

It's All Greek to Me! Exploring the Binomial System

We're all comfortable with using common names for familiar plants and animals. After all, that's all we need most of the time. So why do we use scientific names? Why say *Leucanthemum* (Lou-can-thu-mum) when we can say daisy instead? Well, most of the time it's just fine to say daisy, but sometimes we need to be more specific. For one thing, common names may vary around the world, sometimes even within the state or county where you live. A daisy to someone in San Francisco may be quite different from a daisy to someone in New York. Did you know that there are actually hundreds of kinds of flowers that share the name 'daisy'? In addition, while one common name can refer to hundreds of different organisms, sometimes a single organism can have several, or even hundreds of different common names! Fall aster, New England daisy and Michaelmas daisy are all the same daisy, *Aster novae-angliae*! To avoid confusion, each kind of organism has only one scientific name that is recognized in any country in the world, no matter which language is in common use.

We use Latin, and sometimes Greek, as the basis for a universal scientific language, and occasionally, words from other obscure languages. We use these 'dead' languages because the word meanings don't change the way they sometimes do in English and other modern languages. You may be thinking "Who wants to learn another language? I can call a tiger a 'tiger' and everybody knows what I mean!" Maybe you find scientific names long, unpronounceable and intimidating, but you can probably say *Tyrannosaurus*, *Pteradactyl*, and *Chrysanthemum* without even hesitating – yet those are all scientific names. Other scientific names are just as easy once you know some basics. Because scientific names come from dead languages, no one is absolutely sure how they are pronounced, although we do have some generally accepted rules. So go ahead and give it a try. Maybe your way is the right way, we'll never know for sure.

You'll find that when you know some word roots, you can not only understand the language of biology, but also chemistry, geology, physics and the other sciences. Word roots will also help you to understand our own language better, and help you improve your spelling. You may be surprised to find out that you already know a lot of Latin. That's because a lot of English words are from Latin roots.

For instance, what do you think these words mean?

gigantea
intermedia

familiaris
officinale

mississippiensis
atlanticus

flora
horribilis

To name organisms, scientists use the binomial system of nomenclature, devised by Carl Linnaeus. (He also established the kingdom, class, order, family, genus, and species system of classifying organisms.) In the 18th century, he published two books, one for plants, and one for animals, to introduce his new system for naming organisms. Until Linnaeus, scientists used long phrases to describe organisms, but his system used just two words, the genus (plural genera) and the specific epithet. Together, they form the species

name. (Occasionally you may see a third word; the subspecies.) You can use just the genus name alone, or the genus and specific epithet together, but never just the specific epithet by itself. The scientific name often describes the organism in some way. After the species name, you may also see the name of the person who first described the organism. We continue to use the binomial system today for naming new organisms, although Linnaeus's system of classification is currently undergoing a lot of revision.

Sometimes, what we think of as the common name is actually the scientific name, or very close to it. You probably already know what these organisms are:

<i>Gorilla</i>	<i>Rhododendron</i>	<i>Citrus</i>	<i>Octopus</i>	<i>Magnolia</i>
<i>Bison</i>	<i>Hippopotamus</i>	<i>Rhinoceros</i>	<i>Giraffa</i>	<i>Velociraptor</i>

Often, scientific names are made up from fairly common word roots. For instance, we can combine *rubri* (red) with *flora* (flower), to get *rubriflora*, which describes a red flower. The more word roots we know the easier it is to figure out what scientific names mean. Often, the name describes the appearance or behavior of an organism. Can you guess something about what sorts of organisms are described here?

<i>Acrobates pygmaeus</i>	<i>Chaos chaos</i>	<i>Canis familiaris</i>
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The common name for *Acrobatus pygmaeus* is feathertail glider, a small, agile marsupial that lives in trees in Australia. *Chaos chaos* is a giant amoeba – an organism so small you can barely see it with the naked eye! It's called *Chaos chaos* because its ever changing shape doesn't have a recognizable pattern, and it is called the giant amoeba because it is big – for an amoeba! And what do you think a familiar canine is? That's right, our friend the dog.

Some scientific names are just fun to say. *Naja naja naja* is the king cobra. *Bufo bufo bufo* is the European toad. *Gorilla gorilla gorilla* is the mountain gorilla. Some other creative names are *Bla nini*, *Bathymaster*, *Aha ha* and *Stupidogobius*. As you can see, scientists aren't always serious, and sometimes like to have fun when naming new organisms. A scientist named Platnick placed several spiders in the genus *Nops*, but later found out they each needed to be in their own genera. He named these new genera *Notnops*, *Taintnops*, and *Tisentnops*. In Greek, *ch* is pronounced like a *k*. George Kirkaldy, an English entomologist who worked in Hawaii, used this fact to name several genera of true bugs he was describing *Ochisme*, *Dolichisme*, *Florichisme*, *Elachisme*, *Marichisme*, *Nanichisme*, *Peggichisme* and *Polychisme*. Many years went by before other scientists noticed how these words were pronounced! He was in trouble with his more serious-minded colleagues, but the names are still in effect. Some more recent names are *Pieza kake*, *Pieza pi* and *Pieza rhea*. Other fun names are *Bittium* and *Ittibittium*, and *Abracadabrella*, and *Verae peculya*.

This is probably a good time to mention that not all scientific names accurately describe the organism in question. This is because the rules for giving and changing names are very complicated, and it's difficult to change an organism's name once it

has been finalized, so sometimes the binomial description is just plain wrong! For instance, *Nasturtium* is the scientific name for watercress, not the familiar flower. A *Platypus* isn't a platypus, but a beetle. Some plants have geographical specific epithets such as *chinensis*, but were later discovered to be from somewhere else. Most of the time, however, the scientific name gives us useful information.

Lots of organisms are named after people, sometimes the person who first described it or someone they know, or sometimes someone the discoverer admires. I bet you know who these are named for:

<i>Lewisia</i>	<i>Darthvaderum</i>	<i>Cyclops</i>	<i>Montypythonoides</i>
<i>Clarkia</i>	<i>Draculoides</i>	<i>Gollum</i>	<i>Smeagol</i>

Some names tell you where an organism is found.

<i>Alligator mississippiensis</i>	<i>Gazella arabica</i>	<i>Camellia japonica</i>
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Lots of names come from ancient mythology:

<i>Adonis</i>	<i>Aphrodite</i>	<i>Chronos</i>	<i>Daphne</i>	<i>Diana</i>
<i>Eros</i>	<i>Hermes</i>	<i>Mars</i>	<i>Pandora</i>	<i>Pluto</i>
<i>Venus</i>	<i>Polyphemus</i>	<i>Poseidon</i>	<i>Zeus</i>	<i>Narcissus</i>

Now it's time to have some fun. Attached are some lists of word roots. Pretend you're a scientist who has just discovered a new organism, and now you need to name it. It can be anything you want: a plant, an animal, a mushroom, or a complete invention of your own. Write a short description of your new organism (what it looks like, eats, lives, where or how you found it, etc . . .) and draw a picture of it. Be as creative as you like. Write the species name under the organism. Don't forget to add your own name to the end of the binomial as the describer of the new organism.

There are lengthy books of rules for scientists who are naming organisms; here are a couple rules you may find helpful. In a binomial the genus is usually a noun (*Canis*), and is always capitalized. The second word is usually an adjective, and isn't capitalized (*familiaris*). We always use *italics* when we type a binomial, and when handwriting, we underline it in order to set it apart. To give a species a place name, add "*ensis*" at the end of the word, for instance *sonomensis*. If the word ends in a vowel, such as Petaluma, drop the vowel and change it to *petalumensis*. If you want to name a species after a friend, add an *i* to the end of boys' names, such as *carli*, or an *ae* to girls' names, such as *susanae*. Drop any final vowel on your friend's name if you need to, before adding the ending. Even if your new organism's name doesn't follow all the rules of nomenclature, it will be close enough to sound real. To put several roots together, you may need to add vowels between them to be able to pronounce them. Just experiment a bit – since you don't have to follow all the rules of international nomenclature, you can't go wrong!

Color: chromo, colori

Black: *nigri*
Blue: *cerule, cyano*
Brown: *brunne*
Green: *viridi*
Purple: *purpur*
Red: *rubri, rubra*
White: *alba*
Yellow: *lute, flav*

Size

Dwarf: *nano*
Equal: *equi*
Gigantic: *giganto, colosso, titano*
Heavy: *gravi*
Large: *grandi, macro, mega*
Largest: *maxim*
Less than: *sub*
Light in weight: *levi*
Long: *longi*
Short: *brevi, curti*
Small: *micro, minut*
Smallest: *minim*
Tall: *alti*

Shape: forma

Angled: *anguli*
Curled: *crisp*
Cylindrical: *cyliind*
Flat: *plani*
Hollow: *cavi*
Long: *longi*
Pointed: *cuspi*
Round: *circuli, cyclo, gyro, rotundi*
Sharp: *acuti*
Slender: *gracil*
Spiral: *spirali, helix*
Square: *quadrat*
Thick: *crassi, pachy*
Twisted: *strepto*
Wavy: *undulat*
Wide: *lati*

Texture

Bare: *nudi*
Firm: *solid*
Furrowed: *striat*
Hairy: *hirsut, pili*
Hard: *duri, duro*
Moist: *humid*
Rough: *scabr*
Smooth: *glabr, levi, lubric*
Soft: *mollis*
Spiny: *spini*
Spotted: *macula*
Stiff: *rigid*
Thick: *crass, dens, gross*
Wide: *lati*
Woolly: *lani, pexi*
Wrinkled: *corrugat*

Direction and Position

Above: *hyper, super*
Across: *trans*
Against: *anti, contra*
Apart: *dis*
Around: *circum*
Before: *ante, pre*
Behind: *post, postero*
Below: *hypo*
Between: *inter, enter, inter*
Beyond: *ultra, extra*
Far: *tele*
First: *proto*
Inner: *endo*
Middle: *medi, medio*
Near: *proxim*
Northern: *arctic*
Opposite: *anti, contra, counter*
Outside: *ecto, exo, externa*
Side: *latero*
Southern: *austral*
Turning: *gyro*
Under: *hypo, sub*
Western: *occidental*
Within: *ento*

Numbers

One-half: *semi, hemi*
One: *mono, uni*
Two: *bi, di, duo*
Three: *tri*
Four: *quadri, tetra*
Five: *pento, quinque*
Six: *hexa, sexa*
Seven: *septem*
Eight: *octo*
Nine: *novem*
Ten: *deca, decim*
One hundred: *centi*
One thousand: *kilo, milli*

Quantity

All: *omni, pan*
Alone: *solo*
Common: *commun*
Equal: *equi*
Empty: *vacu*
Full: *pleni*
Many: *multi, poly*
More: *pluri*
Part: *parti*
Simple: *simplici*
Whole: *integri*

Activities

Creep: *reptili*
Dance: *choreo*
Eat: *tropho, vora*
Motion: *cine, cinemato, moti*
Noisy: *garrul, vocifer*
Sleep: *dorm, hypno, somni*
Slow: *tardi*
Sound: *phono*
Swift: *celeri, tachy, veloci*
Swim: *nata*
Turn: *trop*
Walk: *ambulat*

Animal Parts

Arm: *brachi*
Back: *dorsi*
Belly: *ventro*
Body: *corporo*
Bone: *ossi, osteo*
Digit: *dactylo, digiti*
Ear: *auri*
Eye: *oculi*
Face: *faci*
Food: *pedi, podo*
Hair: *capill, pili*
Hand: *mani, chiro*
Head: *capit, cephalo*
Leg: *crur*
Mouth: *ora, stomato*
Nose: *nasi, rhino*
Sense organ: *sensor*
Skin: *derm, cuti*
Skull: *cranio*
Spine: *spini*
Stomach: *gastor*
Tail: *caud*
Thigh: *femor*
Tooth: *denti, odonto*
Wing: *ala, ptero*

Plant Parts

Bark: *cortici*
Berry: *acini*
Branch: *clado, rami*
Bud: *gemm*
Flower: *antho, flora*
Fruit: *carpo, fructi*
Leaf: *foli, phyllo*
Nut: *nuci, caryo*
Root: *radici, rhizo*
Seed: *blasto, semini*
Stalk or stem: *cauli, petiol*
Thorn, spine: *spina, spini*

Habitats

Cave: *caverni*
Dry: *arid*
Field: *agri, agro*
House: *eco*
Island: *insular*
Mountain: *montan, oreo*
River: *amni, fluvia*
Sea: *marin, maritim, oceano*
Water: *aqua, hydro*

Miscellaneous

Alike: *identi, homo, simili*
Ancient: *archaeo, palaento*
Backward: *retro*
Beautiful: *bella, calo*
Creeping: *repen*
Different: *hegero, vari*
Earth: *geo*
Edible: *edibil*
Elegant: *décor*
False: *falsi, pseudo*
Feed: *nutri*
Fierce, wild: *feroc*
Good: *bon*
Hero: *hero*
Hidden: *crypto*
Hot: *cald*
Laughable: *ridicul*
Legend: *myth*
Lessen: *dimin*

Miscellaneous

Life: *bio*
Light up: *illumina*
Live: *residen*
Machine: *machina*
Man: *anthropo, homi*
Moon: *luni*
Music: *harmoni*
Nearly: *quasi*
New: *neo, novi*
Night: *noct*
Piece: *segment*
Power: *dynamo*
Secret: *secret*
Silly: *frivol*
Smell: *odor*
Star: *stella, astro*
Strong: *fort*
Sun: *helio, sol*
Terrible: *horrib*
Time: *chrono, tempor*
True: *veri*
Various: *diversi*
Winding, zigzag: *meandr*
With, together: *con*

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Lists of word roots come from various sources, most notably *Dictionary of Word Roots and Combining Forms*, by Donald J. Borror