

What is a species?

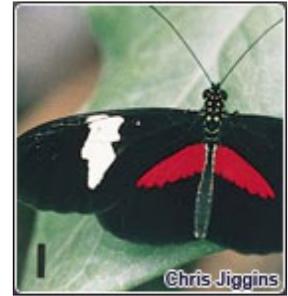


'The origin of species by means of natural selection' is Darwin's most famous book. But what is a species?

Four definitions

Here are four different concepts that have been put forward to define a species:

1. *Typological species*: If it looks like it's the same species – then it is.
2. *Biological species concept*: simply, two individuals are members of the same species if they can mate to produce fertile offspring.
3. *Evolutionary species*: this definition has been used by palaeontologists studying fossils through geological time. G. G. Simpson has defined it as, "a lineage evolving separately from others and with its own unitary evolutionary role and tendencies".
4. *Nominalist species concept*: This thinking argues that the concept of a species is merely an arbitrary bracketing of individuals, and therefore species as such don't exist. Whilst philosophically interesting this concept is of little use practically and is commonly refuted by the observation that cultures from across the globe recognise a species – suggesting that it is more than an arbitrary western concept.



Defining problems

Today, biologists most commonly use the biological species concept. However, even this simple definition encounters problems.

Many species reproduce clonally, without sex. Good examples are bacteria, amoeba and many other microorganisms. But even bigger animals can challenge the concept of a biological species. Sometimes, sexually reproducing greenfly (aphids) experience a mutation that causes females to produce clones of themselves. If the aphid finds itself in a good environment, the rapid production of identical clones builds up large populations, this is one reason they are such a successful pest.

Since, in this scenario, there is no mating we can't use the biological species concept, as that would mean that each greenfly was a member of its own individual species!

Many aphids do in fact revert to producing sexually at the end of the season. Yet some species consist entirely of females and only reproduce clonally. This type of reproduction is called parthenogenesis and is even found in some vertebrates, including species of fish and lizard, and means the biological species concept really can't be applied.

Instead we can revert to other definitions of species based of what organisms look like. This is what [Linnaeus](#) mainly used in his original classification and what we are forced to use today when classifying fossils, since fossils do not mate.

Promiscuous butterflies and choosy partners



However relying just on looks can be deceptive.

Two species of butterfly, *Heliconius himera* (top right) and *Heliconius erato* (left), look completely different. However, they have been found to mate and form hybrids in the wild!

At the other end of the scale, so called 'cryptic species' look very similar but don't mate. For example, one species of fig tree is pollinated by four cryptic species of tiny wasps.