WHAT'S SO IMPORTANT ABOUT NAMES?

Topics Covered:

- **Classification and taxonomy**
- **Understanding the importance of Linnaeus's contribution to science**
- **Making and using keys**

What's in a name?

Giving something a name allows us to talk about it. Names are important not only for people, but also for the plants we cultivate in our gardens. In the early days of botany (the 17th and early 18th centuries) plants were given long Latin phrases for names that described their particular features. As more plants became known, names tended to become longer, and much more difficult to remember and use. Then, in the 18th century, a Swedish biologist named Carl Linnaeus developed and popularised a two-name (binomial) system for all plant species—GENUS and SPECIES. His system is still in use today.

GENUS: **A group of organisms that have certain characteristics in common but can be divided further into other groups (i.e. into species)**

SPECIES: **A useful definition of a species is a group of organisms which can interbreed to produce fertile offspring**

Binomial names

The use of only two words (the binomial name) made it much easier to categorise and compare different plants and animals.

Imagine, for instance, talking about a type of geranium using the old name:

Geranium pedunculis bifloris, caule dichotomo erecto, foliis quinquepartitis incisis; summis sessilibus

The binomial name is much easier to use:

Geranium maculatum

Who was Carl Linnaeus?

Carl Linnaeus (1707–1778) was born and brought up in and around Råshult, in the countryside of southern Sweden. Linnaeus constantly pestered his father—a pastor and keen gardener—to tell him the names of the plants that grew around their home, showing a fascination with the naming of things that would never leave him.

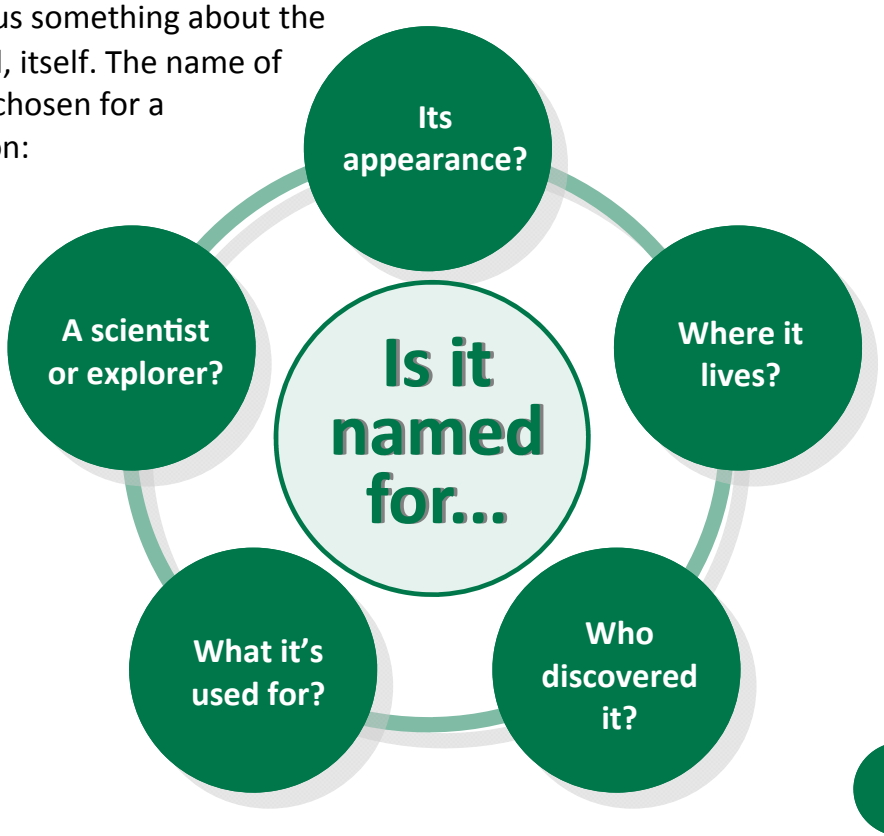
He used his binomial naming system in his book *Species Plantarum* or *The Species of Plants* (published in 1753), naming and classifying over 9,000 plant species. He did the same for animals in his book *Systema Naturae*.

Q1 Giving every type of living thing two names is a bit like you having a first name and a surname. Which of your two names (first name or surname) is equivalent to the genus and which to the species (think carefully)?

Q2 Can you think of any other binomial names? Give two examples.

Every Name has a Story

Linnaeus used Latin for his names, but many names were also Latinised versions of other languages, like Greek. He used Latin because not only was it the language of science, but because it was a common language throughout the world. It meant a Latin name could be understood by anyone. Though Linnaeus avoided long, wordy descriptions, his binomial names still tell us something about the plant, or animal, itself. The name of an organism is chosen for a particular reason:



Plants named for their APPEARANCE

Linnaeus used many descriptive names because they are simple and easy to remember. *Trillium erectum,* for instance, is named for its three bracts, petals and sepals (*tri-* meaning three). *Carex remota* is named for its widely spaced flower heads (*remota* means scattered).

Colour is a common characteristic used in plant names. *Geranium phaeum* refers to the dusky red colour of the flowers, from *phaeos*, the Greek for dark coloured; *Geranium maculatum* is also known as the Spotted Geranium (*macula* is Latin for spot). Botanists can also be poetic in their choice of characteristics to use as names—the delicate *Primula auricula* is named for the shape of its petals (*auricula* means little ear).

Top right: *Trillium erectum*, with its three bracts, petals and sepals
Bottom right: *Primula auricula*, and its ear-shaped petals

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Plants named for WHERE THEY GROW

Some plants grow only in certain places and are named for the area in which they grow, using Latinised versions of the place names. For example *Iris sibirica* is from Eastern Russia (including Siberia), or think about the name of the tea plant, *Camellia sinensis*— 'sinensis' is the Latin for China.

Plant names can also be used to tell us something about the habitat the plant is found in. *Sylva* means woods, which can be found in many woodland plant names, like *Geranium sylvaticum* and *Fagus sylvatica*. Or there is *Geum rivale,* a plant that grows in wet places, shown in its name—*rivale* means 'growing by streams'.

Top left: *Camellia sinensis*, the tea plant native to China
Bottom left: *Geum rivale,* grows in wet places

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Plants named for their USES

Plants with the species name '*officinalis*' were probably once used as a medicine. The name comes from *opificina* which referred to a storeroom in a monastery—monks were skilled in the medical uses of plants. Some plants were believed to have healing properties if they resembled a part of the body. The plant name *Pulmonaria officinalis* looks at both of these origins—*Pulmonaria* refers to the plant's spotted leaves resembling lungs and was thought to relieve lung conditions. Plant names can also reveal their specific medical use. *Anthyllis vulneraria* was used by the Greeks and Romans to heal wounds—*vulnas* means wound.

Other names point to a plant's use. *Pisum sativum,* or the garden pea, is so named to show that is was used for food (*sativus* means sown or cultivated).

Top right: *Pulmonaria officinalis*, with its 'lung-like' leaves
Bottom right: *Pisum sativum,* cultivated for food

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Plants named for PEOPLE

Linnaeus often named plants after the people who collected them, or even after his friends! This still happens today. One example is the plant genus *Sarracenia* (a carnivorous plant) named after physician Michael Sarrazin who used it to treat smallpox. The genus *Banksia* is named for Sir Joseph Banks, who accompanied Captain Cook on the *Endeavour* voyage as a botanist, bringing back many new Australian species to Europe.

Linnaeus was also known to name plants after people he didn't like—when botanist Johann Sigesebeck was dismissive about Linnaeus's work, Linnaeus named an unattractive weed after him—*Sigesbeckia orientalis*, a name still in use today. What a legacy!

Top left: *Sarracenia alata x leucophylla,* named for Michael Sarrazin
Bottom left: *Banksia menziesii,* named for Joseph Banks

GUESS THE NAME

Try matching the names to the plants shown here (a table of useful Latin/Greek descriptions is there to help you). The Latin/Greek will form PART of a word, so bear this in mind when you look at the names. Remember, look at all the characteristics—what colour is it? Is it smooth or spiny? Does it have a certain number of features? Place the correct letter in the box in each picture.

A Solanum lasiocarpum
B Calochortus striatus
C Auricularia auricula-judae
D Banksia coccinea
E Pachystachys lutea
F Trillium ovatum

COLOURS

LATIN (L) or GREEK (G)	ENGLISH
Albus (L)	White
Coccineus (L)	Bright red
Luteus (L)	Golden yellow

NUMBERS

LATIN (L) or GREEK (G)	ENGLISH
Uni- (L & G)	One
Di- (L & G)	Two
Tri- (L & G)	Three

TEXTURES, SHAPES and PATTERNS

LATIN (L) or GREEK (G)	ENGLISH
Aculeatus (L)	Prickly
Auricula (L)	Ear-like
Lasio (G)	Hairy
Ovi- (L)	Egg-shaped/oval
Rhytis (G)	Wrinkled
Stria (L)	Lines, striped
Tomentosus (L)	Furry
Umbella (L)	Umbrella-shaped

WHAT'S SO IMPORTANT ABOUT NAMES?

Linnaeus laid the foundations of the science we call **taxonomy**. Taxonomy involves two things, **classifying** and **naming**.

Classifying

Classifying is deciding how to group living things and what things go in what groups. For example, we humans are classified as **animals**. We are also in a group of:

- animals with backbones called **vertebrates**
- warm-blooded, milk-producing vertebrates called **mammals**
- mammals adapted for living in trees and with large brains called **primates**

Naming

As well as sorting the organisms into groups, the groups have to be given names like the ones on the left: 'animals', 'vertebrates', 'mammals' and 'primates'. Each individual type of organism must then be given its binomial (its genus and species names). Having a standardised way of naming things means we are able to study them and communicate with others about them, all over the world.

Biological Classification

It is important to remember that for thousands of years humans have been grouping things together, even in a basic way. You can easily recognise that a rose and a daffodil have similar characteristics, but are not the same. By recognising this you have already noticed that there are different **Taxonomic Ranks**—there are seven ranks currently used: Kingdom, Phylum, Class, Order, Family, Genus and Species. Each rank groups together organisms with similar characteristics, becoming more and more detailed as you go down the chain. Both of the plants below share many of the same characteristics: they are of the plant kingdom, and both belong to the Proteaceae family. Yet, they are a different genus and species. Banksias are native to Australia, while Proteas are native to South Africa.

KINGDOM
PHYLUM
CLASS
ORDER
FAMILY
GENUS
SPECIES

KINGDOM: PLANTAE
PHYLUM: ANGIOSPERMS
CLASS: EUDICOTS
ORDER: PROTEALES
FAMILY: PROTEACEAE
GENUS: PROTEA
SPECIES: NERIIFOLIA

KINGDOM: PLANTAE
PHYLUM: ANGIOSPERMS
CLASS: EUDICOTS
ORDER: PROTEALES
FAMILY: PROTEACEAE
GENUS: BANKSIA
SPECIES: DALLANEYI

Survival of the Hottest

Banksias and Proteas have many things in common but here is an interesting one: being from hot dry countries where bushfires are common, they both use the heat from these fires to help force open their seed capsules and disperse their seeds.

Evolution and classification

When classifying living things, it is usual to try to group the living things according to how closely related they are in evolutionary terms. The smallest groups are the most closely related.

Q3 What is the name given to the smallest group of closely related organisms which are not actually the same species?

What is the largest group?

Until recently the largest group size in common use was the **Kingdom**. There were 5 kingdoms, including the well known plant and animal kingdoms, but also including Fungi, Bacteria and a group of simple organisms called Protists. Modern research, particularly DNA studies, suggests that living things fall naturally into three larger groups and that we should increase the number of Kingdoms. The three large groups are called domains—two of them contain only bacteria. Animals, plants, fungi and protists have much more complicated cells than bacteria, evolved later and form the third domain.

Some questions to make you think

Linnaeus received specimens of plants, insects and other preserved specimens from all over the world. His collection is kept safely at the headquarters of the biological society named after him, the Linnean Society of London. Scientists from all over the world study the collections at the Linnean Society, as well as Royal Botanic Gardens, Kew (who hold over 7 million specimens in their herbarium and 27,000 different seed species in their Millenium Seed Bank) and the Natural History Museum, London who hold over 6 million plant specimens. As the world changes and organisms evolve, all of these specimens are important to scientific study. It is necessary to keep plant specimens from all periods of time. Linnaeus said:

> *"If you do not know the names of things, the knowledge of them is lost too."*

Q4 What do you think Linnaeus meant by this?
Q5 Why is it useful to put all living things into groups?
Q6 What is the importance of taxonomy today?
Q7 What is the point of keeping Linnaeus's specimens, even though they were collected in the 1700s/two to three hundred years ago?
Q8 How could you tell if a plant you had 'discovered' was a new species?

What's its name?

How can you find out the name of an organism if you don't know what it is? This is a common problem, particularly for people like ecologists and conservationists who need to identify species in their natural habitats. One way is to use a key. At each step of a key, you must answer a question about one or more of the features of your chosen specimen. One of the simplest types of key is the **dichotomous key**, where each step of the key has only two alternatives. An example is given below:

Five species of plantain in the UK

- **Leaves broad** (less than 5 times as long as they are wide)
  - Leaves less than twice as long as they are wide; usually found in well-trodden places, lawns or waste ground → **Greater plantain** *Plantago major*
  - Leaves more than twice as long as they are wide; found growing in lime-rich soil → **Hoary plantain** *Plantago media*
- **Leaves long and narrow** (at least 5 times as long as they are wide)
  - Flowering stalks are furrowed; leaves have many obvious 'ribs' running along their length → **Ribwort plantain** *Plantago lanceolata*
  - Flowering stalks are smooth and unfurrowed; leaves not strongly ribbed
    - Leaves have 1 vein; narrow, toothed leaves which radiate in a star-shaped rosette; found in dry, often sandy places, usually on the coast → **Buckshorn plantain** *Plantago coronopus*
    - Leaves have 3 – 5 veins; very narrow, fleshy leaves; found in saltmarshes or sometimes on mountains → **Sea plantain** *Plantago maritima*

Try writing a key for wild roses

There are many different species of wild rose in the British Isles, but you could try writing a key for the five most common ones. Roses have stems with thorns and relatively large flowers. The flowers are commonly white or pink, though some are red. The fruit is a hard berry-like 'hip'. Below are some descriptions of the five roses. Select the features you think are most suitable and use them to make a key.

Name	Plant description	Thorns (curved or straight)	Leaflets	Flower colour	Flower size	Flowering time	Hip colour	Distribution
Dog rose	Stems grow up to 3m long in arching pattern	Curved	Leaflets not hairy (though sometimes hairy underneath)	Pink	30–50mm across	June–July	Red	More common in south
Field rose	Forms bushes or climbs through other plants	Curved	Leaflets not hairy (sometimes very few hairs underneath)	White	30–50mm across	July–August	Red	Found in southern areas
Burnet rose	Forms short bushes	Straight	Leaflets not hairy (though sometimes hairy underneath)	White	20–40mm across	May–July	Dark purple/ black	Found in dry open places e.g. dunes or heath
Downy rose	Stems arching to 2m long	Can be straight or curved	Leaflets densely covered in hairs	Pink	30–50mm across	June–July	Red	Found in hedges, scrub and open woods throughout Britain, particularly in the north
Sweet briar	Stems vertical to 2m	Curved	Leaflets densely covered with sticky, brown, sweet-smelling hairs	Pink	25–40mm across	June–July	Red	Found in southern areas, mostly in scrub on chalk or limestone