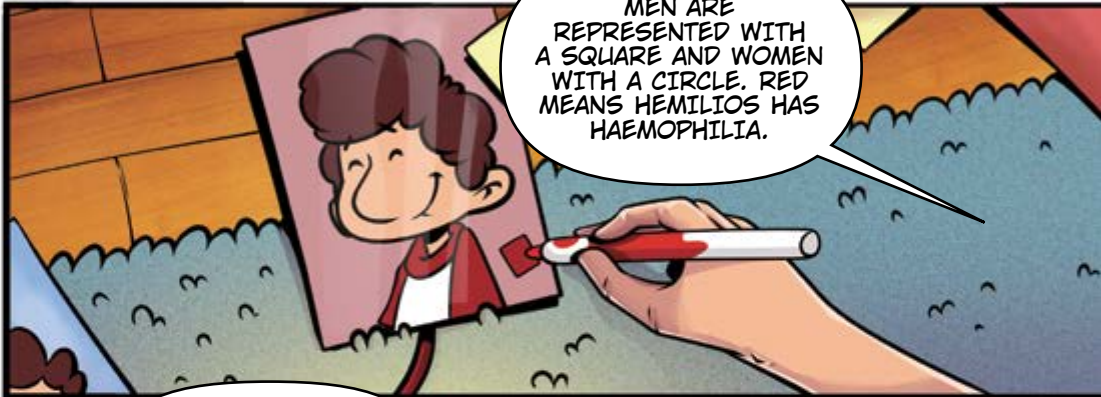
MEN HAVE ONE X CHROMOSOME AND ONE Y CHROMOSOME (XY) WHILE WOMEN HAVE TWO X CHROMOSOMES (XX).



THEREFORE, IF A BOY INHERITS AN X CHROMOSOME WITH THE HAEMOPHILIA GENE FROM HIS MOTHER, THEN HE WILL HAVE HAEMOPHILIA.



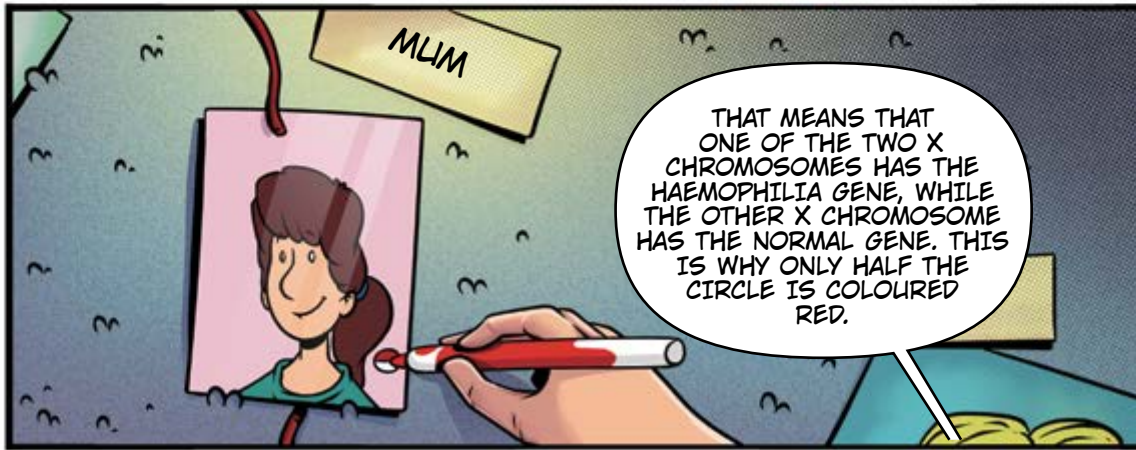
LET'S SAY
ALEXEI IS LIKE
HEMILIOS, WHO HAS
HAEMOPHILIA.



MEN ARE
REPRESENTED WITH
A SQUARE AND WOMEN
WITH A CIRCLE. RED
MEANS HEMILIOS HAS
HAEMOPHILIA.



EMPRESS
ALEXANDRA WAS LIKE
ME, IN OTHER WORDS,
A CARRIER.



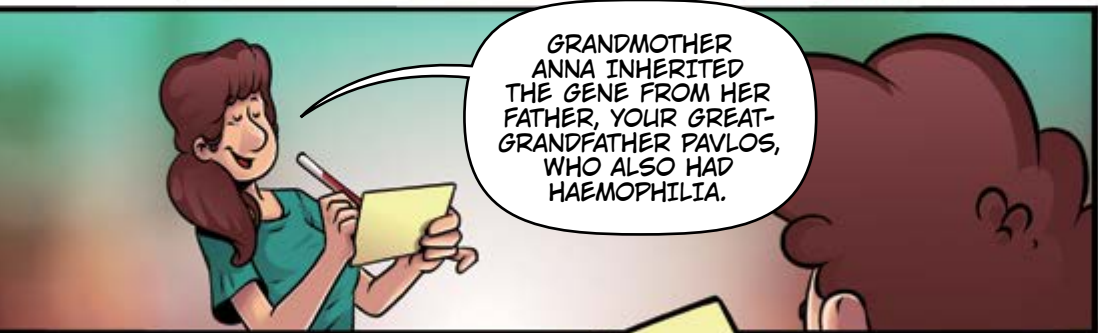
THAT MEANS THAT
ONE OF THE TWO X
CHROMOSOMES HAS THE
HAEMOPHILIA GENE, WHILE
THE OTHER X CHROMOSOME
HAS THE NORMAL GENE. THIS
IS WHY ONLY HALF THE
CIRCLE IS COLOURED
RED.



ALEXEI'S GRANDMOTHER, QUEEN VICTORIA OF ENGLAND,...



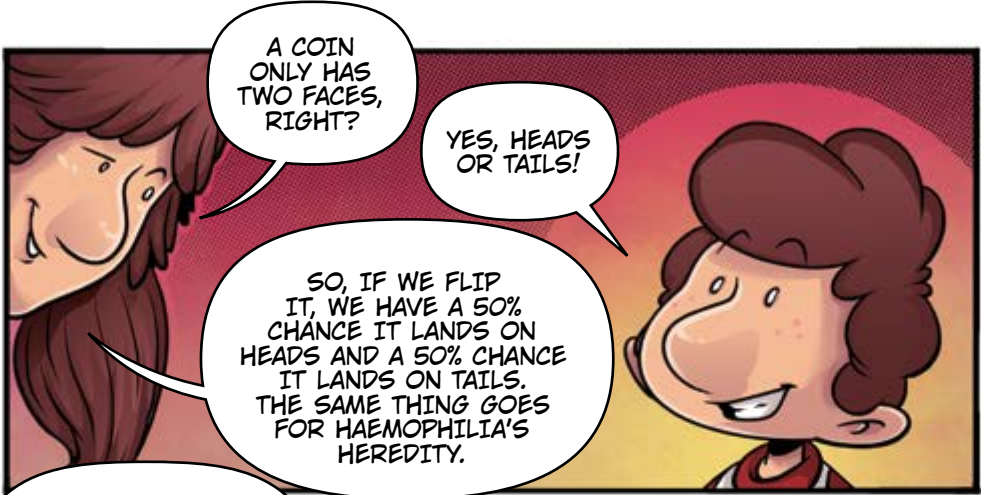
WAS LIKE GRANDMOTHER ANNA, WHO WAS ALSO A CARRIER.



GRANDMOTHER ANNA INHERITED THE GENE FROM HER FATHER, YOUR GREAT-GRANDFATHER PAVLOS, WHO ALSO HAD HAEMOPHILIA.







A COIN ONLY HAS TWO FACES, RIGHT?

YES, HEADS OR TAILS!

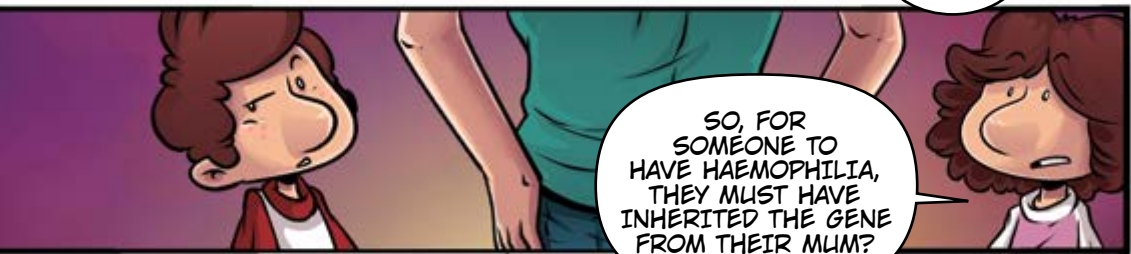
SO, IF WE FLIP IT, WE HAVE A 50% CHANCE IT LANDS ON HEADS AND A 50% CHANCE IT LANDS ON TAILS. THE SAME THING GOES FOR HAEMOPHILIA'S HEREDITY.

A WOMAN WHO IS A CARRIER HAS A 50% CHANCE OF PASSING THE HAEMOPHILIA GENE ON TO HER CHILDREN. JUST LIKE THE COIN HAS A 50% CHANCE OF LANDING ON ONE FACE AND A 50% CHANCE OF LANDING ON THE OTHER.

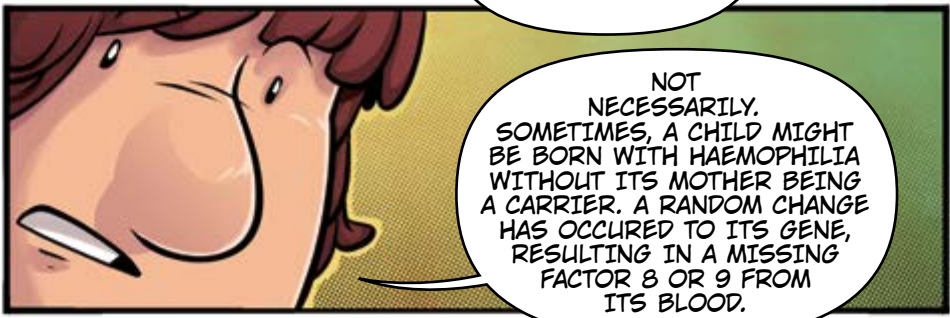


THAT MEANS I WAS BORN WITH HAEMOPHILIA BECAUSE I HAPPENED TO INHERIT THE GENE FROM YOU.

EXACTLY!



SO, FOR SOMEONE TO HAVE HAEMOPHILIA, THEY MUST HAVE INHERITED THE GENE FROM THEIR MUM?



NOT NECESSARILY. SOMETIMES, A CHILD MIGHT BE BORN WITH HAEMOPHILIA WITHOUT ITS MOTHER BEING A CARRIER. A RANDOM CHANGE HAS OCCURED TO ITS GENE, RESULTING IN A MISSING FACTOR 8 OR 9 FROM ITS BLOOD.



DOES THIS CHANGE HAPPEN OFTEN?

IT HAPPENS TO 1/3 OF HAEMOPHILIA CASES.

IS THERE A WAY OF KNOWING WHETHER A CHILD WILL BE BORN WITH HAEMOPHILIA?




A PREGNANT WOMAN CAN HAVE SPECIAL TESTS THAT SHOW WHETHER HER BABY HAS THE HAEMOPHILIA GENE.

WELL, I GUESS DNA IS QUITE INTERESTING AFTER ALL.



SEE, I TOLD YOU SO.

HEMILIOS AND LILA STUDIED FOR THEIR SCIENCE TEST TOGETHER.



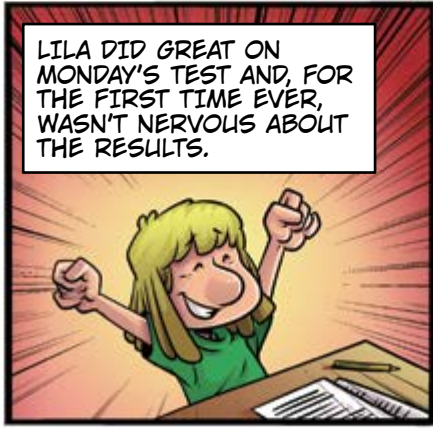
YOU WERE RIGHT AFTER ALL. I HADN'T REALIZED HOW MANY THINGS THAT WE LEARN ABOUT THE NATURAL WORLD CAN BE ENCOUNTERED IN OUR EVERYDAY LIVES.

AND YOU WERE RIGHT ABOUT HISTORY. I DIDN'T THINK IT WOULD BE SO MUCH FUN TO LEARN ABOUT THE PAST.



I CAN HELP YOU STUDY FOR YOUR HISTORY LESSON NEXT WEEKEND.

WE CAN EVEN WATCH A DOCUMENTARY ABOUT THE OTHER KINGS OF EUROPE!



LILA DID GREAT ON MONDAY'S TEST AND, FOR THE FIRST TIME EVER, WASN'T NERVOUS ABOUT THE RESULTS.

TWO DAYS LATER, THEIR TEACHER GAVE THEM THE RESULTS AND LILA GOT A 10 ON HER TEST.



YOU'RE VERY HAPPY TODAY, LILA. IS IT BECAUSE YOU GOT A GOOD MARK ON THE TEST?

IT'S THAT, TOO, BUT TODAY'S THE DAY MY MUM AND I ARE GOING TO KOSTAS'S HOUSE TO ADOPT THE PUPPY!

THAT'S GREAT! I'M HAPPY YOU EVENTUALLY DECIDED TO ADOPT HER!

YES, I CAN'T WAIT UNTIL SCHOOL'S OVER!

HAVE YOU COME UP WITH A NAME YET?

SNOW WHITE, BECAUSE SHE'S WHITE LIKE THE SNOW... AND SHE'LL ALWAYS BE MY LITTLE PRINCESS!

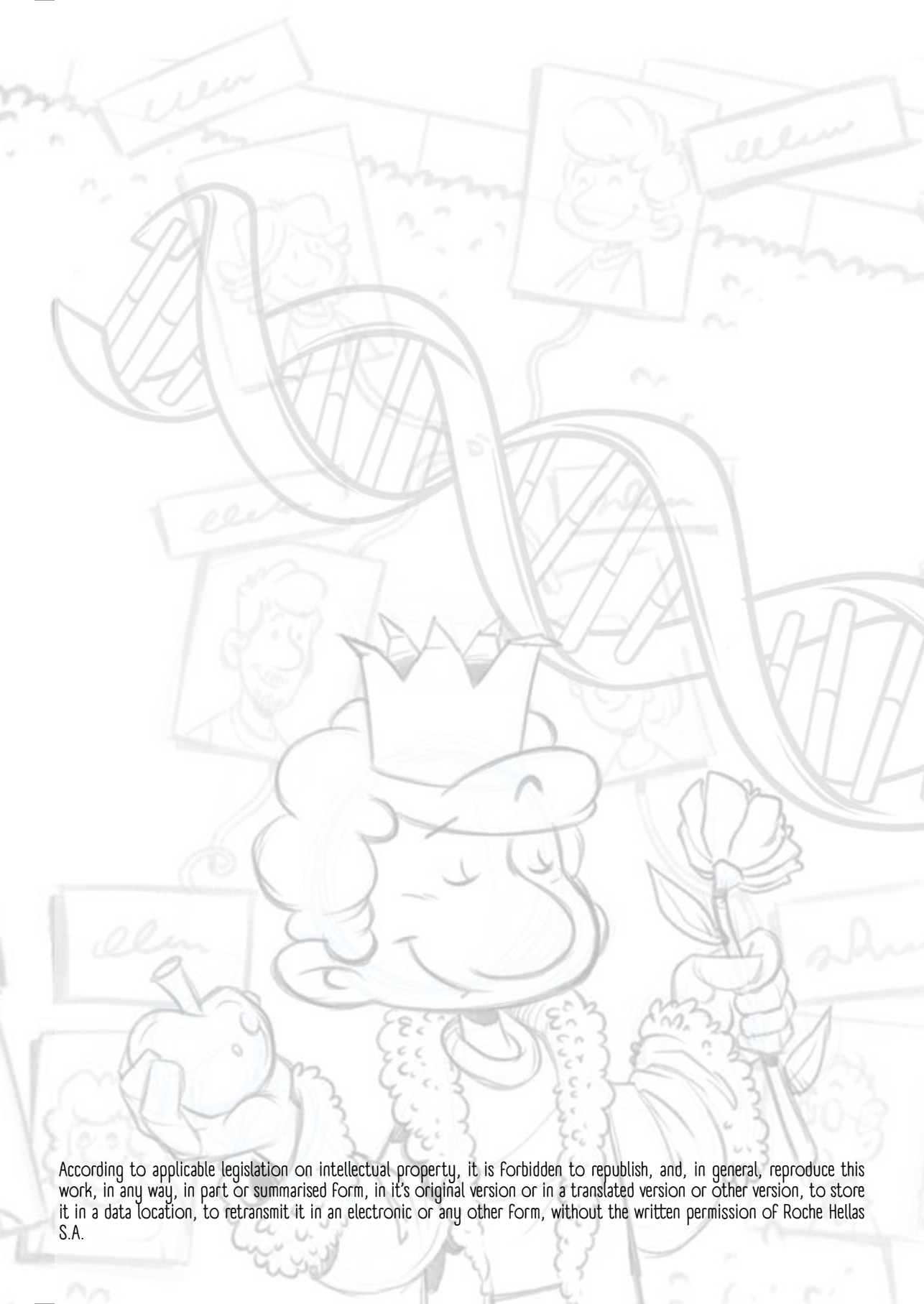
AND TOBY WILL BE HER BODYGUARD!

THE END

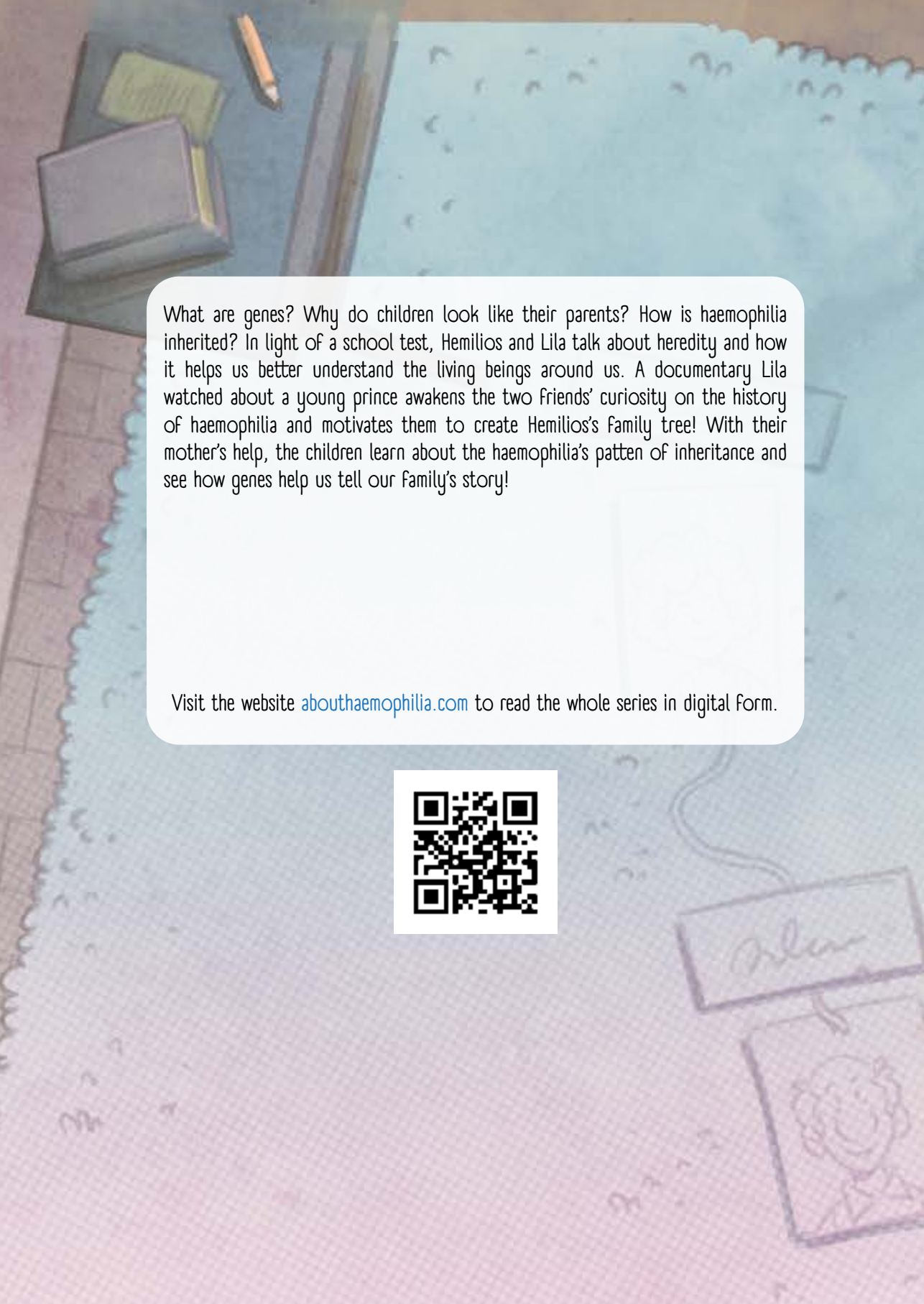




This booklet is distributed free of charge to the families of children with haemophilia.



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A top-down view of a desk with school supplies. On the left, there's a stack of books, a pencil, and a ruler. In the center, a light blue notebook with a scalloped edge is open. The background is a wooden desk surface. In the bottom right corner, there's a faint drawing of a person's face in a box, with the name 'Alan' written above it.

What are genes? Why do children look like their parents? How is haemophilia inherited? In light of a school test, Hemilios and Lila talk about heredity and how it helps us better understand the living beings around us. A documentary Lila watched about a young prince awakens the two friends' curiosity on the history of haemophilia and motivates them to create Hemilios's family tree! With their mother's help, the children learn about the haemophilia's patten of inheritance and see how genes help us tell our family's story!

Visit the website abouthaemophilia.com to read the whole series in digital form.

