

		CYP families	CYP subfamilies
Animals	3,282	120	500
Insects	1,675 (part of the animal total)	59	338
Animals (not insects)	1,607	69	169
Plants	4,266	126	464
Fungi	2,570	459	1011
Protists	247	62	119
Bacteria	905	196	409
Archaea	22	12	14
Viruses	2 (Mimivirus)	2	2
Total	11,294	977	2519

Plants (August 20, 2009)

4479 entries

213 variants

983 pseudogenes (1 is also a variant)

4266 named plant P450s excluding variants

3284 named plant P450s excluding variants and pseudogenes

Plant names use CYP51, 55, 71-99, 701-804

The following CYP family names have been retired by name changes

91, 95, 713, 717, 730, 731, 732, 764, 789

Currently, there are 126 plant CYP families and 464 subfamilies.

235 species of plants are represented.

23 families are only seen in algae (55, 737-745, 747-748, 767-772, 800-804).

One of these CYP55B is probably a lateral transfer from fungi.

CYP746 is found in both moss and algae

13 are only seen in the moss *Physcomitrella* (751-760, 762-763, 766)

CYP761 and CYP765 are found in moss and liverwort.

24 families are only found in *Selaginella* (spike moss) (773-788, 790-797)

[note CYP789A1 was renamed to CYP703E1]

CYP51, CYP97 and CYP710 are the only families in seed plants, moss and algae

63 families are found in seed plants

(51, 71-90, 92-4, 96-99, 701-712, 714-716, 718-729, 733-736, 749-750, 798-799)

CYP725, CYP750, CYP798 and CYP799 are gymnosperm specific, so that leaves 59 families in angiosperms.

As a bookkeeping note CYP726 from *Euphorbia* is probably miss-named and it should be in the CYP71 family as a subfamily. That would drop the number of angiosperm families to 58. CYP99 and CYP723 are only seen in grasses and CYP719 is only in *Ranunculales* or *Aristolochiales*. CYP702 and CYP708 are only in *Brassicales*.

That leaves a core angiosperm CYP family count of 53.

Protists (August 20, 2009)

Protists are Eukaryotes that are not plants animals or fungi.

There are 249 protist entries and only 2 variants. There are 29 pseudogenes.

There are 247 CYPs in protists (excluding the variants)

There are 218 CYPs excluding both variants and pseudogenes.

There are 62 CYP families and 119 subfamilies in 22 species.

Not too many protist species have been sequenced yet.

There are some that do not have any P450s such as *Giardia lamblia* (an anerobe) and *Plasmodium falciparum* (a parasite). *Toxoplasma gondii* has only one CYP.

Bacteria (August 21, 2009)

There are 905 named bacterial CYPs and 22 Archaeal CYPs

There are only 39 pseudogenes and none of those are Archaeal.

There are 866 named bacterial CYPs if pseudogenes are excluded.

The bacterial CYPs are in 196 families and 409 subfamilies in 196 species.

The 22 Archaeal CYPs are in 12 families and 14 subfamilies in 14 species.
(CYP119, 147, 174, 197, 231, 323, 299, 1001, 1002, 1003, 1006, 1014)

Only two Archaeal CYPs CYP147E1, CYP197C1 are in families that contain non-Archaeal CYPs.

Viruses (August 21, 2009)

There are only two know viral P450s CYP5253A1 and CYP5254A1.

The mimivirus may reproduce in amoeba, so these genes may originate with amoeba.

Lamb DC, Lei L, Warrilow AG, Lepesheva GI, Mullins JG, Waterman MR, Kelly SL.

The first virally encoded cytochrome p450.

J Virol. 2009 Aug;83(16):8266-9. Epub 2009 Jun 10.

Fungi (August 21, 2009)

There are 2568 named fungal P450s after excluding 24 variants.

There are 164 pseudogenes.

There are 2404 named P450s if variants and pseudogenes are excluded.

These P450s are in 459 CYP families and 1011 subfamilies in 121 species.

All fungi have CYP51 and CYP61 except *Batrachochytrium dendrobatidis*

Which seems to be missing CYP61. This is a chytrid fungi.

Animals are also missing CYP61.

Animals (August 24, 2009)

There are 3282 animal P450s in approximately 253 species.

1675 of these are insects and 1607 are not insect sequences.

The insect CYPs are in 59 families and 338 subfamilies, in 89 species

The non-insect CYPs are in 69 families and 169 subfamilies in 164 species.

Eight families have members in both insects and non-insect species.

CYP4C, CYP18, CYP302, CYP306, CYP307, CYP314, CYP315 are in insects and *Daphnia* (a crustacean). CYP31A is *C. elegans* and CYP31B is in *Ips* an insect.

After accounting for some overlap in 8 families and 7 subfamilies, all animals have 120 CYP families and 500 subfamilies.