

CHARLES DARWIN



AND THE THEORY OF NATURAL SELECTION

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h/h

Who was Charles Darwin?

From his earliest childhood, Charles Darwin (1809 – 1882) was passionate about Nature. During every waking moment he would roam the countryside around his home with his dogs, hunting and observing animals, climbing trees and hills.

Years later, while studying to be a priest, Darwin's professor of botany, John Henslow (1795 – 1861), offered him the unique opportunity to embark on a voyage of discovery around the world aboard a ship called the *Beagle*. Darwin sailed from England on the 27th of December 1831, at just 22 years of age. During the long voyage at sea, which lasted 5 years,

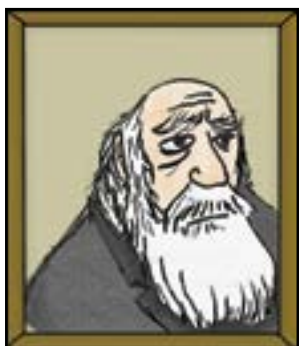


The young Charles Darwin

Darwin made important observations and notes of all that he saw, and he collected abundant plants, animals, fossils and rocks as part of his study of Nature.

Back in England in 1836, Darwin spent years examining his huge collection of specimens brought back from his voyage. He also conducted many experiments, and maintained a regular correspondence with other scientists and naturalists all over the world. During all this time, he also did a lot of reading, and a lot of thinking.

As a result of so much study, Darwin came up with new ideas about subjects as varied as the movement of climbing plants, the life of earthworms, emotions in humans and animals...and of course his greatest idea of all, the ground-breaking Theory of Evolution by Natural Selection.



The older Darwin

It was this theory that dominated the intellectual life of Charles Darwin and made him one of the greatest thinkers in history. The theory of evolution by natural selection was published in 1859 in a book called *On the Origin of Species*. With this work, one of the most important of all time, Darwin

changed the course of the study of nature and the way we think about the world, forever.

Let us meet the other characters in the story...

Captain Robert Fitzroy (1805 - 1865)



When Fitzroy took over command of the *Beagle* in 1831 and prepared for the epic voyage around the world, he required “the company of a gentleman” with a similar interest in scientific exploration. So it was that he came upon young Charles Darwin. Darwin and Fitzroy got along quite well although they were actually very different to each other; Darwin's liberal ideas contrasted with Fitzroy's more conservative beliefs. For example, contrary to Fitzroy Darwin detested the idea of slavery, and he was shocked by the captain's brutal methods of disciplining his crew on board the *Beagle*. Many years later Fitzroy, a deeply religious man, was among those who violently rejected Darwin's theory of evolution by natural selection.

Syms Covington (1809 - 1861)



Cabin boy aboard the *Beagle*, Covington became Darwin's personal assistant. In the Galápagos islands he proved invaluable helping to collect finches, and contrary to his employer, he did remember to label each specimen with the island he collected it

from! Thanks to Covington's thoroughness, Darwin was later able to see how each island contained a different kind of finch. This clue was a fundamental piece of evidence for the theory of evolution by natural selection.

Charles Lyell (1797 - 1875)



Considered to be the founder of geology, Charles Lyell shook the current thinking of his time by stating that the Earth is very much older than people thought. Lyell gave the example of fossils, of which the age is measured in millions of years. Lyell's important book, *Principles of*

geology, was key in shaping Darwin's own thinking about the Earth and its life forms, and he read it keenly during his time aboard the *Beagle*. Upon returning to England in 1836 Darwin met Charles

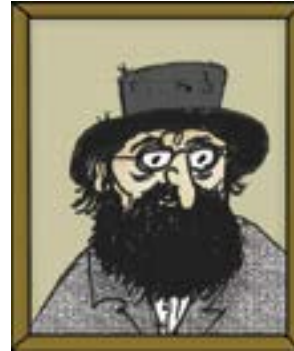
Lyell and the two became colleagues and friends.

John Gould (1804 - 1881)



Artist and ornithologist, John Gould took on the huge task of identifying the bird specimens Darwin brought back from his voyage around the world. With Gould's help, Darwin was thus able to confirm that the mockingbirds ("Thenca") in the Galápagos islands are related to those on the South American continent. Gould also noticed the relationship between the shape of finches' bills and the way they feed, an observation that contributed to Darwin's thinking towards his theory of natural selection.

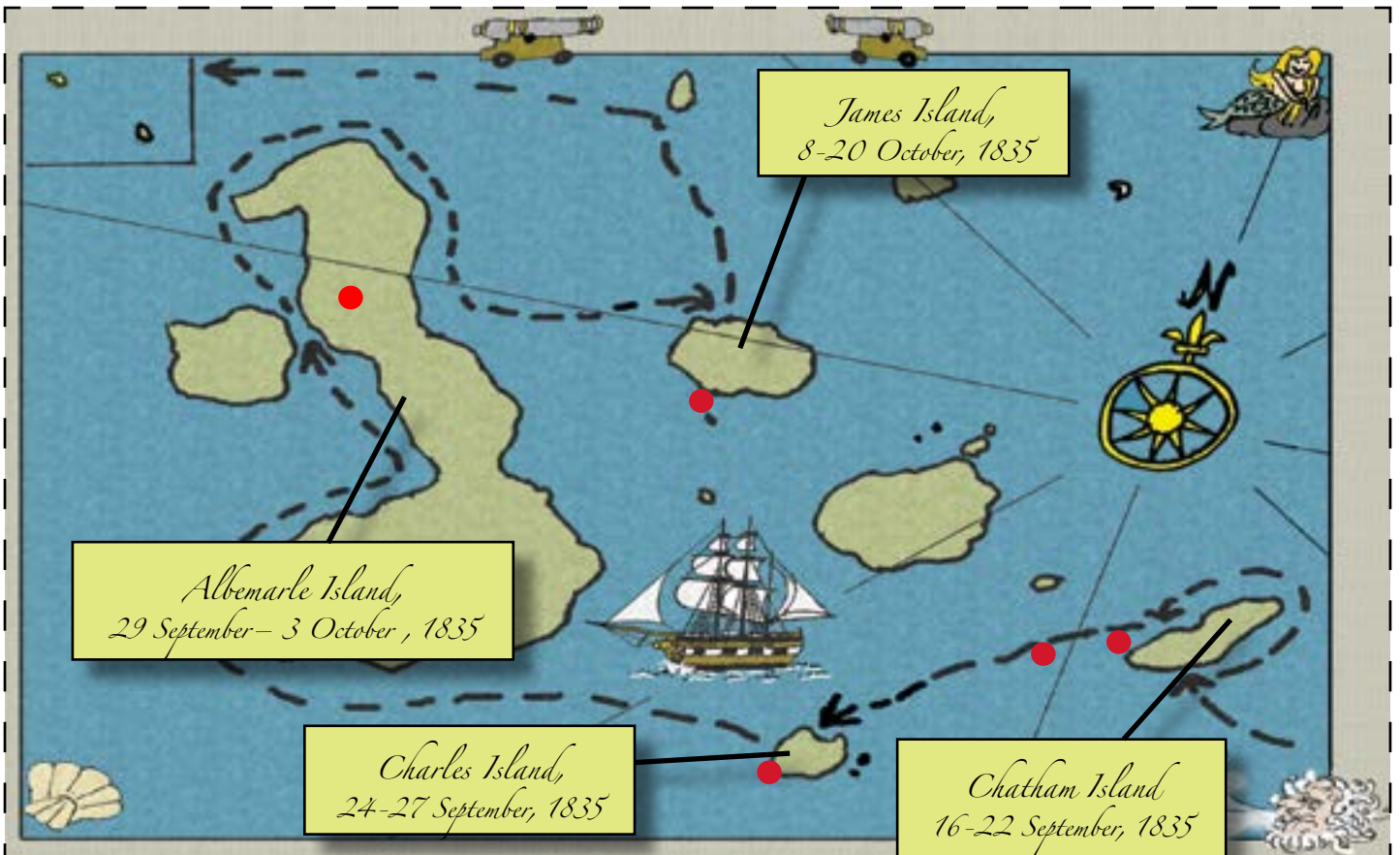
Alfred Russell Wallace (1823 - 1913)



Young explorer, adventurer and naturalist, Wallace travelled extensively in the Americas and Asia and marvelled at the diversity of life he encountered. Wallace marvelled so much that he actually came to the same conclusions as Darwin regarding the evolution of life on Earth, quite independently of Darwin's own theory of natural selection! However the two naturalists never competed with each other, and rather became allies defending their joint theory.

The *Beagle's* route in the Galápagos Islands

Darwin visited the Galápagos for five weeks between the 16th September and 20th October, 1835. The *Beagle* reached the islands after almost four years at sea, mainly surveying the South American coast.



● Area explored by Darwin - - - - - Route of the *Beagle* in search of water (without Darwin)

- - - - -> Route of the *Beagle* (Darwin aboard)

And now, let us go back in time to 1835, and join Charles Darwin in the fabled Galápagos islands!

16th September, 1835.
HMS Beagle anchors
off Chatham island*,
Galápagos...



During his stay in Galápagos the young Darwin
observed and measured everything he saw:
plants, animals, even rocks...



* San Cristóbal island today

The mysterious marine iguanas certainly attracted his attention..

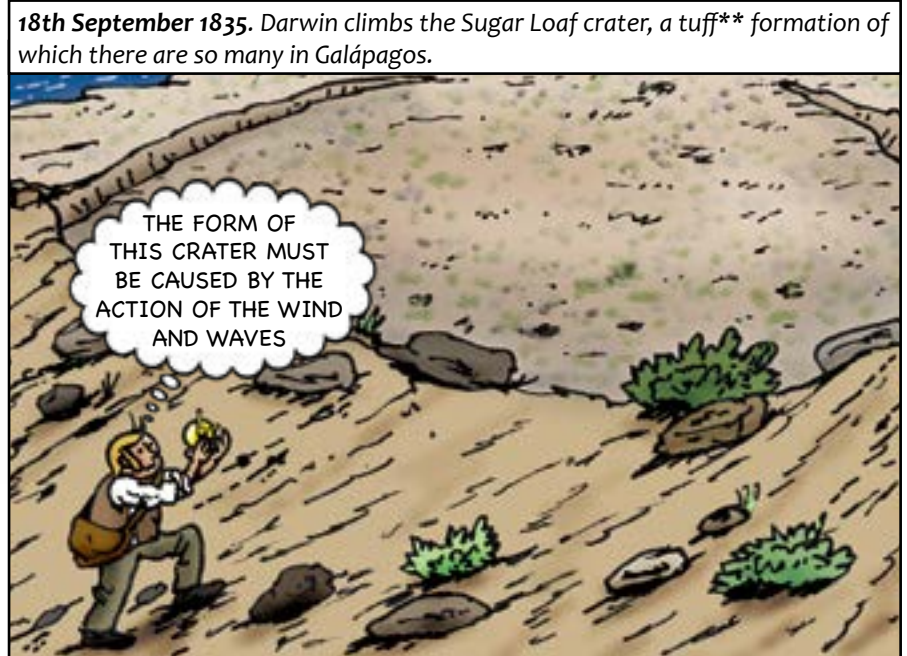


Darwin's methods of investigation could be very hands-on, and would be frowned upon today...



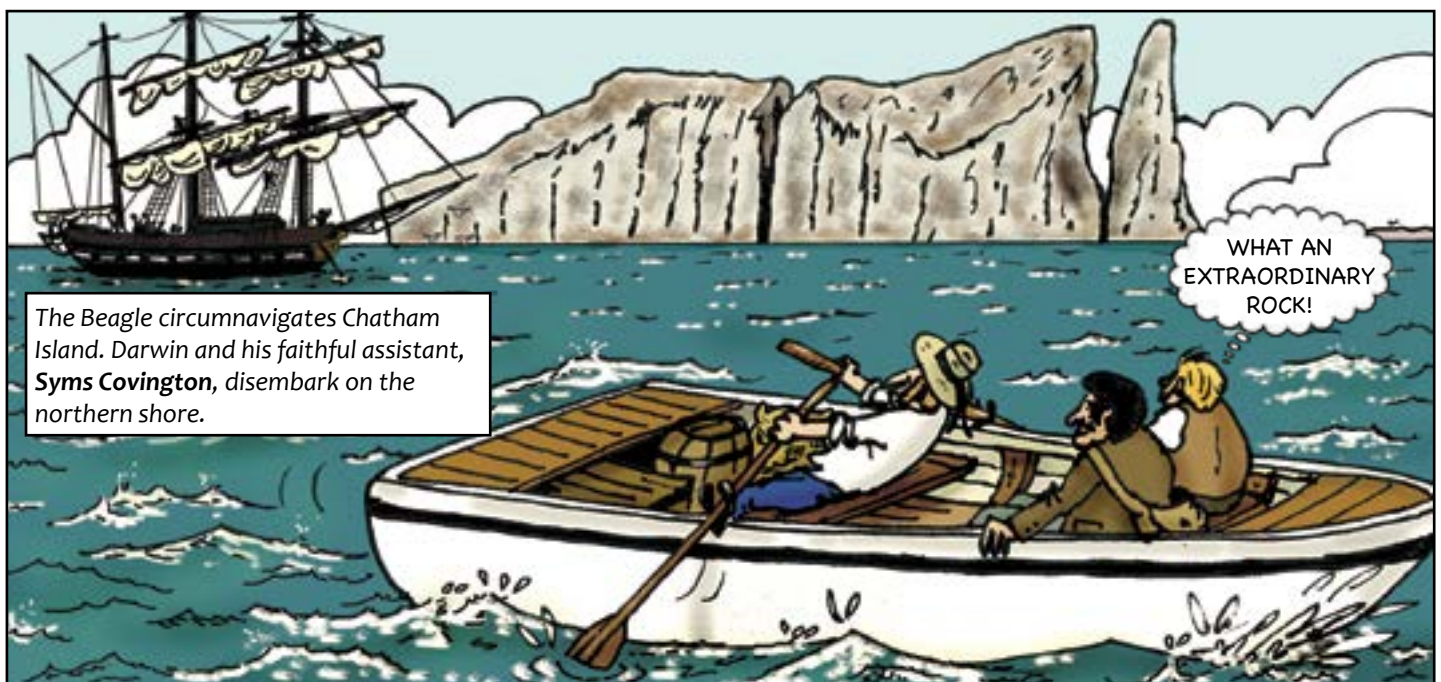
THAT'S THE THIRD TIME IT
CRAWLS IMMEDIATELY BACK ONTO
LAND! THEY SEEM TO FEEL SAFER OUT OF
THE WATER... DOES THAT MEAN THEY HAVE
NO NATURAL PREDATORS ON LAND?





* Mockingbird (*Mimus*). "Thenca" was the name Darwin had heard used in Chile.

** Tuff: Solidified volcanic ash produced by volcanic eruptions





THOSE CONES REMIND ME OF THE IRON FOUNDRIES IN STAFFORDSHIRE!



THESE LAVA FORMATIONS LOOK LIKE A SEA OF STONE... A GIANT TORTOISE! IT MUST WEIGH AT LEAST 200 POUNDS!

After having examined the tortoise and taken some measurements, young Darwin decides to try a few experiments...

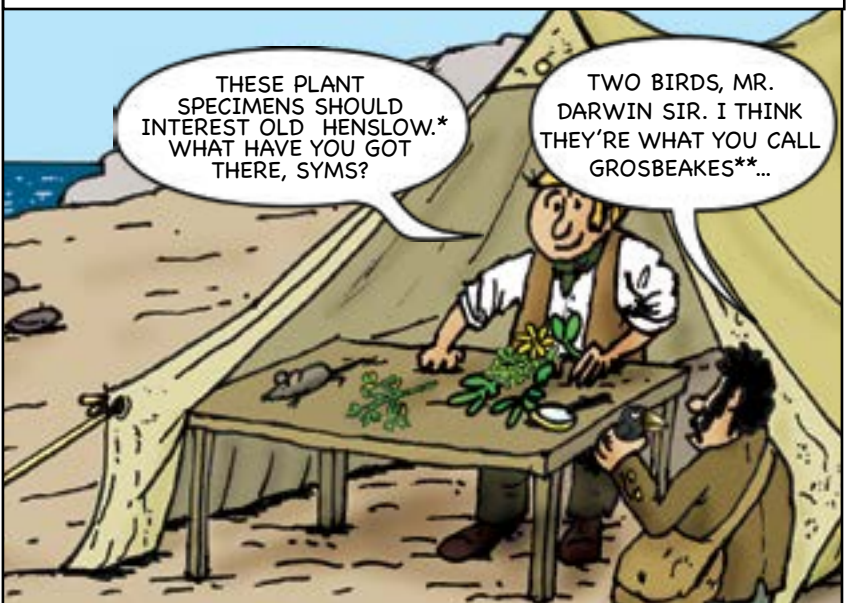


LET'S SEE IF IT WILL CARRY ME!



SPLAT!

A little later, when Darwin has tired of studying the tortoise, he and his assistant organise the various specimens of plants and animals collected earlier.



THESE PLANT SPECIMENS SHOULD INTEREST OLD HENSLOW.* WHAT HAVE YOU GOT THERE, SYMS?

TWO BIRDS, MR. DARWIN SIR. I THINK THEY'RE WHAT YOU CALL GROSBEAKES**...

* Reverend John Henslow (1795-1861) was Darwin's botany professor at Cambridge
** Finches

Before weighing anchor, the Beagle stocks up on food...*

FIFTEEN TORTOISES. CAP'N SAYS THAT SHOULD KEEP US GOING FOR A WHILE...



Over the next two days the Beagle navigates towards Charles island**



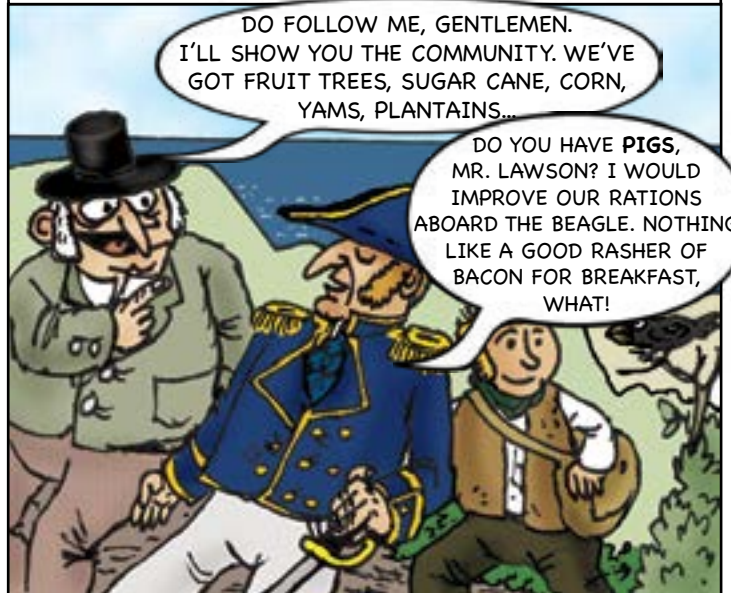
17:20, 24th September, 1835. The Beagle anchors in Post Office Bay



Accompanied by Mr. Nicholas Lawson, Vice Governor of the island, Captain Fitzroy and Darwin climb to the highlands

DO FOLLOW ME, GENTLEMEN. I'LL SHOW YOU THE COMMUNITY. WE'VE GOT FRUIT TREES, SUGAR CANE, CORN, YAMS, PLANTAINS...

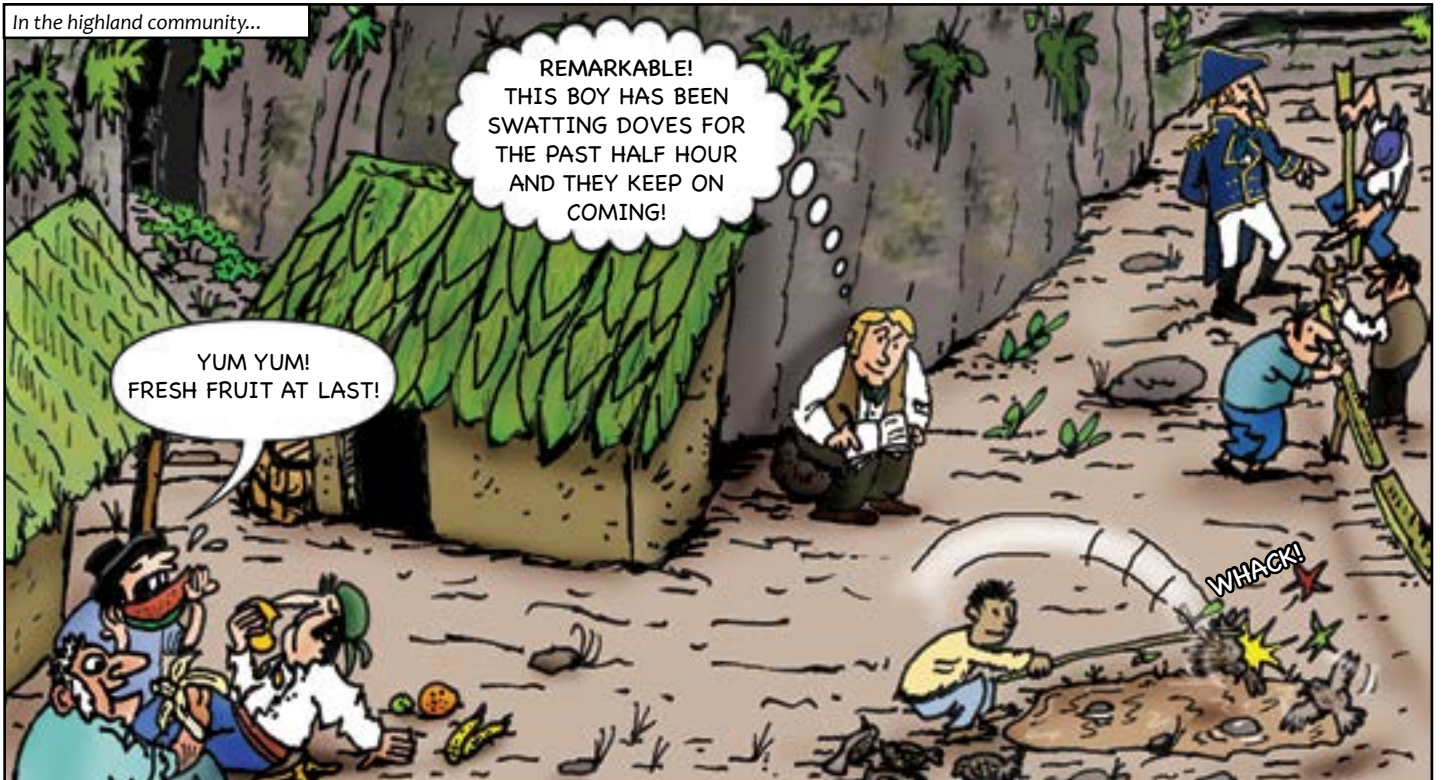
DO YOU HAVE PIGS, MR. LAWSON? I WOULD IMPROVE OUR RATIONS ABOARD THE BEAGLE. NOTHING LIKE A GOOD RASHER OF BACON FOR BREAKFAST, WHAT!



In the highland community...

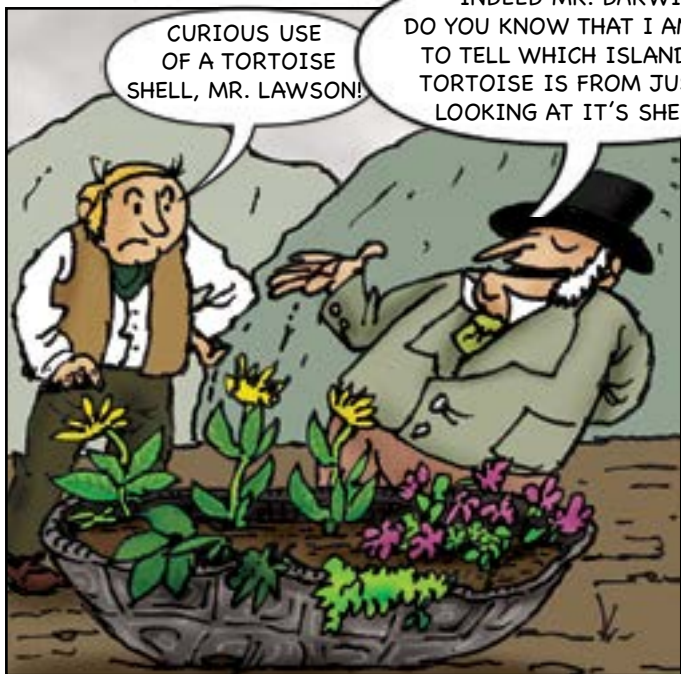
REMARKABLE! THIS BOY HAS BEEN SWATTING DOVES FOR THE PAST HALF HOUR AND THEY KEEP ON COMING!

YUM YUM! FRESH FRUIT AT LAST!



* A common practice at the time with sailors, whalers and pirates, the heavy harvest of the Galápagos tortoises nearly caused their extinction.

** Floreana island



CURIOUS USE OF A TORTOISE SHELL, MR. LAWSON!

INDEED MR. DARWIN! DO YOU KNOW THAT I AM ABLE TO TELL WHICH ISLAND ANY TORTOISE IS FROM JUST BY LOOKING AT IT'S SHELL?*

Next day, Darwin continues to explore the highlands



..38, 39, AND 40 HILLS...ALL CRATERS, AND THEREFORE EXTINGUISHED VOLCANOES...

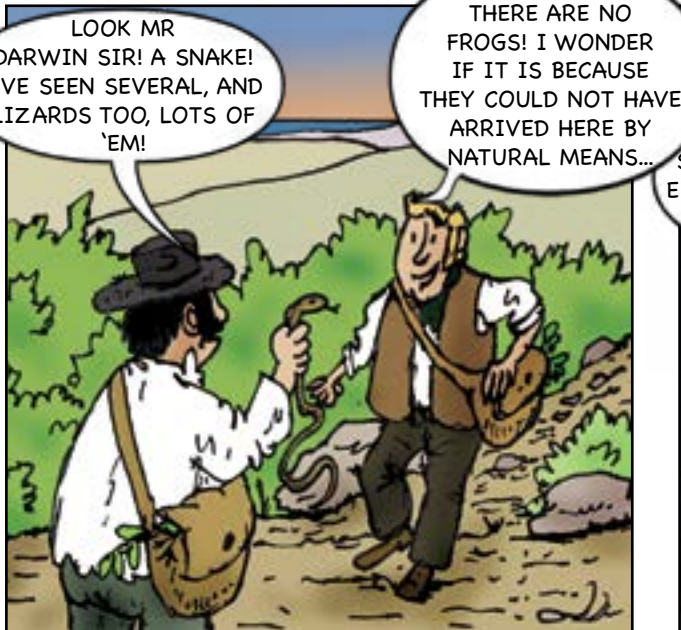
IT LOOKS JUST LIKE THE ONE ON CHATHAM! BUT ARE THEY THE SAME SPECIES? EXTRAORDINARY...I WONDER IF A BOTANIST WOULD SEE SO MUCH SIMILARITY WITH CONTINENTAL SOUTH AMERICA IN PLANTS AS I AM SEEING IN BIRDS...



PHEW, IT'S HOT! I'LL HAVE A DRINK OF WATER...WHO'S THIS? WHAT?! ANOTHER THENCA!



The following day the Beagle sails for Albemarle** island...

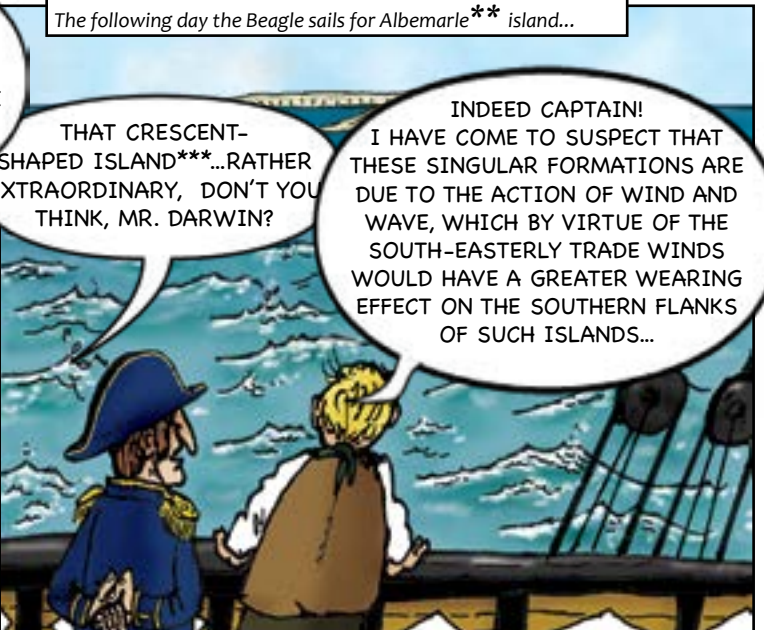


LOOK MR DARWIN SIR! A SNAKE! I'VE SEEN SEVERAL, AND LIZARDS TOO, LOTS OF 'EM!

YES, BUT THERE ARE NO FROGS! I WONDER IF IT IS BECAUSE THEY COULD NOT HAVE ARRIVED HERE BY NATURAL MEANS...

THAT CRESCENT-SHAPED ISLAND***...RATHER EXTRAORDINARY, DON'T YOU THINK, MR. DARWIN?

INDEED CAPTAIN! I HAVE COME TO SUSPECT THAT THESE SINGULAR FORMATIONS ARE DUE TO THE ACTION OF WIND AND WAVE, WHICH BY VIRTUE OF THE SOUTH-EASTERLY TRADE WINDS WOULD HAVE A GREATER WEARING EFFECT ON THE SOUTHERN FLANKS OF SUCH ISLANDS...



* Overlooked at the time, Lawson's comment was later recalled by Darwin and proved significant in the thought process leading to his theory of evolution

** Isabela island

*** Tortuga island

During moments of rest and when his chronic seasickness would let him, Darwin was an avid reader of Charles Lyell's seminal work, the 'Principles of Geology'. Lyell's observations, notably of fossils, urged him to proclaim that the Earth was a lot older than previously thought and that its formation occurs over long periods of time by slow-moving forces still in operation in the present. Darwin was heavily influenced by Lyell's work and had himself experienced an earthquake in Chile during the course of his voyage. In the same country he had also discovered marine fossils in the Andes. Young Darwin quickly understood that Nature is all about constant change and movement - a truly revolutionary idea for his time.



The Beagle rounds the south-western point of Albemarle island, land of giant volcanoes*...



1st October, 1835. The Beagle anchors in Banks Cove,** Albemarle island



* Darwin and Fitzroy witnessed a "small jet of smoke curling from the summit of one the great craters." The crater in question was that of Sierra Negra.

** Today known as Tagus Cove

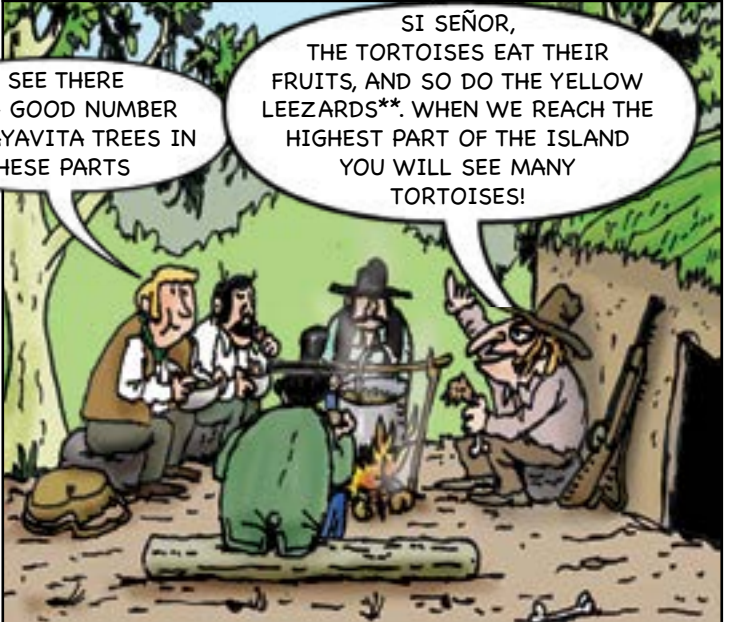
The following day, the Beagle sails for James island*



October 8th, 1835. Landfall at Buccaneer Cove, James island



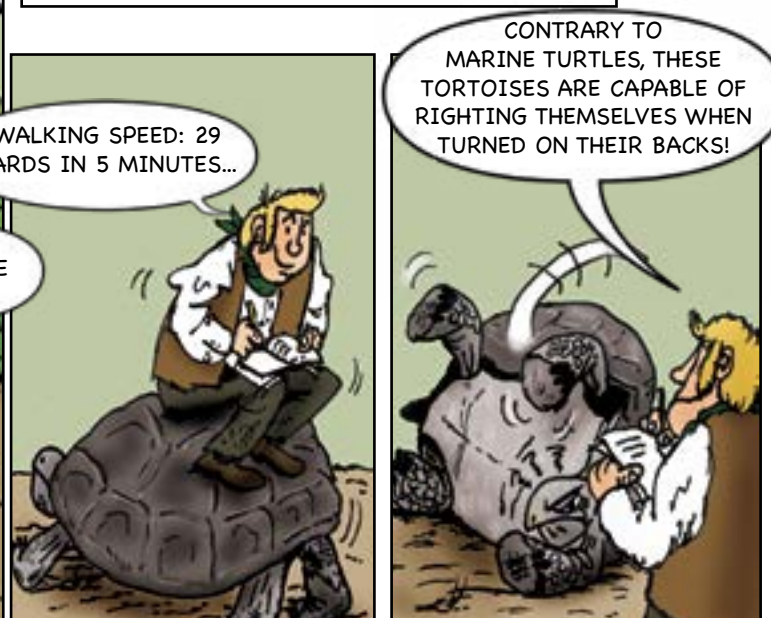
The following day, Darwin and his colleagues climb to the highlands, where they meet a party of Spaniards hunting tortoise...



In effect, at the summit of the island...



Enchanted, the young naturalist continues with his experiments...



* Santiago island
** Land iguanas

Back at his camp near the beach, Darwin continues his studies, measuring air and soil temperatures...



... observing and collecting more birds...

ANOTHER THENCA!
IS IT DISTINCT TO THOSE IN
THE OTHER ISLANDS? THEY ALL HAVE
THE SAME HABITS AS THOSE OF THE
CONTINENT - LIKE EATING THOSE BITS
OF MEAT, FOR EXAMPLE...

GOT A COUPLE
MORE GROSBEAKES
FOR OUR COLLECTION,
MR. DARWIN...



... and studying the habits of the land iguanas. Darwin was especially struck by the manner in which these creatures alternately use their left and right legs to dig burrows...



On his last night in the Galapagos Darwin is lucky enough to see Halley's Comet*



October 20th, 1835. After having briefly surveyed the islands of Darwin and Wolf, HMS Beagle finally turns its prow to the west and sets sail for Tahiti...

End of part 1

* The only comet of its kind that can be seen without a telescope, and of which recorded observations date back to 240 BC. First scientifically described by Edmond Halley (1656 - 1742), the comet passes Earth every 75 or 76 years. Its next appearance is due to occur in 2061.

October 2nd, 1836. The Beagle reaches England after having circumnavigated the world during 5 long years. Darwin settles in London and quickly seeks the society of fellow naturalists to help him organise the vast collection of specimens brought back from his voyage.



A few days after his arrival, Darwin is invited to the home of the great geologist, Charles Lyell, where he also meets Richard Owen, who shows a keen interest in the fossils Darwin has brought back from South America.



MY DEAR SIR, YOU DO REALISE THESE SOUTH AMERICAN SPECIMENS ARE QUITE DIFFERENT TO OUR EUROPEAN FOSSILS?!



OF COURSE! BUT WHAT IS TRULY SINGULAR ABOUT THEM IS THAT THEY REVEAL PAST LIFE FORMS VERY SIMILAR TO THOSE WE KNOW TODAY...ALMOST AS IF THEY WERE RELATED!

YOU'RE RIGHT MR. DARWIN. THESE GALÁPAGOS THENCA ARE SURELY RELATED TO THOSE ON THE CONTINENT, BUT THEY ARE 3 DIFFERENT SPECIES, EACH UNIQUE TO THE ISLANDS!



AS I SUSPECTED!



Another key acquaintance was the ornithologist John Gould, who identified the birds in Darwin's collection.



ONE SPECIES IS UNIQUE TO CHATHAM ISLAND, ANOTHER TO CHARLES ISLAND, AND THIS ONE IS ONLY FOUND ON JAMES ISLAND.



THREE SPECIES OF THENCA, EACH TO IT'S OWN ISLAND!

AND THE TORTOISES: MR. LAWSON SAID EACH ISLAND HAD IT'S OWN TORTOISE...

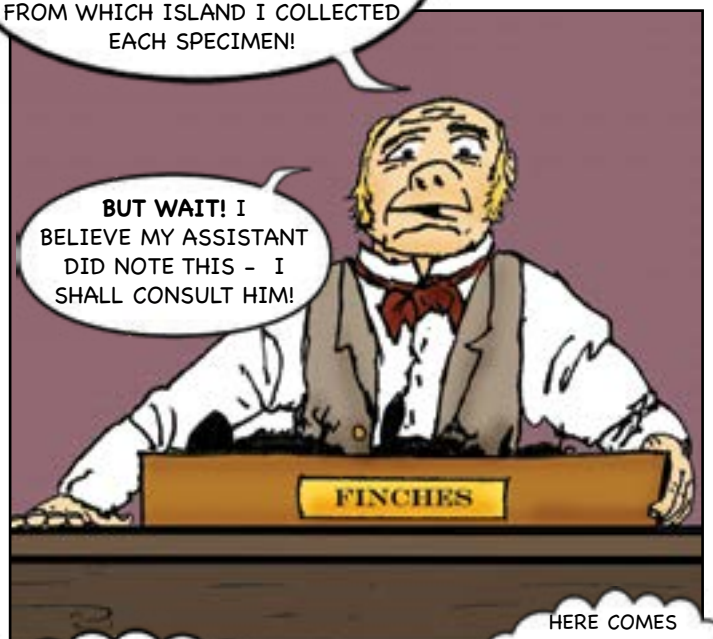
BUT WHY WERE THEY CREATED DIFFERENTLY?

INDEED YOU ARE RIGHT SIR! NOW I SEE IT: EACH HAS A DIFFERENTLY SHAPED BILL! HOW INTRIGUING...AS IF ONE ORIGINAL ANCESTOR HAD BEEN GRADUALLY CHANGING... IF ONLY I HAD NOTED FROM WHICH ISLAND I COLLECTED EACH SPECIMEN!

But Gould still had some surprises in store for Darwin regarding the study of the bird specimens. The next day in Gould's study...



HERE ARE YOUR GALAPAGOS FINCHES MR. DARWIN. BUT YOU SEE...THESE OTHER BIRDS YOU THOUGHT TO BE DIFFERENT ARE IN FACT ALSO FINCHES! THEY FORM A NEW GENUS, THE GEOSPIZA, OR "GROUND FINCHES".



BUT WAIT! I BELIEVE MY ASSISTANT DID NOTE THIS - I SHALL CONSULT HIM!

Darwin does not only frequent other naturalists: on a visit to London Zoo one day he meets Jenny the orangutan...



SO THIS IS THE APE EVERYONE'S TALKING ABOUT. BY JOVE, HOW VERY ALIKE IT IS TO HUMANS! ONE MIGHT ALMOST THINK WE ARE RELATED!

HERE COMES ANOTHER ONE STARING AND GAWPING...THEY REALLY DO LOOK LIKE ME, LESS EVOLVED OF COURSE...

SCRATCH SCRATCH

Between 1837 and 1838 Darwin pondered the similarities among the birds and tortoises of the Galápagos, and he asked himself if the forms of living beings may change through time. In July 1837 Darwin starts to write in secret about what he calls the "transmutation of species".

Darwin spends all his time writing down his ideas, analysing his observations and reading about geology.

If a pair arrives in an area, and is able to survive and reproduce, who is to say what may happen? Following this view, animals that live on different islands will transform as long as they remain separated from their ancestors. This may have happened to the thenca and tortoises of Galápagos.

Darwin struggles with the contradiction between what he sees and what everybody else - including the most distinguished minds of the period - believes: if each living being is created perfectly as they say, why is there so much evidence that those beings change?

WHY ARE THE THENCA, TORTOISES AND FINCHES OF GALÁPAGOS SO DIFFERENT IF THEY LIVE ON ALMOST IDENTICAL ISLANDS? AND IF ALL BEINGS ARE CREATED WHERE CONDITIONS ARE PERFECT FOR THEM, WHY ARE THERE SO FEW TYPES OF INSECTS IN THE HIGHLANDS OF GALÁPAGOS, WHERE THE VEGETATION IS IDEAL?

GALÁPAGOS HAS DIFFERENT THENCA SPECIES, ALL OF WHICH ARE RELATED TO THE ONE ON THE MAINLAND. SO SOMEHOW THEY REACHED GALÁPAGOS FROM THE CONTINENT AND CHANGED TO FORM DISTINCT SPECIES ON EACH ISLAND...

"This means that living beings were not created in one or other location to never change, but rather the contrary, when isolated they vary with time until they form distinct varieties and species..."

During this period Darwin befriended the botanist Joseph Hooker, who identified the plants collected on the voyage of the Beagle. Hooker's findings were startling...

LET'S SEE WHAT OLD HOOKER SAYS...
"...as you suspected, the plants of Galápagos are strongly related to those of the South American continent. Furthermore, of the 217 species that you collected from that region, 109 are unique to the Galápagos, and 85 of these exist in only one island!" EXACTLY LIKE THE THENCA AND TORTOISES!

Darwin's ideas contradicted the beliefs of an entire era. He feared public opinion so much that he decided to keep his findings to himself. In 1842 the Darwin family moves to the country: Down House in Kent, England.

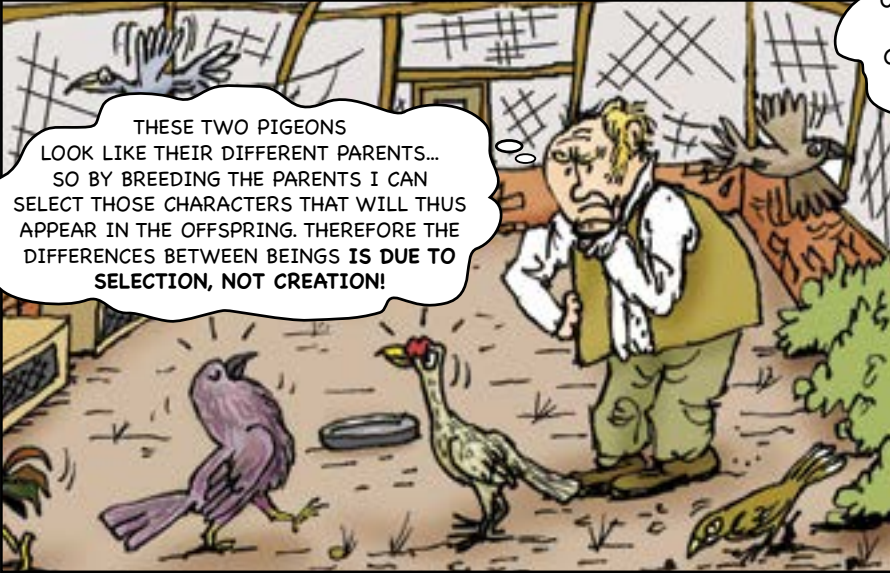


Installed in his new home, Darwin buries himself in experiments of natural history. He spends years classifying barnacles...



8 YEARS
STUDYING THESE
CREATURES: HOW I HATE THEM!
BUT THEY HAVE TAUGHT ME
MUCH ON VARIABILITY AND
PARENTHOOD AMONG
SPECIES...

Darwin also spends a huge amount of time, energy and money studying pigeons, which he breeds for the purpose. It is this study that unexpectedly gives Darwin an important clue towards completing his secret theory on the "transmutation of species": the idea of "selection" is born...



THESE TWO PIGEONS
LOOK LIKE THEIR DIFFERENT PARENTS...
SO BY BREEDING THE PARENTS I CAN
SELECT THOSE CHARACTERS THAT WILL THUS
APPEAR IN THE OFFSPRING. THEREFORE THE
DIFFERENCES BETWEEN BEINGS IS DUE TO
SELECTION, NOT CREATION!

BUT WAIT! IF HUMANS MAY THUS SELECT
CERTAIN TRAITS IN DOMESTIC ANIMALS THROUGH
BREEDING, NATURE MUST ALSO SELECT THE
CHARACTERS THAT RESULT IN THE FORMATION OF
NEW SPECIES...! THE QUESTION IS **HOW?!**



MALTHUS SAYS THAT
CONSUMERS REPRODUCE FASTER
THAN FOOD CAN GROW, WHICH
THEREFORE WILL NEVER BE SUFFICIENT
FOR ALL...THIS LEADS TO A "FIGHT FOR
SURVIVAL", WHERE ONLY THE BEST
PREPARED BEINGS WILL GET THE FOOD
THEY NEED, LEAVING THE WEAKER
INDIVIDUALS TO PERISH... HMMM



Thanks to his own observations and intense correspondence with fellow naturalists from all over the world, Darwin became more and more convinced that living things indeed change through time, and are not created as finished, fixed and perfect beings, as everyone else thought.
The many experiments Darwin conducted in his own home also showed him that by carefully selecting which males breed with which females, humans can truly determine the way domestic animals look and behave from one generation to the next.
But how this selective process works in Nature was still a mystery.
And then, in 1838, Darwin came across a manuscript written by a certain economist called **Thomas Malthus**...

At last, Darwin had found the missing piece in his theory of evolution: how species change through time. But these were dangerous ideas...everyone believed that all living things had been created by God, they were perfect, and they did not change. And so Darwin, terrified of public outcry, keeps his theory to himself. But he is still a God-fearing man, and as he nurses his guilty thoughts, the nightmares get worse and worse...

...THIS MEANS THAT ONLY THE INDIVIDUALS BEST ADAPTED TO THEIR ENVIRONMENT WILL SURVIVE AND BEAR OFFSPRING, LEAVING THE LESS ADAPTED ONES TO DIE WITHOUT BEING ABLE TO REPRODUCE... BUT-BUT THEN, COULD THIS BE NATURE'S WAY OF SELECTING WHICH CHARACTERISTICS GET PASSED ON FROM ONE GENERATION TO THE NEXT?! COULD THIS BE THE NATURAL MEANS OF SELECTION THAT DETERMINES HOW A SPECIES CAN GRADUALLY CHANGE THROUGH TIME?!



The years pass and Darwin continues his experiments and observations of plants and domestic animals. He jealously guards his terrible secret of the theory of natural selection and the transmutation of species. Until one day, an unexpected letter arrives from a young naturalist called Alfred Russel Wallace. Already suffering from chronic illness, the letter has a devastating effect on Darwin...



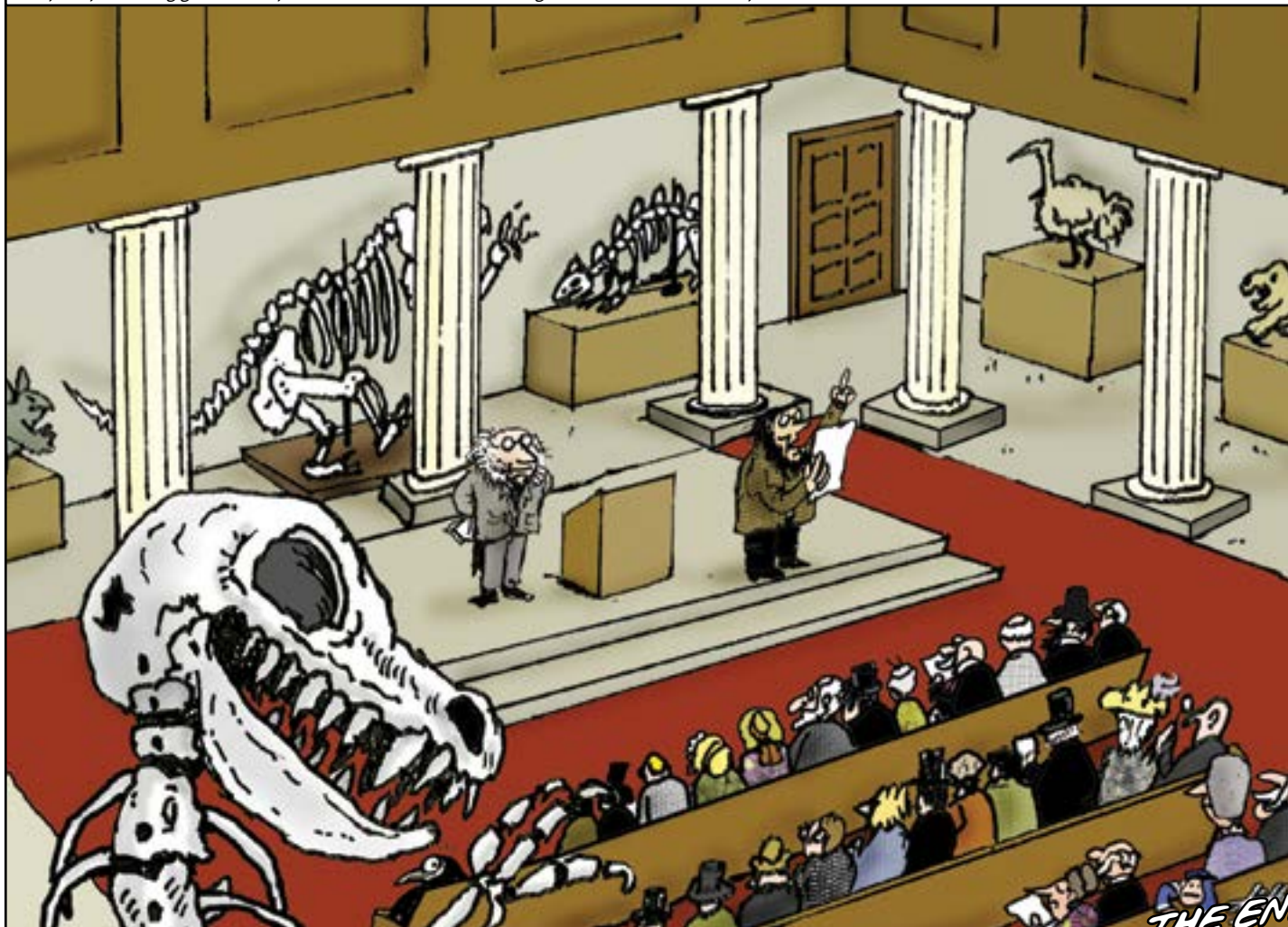
During his travels, young Wallace did a lot of his own thinking about the fabulous diversity he continually observed everywhere he went in the natural world. In 1858, during a bout of tropical fever while on a remote island of Indonesia, Wallace made the connection between the population theory of Thomas Malthus and the idea of natural selection. He scribbled his essay and sent it to Darwin, who he much admired, for review. After hiding his theory for so long, Darwin was stricken - 20 years of work summed up in a mere letter, a letter **written by someone else!**



Affected by the tragic illness of his young son, Darwin is at a loss. If he publishes his own work and ignores Wallace's letter, he will be seen as a thief of someone else's ideas, but if he allows Wallace's version of his theory to be published, he will have lost his life's work! What to do?!



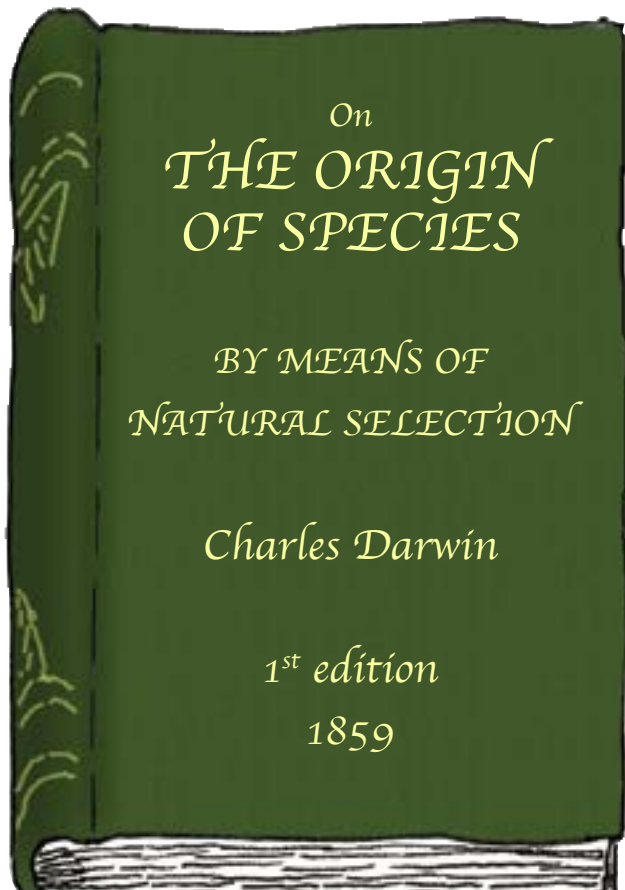
Happily, Darwin had made good friends in the distinguished scientists Joseph Hooker and Charles Lyell. They convinced Darwin to let them present both papers in a joint presentation that clearly marked Darwin's greater work while also recognising that of Wallace. The papers were read out on the 1st of July 1858 before the Linnean Society in London. With this elegant gesture, Darwin kept his due authority as chief discoverer of the theory of evolution by natural selection, and Wallace benefited from being given credit for his contribution and becoming associated with his more famous mentor.



Epilogue: what happened next?

The public, whose opinion Darwin had feared for so long, showed very little reaction to the first reading of the theory of evolution by natural selection.

Meanwhile, Darwin followed Lyell and Hooker's suggestion that he expose his theory in more detail, incorporating 20 years of observations, readings, experiments, correspondence and thought. The result was a 500 page book called "*On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*".



Published in 6 editions during Darwin's lifetime and translated into 18 languages, *On the Origin of Species* is one of the most important scientific works of all time.

The book was made available on the 24th November 1859: all 2,500 copies printed were sold out in one day, and provoked a huge, widespread and varied public opinion.



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Darwin's legacy

Darwin explained things about the natural world that were very new for his time. Apart from the theory of natural selection he established other scientific facts that were proved by future thinkers decades later. For example, Darwin understood that continents are continually getting further away from each other, an idea that was at first rejected, then suspected by scientists as late as 1912, before being finally confirmed by more modern techniques 40 years later!

Darwin's work opened the doors to many modern scientific fields, such as biology, psychology, ethology (the study of animal behaviour) and ecology (the study of how living beings relate to each other and their environment).



What is natural selection?

It's actually very simple! Here are the basic principles:

1. No living being is exactly the same as any other: each has different traits. These traits are physical (e.g. the size of a bird's bill) and behavioural (e.g. feeding technique). Because they vary between individuals, these traits are called "variations".
2. When a living being reproduces, it transmits part of its variations to its offspring. In this way, offspring receive variations from both parents.
3. Those offspring who inherit the particular combination of each of their parents' variations that allow them to cope better with the environment are more likely to survive and reproduce in turn. If they succeed, they then pass on those "winning" traits to their own

offspring, and so on. This is what we mean when we talk about “natural selection”.

4. When a population of any given species is for any reason isolated from other members of its species (sometimes for millions of years), the process of natural selection can change the isolated population so much that over time the members of that isolated group end up looking and acting very differently to the original, ancestor species. After such a change, members of the isolated group will no longer be able to reproduce with individuals more closely resembling the original species, their common ancestor. This is how new species are formed, and the process is called the “evolution of species”.

Let us look at a simple example:

Imagine that millions of years ago, several finches got blown over to the Galápagos islands from the South American continent. Because all individuals are a bit different to each other, no two finches were identical. Let us say that one of the traits that varied between finches was the size of their bill.

Let us think now that some of these colonising finches became stranded on an island where the only food was very hard seeds. Because the finches could not get off the island (they were isolated), only those with bills big and strong enough to crack the seeds could survive and reproduce. The ones with smaller, weaker bills died of hunger.



In this way, big bills gradually became a favourable trait for survival on that particular island, and as such were passed on through the generations of finches isolated there. Finches born with insufficiently large bills to crack the seeds died off, leaving only the big-billed individuals. After a few generations of this, all the finches on the island had big bills - no more finches with small bills were being born.



Anyone landing on the island now would only find finches with large bills. Even though those finches were originally from the same species as those on the mainland or any that landed on other islands where conditions were different, they had changed

to such an extent that they no longer resembled or behaved like their ancestors: they had become a new species, and this happened by evolution through natural selection.



“Can’t eat this, can’t eat that! These finches are impossible!”
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Darwin the revolutionary

Darwin lived at a time when everyone believed without question that the natural world had been created by God, perfectly and unchangeably. The very idea that a plant or animal could evolve into something else was completely new and very daring.

This is why Darwin’s thoughts were revolutionary: although the idea of evolution had been around for some time, Darwin was the first to provide a convincing explanation of *how it worked*. The theory of natural selection showed how a living being can change through time through a natural process, and not by the will of God. Darwin also said that humans are animals, subject to natural selection and evolution, and not created by God in His image.

Few people realise that Darwin himself was religious. He never denied the existence of God, but rather saw the process of natural selection as God’s way of managing the natural world. This view was common at the time, and enabled science to advance with the blessing of the Church.

Darwin’s legacy in the Galápagos islands

The name of Charles Darwin is everywhere in the Galápagos: he was the first person to let the world know about the natural marvels on these unique islands. Hundreds of years ago the Galápagos were known to sailors only as a hellish place with nothing but rocks, volcanoes and thorns. However, in just five weeks Darwin changed that view for ever. The

specimens, observations and notes he and his assistants made during the epic *Beagle* voyage provided ample evidence that the Galápagos islands were, and still are, more like a natural paradise on Earth. The Galápagos are today considered a wonder, a natural heritage to be treasured and protected for ever.

Now that we know a little bit more about Charles Darwin and his work, we can follow his footsteps and each do what we can to treasure and care for the natural environment we live in. And if you are lucky enough to spend time on the Galápagos islands, remember how important they are, and do what you can to help the people who live there protect them and the life they sustain.

A moment of reflection...

Darwin's theory of evolution by means of natural selection shows that living beings today are alive because they are adapted to the place and time they live in. They are survivors - for now. But as conditions change, the species those beings belong to also need to change if they are to survive.

And so species continue to evolve, generation by generation, each individual plant and animal challenged to survive in a constantly changing environment. It has been this way for millions and millions of years, since the first life on Earth.

And yet, humans can wipe it all away in seconds: our modern way of life is responsible for the instant destruction of countless numbers of living beings all over the world, all of which are the result of millions of years of evolution by natural selection. It happens all the time. **Its happening right now.**

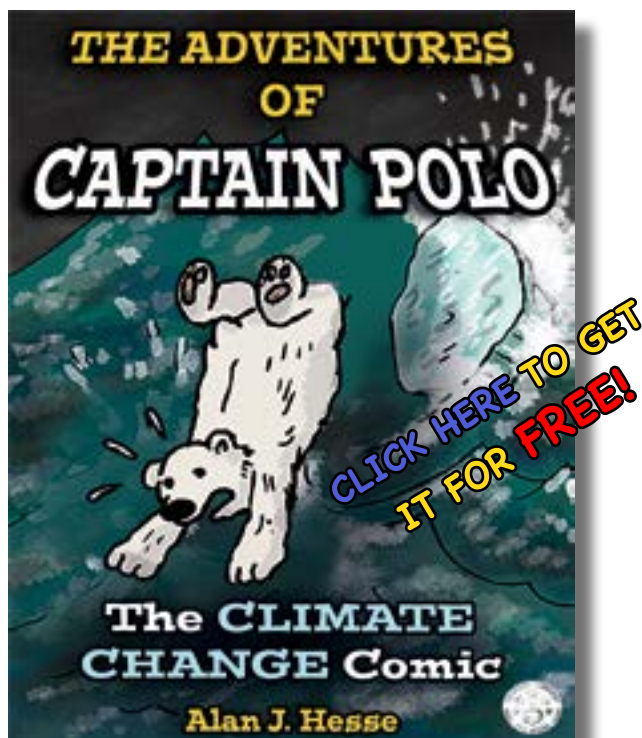
No one of us can save the world. Not all of it. Not even Darwin could do that. But what Darwin did do was change the way we understand life on Earth.

Now its your turn: what can you do?

Thank you for reading this book. If you enjoyed it, I would be very grateful for a review. I read every review personally and I want this book to be as valuable as possible to all my readers!



Other educational comics by Alan J. Hesse



Information on climate change and global warming is often overwhelming and confusing.

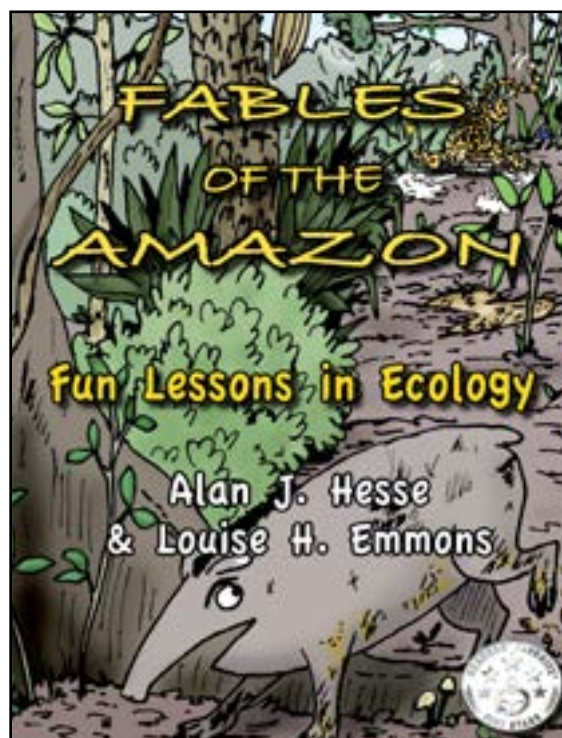
This action-packed, funny comic will sweep you into a global journey of discovery that will help you understand the causes and effects of climate change around the world, what people are doing about it, and how each one of us can make a difference. This comic is for curious kids (ages 9+), attentive parents, creative teachers and anyone who is concerned about climate change and wants to learn more by reading a fiction story that is visually stimulating, fun to read and scientifically accurate.



"The comic book speaks about the problems that arise after deforestation, erosion, habitat loss, and more. It is a good story to spread awareness of climate change and I am sure, like me, that young readers will be waiting for the next book in the series."
Mamta Madhavan, Readers Favorite



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Explore the secrets of the Amazon jungle in this comic book of children's fables

The funny comic strips in this book feature facts about jungle animals drawn from actual field observations made by the conservation scientist authors.

Natural history and ecology are fascinating but complex subjects. What better way to discover them than through a comic that is both funny and scientifically accurate?

A perfect learning resource for nature-loving kids and adults, as well as for science teachers!



"Fables of the Amazon delivers important forest lessons, animal facts, and moral tales through humorous stories and vivid images that will broaden children's minds to the unique world of the Amazon."

Liz Konkel, Readers Favorite



[Read the full review](#)



About the author

Alan J. Hesse believes in the power of storytelling to change the minds and hearts of people of all ages and backgrounds.

Alan is a conservation biologist, cartoonist and comic author. He believes that we must all do what we can to preserve our planet's fragile ecosystems and wildlife. By creating educational and entertaining [comics](#) and [cartoons](#) about the environment and human wellbeing, Alan hopes to inform, entertain and inspire readers from all over the world.

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This comic is based on historical facts obtained from the following sources:

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