

# The Socotra archipelago

Twenty-first century Galápagos



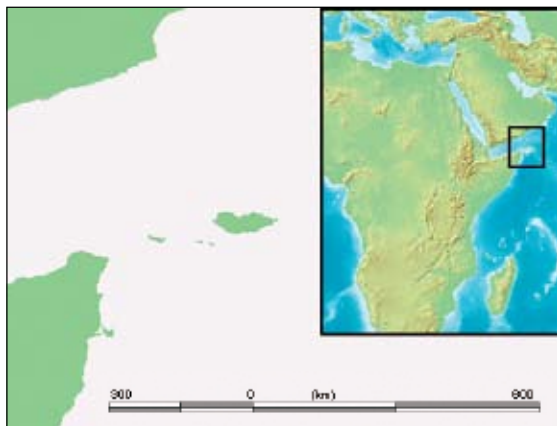
**Key words**  
biodiversity  
endemic species  
selection pressure

*Socotra is a small archipelago of four islands in the Indian Ocean off the horn of Africa, belonging to the Republic of Yemen. The islands are becoming famous for their range of animal and plant species. John Stacey explains what Charles Darwin might have made of a visit to this wildlife haven.*

The main island has three geographical terrains, narrow coastal plains, a limestone plateau and the Haggier Mountains. Socotra was recognised by UNESCO as a world heritage site in July 2008. It is considered the ‘jewel’ of biodiversity in the Arabian sea and has been described as the Galápagos of the East. Socotra is a **biodiversity** ‘hotspot’, a biogeographic region with a significant reservoir of biodiversity frequently threatened with destruction.

Socotra is in the Indian Ocean, part of the Republic of Yemen.

The Galápagos Islands, which were visited by Darwin, are in the Pacific Ocean and are part of Ecuador.



## Endemic or endangered?

In common with many islands one of the most interesting aspects of the biodiversity is the large number of **endemic species** (Box 2), (endemism) that have already been identified by a very limited number of scientific surveys. Isolation, heat and drought have encouraged the development of endemism (the presence of species found nowhere else on Earth).

An *endemic* species should not be confused with an *endangered* species, a species with a declining population in danger of extinction, even though it may be found in several places. Some endemic species may also be endangered, usually due to habitat change. This could be caused by expanding human developments or reduction of suitable habitat.

Charles Darwin would have had to have spent some time on either the mainland of the horn of Africa or Yemen to become familiar with the main species of plants and animals. He would have then had to land on Socotra between October and May as even now the island is inaccessible between June and September due to severe monsoon weather. He would have quickly noticed the large number of endemic plant species, with an average density about twice that of the Galápagos archipelago.

	Land area km <sup>2</sup>	Plant species	Endemic species
Galápagos archipelago	7 844	543	229 (42%)
Socotra archipelago	3 799	825	307 (37%)

He would have seen a bird called the Socotra bunting and would have been able to collect and describe its eleven to fourteen subspecies. Subspecies are regarded as an intermediate stage in of the process of speciation, the formation of new species. They are physically distinct but they are capable of interbreeding to produce fertile offspring in areas were their habitats overlap.

The reptiles, especially 15 endemic species of geckos, would also have been of great interest to him.

Biological group	Number of endemic species
plants	307
insects	113
reptiles	26
birds	6

## Darwin gets thinking

On the Galápagos, Darwin noticed some species of Mockingbirds which were different on different islands in the group. It was this observation which got him thinking about how species change. In ‘The Voyage of the Beagle’ he commented

*“My attention was first thoroughly aroused by comparing together the various specimens ... of the mocking-thrush ...”*

And

*“Although the species are thus peculiar to the archipelago, yet nearly all in their general structure, habits, colour of feathers, and even tone of voice are strictly American.”*

And famously

*“It never occurred to me, that the productions of islands only a few miles apart, and placed under the same physical conditions, would be dissimilar. I therefore did not attempt to make a series of specimens from the separate islands. It is the fate of every voyager, when he has just discovered what object in any place is more particularly worthy of his attention, to be hurried from it.”*

It seems likely that he would have been encouraged down a similar way of thinking if he had been in the Socotra archipelago rather than the Galápagos one.

In addition to these animals, Darwin would also have been fascinated by the endemic plant genera, of which there are ten. Here are the three most famous and easily seen:



A succulent, the desert rose (*Adenium socotranum*). This has a thickened short perennial stem. It uses cell sap cycling within the caudex (thickened stem) to prevent overheating as a specific adaptation to the arid climatic conditions on Socotra.



The dragon’s blood tree (*Dracaena cinnabari*) gives a red sap used as a medicine and a dye.



The cucumber tree (*Dendrosicyos socotrana*) is the only member of the cucumber family to grow as a tree. It also has a caudex stem.

## The future for endemic species on Socotra

So, this island group would have provided Darwin with all the raw material for thought which he got in the Galápagos. And, also like the present day Galápagos, this unique place is under threat from humans. The three unique plants species named above are all under threat of extinction in the wild. A significant number of species are already registered on the IUCN endangered list, even though very little development has taken place on the islands. The expanding population of goats, the sinking of boreholes to obtain water for stock animals, and introduced rat populations preying on many endemic species.

Of the three main habitats the coastal plains are more degraded than the limestone plateau as they are more accessible for humans and livestock. The trees growing further inland are beginning to be threatened by harvesting of fodder for livestock. And there is now an airport on Socotra with one flight a week from the mainland. Ecotourism is just beginning and at present there are very few facilities for visitors. It remains to be seen to what extent visitors to Socotra cause degradation of habitats leading to extinction in the wild.

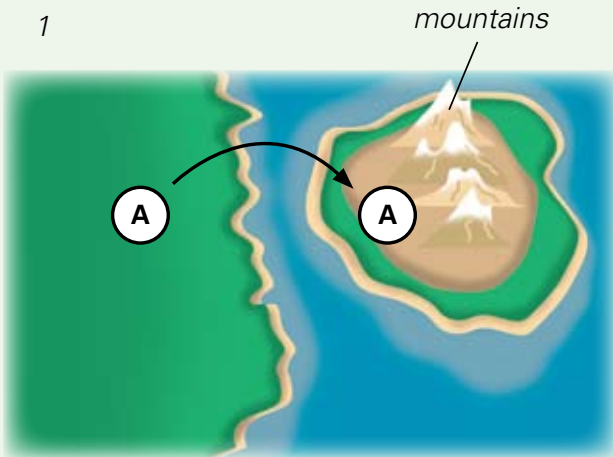
### BOX 1 Natural Selection

Darwin’s real achievement was to suggest the simple, but very powerful, idea of Natural Selection. This idea relies on just a few simple steps:

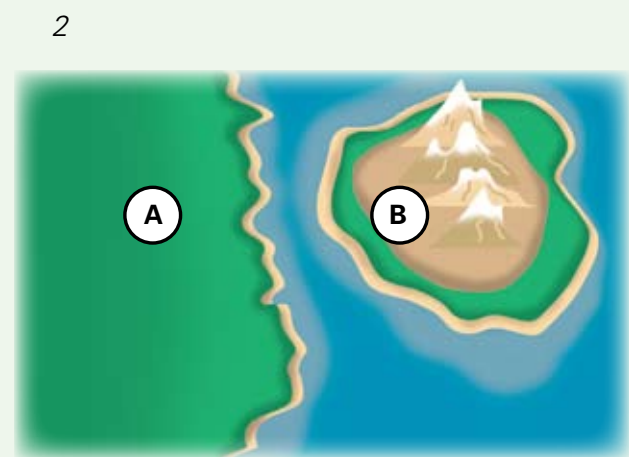
- Living things produce more offspring than are needed to replace themselves, but populations stay about constant.
- Members of a species vary.
- This variation can be passed on (inherited) from parents to offspring.
- Those with advantages tend to survive better and (this is the important point) leave more offspring who carry their advantageous features.

## BOX 2 Endemism

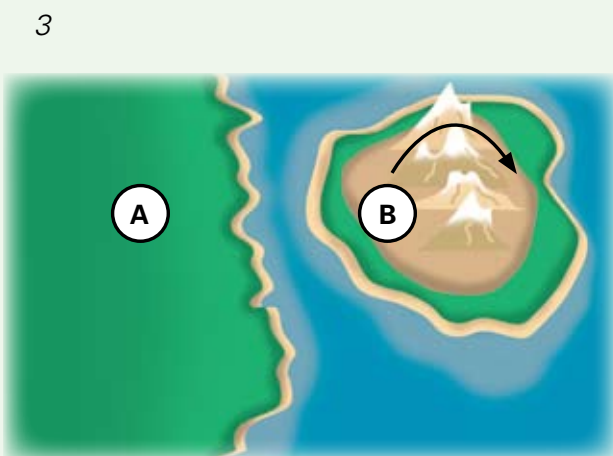
Endemic species may be formed when a small population becomes geographically isolated from a main population, like organisms on an island isolated from those on the mainland. The gene pool of the founder population is likely to be less diverse as the island population will initially be small. The new environment will provide different **selection pressures** (see Box 1) on the individuals favouring the passage of genes which give a selective advantage into the next generation. In addition, some genes will be lost randomly because the founder population is small and they were not passed on to any individuals simply by chance. The genetic, behavioural and structural differences become sufficiently different that breeding to produce fertile offspring with members of the ancestral mainland population is not possible.



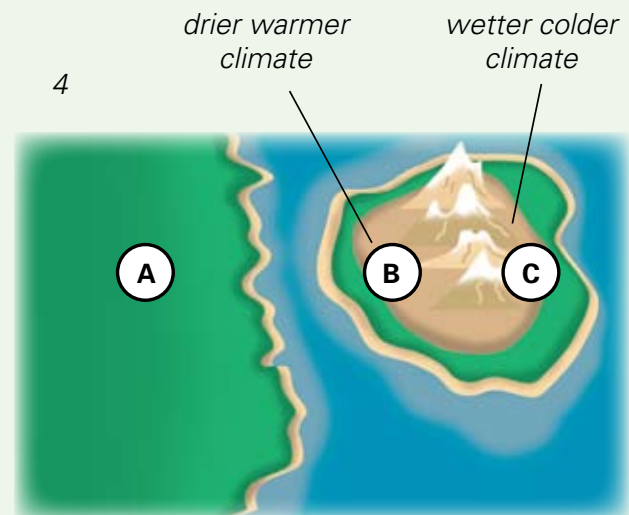
Some of population A is carried from the mainland to the island.



Isolated from population A, the island population eventually evolves to form a new species, B.



Some of the population B moves over the mountains to the opposite side of the island.



Isolated from population B, a new species, C, evolves due to the different selection pressures on that side of the mountain range.

The Socotra Archipelago Conservation and Development Programme (SCDP) is an attempt by the Republic of Yemen to conserve and develop in a sustainable way the group of islands with the help of the United Nations Development Programme.

John Stacey is a biologist based in Rye, Sussex, UK.

### Look here!

The SCDP website: [www.socotraisland.org](http://www.socotraisland.org)

Friends of Socotra: [www.friendsofsocotra.org](http://www.friendsofsocotra.org)