

INCREDIBLE SCIENTISTS,
SENSATIONAL DISCOVERIES
- in comics -

**CHARLES DARWIN
AND THE THEORY OF EVOLUTION**

3

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PROLOGUE

Scientists have been working hard for broadening human-boundary knowledge and have been giving mankind the best of life perspective. Their theories change the thoughts and persuade mankind life.

A theory is the picture of a big idea based, mainly, towards observation. Each new discovery becomes part of the author life story.

Scientific ideas have been faced overturning towards the years because people incredibly and persistently broke old conceptions stuck in the traditions as well presenting a new way of thinking. However, every scientific idea that is considered the truth nowadays is susceptible to be changed, fairly enough, it is necessary that someone come up with a new conception, being determined and find out a way of convincingly proving the new hypothesis. There are many questions to the new generation of scientists to be answered that will change the world. This comic collection has gotten the objective for promoting the learning basic concepts of science towards the science history, into an attractive manner, pleasant, as well as with an easy and understanding language, contributing to improve scientific education.

At the end of each adventure there is a chapter dubbed “now you are the scientist”. They are activities related to the story you have just read for training and that allure the reader to put themselves into the scientist shoes and other exercises for being debated in groups.

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Vice-Director and Director at Israel Pinheiro Municipal School / 2003 – 2006

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Member of the Directorate of Integral Education - Municipal Education

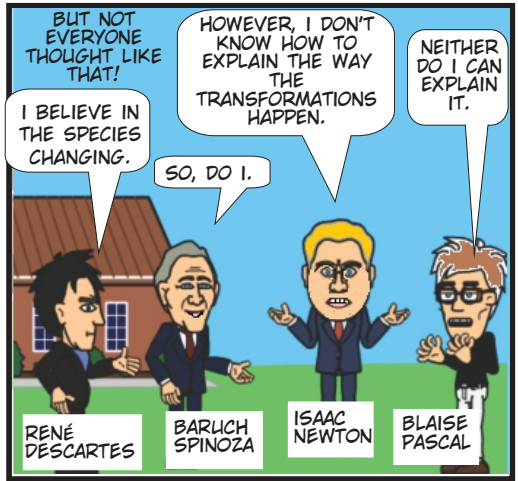
Secretariat / since 2015

Coordinator of the BH Eco-School Program / since 2016



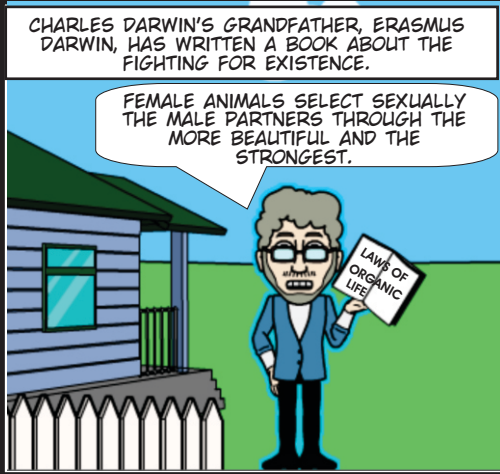
CREATIONISM IS THE IDEA THAT ONE BELIEVES THAT ALL LIVE-BEINGS WERE CREATED EXACTLY AS THEY ARE NOWADAYS. GOD HAS CREATED THE SPECIES PRECISELY AND UNCHANGEABLE.

* RAPHAEL SANZIO PAINTING - THE CREATION - XVI CENTURY



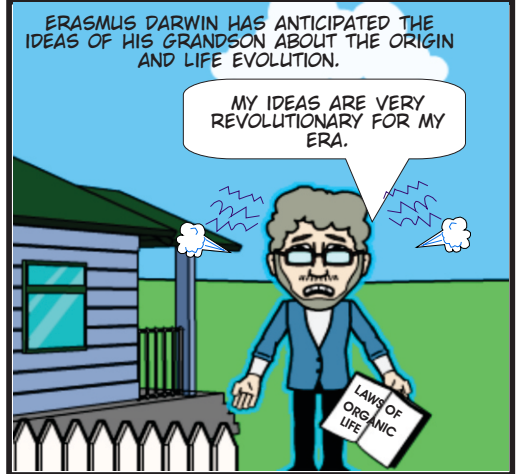
BUT NOT EVERYONE THOUGHT LIKE THAT!
I BELIEVE IN THE SPECIES CHANGING.
SO, DO I.
HOWEVER, I DON'T KNOW HOW TO EXPLAIN THE WAY THE TRANSFORMATIONS HAPPEN.
NEITHER DO I CAN EXPLAIN IT.

RENÉ DESCARTES
BARUCH SPINOZA
ISAAC NEWTON
BLAISE PASCAL



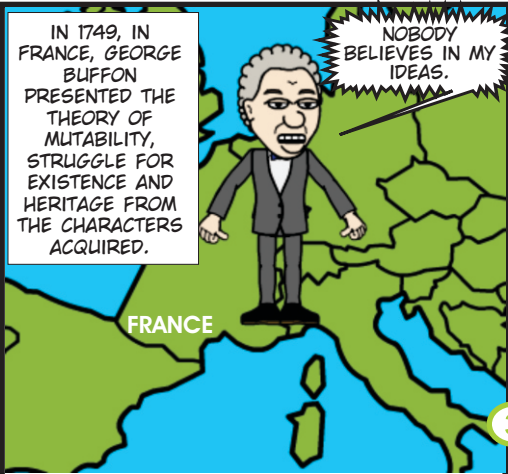
CHARLES DARWIN'S GRANDFATHER, ERASMUS DARWIN, HAS WRITTEN A BOOK ABOUT THE FIGHTING FOR EXISTENCE.

FEMALE ANIMALS SELECT SEXUALLY THE MALE PARTNERS THROUGH THE MORE BEAUTIFUL AND THE STRONGEST.



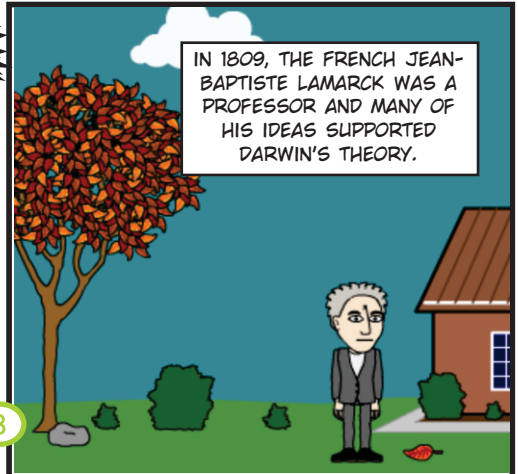
ERASMUS DARWIN HAS ANTICIPATED THE IDEAS OF HIS GRANDSON ABOUT THE ORIGIN AND LIFE EVOLUTION.

MY IDEAS ARE VERY REVOLUTIONARY FOR MY ERA.



IN 1749, IN FRANCE, GEORGE BUFFON PRESENTED THE THEORY OF MUTABILITY, STRUGGLE FOR EXISTENCE AND HERITAGE FROM THE CHARACTERS ACQUIRED.

NOBODY BELIEVES IN MY IDEAS.



IN 1809, THE FRENCH JEAN-BAPTISTE LAMARCK WAS A PROFESSOR AND MANY OF HIS IDEAS SUPPORTED DARWIN'S THEORY.

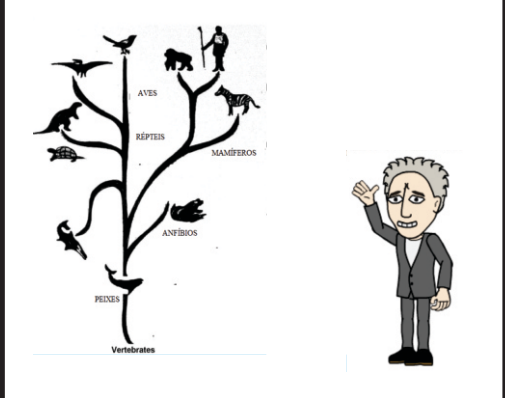
LAMARCK IDEAS WERE IMPORTANT BECAUSE HE WAS THE FIRST SCIENTIST TRY EXPLAINING THE EVOLUTION.



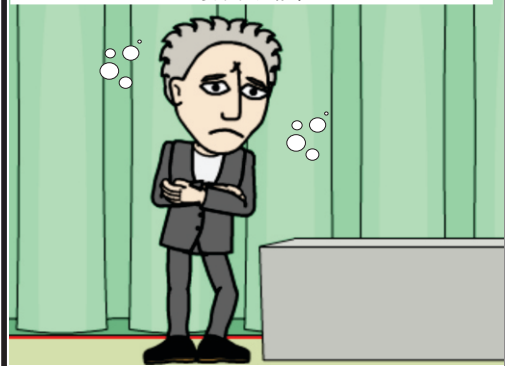
AT FIRST, IT HAS NOTICED TO THE FACT THAT LIVE-BEINGS WERE ADAPTED TO A SELF LIFE-STYLE OF EACH ONE.



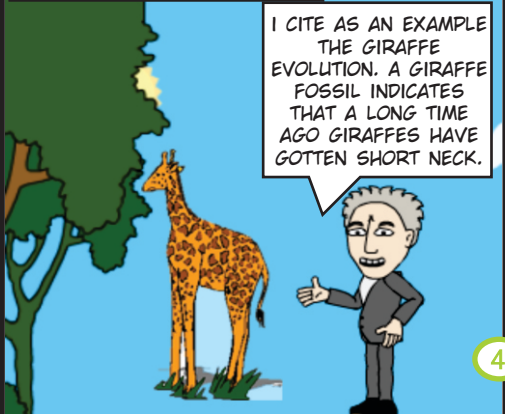
BEYOND THAT, SCIENTISTS HAVE FIGURE OUT THAT EVOLUTION IS A PROCESS THAT LAST A LONG TIME.



NOT EVERY LAMARCK IDEAS WERE CORRECT, THOUGH. AND HE DID NOT KNOW HOW TO EXPLAIN THE THEORY OF USE AND MISUSED. LAMARCK BECAME DISCREDIT BY SCIENTIFIC COMMUNITY.



THE USE AND MISUSED THEORY WAS THE FOLLOWING:



THE NECESSITY OF FEEDING HAS CONTRIBUTED TO THE GIRAFFE'S NECK DEVELOPMENT BECAUSE THE CONSTANT USE OF THEIR NECK. THE ACQUIRED CHARACTERISTICS (LONG NECK) START BEING CONVEYED TO THE GIRAFFE'S DESCENDENTS FROM GENERATION TO GENERATION.

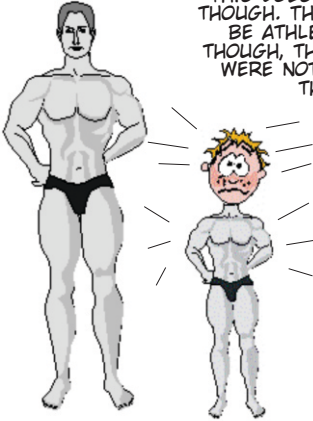


THIS IDEA IS NOT ACCEPTED BY SCIENCE NOWADAYS.

BY CONSIDERING THIS CONCEPTION, PEOPLE SHOULD WORK-OUT A LOT AND EACH GENERATION OF PEOPLE BECOME STRONGER AND STRONGER. THUS, THEY WOULD TRANSFER THIS CHARACTERISTIC TO NEXT GENERATION.



THIS DOES NOT HAPPEN THOUGH. THE FATHER CAN BE ATHLETIC. EVEN THOUGH, THEIR CHILDREN WERE NOT BORN LIKE THAT.

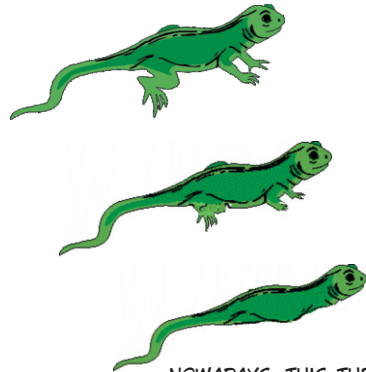


LAMARCK HAS ALSO TRIED TO EXPLAIN THE ABSENCE OF LEG ON SNAKES.

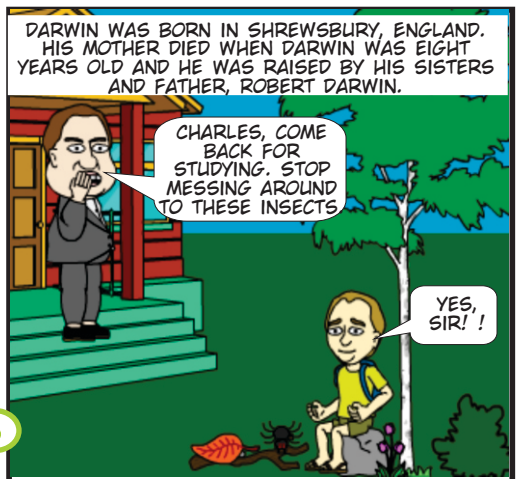
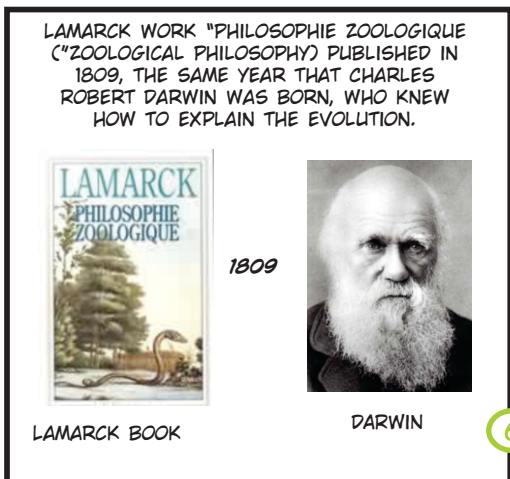
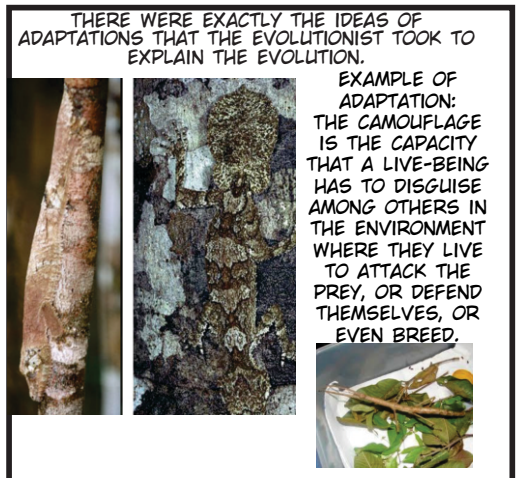
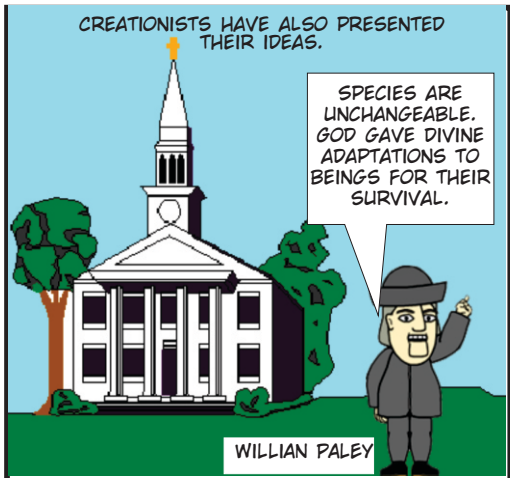
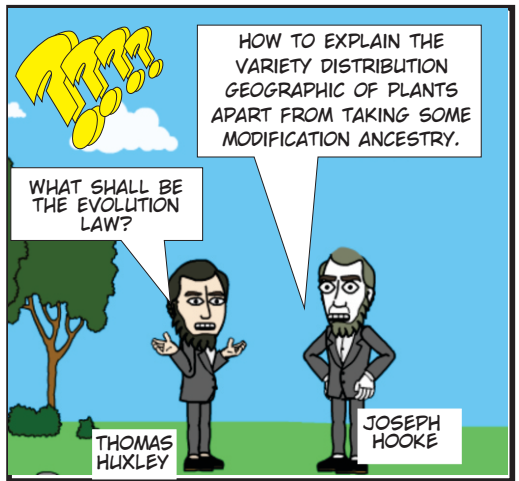
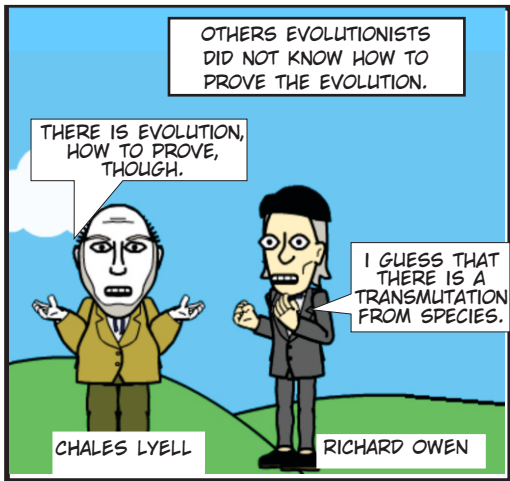


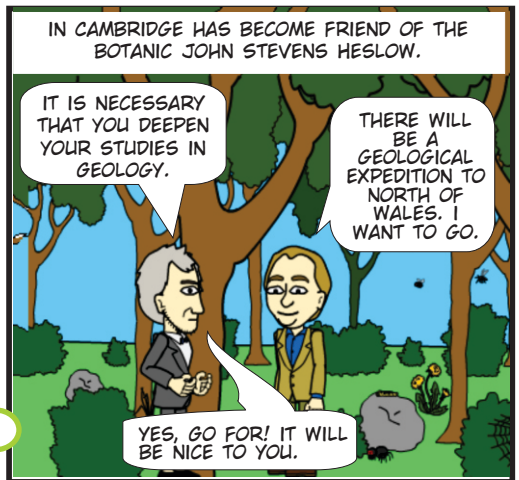
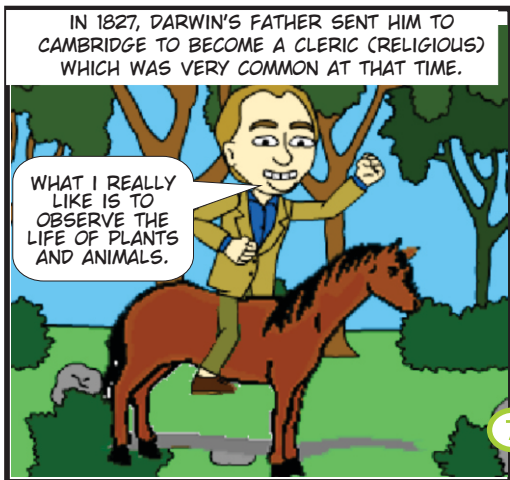
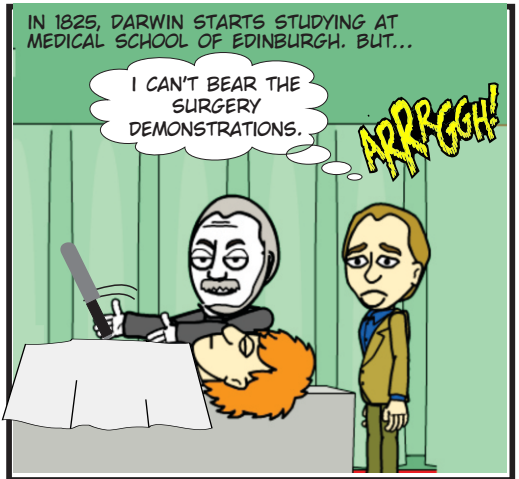
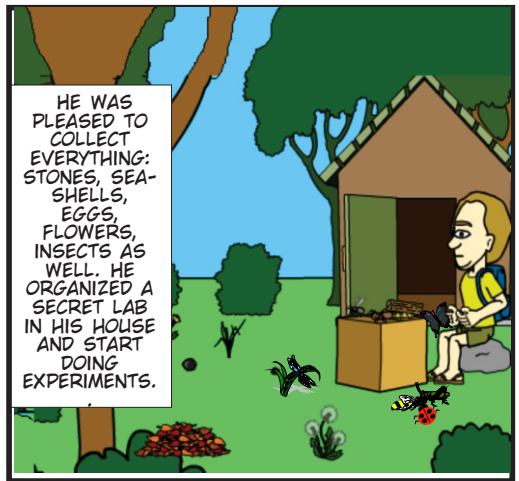
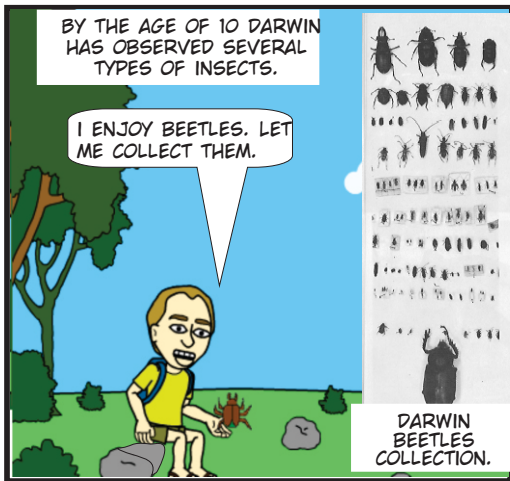
IF SOME BODY ORGAN OR MEMBERS ARE NOT USED, THEY TEND TO BECOME ATROPHIED (THE BODY PART GETS LESS DEVELOPED).

THEN, SNAKES ANCESTORS - THE LIZARDS - THEY SHOULD CREEP BY USING LESS THEIR LEGS CONSEQUENTLY THOSE BECOME SMALLER BECAUSE THEY WERE NOT USED.



NOWADAYS, THIS THEORY IS ALSO NOT ACCEPTED.





BY THE AGE OF 22, EVEN WITHOUT KNOWING WHAT TO DO, THERE WAS AN OPPORTUNITY.

THERE WILL BE A VESSEL, THE BEAGLE, WHICH WILL TRAVEL AROUND THE WORLD TO TAKE SOME MEASUREMENTS AND STUDY THE SOUTH AMERICA COAST. WOULD YOU LIKE TO GO?

I MUST ASK MY FATHER PERMISSION

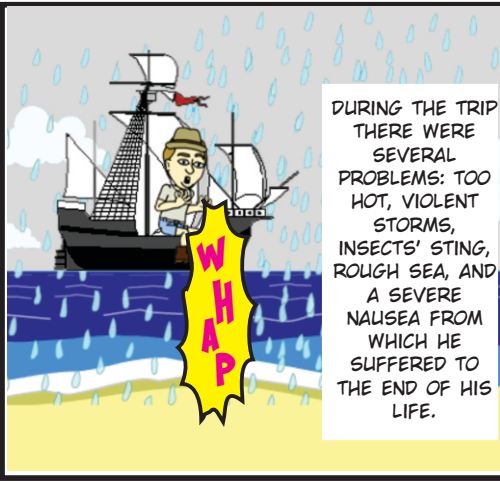
DADDY, I REALLY WANT TO GO IN THE BEAGLE TRIP.

I AM NOT SURE, MY SON. TWO YEARS IS A LOT OF TIME.

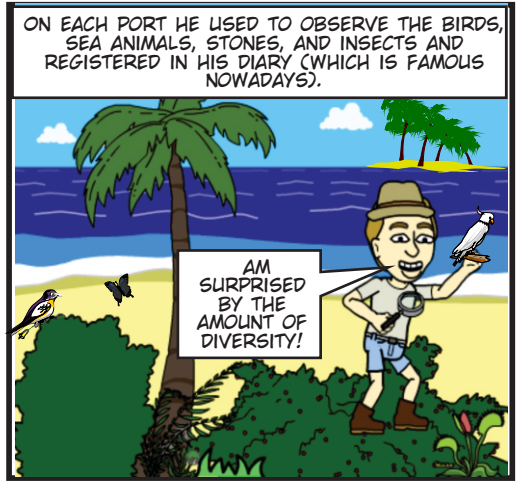
I WOULD LIKE TO GO VERY MUCH, DADDY.

BY CONSIDERING ALL THIS, I ALLOW YOU TO GO.



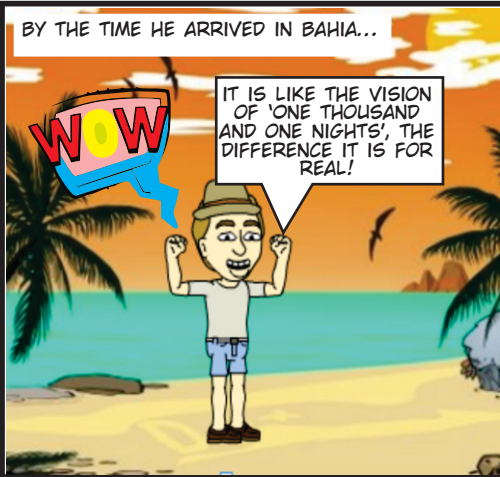


DURING THE TRIP THERE WERE SEVERAL PROBLEMS: TOO HOT, VIOLENT STORMS, INSECTS' STING, ROUGH SEA, AND A SEVERE NAUSEA FROM WHICH HE SUFFERED TO THE END OF HIS LIFE.



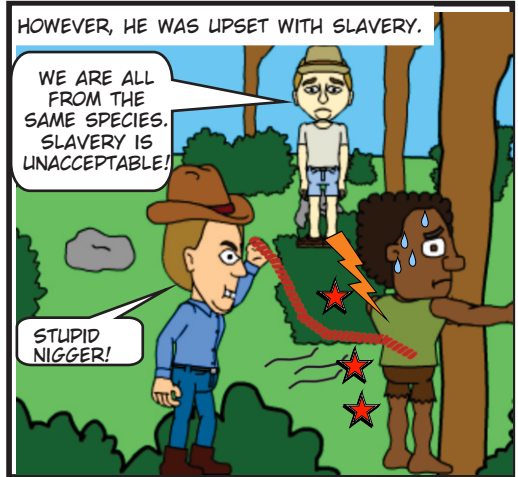
AM SURPRISED BY THE AMOUNT OF DIVERSITY!

ON EACH PORT HE USED TO OBSERVE THE BIRDS, SEA ANIMALS, STONES, AND INSECTS AND REGISTERED IN HIS DIARY (WHICH IS FAMOUS NOWADAYS).



IT IS LIKE THE VISION OF 'ONE THOUSAND AND ONE NIGHTS', THE DIFFERENCE IT IS FOR REAL!

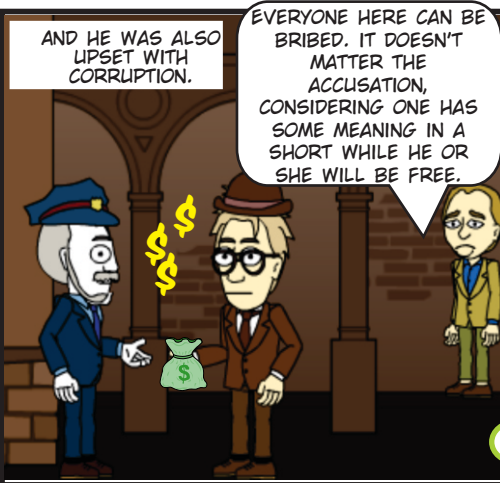
BY THE TIME HE ARRIVED IN BAHIA...



HOWEVER, HE WAS UPSET WITH SLAVERY.

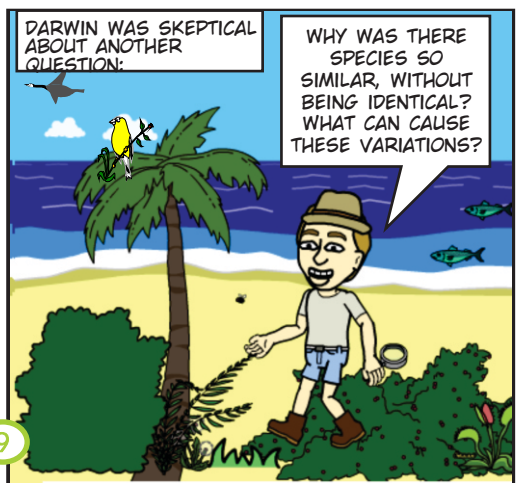
WE ARE ALL FROM THE SAME SPECIES. SLAVERY IS UNACCEPTABLE!

STUPID NIGGER!



AND HE WAS ALSO UPSET WITH CORRUPTION.

EVERYONE HERE CAN BE BRIBED. IT DOESN'T MATTER THE ACCUSATION, CONSIDERING ONE HAS SOME MEANING IN A SHORT WHILE HE OR SHE WILL BE FREE.



DARWIN WAS SKEPTICAL ABOUT ANOTHER QUESTION:

WHY WAS THERE SPECIES SO SIMILAR, WITHOUT BEING IDENTICAL? WHAT CAN CAUSE THESE VARIATIONS?

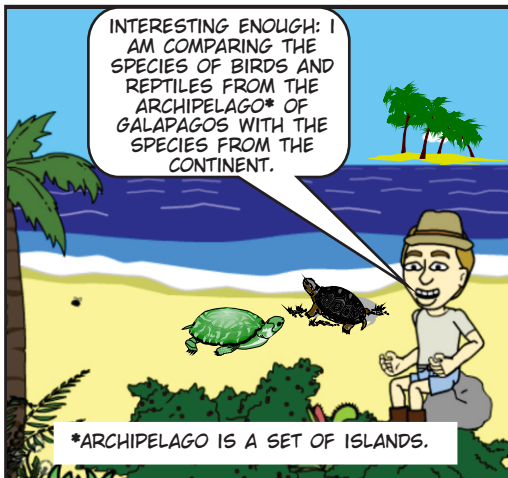


HERE IN GALAPAGOS, THERE ARE SPECIES AS NO OTHER PLACE IN THE WORLD! THIS VOYAGE IS THE GREATEST EXPERIENCE OF ALL MY LIFE.

UAAU

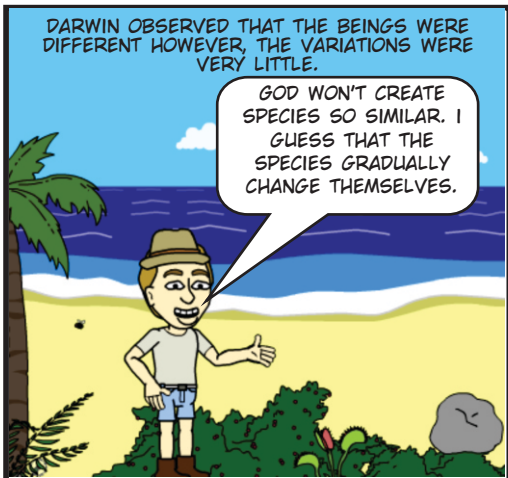


VOU ENCAIXOTAR ESPECIES E FÓSSEIS PARA ENVIAR PARA INGLATERRA. QUANDO EU VOLTAR VOU EXAMINAR TUDO.



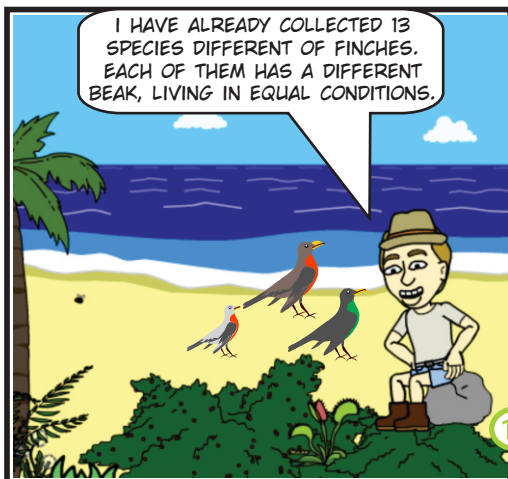
INTERESTING ENOUGH: I AM COMPARING THE SPECIES OF BIRDS AND REPTILES FROM THE ARCHIPELAGO* OF GALAPAGOS WITH THE SPECIES FROM THE CONTINENT.

*ARCHIPELAGO IS A SET OF ISLANDS.

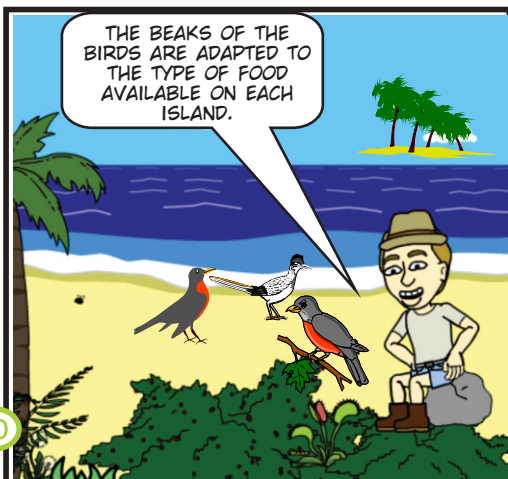


DARWIN OBSERVED THAT THE BEINGS WERE DIFFERENT HOWEVER, THE VARIATIONS WERE VERY LITTLE.

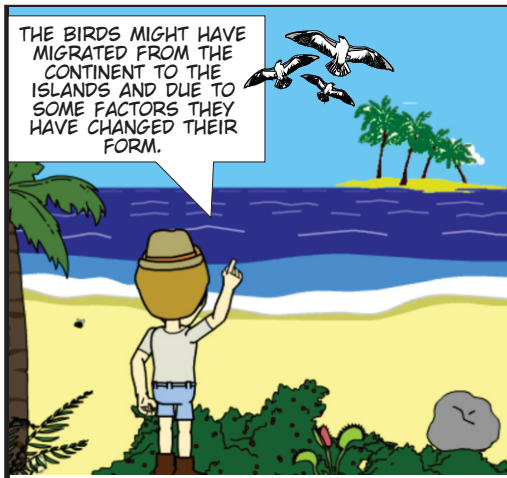
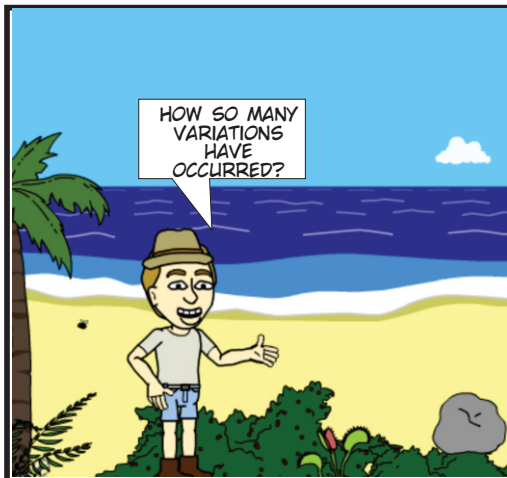
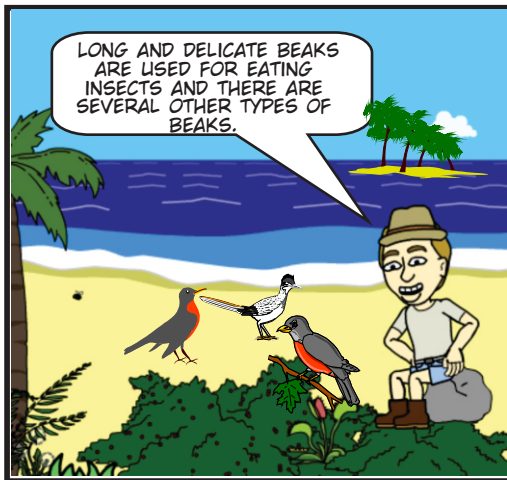
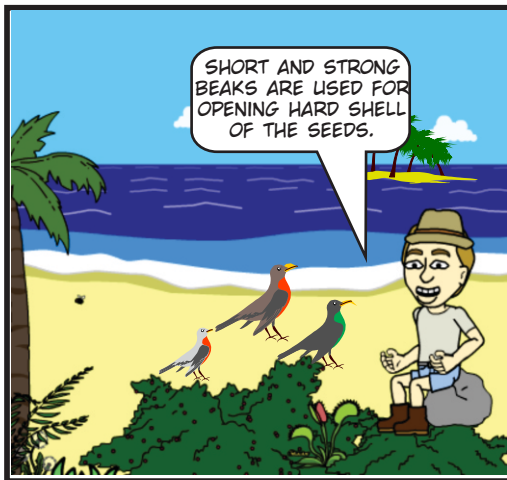
GOD WON'T CREATE SPECIES SO SIMILAR. I GUESS THAT THE SPECIES GRADUALLY CHANGE THEMSELVES.



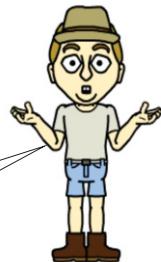
I HAVE ALREADY COLLECTED 13 SPECIES DIFFERENT OF FINCHES. EACH OF THEM HAS A DIFFERENT BEAK, LIVING IN EQUAL CONDITIONS.



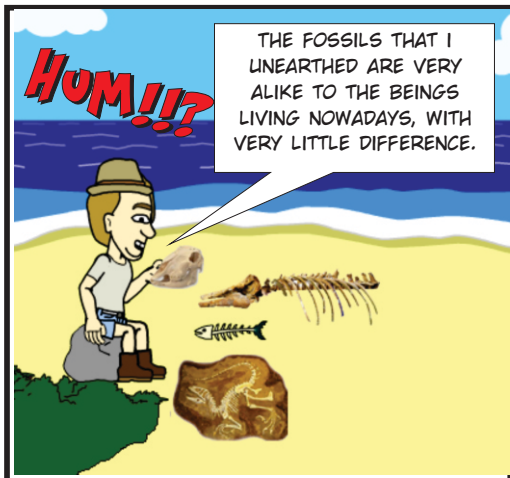
THE BEAKS OF THE BIRDS ARE ADAPTED TO THE TYPE OF FOOD AVAILABLE ON EACH ISLAND.



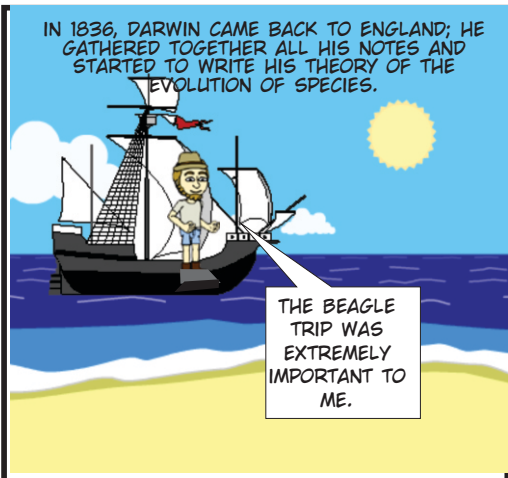
ARCHIPELAGO OF GALAPAGOS



OR, CAN WE IMAGINE THAT THE ISLANDS WERE ALL CONNECTS TO THE CONTINENT, AND THE ISLANDS DRIFTED AWAY FROM THE CONTINENT, BY GEOLOGICAL NATURAL EVENTS THAT ISOLATED THE ANIMALS? THEN, FOR SOME REASONS, THE ANIMALS HAVE SUFFERED MUTATIONS.

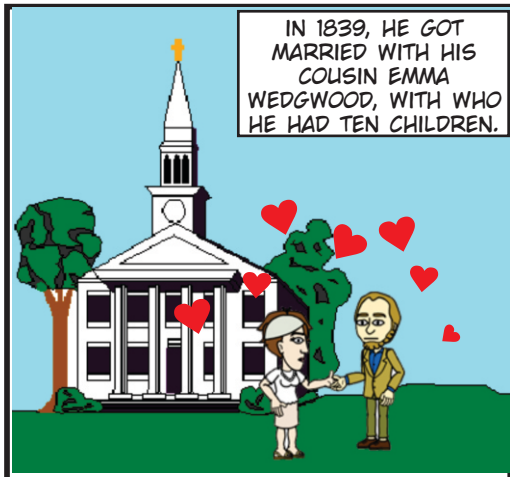


THE FOSSILS THAT I UNEARTHED ARE VERY ALIKE TO THE BEINGS LIVING NOWADAYS, WITH VERY LITTLE DIFFERENCE.



IN 1836, DARWIN CAME BACK TO ENGLAND; HE GATHERED TOGETHER ALL HIS NOTES AND STARTED TO WRITE HIS THEORY OF THE EVOLUTION OF SPECIES.

THE BEAGLE TRIP WAS EXTREMELY IMPORTANT TO ME.



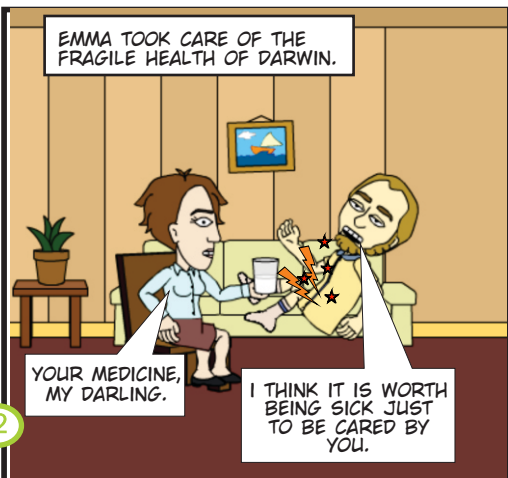
IN 1839, HE GOT MARRIED WITH HIS COUSIN EMMA WEDGWOOD, WITH WHO HE HAD TEN CHILDREN.



THEY WENT TO LIVE IN DOWN HOUSE, 20 KM FROM LONDON.



IN 1839, HE ALSO WROTE HIS REPORT OF THE TRIP-DIARY RESEARCH.

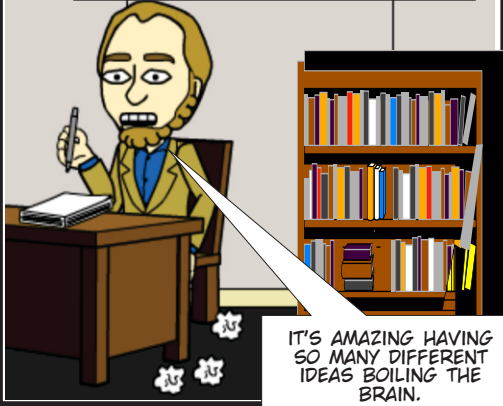


EMMA TOOK CARE OF THE FRAGILE HEALTH OF DARWIN.

YOUR MEDICINE, MY DARLING.

I THINK IT IS WORTH BEING SICK JUST TO BE CARED BY YOU.

HE HAS CONTINUOUSLY BEEN WRITING AND TRYING TO FIND A CAUSE TO THE NATURAL ORIGIN OF THE SPECIES.



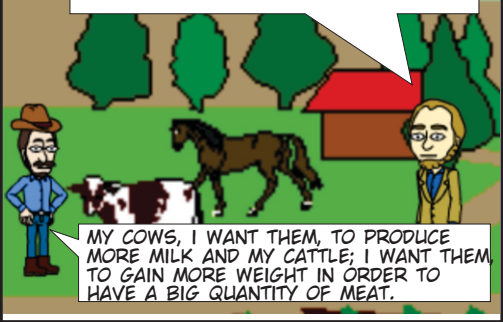
IT'S AMAZING HAVING SO MANY DIFFERENT IDEAS BOILING THE BRAIN.

THAT'S IT. I AM GOING TO STUDY THE VARIATION OF SPECIES STARTING BY DOMESTICATION. THIS IS, THE DIFFERENCE BETWEEN THE TAMED SPECIES AND THE WILD ONES: DOGS, CATTLE, BIRDS, AND PLANTS.



DARWIN WENT AROUND TO THE RURAL AREAS TALKING TO BREEDERS AND PLANTERS.

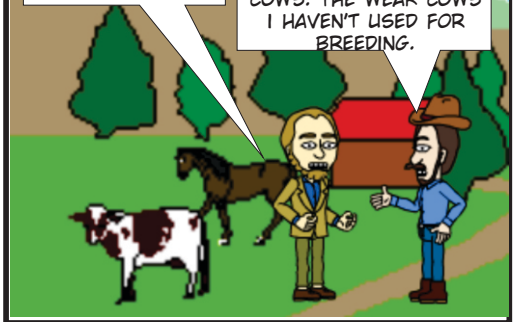
WHEN YOU BREED AN ANIMAL WHICH QUALITIES WOULD YOU TRY TO DEVELOP?



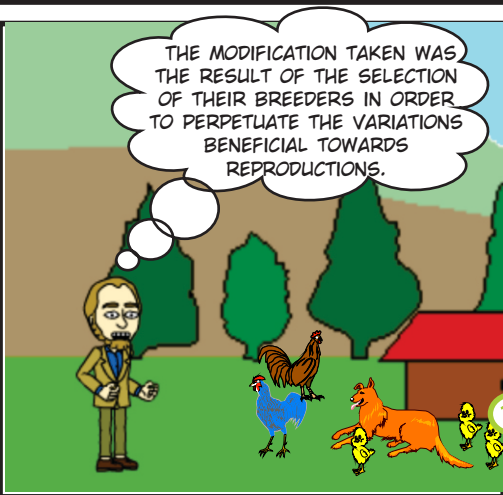
MY COWS, I WANT THEM, TO PRODUCE MORE MILK AND MY CATTLE; I WANT THEM TO GAIN MORE WEIGHT IN ORDER TO HAVE A BIG QUANTITY OF MEAT.

IS IT EASY TO MODIFY A SPECIES AIMING THAT THEY CARRY THE CHARACTERISTIC THAT YOU HAVE WISHED?

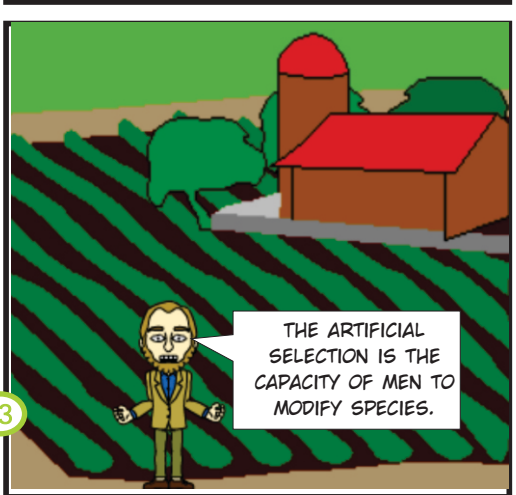
YES, IN A SHORT GENERATION, MY CATTLE START PRODUCING MUCH MORE MILK BECAUSE I BRED THEM ONLY WITH THE BEST COWS. THE WEAK COWS I HAVEN'T USED FOR BREEDING.

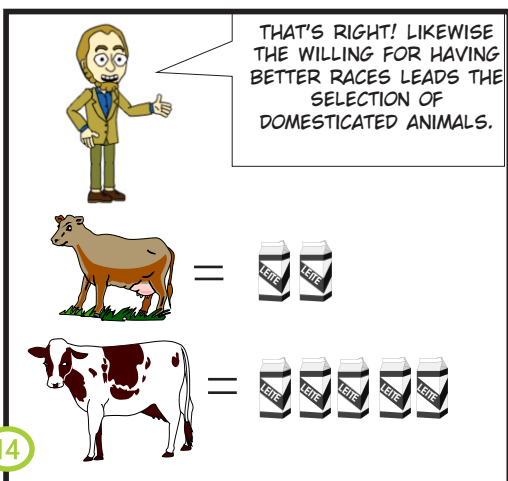
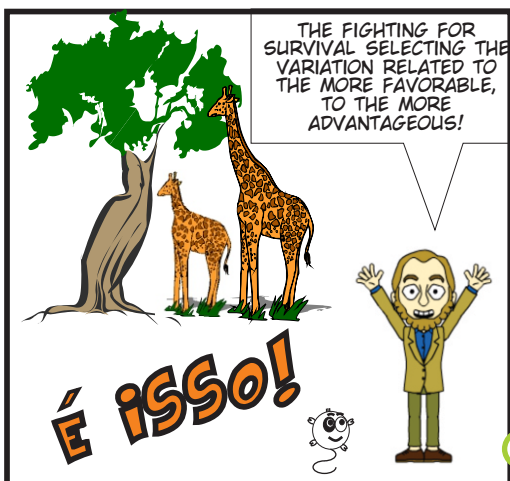
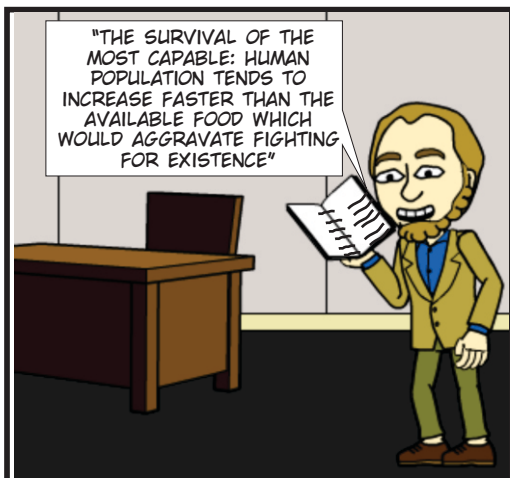
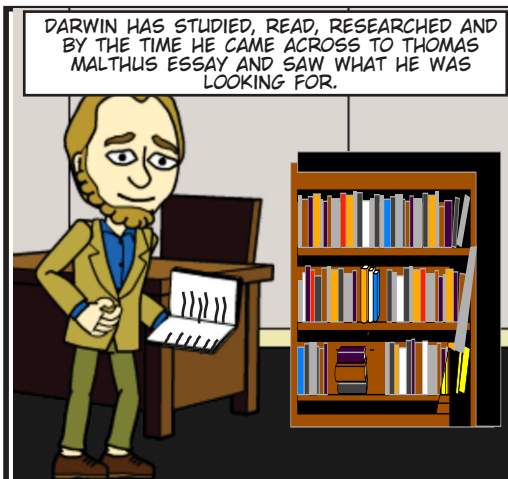
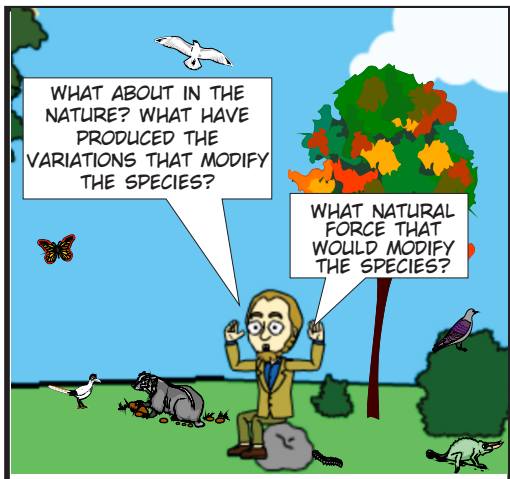


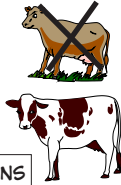
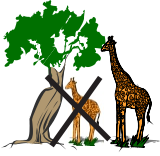
THE MODIFICATION TAKEN WAS THE RESULT OF THE SELECTION OF THEIR BREEDERS IN ORDER TO PERPETUATE THE VARIATIONS BENEFICIAL TOWARDS REPRODUCTIONS.



THE ARTIFICIAL SELECTION IS THE CAPACITY OF MEN TO MODIFY SPECIES.

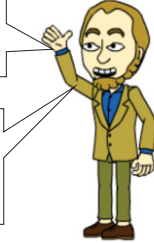




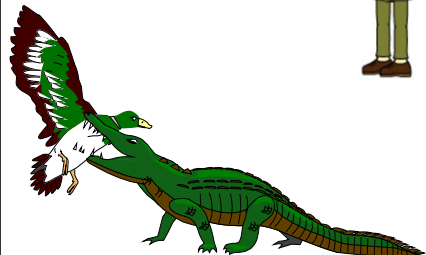


THE FAVORABLE VARIATIONS TEND TO PRESERVE THEMSELVES AS WELL AS THE OTHER UNFAVORABLE ONES TEND TO BE DESTROYED.

ONCE A SPECIES IS NOT CAPABLE TO ADAPT THEY DIE. THE WEAK SPECIES AND NOT ADAPTED ONES ARE ELIMINATED.



IN NATURE THERE IS FIGHT FOR SURVIVING. NATURE SELECTS THE MOST COMPETENT.



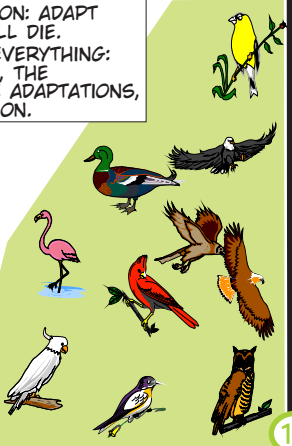
THE VARIATIONS ARE THE RAW MATERIAL OF EVOLUTION; OTHERWISE ALL THE SPECIES WOULD BE FIXED, STATIC. THE CONTINUING ADAPTATION IS WHAT CAUSES THE EVOLUTION.



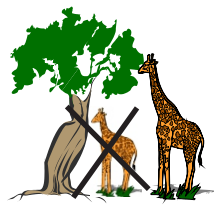
ALL SPECIES WERE NOT ELABORATED FROM A UNIQUE DIVINE CREATIVE EXPLOSION. ALL BEINGS HAVE BEEN DEVELOPED, EVOLVED FROM SPECIES THAT HAD ALREADY EXISTED.



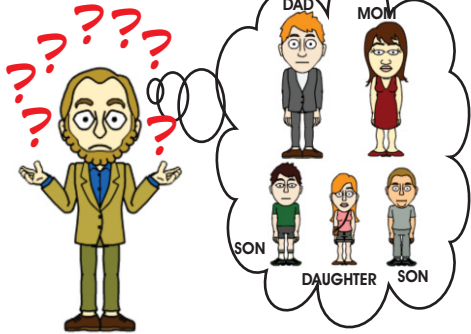
NATURAL SELECTION: ADAPT YOURSELF OR WILL DIE. THIS EXPLAINS EVERYTHING: THE DIFFERENCES, THE SIMILARITIES, THE ADAPTATIONS, AND THE EXTINCTION.



THE NATURAL SELECTION LEADS TO SPECIES SURVIVAL OF LONG-NECK GIRAFFE WHICH WAS MORE CAPABLE TO SURVIVE IN THIS WAY AND THEY WERE ABLE TO FEED THEMSELVES FROM HIGH TREES. AND THUS THIS SUCCEEDS TOWARDS ALL OTHER BEINGS.



DARWIN ONLY DIDN'T KNOW HOW TO EXPLAIN THE REASON THERE WERE SO MANY VARIATION OF CHARACTERISTICS AMONG THE OFFSPRING, NOR DOES HOW THE OFFSPRING INHERITED THESE CHARACTERISTICS.



HOW DO THE MORE ADAPTABLE CHARACTERISTICS CONVEY THEIR ESPECIAL GIFT TO THEIR DECEDENTS?

IT IS ONLY WOULD BE EXPLAINED BY OTHERS SCIENTISTS: GREGOR MENDEL IN 1865.

IN 1854 DARWIN TOLD HIS THEORY TO HIS FRIENDS HOOKE AND LYELL.

YOU MUST WRITE YOUR BOOK RIGHT AWAY BEFORE ANYONE ELSE HAS THE SAME IDEA.

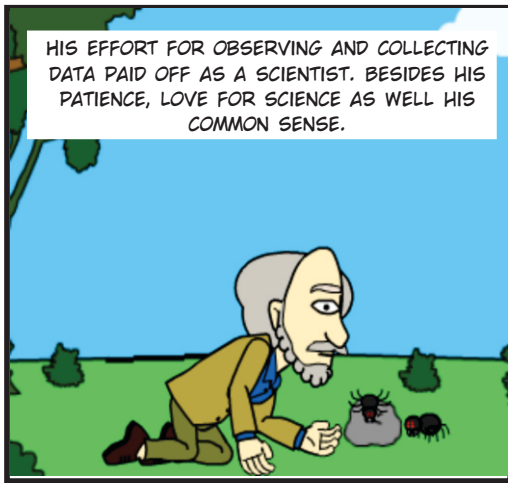
I CANNOT RUSH MYSELF. I MUST PROVE ALL MY THEORIES.

DO NOT DELAY TOO MUCH DARWIN.

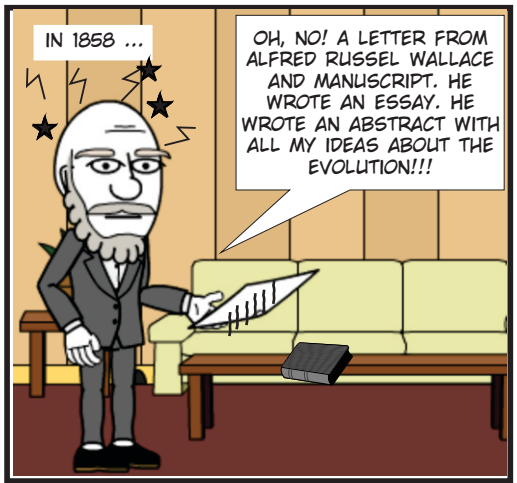
I NEED TO CHECK ALL DATA, LOOK FOR MISTAKES, PREDICT EVERY OBJECTION THAT MIGHT BE PLACED BY THE OPPONENTS TO MY IDEAS.

I HAVE LEARNED NOT TO OBJECT ANY CASE OF OPINIONS THAT CAN BREACH FOUNDATION FACTS.

DARWIN HAS STUDIED A VARIETY OF SPECIES. HIS WORK WAS DETAILED AND ACCURATE. HE REGISTERED EVERYTHING HE OBSERVED.

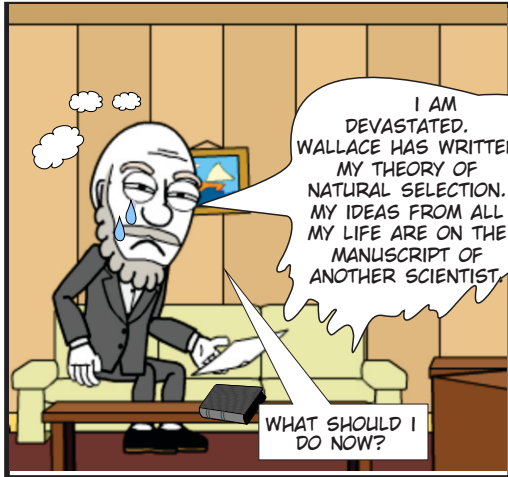


HIS EFFORT FOR OBSERVING AND COLLECTING DATA PAID OFF AS A SCIENTIST. BESIDES HIS PATIENCE, LOVE FOR SCIENCE AS WELL HIS COMMON SENSE.



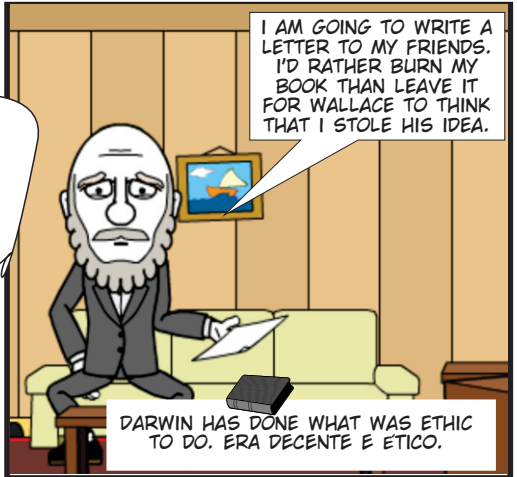
IN 1858 ...

OH, NO! A LETTER FROM ALFRED RUSSEL WALLACE AND MANUSCRIPT. HE WROTE AN ESSAY. HE WROTE AN ABSTRACT WITH ALL MY IDEAS ABOUT THE EVOLUTION!!!



I AM DEVASTATED. WALLACE HAS WRITTEN MY THEORY OF NATURAL SELECTION. MY IDEAS FROM ALL MY LIFE ARE ON THE MANUSCRIPT OF ANOTHER SCIENTIST.

WHAT SHOULD I DO NOW?



I AM GOING TO WRITE A LETTER TO MY FRIENDS. I'D RATHER BURN MY BOOK THAN LEAVE IT FOR WALLACE TO THINK THAT I STOLE HIS IDEA.

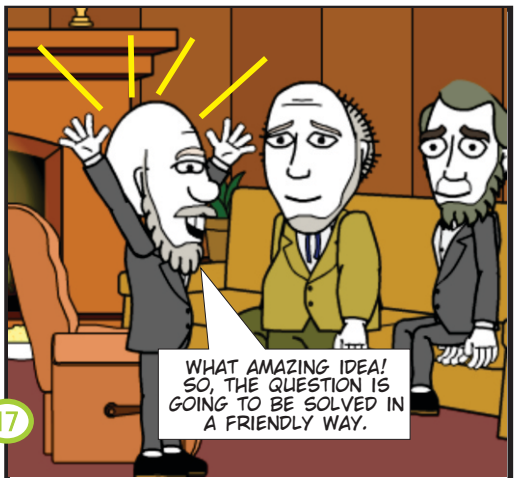
DARWIN HAS DONE WHAT WAS ETHIC TO DO. ERA DECENTE E ETICO.



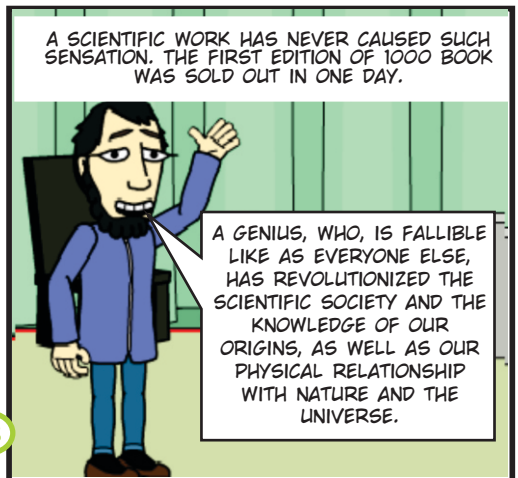
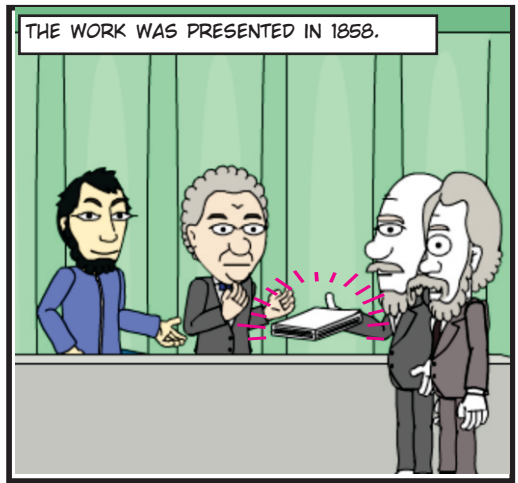
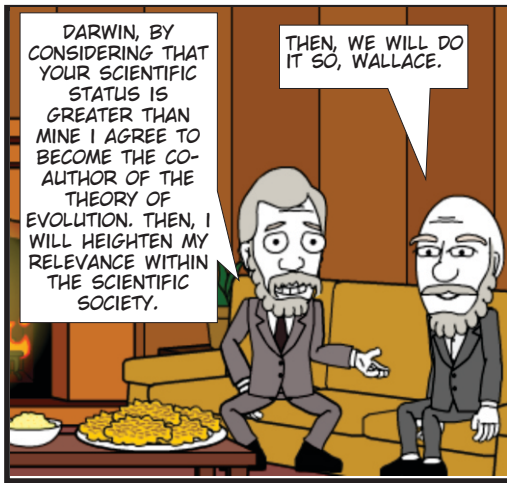
WE HAVE TALKED TO WALLACE.

HE HAS AGREED THAT BOTH OF YOU PRESENT TOGETHER THIS WORK AT LINNAEAN SOCIETY*.

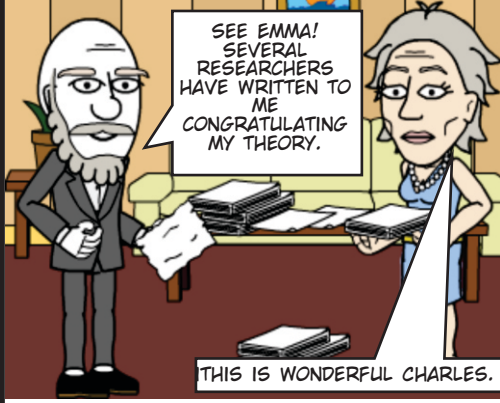
* LINNAEAN SOCIETY OF LONDON CHIEF OF STAFF OF SCIENCE OF ENGLAND.



WHAT AMAZING IDEA! SO, THE QUESTION IS GOING TO BE SOLVED IN A FRIENDLY WAY.



CRITICISMS AND OTHER COMMENTS TO THE BOOK HAVE ALSO BEEN MADE.



SEE EMMA! SEVERAL RESEARCHERS HAVE WRITTEN TO ME CONGRATULATING MY THEORY.

THIS IS WONDERFUL CHARLES.

THOMAS HENRY HUXLEY, AN IMPORTANT NATURALIST HAS SAID:



WHAT EXTREME STUPIDITY NOT THINKS ABOUT IT!

THE 'CHURCH' (RELIGIOUS PEOPLE) WAS VEHEMENTLY AGAINST DARWIN IDEAS. THEY WERE HOSTILE!



DARWIN IS AN ANTI-CHRIST!

HE IS A MONSTER!

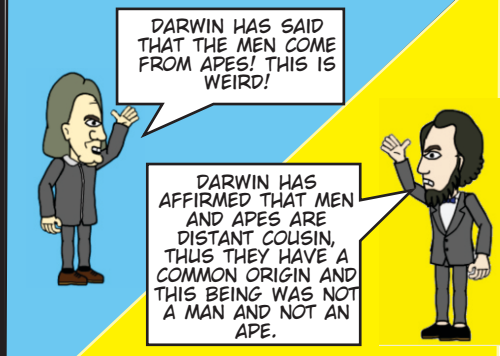
HE IS AGAINST GOD!

TO THE 'CHURCH' ALL SPECIES HAVE ALREADY BEEN CREATED BY GOD SINCE THE BEGINNING OF THE TIME E LAST FOREVER, WITHOUT ANY MODIFICATIONS.



BUT ACCORDING TO DARWIN, GOD IS NOT THE CREATOR OF ALL SPECIES. ALL SPECIES START FACING MODIFICATIONS TOWARDS THE TIME. THE NATURAL WORLD EXPLAINS ITSELF WITHOUT NEED THAT GOD PROTECT EACH SPECIES.

THE BISHOP SAMUEL WILBERFORCE WAS DARWIN THE GREATEST OPPONENT.



DARWIN HAS SAID THAT THE MEN COME FROM APES! THIS IS WEIRD!

DARWIN HAS AFFIRMED THAT MEN AND APES ARE DISTANT COUSIN, THUS THEY HAVE A COMMON ORIGIN AND THIS BEING WAS NOT A MAN AND NOT AN APE.

MANKIND ABOVE ANY OTHER LIVE-BEING.

MANKIND IS SUSCEPTIBLE TO THE NATURE LAW AS ANY OTHER LIVE-BEING

THOMAS HENRY HUXLEY WAS ONE OF THE GREATEST ADVOCATES OF DARWIN IDEAS.

DURING THE MEETING OF THE BRITISH ASSOCIATION FOR SCIENCE ADVANCE, THE BISHOP WAS NOT HUMILIATED. HOWEVER, HE WAS VERY UNCOMFORTABLE:

WAS IT FROM THE PART OF YOUR GRANDMOTHER OR FROM YOUR GRANDFATHER THAT YOU HAVE DESCENDED FROM AN APE?

IT WAS BETTER TO DESCEND FROM AN APE RATHER THAN A HUMAN BEING LIKE YOU WHO TRY TO HIDE THE TRUTH WITH YOU.



HUXLEY WAS DUBBED "THE BULLDOG OF DARWIN".

THERE WAS MANY MISUNDERSTANDING AND DEFAMATION. THE EVOLUTION THEORY START BECOMING THE THEME DISCUSSED AMONG EVERY TALKING.

I DO BELIEVE IN DARWIN MORE THAN THE CHURCH.

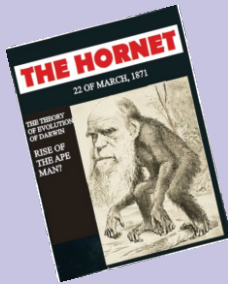
I DON'T COME FROM APE.

BUT DARWIN DID NOT SAY THAT!

I GUESS THAT GOD CHOSE TO USE THE EVOLUTION MECHANISM TO CREATE THE VARIETIES OF BEINGS IN THE PLANET.



THE BATTLE TOOK PLACE ON NEWSPAPER AND MAGAZINES.



HUXLEY WAS INVITED TO WRITE ABOUT HIS EVOLUTIONIST IDEAS IN THE JOURNAL "THE TIMES", THE MOST READING NEWSPAPER OF ENGLAND. HUXLEY HAS PRESENTED CLEAR AND DETAILED EXPOSITION ABOUT THE THEORY.



CRITICALS ASKED:

WHERE ARE THE LINKS? WHERE IS THE FIRST SPECIES THAT CONNECTS THE PRIMARY SPECIES TO THE NEW SPECIES?

THIS IS THE MOST OBVIOUS AND GRAVE OBJECTION THAT ONE CAN RAISE AGAINST MY THEORY. THE EXPLANATION IS IN THE EXTREME IMPERFECTION OF THE GEOLOGIC RECORDING. IT IS NECESSARY TO FIND MORE FOSSIL.



IN 1859, A FOSSIL OF AN ARCHAEOPTERYX* WAS DISCOVERED, WHICH REINFORCE DARWIN THEORY.



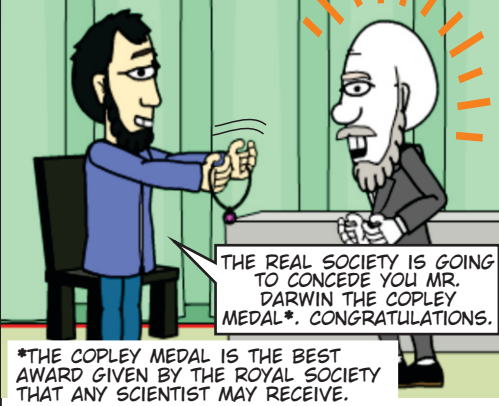
* THE EVOLUTIONARY LINK AMONG REPTILES AND BIRDS. IT WAS AN ANIMAL THAT HOLD TAILS, BONES OF REPTILE AND FEATHERS.

EVEN THOUGH THERE WAS ATTACK, DARWIN DID NOT PARTICIPATE TO THE ARGUMENT, DUE TO HIS FRAGILE HEALTH AS WELL HIS PACIFIC CHARACTER. HE HAS NEVER PRONOUNCED ANY BAD WORD.

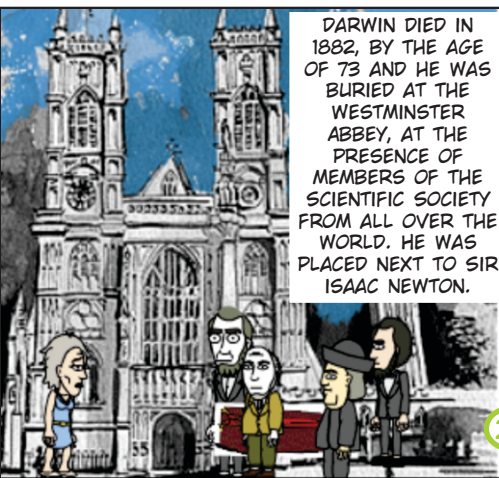


DARWIN REPUTATION OF AN ACCURATE, COMPREHENSIVE, HUMBLE, GENEROUS, TOLERANT, MAGNIFICENT SCIENTIST STARTS TO BECOM BEING RECOGNIZED EVEN THOUGH BY HIS OPPONENTS. AFTER SEVERAL OBSTACLES, THE THEORY BECAME ACCEPTED.

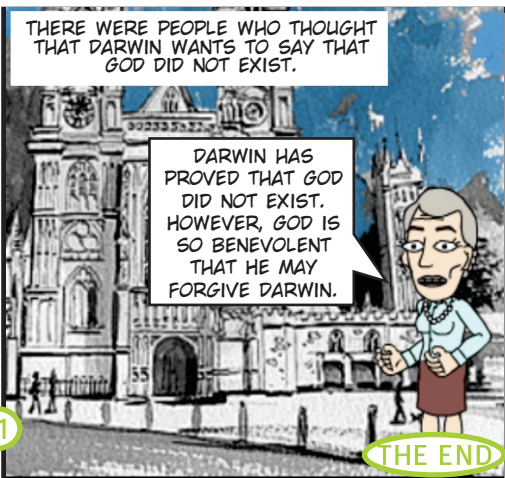
DARWIN HAS RECEIVED MEDALS, DIPLOMAS AND OTHERS PRIZE TOWARDS HIS LIFE. AND, IN 1864...



IN 1871, DARWIN PUBLISHED ANOTHER BOOK. IT WAS ANOTHER WORK WHICH HAS CAUSED SENSATION.



DARWIN DIED IN 1882, BY THE AGE OF 73 AND HE WAS BURIED AT THE WESTMINSTER ABBEY, AT THE PRESENCE OF MEMBERS OF THE SCIENTIFIC SOCIETY FROM ALL OVER THE WORLD. HE WAS PLACED NEXT TO SIR ISAAC NEWTON.



THERE WERE PEOPLE WHO THOUGHT THAT DARWIN WANTS TO SAY THAT GOD DID NOT EXIST.

DARWIN HAS PROVED THAT GOD DID NOT EXIST. HOWEVER, GOD IS SO BENEVOLENT THAT HE MAY FORGIVE DARWIN.

NOW YOU ARE THE SCIENTIST

Experiment 1)

Title: You are a hunter

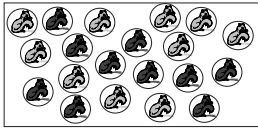
Objective: understanding how natural selection works.

Material: 20 square dark carton-paper scraps and 20 square white carton-paper scraps.

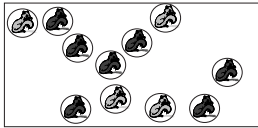
Procedure: You are the predator and arrived to a new area.

The dark scraps and white scraps are the prey that belongs to same species. By considering that you hunt at night, you see better the white preys.

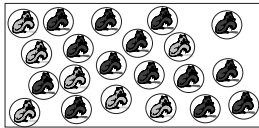
1. Spread the 40 preys over the table.



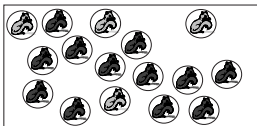
2. Start hunting. You should capture two white preys for each dark prey captured. The animals which are killed should be removed from the table.



3. The animals mated. Each couple which survives got two cubs. However, add two scraps of each color of couple on the game.



4. The hunting re-starts. You should keep hunting two white preys for each dark prey killed.



5. What is happening to the animals with white skin?

6. Again, the animals which have survived reproduce. (There was a simplification considering that the cubs got the same color of their parents, and this is not what always happen.)



7. What happened to the animals with white skin?

8. If the game continues this way what will happen with the animals with white skin?

9. Redo the game, but now change the rules. For example, if the couple had 4 cubs when they mate. What would happen?



Experience 2)

Title: Research: Who believes on the evolution?

Objectives: Ask people about their opinion about evolution, make a graphic to figure out the results of the research, discuss about the results and take conclusions.

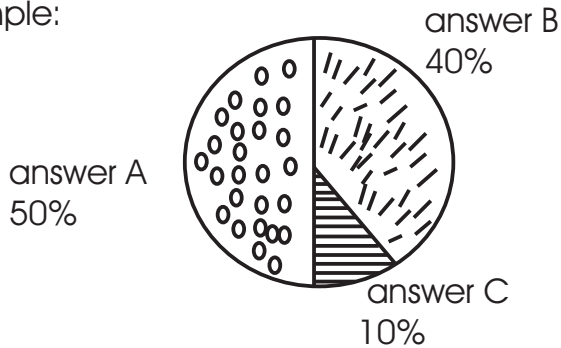
Material: Research form (see model), pencil, eraser, compass, colorful pencil.

Do you believe that mankind was created by God or mankind has evolved from other animals?	Research form							
	gender		age		education		Religion	
Answers	F	M	12 to 40	40 above	Middle school	High school Or Graduated	yes	no
A) create by God								
B) evolved from other animal								
C) Don't know								

Procedure:

1. Each student should question 20 persons (The bigger the number of interviewer the better is the results, thus there will be more variety of opinions).
2. You should choose different people to interviewer, related to age, gender, education, and religion.
3. Interview people in the family, in the community, in the school. Make sure the interviewed person understand that he/she doesn't need to tell her name.
4. Ask the question: Do you believe that mankind was created by God or they have evolved from other animals?
5. Check the square related to their answer.
6. Working on the results:
 - 6.1. Calculate the percentage: For example: if 25 answered b among 50 people interviewed, the answer is $25/50 \times 100 = 50\%$
 - 6.2. After calculating the percentage for every answer, you should make a graphic in order to become easier to visualize. Make sure the graphic is colored.

Example:



7. Deepening the results

7.1. Add to the results of each items (Gender, age, education, religion)

7.2. Calculate the percentage from each one.

7.3. Compare the results.

8. Who believes more in evolution?

a. Men or women

b. The younger or the older?

c. Ones with more or less education?

d. Ones with religion or not?

9. Make a graphic from the results.

10. What is possible to come to a conclusion from your research?

Discuss the result with your colleagues.

EXERCISES

1. What was the most significant discovering from Charles Darwin?
2. What was the importance of this discovery?
3. What kind of impact this discovery brought to the world?
4. Mankind has been interfering into the earth environment more than any other species has done before. They have interfered even on the natural selection process. How do they do it? Give examples.
5. Have you ever heard about bicho-pau (carausius or walking-stick)? What kind adaptation do you think this insect has? What is the advantage of this characteristic?
6. Observe figure 1. There are two moths (one dark and the other pale) over the brownish trunk of a tree. Answer:
 - 6.1. Which moth presents higher possibility for becoming a prey? Why?
 - 6.2. Imagine a population of thousands pale and dark moths. Which variety would exist in higher quantity? Why?

7. Now observe the figure 2. In this same region occurred an industrialization process and a large number of factories polluted the field and forest darkening the trunk of the trees.

- 7.1. What alteration the tree has suffered?
- 7.2. What kind of pollutant can cause the alteration to the trunk of a tree?
- 7.3. What will the consequence be towards the moth population?
- 7.4. In this scenario, which moth has more chance for surviving?

8. People most of time misunderstanding Darwin theory. So, correct the following sentence if someone may say it to you:
"If mankind comes from ape, why man and women are not modifying themselves anymore?"

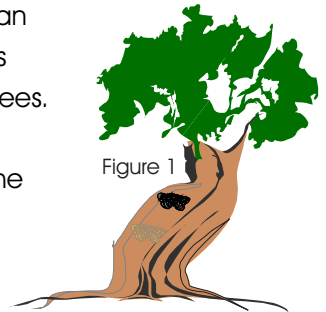


Figure 1



Figure 2

9. Try finding in the story, which cartoon the Bug-Bug (🐞) appears and describe what is the scientific discovery related to.

COLLECTION
INCREDIBLE SCIENTISTS,
SENSATIONAL DISCOVERIES
- in comics -

- 1-NICOLAU COPÉRNICO AND THE SOLAR SYSTEM
- 2-HISTORY OF THE CELLULAR THEORY
- 3-CHARLES DARWIN AND THE THEORY OF EVOLUTION
- 4-GREGOR MENDEL, THE FATHER OF GENETICS
- 5-LUIS PASTEUR AND THE MICROBIAL THEORY
- 6-ARQUIMEDES, THE FIRST SCIENTIST
- 7-GALILEU GALILEI, THE MESSENGER OF THE STARS
- 8- ISSAC NEWTON AND UNIVERSAL GRAVITATION
- 9- VITAL BRAZIL AND THE ANTIPHYDIC SERUM
- 10- PETER LUND AND BRAZILIAN PALEONTOLOGY
- 11- EINSTEIN AND THE RELATIVITY
- 12- HISTORY OF THE ORIGIN OF LIFE
- 13- HISTORY OF DINOSAURS
- 14- JOHN DALTON AND ATOMIC THEORY
- 15- WATSON & CRICK AND THE DNA
- 16- MARIE CURIE AND THE RADIOACTIVITY
- 17- THE EVOLUTION OF SCIENTIFIC THINKING
- 18- OSWALDO CRUZ & CARLOS CHAGAS AND THE EPIDEMICS OF BRAZIL
- 19- CARLOS LINEU AND THE CLASSIFICATION OF LIVING BEINGS
- 20- DMITRI MENDELEEV AND THE PERIODIC TABLE
21. STEPHEN HAWKING: FROM BIG BANG TO BLACK HOLES
22. THE 5 SENSES IN THE FIELD AND IN THE CITY
23. VISIT TO THE MUSEUM
24. MARY ANNING, THE FOSSIL HUNTER

