



Appendix

TABLE 1a: Metabolism protein families as designated by Pfam and classified by KEGG.

Enzyme	Number of hits (Pfam)
Hydrolases	
Serine hydrolase (FSH1)	1
DLH, dienelactone hydrolase family	3
Hydrolase, haloaciddehalogenase-like hydrolase	2
*Abhydrolase, alpha/beta hydrolase folds (Abhydrolase_3 and 1)	12
Acting on carbon-nitrogen bonds	
Amidase	5
Amidohydrolase	2
Arginase family	1
Transglutaminase-like superfamily	1
Carboxylic-ester hydrolases	
*Cutinase	2
GDSL-like lipase/acylhydrolase	3
Patatin-like phospholipase	1
Phosphatidylinositol-specific phospholipase C, Y domain	1
PLA2_B, lysophospholipase catalytic domain	1
Proteobacterial lipase chaperone protein	1
Putative lysophospholipase	1
Esterases	
Abhydrolase_2, Phospholipase/carboxylesterase	1
Acetyl xylan esterase (AXE1)	1
*Arylesterase	1
*Carboxylesterase	1
Formylglycine-generating sulphatase enzyme	1
Metallophos, calcineurin-like phosphoesterase	1
Sulphatase	1
Tyrosyl-DNA phosphodiesterase	1
Glycosylases	
*Alpha-L-fucosidase	1
Cation efflux family	2
*Glycosyl hydrolase family (32 N-terminal domain, cellulase, 31, 28, central catalytic domain, 18, 3 N-terminal domain, 16, 81, 43, 1, 2 TIM barrel domain, 5, 71, 76, 7, hydrolase catalytic core)	26
*Melibiase	3
Phosphorylase superfamily	1
Helicases	
Putative helicase	1
Nucleotidases	
5' nucleotidase family	1
Nucleases	
Endoribonuclease L-PSP	5
Exonuclease	1
Herpesvirus alkaline exonuclease	1
LAGLIDADG DNA endonuclease family	1
Ribonucleases P/MRP protein subunit POP1	1
S1/P1 Nuclease	1
Viral/archaeal nuclease	1
Proteases/peptidases/proteinase	
Eukaryotic aspartyl protease	1
Fungalysinmetallopeptidase (M36)	1
Gamma-glutamyltranspeptidase	1
Metallopeptidase family M24	2

*, CAZies.

The dCAS software is developed and maintained at the Bioinformatics and Computational Biosciences Branch, Office of Cyber Infrastructure and Computational Biology, National Institute of Allergy and Infectious Diseases in Bethesda, MD, USA. The software is freely available for download at <http://exon.niaid.nih.gov>.

Table 1a continues →

TABLE 1a (Continues...): Metabolism protein families as designated by Pfam and classified by KEGG.

Enzyme	Number of hits (Pfam)
Peptidase family (Peptidase_M28, Peptidase family M28, Peptidase_M13, Peptidase family M13)	3
Peptidase_S10, serine carboxypeptidase	1
Peptidase_S8, subtilase family	3
Peptidase_S9, prolyl oligopeptidase family	2
RVP_2, retroviral aspartyl protease	1
X-Pro dipeptidyl-peptidase (S15 family)	1
Isomerases	
Asp/Glu/Hydantoinracemase	1
Epimerase, NAD dependent epimerase/dehydratase family	3
Mandelateracemase / muconatelactonising enzyme, C-terminal domain	1
N-acylglucosamine 2-epimerase (GlcNAc 2-epimerase)	1
Phosphoglyceratemutase family (PGAM)	4
Prolineracemase	1
Ribose/galactoselsomerase	1
Topoisomerase II-associated protein PAT1	6
Lyases	
Acetoacetate decarboxylase (ADC)	1
HhH-GPD superfamily base excision DNA repair protein	1
HpcH_Hpal, HpcH/Hpalaldolase/citrate lyase family	1
Ornithine cyclodeaminase/mu-crystallin family	2
*Pec_lyase_C, Pectatylase	3
Possible lysine decarboxylase	1
Scytalonedehydratase	1
Oxidoreductases	
Cytochrome c oxidase caa3 assembly factor (Caa3_CtaG)	1
DAO, FAD-dependent oxidoreductase	8
GFO_IDH_MocA, oxidoreductase family, NAD-binding Rossmann fold	3
GMC oxidoreductase	4
NADH:flavin oxidoreductase / NADH oxidase family	5
Pyridine nucleotide-disulphideoxidoreductase	4
Squaleneepoxidase	1
Acting on the CH-NH group of donors	
Amino_oxidase, flavin containing amine oxidoreductase	3
Acting on the CH-OH group of donors	
Histidinol dehydrogenase	1
Shikimate / quinate 5-dehydrogenase	1
Acting on the aldehyde or oxo group of donors	
Aldehyde dehydrogenase family	7
Molybdopterinoxidoreductase	1
Acting on NADH or NADPH	
Oxidored_q6, NADH ubiquinone oxidoreductase, 20 Kd subunit	1
Acting on the heme group of donors	
Cytochrome oxidase subunit II	1
Acting on single donors with O₂ as oxidant	
Ammonia monooxygenase/methane monooxygenase, subunit C	1
Lipoxygenase	1
HgmA, homogentisate 1,2-dioxygenase	1
Acting on paired donors	
Phytanoyl-CoA dioxygenase (PhyH)	1
Acting on the CH-CH group of donors	
Flavoprotein	1
Peroxidase	
Catalase	1
Peroxidase, family 2	2

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TABLE 1a (Continues...): Metabolism protein families as designated by Pfam and classified by KEGG.

Enzyme	Number of hits (Pfam)
Transferases	
Arylsulphotransferase (ASST)	1
CoA-transferase family III	1
Coenzyme A transferase	1
Transferase family	1
Acetyltransferases	
Acetyltransferase (GNAT) family	4
Alcohol acetyltransferase	1
Maltose acetyltransferase (Mac)	1
Acytransferases	
Acytransferase family	2
Acytransferase domain	3
Aminotransferases	
Aminotransferase (classes I, II and III)	5
Glycosyltransferases	
4-alpha-L-fucosyltransferase (Fuc4NAc transferase)	1
*Chitin synthase	1
*Mannosyltransferase putative	1
Oligosaccharyltransferase STT3 subunit	1
*Raffinose synthase or seed inhibition protein Sip1	1
Kinases/phosphotransferases	
Adenylylsulphate kinase	1
Alpha-kinase family	1
Amino acid kinase family	1
APH, phosphotransferase enzyme family	6
Casein kinase substrate phosphoprotein PP28	1
Choline/ethanolamine kinase	1
Glycogen synthase kinase-3 binding	1
HATPase_c, histidine kinase-, DNA gyrase B-, and HSP90-like ATPase	1
Hexokinase	1
Protein kinase domain	4
Shikimate kinase	1
Methyltransferases	
Methyltransf_6, demethylmenaquinonemethyltransferase	2
Methyltransferase domain	7
Methyltransferase small domain	1
O-Methyltransferase	1
SAM dependent carboxyl methyltransferase	1
Trimethylaminemethyltransferase (MTTB)	1
Nucleotidyltransferase	
ATP adenylyltransferase	2
Transferring alkyl or aryl groups	
Glutathione S-transferase	5
DMRL_synthase, 6,7-dimethyl-8-ribityllumazine synthase	1
Transferring aldehyde or ketonic groups	
Transaldolase	1
Transferring phosphorus-containing groups	
Acetyl-CoA carboxylase, central region	1
Transferring sulphur-containing groups	
CitF, citrate lyase, alpha subunit (CitF)	1

*, CAZies.

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TABLE 1b: Other interesting protein families as designated by Pfam and classified by KEGG.

Protein or enzyme	Number of hits (Pfam)
ATPases	
ATPase family associated with various cellular activities (AAA)	2
E1-E2 ATPase	1
Telomerase	
Est3, telomerase holoenzyme, Est3 subunit	1
AMP-binding enzyme	
AMP-binding enzyme	8
Motor proteins	
Myosin tail (family motor proteins)	6
Kinesin-associated protein (KAP)	1
Efflux pump	
Fungal trichothecene efflux pump (TRI12)	2
Stress responsive	
Dabb stress responsive	2
Cytochrome	
P450	20
B	3
C	1
Atrophia-1 family	
Atrophia-1 family	4
Hydrophobin Class	
Hydrophobin_2, fungal hydrophobin	1
Transcription factors	
Competence protein	1
Rrn6, RNA polymerase I-specific transcription-initiation factor	1
Transcription factors	6
Transcription initiation factor TFIID component TAF4 family	1
DNA binding domains	
bZIP TF	1
Fungal specific transcription factor domain	28
Transcriptional regulatory proteins	
Transcriptional regulatory protein LGE1	1
Toxins	
Insecticide toxin TcdB middle/C-terminal region	1
Zeta toxin	1
Antigens	
Arrestin (or S-antigen), N-terminal domain	1
Soluble liver antigen/liver pancreas antigen (SLA/LP autoantigen)	1
Tryptophan-threonine-rich plasmodium antigen C terminal	1
Type III secretion system	
Type III secretion protein (HpaP)	1
Homeodomain	
Homeobox domain	2
Homeoboxprospero-like protein (PROX1)	1
Other domains	
Acyl-CoA dehydrogenase, C-terminal domain (and thioester hydrolase C terminal) (and middle domain)	3
ADH_N, alcohol dehydrogenase GroES-like domain	9
AP_endonuc_2, xylose isomerase-like TIM barrel	2
ASCH domain	1
ASD1 Apx/Shroom domain	2
Bromodomain	1
BTB, BTB/POZ domain	4
C2 domain	1

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TABLE 1b (Continues...): Other interesting protein families as designated by Pfam and classified by KEGG.

Protein or enzyme	Number of hits (Pfam)
Cadherin prodomain like	1
CFEM domain	2
Chromo, 'chromo' (CHRromatinOrganisationMOdifier) domain	1
Cupin domain	2
Dak1 domain	1
e3 binding domain	1
EGF_2, EGF-like domain	1
Eukaryotic mediator 12 subunit domain	1
FAD binding domain	20
FAD linked oxidases, C-terminal domain	1
F-box domain	2
Ferric reductase NAD binding domain	1
Flavin reductase like domain	1
Glyceraldehyde 3-phosphate dehydrogenase, C-terminal domain	1
HD domain	1
Hemocyanin_N, hemocyanin, all-alpha domain	1
H-type lectin domain	1
KR domain	2
LSM domain	2
MOSC N-terminal beta barrel domain	1
MVP_shoulder, shoulder domain	1
NACHT domain	5
NAD binding domain of 6-phosphogluconate dehydrogenase	1
NB-ARC domain	1
Neurohypophysial hormones, C-terminal domain	1
Occludin homology domain	1
Oxidoreductasemolybdopterin binding domain	1
PA14_2, GLEYA domain	1
PAN domain	1
Phosphoribosyltransferase domain	1
Piwi domain	1
PORR, plant organelle RNA recognition domain	1
Pro-kumamolisin, activation domain	1
Response regulator receiver domain	1
Rhodanese-like domain	1
Secretin N-terminal domain	1
SET domain	1
SIS domain	1
Terpene synthase family, metal binding domain	3
Thiamine pyrophosphate enzyme, N-terminal TPP binding domain	1
VHS domain	1
VTC domain	1

Table 1b continues →

TABLE 1b (Continues...): Other interesting protein families as designated by Pfam and classified by KEGG.

Protein or enzyme	Number of hits (Pfam)
XFP N-terminal domain	1
Membrane proteins	
7tm_1, 7 transmembrane receptor (rhodopsin family)	1
Endomembrane protein 70	1
LMBR1-like membrane protein	1
Predicted membrane protein	2
Retinal pigment epithelial membrane protein	2
Mating-type protein	
Coprinuscinereus mating-type protein	2
Histone-associated proteins	
Core histone H2A/H2B/H3/H4	1
Hap2_elong, histone acetylation protein 2	1
Histone deacetylation protein Rxt3	1
Rtt106, histone chaperone Rtt106-like	1
Ion channels	
Anoctamin, calcium-activated chloride channel	2
Mid-1-related chloride channel (MCLC)	1
Voltage gated chloride channel	1
Chemoreceptors	
Serpentine type 7TM GPCR chemoreceptor Srsx	1
7TM_GPCR_Srj, serpentine type 7TM GPCR chemoreceptor Srj	1
Zinc cluster proteins/zinc finger proteins	
Fungal Zn(2)-Cys(6) binuclear cluster domain	21
Zinc finger	5
Transporters	
ABC transporter	4
ABC transporter transmembrane region	2
Ammonium transporter family	1
CorA-like Mg ²⁺ transporter protein	4
Formate/nitrite transporter	1
Ion transport protein	2
MFS_1, major facilitator superfamily	53
Na ⁺ /Pi-cotransporter	1
Nucleotide-sugar transporter	1
SNF, sodium : neurotransmitter symporter family	2
Sugar (and other) transporter	18
Sulphate transporter family	1
Transmembrane amino acid transporter protein	5
Tripartite tricarboxylate transporter TctB family	1
ZIP zinc transporter	1
Virus proteins	77
Unknown or uncharacterised	102

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**TABLE 2:** Other protein families as designated by Pfam.

Protein family	Number of hits (Pfam)
2OG-Fe(II) oxygenase superfamily	3
3-beta hydroxysteroid dehydrogenase/isomerase family	3
56kDa selenium binding protein (SBP56)	2
7tm_3, 7 transmembrane sweet-taste receptor of 3 GPCR	1
7TMR-DISM_7TM, 7TM diverse intracellular signalling	1
ABM, antibiotic biosynthesis monooxygenase	1
Aconitase family (aconitatehydratase)	1
ActA protein	1
Actin interacting protein 3	1
Adenylatecyclase associated (CAP) N terminal	1
adh_short, short chain dehydrogenase	24
ADH_zinc_N, zinc-binding dehydrogenase	8
AlG2-like family	1
Aldo/ketoreductase family	3
Amino acid permease	11
Ankyrin repeat	6
Aph-1 protein	1
Apoptosis inhibitory protein 5 (API5)	1
ARC105 or Med15 subunit of mediator complex non-fungal	1
AsmA family	1
Aspartyl/asparaginyl beta-hydroxylase	1
ATP synthase F1 beta subunit	1
Bacterial extracellular solute-binding protein	1
Bacterial phosphonate metabolism protein (PhnI)	1
BAF1 / ABF1 chromatin reorganising factor	1
Bul1 C terminus	1
Caldesmon	1
Caleosin related protein	2
CinA, competence-damaged protein	1
CoA-ligase	1
Cobalamin biosynthesis protein CobT	1
Cofilin_ADF, cofilin/tropomyosin-type actin-binding protein	1
Cohesin loading factor	1
Cortexillin I, coiled coil	1
Cu-oxidase_3, multicopper oxidase	1
MAD, mitotic checkpoint protein	3
Maf-like protein	1
MatE	1
MBOAT family	1
Mediator complex subunit 13 C-terminal	1
Mediator complex subunit 24 N-terminal	1
Mediator complex subunit 25 C-terminal NR box-containing	1
Metallothionein	1
Mg296 protein	1
Microtubule associated protein (MAP65/ASE1 family)	1
Mucin-like glycoprotein	1
Myc amino-terminal region	1
Myelin-associated oligodendrocytic basic protein (MOBP)	1
Neogenin C-terminus	1
Neuregulin	1
Nitrile hydratase, alpha chain	1
Nitrogen fixation protein NifW	1
Nitroreductase family	1
NmrA-like family	5
Noggin	1
Nop53 (60S ribosomal biogenesis)	1
NPH3 family	1
Nucleoporin protein Ndc1-Nup	1
PALP, pyridoxal-phosphate dependent enzyme	1
PAP2 superfamily	2
PaRep2b protein	1
Patched family	1
Pentaxin family	1
Peroxin-3	1
Pex24p, Integral peroxisomal membrane peroxin	1
PGAP1-like protein	1
Phenylacetic acid catabolic protein	1
Photosynthetic reaction centre protein	1

Table 2 continues →

TABLE 2 (Continues...): Other protein families as designated by Pfam.

Protein family	Number of hits (Pfam)
Plant nuclear matrix protein 1 (NMP1)	1
Cupin	1
Cys/Met metabolism PLP-dependent enzyme	3
Cysteine dioxygenase type I	1
D-ala D-ala ligase C-terminus	1
DJ-1/PfpI family	2
Dynamnin_N, dynamnin family	1
Dynamitin	1
Early protein (E6)	1
Electron transfer DM13	1
ERM, Ezrin/radixin/moesin family	1
Exocyst complex component Sec3	1
Fatty acid hydroxylase superfamily	1
Flagellar basal body-associated protein FlIL	1
FliX, class II flagellar assembly regulator	1
FMN-dependent dehydrogenase	4
FMO-like, flavin-binding monooxygenase-like	6
Frag1, Frag1/DRAM/Sfk1 family	1
Fructose-bisphosphatealdolase class-II	1
Git3, G protein-coupled glucose receptor regulating Gpa2	1
Glyoxalase/bleomycin resistance protein/dioxygenase superfamily	4
Golgin subfamily A member 5	1
GPR1/FUN34/yaaH family	2
Hamartin protein	1
HasA, heme-binding protein A (HasA)	1
HET, heterokaryon incompatibility protein (HET)	14
HI0933-like protein	1
IncA protein	1
Intermediate filament head (DNA binding) region	1
Isocitrate/isopropylmalate dehydrogenase	1
Keratin, high sulphur B2 protein	2
KicB killing factor	1
LigB, catalytic LigB subunit of aromatic ring-opening dioxygenase	1
Lipopolysaccharide core biosynthesis protein (WaaY)	1
Luciferase-like monooxygenase	1
Lymphocyte signalling adaptor protein	1
Podoplanin	1
Polysaccharide deacetylase	2
Protamine P1	1
Protamine_P2, sperm histone P2	3
PTR2, POT family	1
Pyoverdine/dityrosine biosynthesis protein	1
Rab5 binding	1
Radical SAM superfamily	1
Rer1 family	1
RTA1 like protein	2
Sarcoglycan complex subunit protein	1
Sin3 associated polypeptide p18 (SAP18)	1
SnoA-like polyketidecyclase	2
Sprouty protein (Spry)	1
SSF, sodium : solute symporter family	2
Stage II sporulation protein P (SpollP)	1
STE3, pheromone A receptor	1
Sulphite exporter TauE/SafE	1
Sulphocyanin (SoxE)	1
SUR7/Pall family	1
T4_tail_cap, tail-tube assembly protein	1
Taurine catabolism dioxygenaseTaud, TfdA family	2
ThiC family	1
THO complex subunit HPR1	1
ThuA, trehaloseutilisation	2
TPR_2, tetratricopeptide repeat	1
TraD_N, F sex factor protein N terminal	1
Trans-activation protein X	1
tRNAsynthetases class I (W and Y)	1
Vel1p, velum formation protein	1
VirE3	1
YibE/F-like protein	1
YL1 nuclear protein	1
zf-MYND, MYND finger	1