THE ORIGIN OF SPECIES

BY MEANS OF NATURAL SELECTION

OR

THE PRESERVATION OF FAVOURED RACES
IN THE STRUGGLE FOR LIFE

CHARLES DARWIN

(ADAPTED FOR SCHOOLS BY BEN ROGERS)

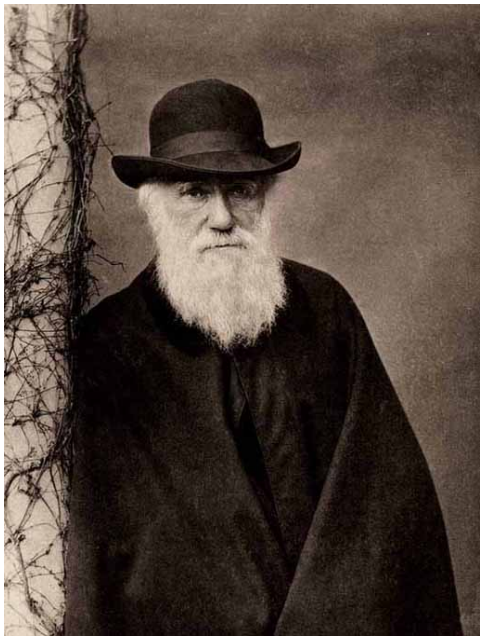
ADAPTOR'S NOTE

THE Origin of Species by Charles Darwin is one of the most important books ever written. It is unique in science writing both because of its importance (Natural Selection is the preeminent scientific idea of the 19th Century) and the clarity of the writing. It precipitated a fundamental change in the way mankind sees itself. Yet is is seldom read.

My aim is to adapt the text so that it can be appreciated by school children. I have avoided simplifying or updating the terminology and have used Darwin's phrases where possible. It is not an adaptation for young readers, although I believe such a text could be written. The text is suitable for readers who, with support, can use background knowledge and infer meaning in texts. Using the teaching strategies at the end of the text, the majority of fourteen year olds are able to read and get satisfaction from reading and understanding the words of one of the world's greatest thinkers.

Finally, I am a science teacher and a literacy teacher. I am not a Darwin scholar. I would appreciate feedback and will happily update this adaptation.

Ben Rogers, October 2014. Norwich.



INTRODUCTION

WHEN on board the H.M.S. *Beagle*, as a naturalist, I was much struck with certain facts about the distribution of the inhabitants of South America. These facts seemed to me to throw some light on the origin of species - that mystery of mysteries. It occurred to me, in 1837, that something might perhaps be made of this question by patiently accumulating and reflecting on all sorts of facts which could have any bearing on it.

My work is now nearly finished. Although much remains obscure, and will long remain obscure, I have no doubt that the view I used to entertain - namely that each species has been independently created - is wrong. I am fully convinced that species can change. Furthermore, I am convinced that Natural Selection has been the main means of change.

VARIATION UNDER DOMESTICATION

Causes of Variability - Inheritance - Principle of Selection

WHEN we look at the individuals of domesticated animals, for example dogs, one of the first things we notice is how much they differ from each other: far more than individuals of any species in a state of nature. For example, there is much more variation between dogs (compare greyhounds, bloodhounds, terriers, spaniels and bull-dogs) than between species of fox. Dogs have a wider range of size, colour, build and even temperament. Wild fox species, on the other hand, show very little variation.

I am strongly inclined to suspect that the most frequent cause of variability is due to inheritance from the parents. The young from the same litter of pups sometimes differ considerably from each other, even though they have been exposed to the same conditions. This shows how important the laws of inheritance are compared to living conditions. If the effect of the conditions were direct, all of the litter would probably have varied in the same way. My impression is, that heat, moisture, light, food, &c. have very little effect, whereas, inheritance from parents is of great importance.

Believing that it is always best to study some special group, I have taken up domestic pigeons. I have kept every breed I could obtain and have been most kindly favoured with skins from several quarters of the world. The diversity of breeds is something astonishing. Compare the English carrier pigeon and the short faced tumbler, and see the wonderful difference in their beaks. The male carrier is remarkable from the wonderful development of the carunculated skin about the head, accompanied by the greatly elongated eyelids and wide gape of mouth. The tumbler has the singular habit of tumbling in the air head over heals. The pouter pigeon has an enormously developed crop, which it glories in inflating. The fantail has thirty or even forty tail-feathers, instead of the usual twelve or fourteen. The differences between the breeds of pigeons are great, yet I am fully convinced that all of them have descended from the rock-pigeon (Columba livia).

We cannot suppose that all breeds were suddenly produced as perfect and as useful as we now see them. The key is man's power of gradual and accumulative selection. This selection results from generations of breeders choosing the best individual animals. It is certain that animal breeders even within a single lifetime have significantly modified some breeds of cattle and sheep. This selection has been carried out since antiquity leading to the breeds we see today.

I must now say a few words on the circumstances to man’s power of selection. A high degree of variability is favourable, providing the breeder with more choices. Small differences in the ancestor rock-pigeons have been selected over time leading to the differences we see today. The number of individuals available to the breeder is also important as more individuals provide a greater choice.

To sum up on the origin of our Domestic Races of animal and plants. The differences between the breeds of domesticated plants and animals is very great. I am convinced that the cause of Change is mankind’s use of Selection.

LESSON NOTES

Reading this adaptation of *The Origin of Species* should be the finale of a sequence of study. Reading it is the equivalent of a performance after much rehearsal. For a modern reader, a significant amount of background knowledge is required. These lesson notes offer a sequence of learning activities to prepare the reader for the final text.

INTRODUCTION

The introduction is a brief text, but it gives the reader and teacher the opportunity to explore the social and scientific context of the book when it was published.

ACTIVITY 1: There are many videos available on the internet to support this text. An example from the BBC is https://www.youtube.com/watch?v=TSVsXrAJEuc. This could be watched at home.

ACTIVITY 2: Discussion. Was Darwin's idea dangerous? I recommend using Philosophy for Children techniques (e.g. http://www.sapere.org.uk/default.aspx?tabid=162) to discuss this with the class.

ACTIVITY 3: Writing is an effective way to ensure children think carefully about an idea. I suggest they write an answer to the question: Was Darwin's Idea Dangerous? Even a short answer (1 paragraph) will support effective reasoning.

ACTIVITY 4: Read the INTRODUCTION. The teacher should judge whether students read this independently, in small groups to each other, or whether the teacher should read it aloud to the class.

CHAPTER 1: VARIATION UNDER DOMESTICATION

This chapter is Darwin's gentle introduction to a controversial idea. Darwin uses examples familiar to the reader to describe how breeds have changed over time by selection by man. These ideas introduce the reader to the idea that species change: they are not immutable.

ACTIVITY 1: How selective breeding works.

Part 1: Which plants and animals have been bred? Use examples (with images) of domestic animals including dogs, and domesticated plants, for example varieties of apple.

Part 2: How are they bred? The breeder chooses individuals with the characteristics she wants to develop in the next generation. She breeds the parents together so that the offspring inherit the chosen characteristics.

ACTIVITY 2: Vocabulary. Key terms needed to understand the text are:

Inherit:	When the offspring have characteristics from their parents.
Selection:	Choosing the individuals with chosen characteristics to breed together.
Variation:	When individuals have different characteristics, for example colour differences, size differences and behaviour differences.
Breeding:	Choosing parents with identified characteristics to breed together to produce offspring with the desired characteristics.

ACTIVITY 3: Complete these tables.

Give examples of domesticated species.

Domesticated Animals	**Domesticated Plants**
Dogs	Apples

Identify useful characteristics a breeder might want to develop.

Useful Characteristics of Dogs	**Useful Characteristics of Apples**
Good sense of smell	Taste

ACTIVITY 4: Text version 1. Use this extremely simplified version to introduce chapter 1.

1. Domesticated animals vary more than wild animals. Give the example of dogs and foxes.
2. Characteristics are inherited from the parents. Give the example of breeding two different varieties of dog together: e.g. dalmations and greyhounds. Ask the pupils to predict the characteristics the puppies will inherit.
3. Darwin studies pigeons to get a better understanding of selection. Show images of types of pigeons. (Fantail, pouter, tumbler, carrier and the original rock-pigeon).
4. Breeders have chosen the best animals and plants to breed together over thousands of years to produce varieties.
5. Breeders need individuals that vary so that they can make choices.

ACTIVITY 5: Sentence starters - complete these sentences:

Domestication is the process of taking a wild plant or animal and…

Breeders choose individuals with the best characteristics so that…

Breeders need a large group of individuals to choose from because…

Breeders need the individuals to vary so that….

Information: Darwin began breeding pigeons to understand the process of selection better. Use this information to complete the sentence from Darwin's point of view:

Believing it is always best to study a special group, I have...

ACTIVITY 5: Read CHAPTER 1.