

Functional Analysis

GO and Pathways based overrepresentation and gene set enrichment analysis

Two types of analysis are presented here: overrepresentation analysis and gene set enrichment analysis (GSEA). For the provided list of genes the overrepresentation analysis compares number of genes in particular category with total number of genes in that category and calculates significance of the overrepresentation with chi2 or Fisher test. GSEA analyse p-value based ranking of genes and search for enrichment of categories in the ranking.

Preporcessing

map gene identifiers

create a subset based on given p-value cut-off

```
## The p-value threshold is: 0.050000
```

```
##      Length      Class      Mode
##      649 character character
```

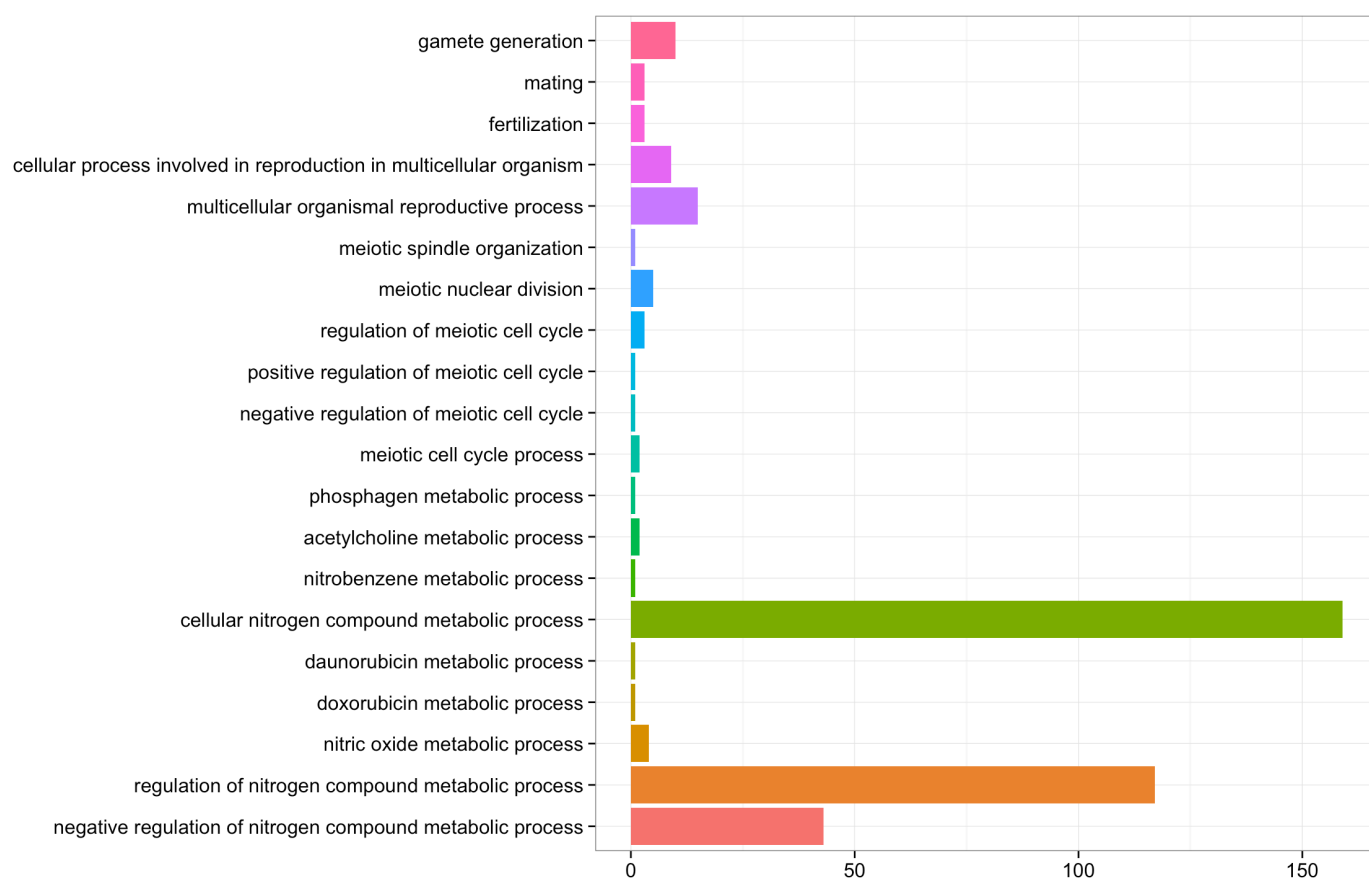
List GO terms

Most common biological processes and molecular functions are listed here:

```

##                                ID
## GO:0000747 GO:0000747
## GO:0000909 GO:0000909
## GO:0007276 GO:0007276
## GO:0007618 GO:0007618
## GO:0009566 GO:0009566
## GO:0034293 GO:0034293
##
##                                Description Count
## GO:0000747 conjugation with cellular fusion      0
## GO:0000909 sporocarp development involved in sexual reproduction      0
## GO:0007276 gamete generation                    10
## GO:0007618 mating                                3
## GO:0009566 fertilization                          3
## GO:0034293 sexual sporulation                     0
##
## GeneRatio
## GO:0000747 0/606
## GO:0000909 0/606
## GO:0007276 10/606
## GO:0007618 3/606
## GO:0009566 3/606
## GO:0034293 0/606
##
##                                geneID
## GO:0000747
## GO:0000909
## GO:0007276 Aurka/Cxcr4/Fosl1/Ins13/Nphp1/Pde3a/Pebp1/Rbp4/Sfmbt1/Tmf1
## GO:0007618 App/Cnr1/Oxtr
## GO:0009566 Acr/Cacnalh/Tpst2
## GO:0034293

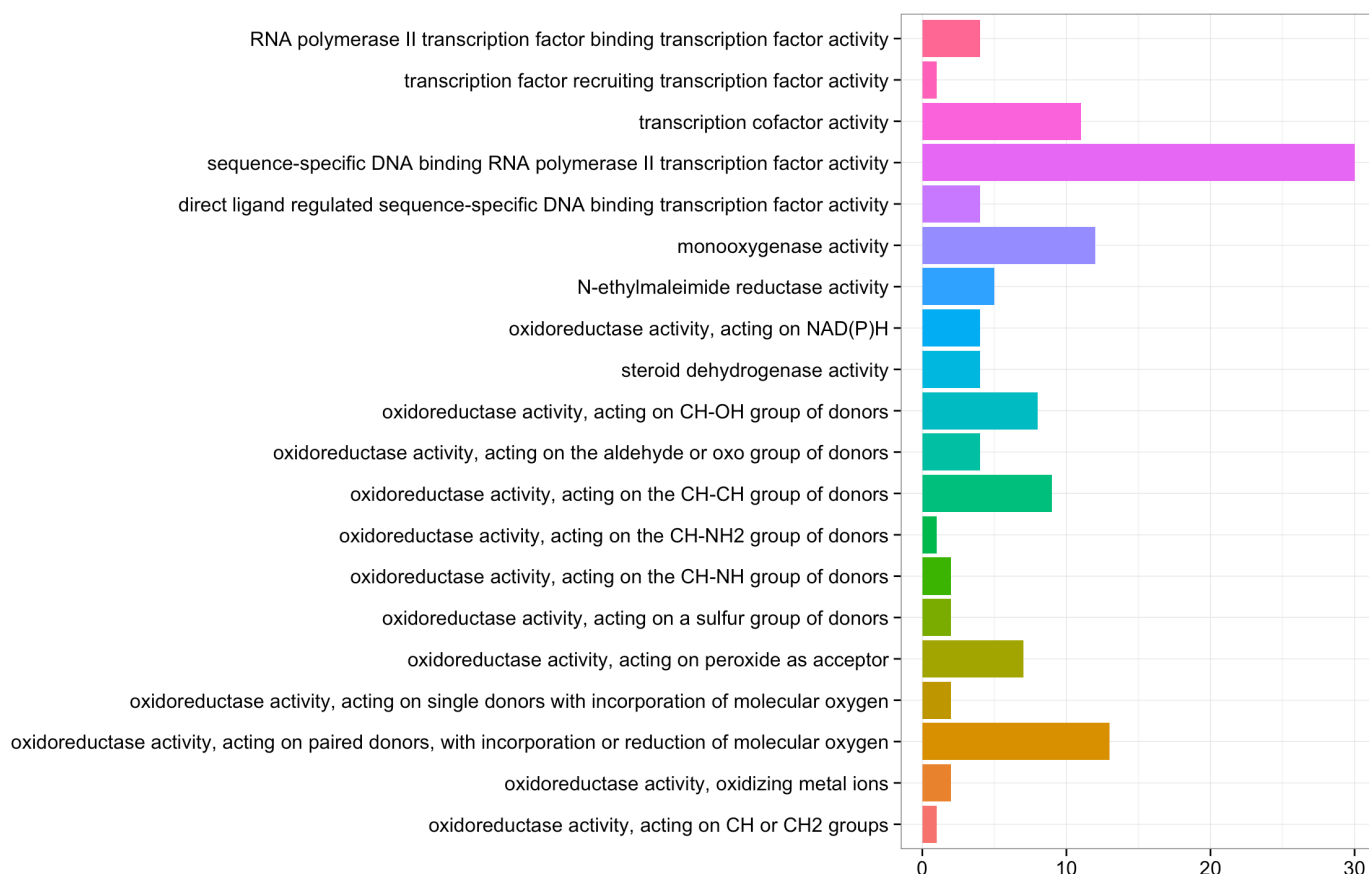
```



```

##                                ID
## GO:0001007 GO:0001007
## GO:0001076 GO:0001076
## GO:0001082 GO:0001082
## GO:0001134 GO:0001134
## GO:0003712 GO:0003712
## GO:0016989 GO:0016989
##
##                                De
scriptio
## GO:0001007 RNA polymerase III transcription factor binding transcription factor
activity
## GO:0001076 RNA polymerase II transcription factor binding transcription factor
activity
## GO:0001082 RNA polymerase I transcription factor binding transcription factor
activity
## GO:0001134 transcription factor recruiting transcription factor
activity
## GO:0003712 transcription cofactor
activity
## GO:0016989 sigma factor antagonist
activity
## Count GeneRatio
## GO:0001007 0 0/606
## GO:0001076 4 4/606
## GO:0001082 0 0/606
## GO:0001134 1 1/606
## GO:0003712 11 11/606
## GO:0016989 0 0/606
##
##                                geneID
## GO:0001007
## GO:0001076 Lif/Med19/Neurod1/Psip1
## GO:0001082
## GO:0001134 Lif
## GO:0003712 Cenpj/Cited4/Eny2/Jun/Junb/Med19/Neurod1/Psip1/Rbpms/Tob1/Tsg101
## GO:0016989

```



Gene Ontology (GO) analysis

GO over-representation analysis

Top 20 significantly overrepresented categories of either biological processes or molecular functions is calculated for selected p-value threshold

##	ID	Description	GeneRatio		
##	GO:0044699	GO:0044699 single-organism process	409/569		
##	GO:0044763	GO:0044763 single-organism cellular process	373/569		
##	GO:0044710	GO:0044710 single-organism metabolic process	177/569		
##	GO:0006629	GO:0006629 lipid metabolic process	71/569		
##	GO:0008152	GO:0008152 metabolic process	326/569		
##	GO:0044237	GO:0044237 cellular metabolic process	283/569		
##	BgRatio	pvalue	p.adjust	qvalue	
##	GO:0044699	13087/23888	1.781663e-17	8.031736e-14	6.166429e-14
##	GO:0044763	11736/23888	9.753110e-16	2.198351e-12	1.687801e-12
##	GO:0044710	4246/23888	3.658743e-15	5.497872e-12	4.221035e-12
##	GO:0006629	1079/23888	8.443666e-15	9.516012e-12	7.305993e-12
##	GO:0008152	9978/23888	3.428243e-14	3.090904e-11	2.373066e-11
##	GO:0044237	8498/23888	1.784834e-12	1.341005e-09	1.029567e-09
##					
geneID					

GO:0044699 G630090E17Rik/Cyp3a59/Pafah2/Ces2a/Aspg/Akr1c18/Atf5/Lin7a/Slc14a1/Sobp/Maob/Glo1/Slc35b1/Acadl/Acadm/Acadvl/Ache/Acp2/Acr/Acta1/Aspa/Adra1b/Avil/Gla/Ak4/Alcam/Alox8/Steap4/Anxa3/Anxa4/Apoa1/Apoc1/App/Arc/Areg/Arf2/Atf3/Atf4/Ngfrap1/Bmp7/Zfp36l1/Btg2/Tspo/Cacnale/Cacnb3/Cat/Cd37/Cd44/Cdc7/Cebpd/Chga/Cxcr4/Plk3/Cnr1/Crabp2/Vcan/Cyp2d9/Dab1/Gadd45a/Ddit3/Dlx3/Dok1/Edn1/Efnb3/Egr1/Egr2/Enc1/Epha2/Epn2/Pofut1/Kcnn3/Fcgrt/Fgfr1/Fmo1/Fos/Fosl1/Fzd5/G0s2/Gata6/Gch1/Gp1bb/Gpam/Gsta3/Gstt1/Nkx6-2/H2-T10/Hbb-b1/Hbegf/Hmbs/Nr4a1/Foxa1/Hoxb1/Hoxd3/Hsd17b2/Hspe1/Iapp/Ier3/Ifrd1/Cyr61/Fabp6/Ins13/Itga2/Itgb5/Jun/Junb/Kcnh1/Kif1a/Kif1b/Kifc3/Kpna2/Krt84/Anpep/Lif/Lpl/Ltc4s/Bco2/Crb1/Maff/Matn2/Met/Sik1/Mthfr/Mybl2/Ppp1r15a/Nab1/Neurod1/Nfatc2ip/Nefm/Nkx2-6/Nr4a3/Olfr46/Otc/Oxtr/Reg3b/Pax4/Pcsk6/Pde6g/Enpp1/Pecam1/Cdk14/Pik3r1/Pla2g2a/Pla2g5/Plcb2/Plscr2/Pole/Ppl/Pipox/Ptger3/Ptger4/Hps4/Dusp1/Ptpn2/Ptpm/Abcd4/Rasgrf2/Klf11/Rbp4/Rbpms/Reg3g/Rgs2/Rpgr/Rras/Rtn2/S100a11/Sars/Frrs1/Selenbp1/Sell/Sepw1/Slc13a2/Slc22a1/Slc3a1/Snta1/Serpinalb/Sephs2/Aurka/Cpeb3/Pank3/Suox/Tifa/BC027231/Prpsap2/Tacr3/Plekhh2/Trim38/Csrnp1/Ugp2/Mis18bp1/Tff2/Slc17a2/Thbs1/Tia1/Klf10/Gcnt4/Haus4/Cenpj/Arl11/Tnf/Tpst2/Trf/Tob1/Trpc1/Tsg101/Ugt8a/Nr1h3/Upp1/Vamp8/Vim/Eny2/Vldlr/Soat2/Pi4ka/Wnt5a/Rbm11/Tbc1d24/Gpr116/Plc12/St8sia5/Zadh2/Pcgf2/Zfp36/Gpbar1/Camk1d/Gbgt1/Rhov/Tshz2/Clca2/Gba2/Zc3h12a/Cwh43/Tmf1/Nlrp2/Slc5a11/Aars/Spg7/Plscr4/Pdk3/Nox1/Zc3h12d/Npc1l1/Fb1l1/Clca1/Klf6/Ets1/Gdf15/Cdh24/Pebsp1/Neurl1b/Kcng2/Slc16a12/Ldb3/Zfp385b/Kcng1/Slc10a5/Frem2/Grin3a/Slc1a7/Hsd17b13/Ppp1r9a/Chrm2/Rgs13/Olfr699/Olfr1415/Olfr955/Olfr420/Olfr1350/Olfr742/Olfr215/Olfr1209/Olfr313/Olfr196/Lgsn/Gphn/Pclo/Inpp4a/Pla2g2e/Pon3/Gcdh/Spib/Plek2/Abcc6/Agpat3/Hnf4g/Slc7a9/Dusp4/Agmo/Tmem91/Abi2/Pla2g4e/Far2/Intu/Ighd/Cyp2d12/Mir130a/Mir26a-1/Tas2r125/Tas2r134/Cyp2c68/Lrrc8b/Ttpa/Cdca8/Wwc2/Ncald/Nptx2/Syt5/Nph1/Slc40a1/Ngef/Cyp2c67/Cyp2w1/Pde3a/Sfmbt1/Rcan1/Tfip11/Cyp39a1/Cpb2/Cyp3a25/Aldh18a1/Ripk3/Mgst1/Ccn11/Slc6a14/Zbtb33/Aldh1a3/Tob2/Cacnalh/Pmaip1/Mlxip1/Tdh/Rhot1/Fads3/Gm14137/Gm6484/Rgs22/Clstn2/Trpv6/Herpud1/Ptges/Cxcl16/Ormdl3/Myo3a/Slc16a9/Sdha/Gatm/Rnf212/Qprt/Klhl13/Poc5/Iah1/Itgb3bp/Aadac/Plxnd1/2810417H13Rik/Crip2/Ccdc88c/Nrn1/Svop/Trim15/C8g/Tnfsf13/Dapk1/Chn2/Ccbl1/Afap1/Iyd/Unc13d/Fam175a/Prr16/4930506M07Rik/Car13/Esco2/Slc39a5/Fndc3b/Plekhh1/Mir337/Mir375/Mir7-1/Slc43a1/Hsd12/Hepacam/Tmem138/Ddit41/Tubb2b/Rftn2/Slc6a19/Spag17/Wdr35/Pfn3/Dusp9/Tcam1/Lpo/Gstk1/Abcc3/Dok5/Il33/Akr1c21/Limch1/Polq/Rdh12/Nol3/Lias/Il24/Acox2/Tm2d1/Sgsm2/D2hgdh/Rdh10/Lpcat4

GO:0044763

Pafah2/Ces2a/Aspg/Akr1c18/Atf5/Lin7a/Slc14a1/Maob/Glo1/Slc35b1/Acadl/Acadm/Acadvl/Ache/Acp2/Acr/Acta1/Aspa/Adra1b/Avil/Gla/Ak4/Alcam/Alox8/Anxa3/Anxa4/Apoa1/Apoc1/App/Arc/Areg/Arf2/Atf3/Atf4/Ngfrap1/Bmp7/Zfp36l1/Btg2/Tspo/Cacnale/Cacnb3/Cat/Cd37/Cd44/Cdc7/Cebpd/Chga/Cxcr4/Plk3/Cnr1/Crabp2/Vcan/Cyp2d9/Dab1/Gadd45a/Ddit3/Dlx3/Dok1/Edn1/Efnb3/Egr1/Egr2/Enc1/Epha2/Epn2/Pofut1/Kcnn3/Fcgrt/Fgfr1/Fmo1/Fos/Fosl1/Fzd5/G0s2/Gata6/Gch1/Gpam/Gsta3/Gstt1/Nkx6-2/Hbb-b1/Hbegf/Hmbs/Nr4a1/Foxa1/Hoxd3/Hsd17b2/Hspe1/Iapp/Ier3/Ifrd1/Cyr61/Fabp6/Ins13/Itga2/Itgb5/Jun/Junb/Kcnh1/Kif1a/Kif1b/Kifc3/Krt84/Anpep/Lif/Lpl/Ltc4s/Bco2/Crb1/Maff/Matn2/Met/Sik1/Mthfr/Mybl2/Ppp1r15a/Nab1/Neurod1/Nefm/Nkx2-6/Nr4a3/Olfr46/Otc/Oxtr/Reg3b/Pax4/Pcsk6/Pde6g/Enpp1/Pecam1/Cdk14/Pik3r1/Pla2g2a/Pla2g5/Plcb2/Plscr2/Pole/Ppl/Pipox/Ptger3/Ptger4/Hps4/Dusp1/Ptpn2/Ptpm/Abcd4/Rasgrf2/Klf11/Rbp4/Rbpms/Reg3g/Rgs2/Rpgr/Rras/Rtn2/Sars/Selenbp1/Sell/Sepw1/Slc13a2/Slc22a1/Snta1/Serpinalb/Sephs2/Aurka/Cpeb3/Pank3/Tifa/BC027231/Prpsap2/Tacr3/Plekhh2/Trim38/Csrnp1/Ugp2/Mis18bp1/Tff2/Slc17a2/Thbs1/Tia1/Klf10/Haus4/Cenpj/Arl11/Tnf/Tpst2/Trf/Tob1/Trpc1/Tsg101/Ugt8a/Nr1h3/Upp1/Vamp8/Vim/Eny2/Vldlr/Soat2/Pi4ka/Wnt5a/Rbm11/Tbc1d24/Gpr116/Plc12/St8sia5/Pcgf2/Zfp36/Gpbar1/Camk1d/Gbgt1/Rhov/Clca2/Gba2/Zc3h12a/Cwh43/Tmf1/Nlrp2/Slc5a11/Aars/Spg7/Plscr4/Pdk3/Nox1/Zc3h12d/Fb1l1/Clca1/Klf6/Ets1/Gdf15/Pebsp1/Neurl1b/Kcng2/Slc16a12/Ldb3/Zfp385b

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GO:0044710

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GO:0006629

Pafah2/Aspg/Akr1c18/Acadl/Acadm/Acadvl/Gla/Alox8/Apoa1/Apoc1/App/Tspo/Cat/Cnr1/Crabp2/Cyp2d9/Edn1/Gata6/Gpam/Hsd17b2/Cyr61/Fabp6/Lpl/Ltc4s/Bco2/Sik1/Pik3r1/Pla2g2a/Pla2g5/Plcb2/Rbp4/Tnf/Ugt8a/Nr1h3/Vldlr/Soat2/Pi4ka/Gpr116/Plcl2/Gbgt1/Gba2/Cwh43/Pdk3/Npc111/Hsd17b13/Inpp4a/Pla2g2e/Gcdh/Agpat3/Agmo/Pla2g4e/Far2/Cyp2d12/Cyp2c68/Cyp2c67/Cyp39a1/Aldh1a3/Cacna1h/Mlxip1/Fads3/Gm6484/Ptges/Ormdl3/Iah1/Aadac/Akr1c21/Rdh12/Lias/Acox2/Rdh10/Lpcat4

GO:0008152

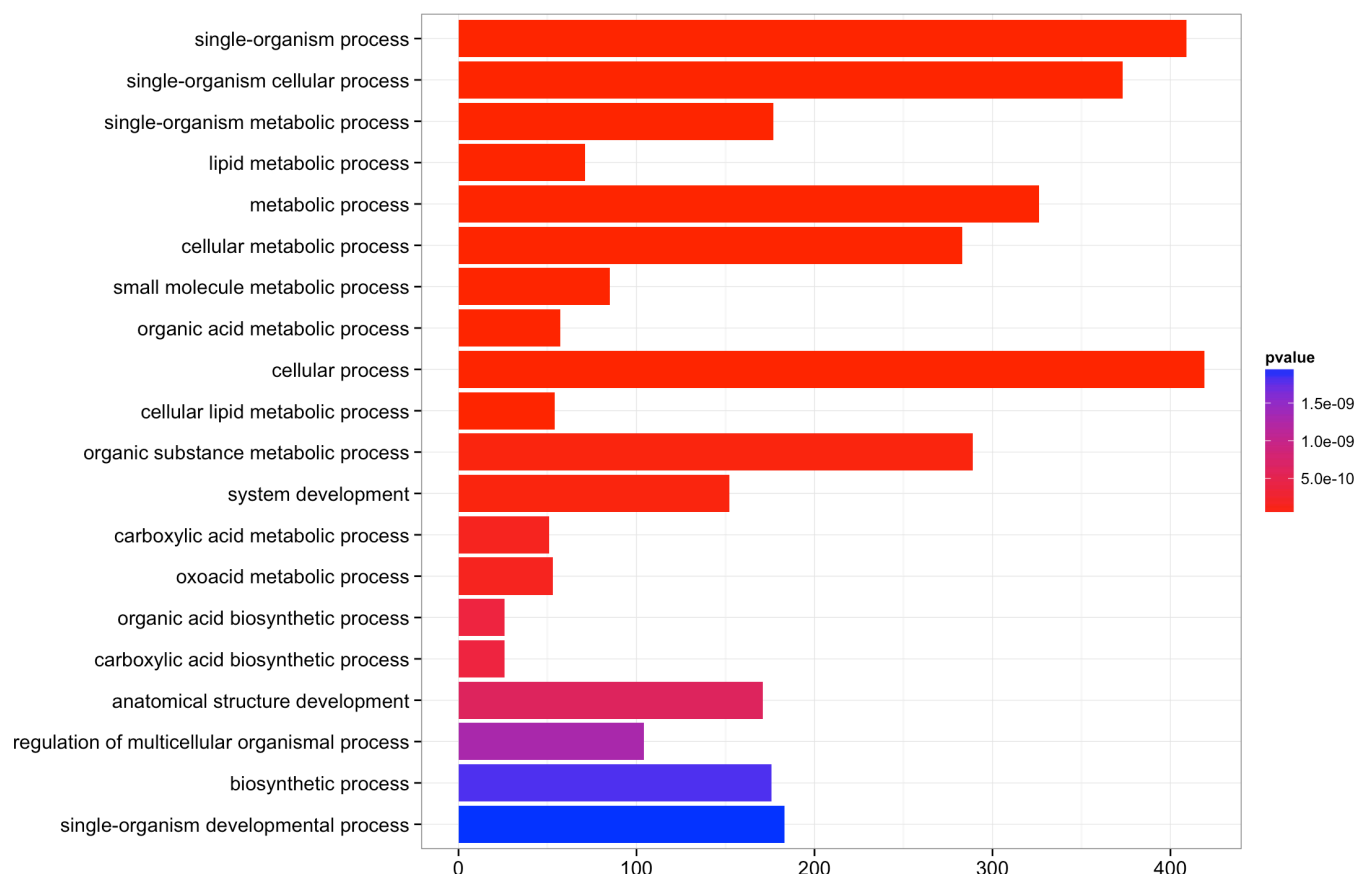
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GO:0044237

Psip1/Ces2a/Pan2/Aspg/Akr1c18/Atf5/Rimkb1/Maob/Glo1/Acad1/Acadm/Acadv1/Ache/Acp2/Acr/Aspa/Adra1b/Gla/Ak4/Alox8/Anxa3/Anxa4/Apoa1/Apoc1/App/Areg/Atf3/Atf4/Bmp7/Zfp3611/Btg2/Tspo/Cat/Cd44/Cdc7/Cebpd/Chga/Clk4/Plk3/Cnr1/Crabp2/Vcan/Cyp2d9/Dab1/Gadd45a/Ddit3/Dlx3/Dok1/Edn1/Egr1/Egr2/Enc1/Epha2/Pofut1/Fgfr1/Fkbp7/Fmol/Fos/Fosb/Fosl1/Fzd5/Gata6/Gch1/Gpam/Gsta3/Gstm4/Gstt1/Nkx6-2/Hbb-b1/Hbegf/Hmbs/Nr4a1/Foxa1/Hoxb1/Hoxd3/Hsd17b2/Hspe1/Ier3/Ifrd1/Cyr61/Fabp6/Ins13/Itga2/Jun/Junb/Anep/Lif/Lpl/Ltc4s/Bco2/Maff/Met/Sik1/Mthfr/Mybl1/Mybl2/Ppp1r15a/Nab1/Neurod1/Nfatc2ip/Nkx2-6/Nr4a3/Hspa41/Otc/Oxtr/Reg3b/Pax4/Pcsk6/Pde6g/Enpp1/Pecam1/Cdk14/Pik3r1/Pla2g2a/Pla2g5/Pole/Prim2/Pipox/Ptger4/Dusp1/Ptpn2/Ptpm/Abcd4/Zfp3/Klf11/Rbp4/Rbpms/Rgs2/Ras/Sars/Snta1/Serpinalb/Sephs2/Aurka/Cpeb3/Pank3/Prpsap2/Tacr3/Trim38/Csrnp1/Ugp2/Tff2/Thbs1/Tia1/Klf10/Gcnt4/Cenpj/Tnf/Tpst2/Trf/Tob1/Trpc1/Tsg101/Ugt8a/Nr1h3/Upp1/Vamp8/Eny2/Vldlr/Soat2/Pi4ka/Wnt5a/Rbm11/Gpr116/Plcl2/St8sia5/Pcgf2/Zfp36/Camk1d/Gbgt1/Tshz2/Gba2/Zc3h12a/Cwh43/Tmf1/Nlrp2/Zfp939/Aars/Pdk3/Nox1/Zc3h12d/Fbll1/Klf6/Ets1/Gdf15/Pebp1/St18/Pcmt2/Lgsn/Gphn/Inpp4a/Pla2g2e/Pon3/Gcdh/Spib/Agpat3/Hnf4g/Dusp4/Zfp182/Agmo/Rnf182/Abi2/Pla2g4e/Pon2/Far2/Mamld1/Cyp2d12/Med19/Pdp1/Mir26a-1/Cyp2c68/Ttpa/Wwc2/Slc40a1/Cyp2c67/Cyp2w1/Pde3a/Sfmbt1/Rcan1/Tfip11/Cyp39a1/Cited4/Aldh18a1/Ripk3/Mgst1/Ccn11/Zbtb33/Aldh1a3/Rbms1/Isg20/Rpl35a/Cacna1h/Pmaip1/Mlxip1/Tdh/Fads3/Gm6484/Fam129a/Herpud1/Ptges/Ormdl3/Lix1/Tceal8/Myo3a/Slc16a9/Asf1b/Sdha/Gatm/Rnf212/Qprt/Klhl13/Wfdc2/Itgb3bp/Aadac/2810417H13Rik/Ccdc88c/Sult1c2/Trim15/Tnfsf13/Dapk1/Ccbl1/Fam175a/Prr16/Car13/Esco2/Slc39a5/Plekhf1/Mir7-1/Dusp9/Lpo/Gstk1/Ckmt2/Dok5/Il33/Polq/Rdh12/Nol3/Lias/Il24/Acox2/D2hgdh/Rdh10/Lpcat4

##	Count
## GO:0044699	409
## GO:0044763	373
## GO:0044710	177
## GO:0006629	71
## GO:0008152	326
## GO:0044237	283



```
##          ID          Description GeneRatio      BgRatio
## GO:0005488 GO:0005488      binding    374/565 11936/23888
## GO:0003674 GO:0003674 molecular_function 565/565 22785/23888
## GO:0043167 GO:0043167      ion binding  188/565  5094/23888
## GO:0016491 GO:0016491 oxidoreductase activity 48/565   743/23888
## GO:0005515 GO:0005515      protein binding 239/565  7463/23888
## GO:0003824 GO:0003824      catalytic activity 180/565  5340/23888
##          pvalue      p.adjust      qvalue
## GO:0005488 2.403822e-15 2.399014e-12 1.986316e-12
## GO:0003674 1.809637e-12 9.030090e-10 7.476659e-10
## GO:0043167 1.886187e-11 6.274715e-09 5.195287e-09
## GO:0016491 3.667305e-10 9.149926e-08 7.575880e-08
## GO:0005515 1.379000e-08 2.752485e-06 2.278979e-06
## GO:0003824 8.690975e-08 1.445599e-05 1.196915e-05
##
```

geneID

GO:0005488

Psip1/Pan2/Epdr1/Atf5/Lgals2/Lin7a/Rimklb/At13/Sobp/Maob/Glo1/Ig1c2/Pcca/Acadl/Acadm/Acadvl/Ache/Acp2/Acr/Acta1/Aspa/Adra1b/Avil/Gla/Ak4/Alcam/Alox8/Steap4/Anxa3/Anxa4/Apoa1/App/Arc/Areg/Arf2/Atf3/Atf4/Ngfrap1/Bmp7/Zfp3611/Btg2/Tspo/Cacna1e/Cacnb3/S100g/Cat/Cd44/Cdc7/Cebpd/Chga/Clk4/Cxcr4/Plk3/Cnr1/Crabp2/Vcan/Cyp2d9/Dab1/Gadd45a/Ddit3/Dlx3/Dok1/Dtnb/Edn1/Efnb3/Egr1/Egr2/Enc1/Epha2/Epn2/Kcnn3/Fcgrt/Fgfr1/Fkbp7/Fmo1/Fos/Fosb/Fosl1/Fzd5/Gata6/Gch1/Gstm4/Nkx6-2/H2-T10/Hbegf/Hmbs/Nr4a1/Foxa1/Hoxb1/Hoxd3/Hspe1/Iapp/Ier3/Ifrd1/Cyr61/Fabp6/Ins13/Itga2/Itgb5/Jun/Junb/Kcnh1/Kif1a/Kif1b/Kifc3/Kpna2/Anpep/Lif/Lpl/Ltc4s/Bco2/Crb1/Maff/Matn2/Met/Sik1/Mthfr/Mx1/

Mybl1/Mybl2/Ppp1r15a/Myl7/Nab1/Neurod1/Nfatc2ip/Nefm/Nkx2-6/Nr4a3/Olfr46/Hspa41/Otc/Oxtr/Reg3b/Pax4/Pcsk6/Pde6g/Enpp1/Pecam1/Cdk14/Pik3r1/Pla2g2a/Pla2g5/Plcb2/Plscr2/Pole/Ppl/Prim2/Pipox/Ptger3/Hps4/Ptpn2/Ptprm/Abcd4/Zfp3/Rasgrf2/Klf11/Rbp4/Rbpms/Reg3g/Rgs2/Rpgr/Rras/S100a11/Sars/Frrs1/Selenbp1/Selenbp2/Sell/Sept8/Sepw1/Sh3bp1/Slc22a1/Slc3a1/Snta1/Serpinalb/Sephs2/Aurka/Cpeb3/Pank3/Suox/Tifa/Prpsap2/Plekhh2/Trim38/Csrnp1/Ugp2/Mis18bp1/Tff2/Thbs1/Tial/Klf10/Cenpj/Arl11/Tnf/Trf/Tob1/Trpc1/Tsg101/Nr1h3/Vamp8/Vim/Vldlr/Soat2/Wnt5a/Rbm11/Plcl2/Zadh2/Pcgf2/Zfp36/Camk1d/Gbgt1/Rhov/Frmd5/Tshz2/Clca2/Efcab7/Zc3h12a/Tmf1/Nlrp2/Aars/Spg7/Plscr4/Pdk3/Nox1/Zc3h12d/Npc111/Fbll1/Clca1/Klf6/Ets1/Gdf15/Actbl2/Cdh24/Pebsp1/Neurl1b/St18/Ldb3/Zfp385b/Frem2/Grin3a/Raver2/Dlgap3/Clec1a/Ppp1r9a/Rgs13/Olfr1415/Olfr955/Olfr1350/Olfr313/Olfr196/Lgsn/Gphn/Pclo/Pla2g2e/Pon3/Gcdh/Spib/Abcc6/Hnf4g/Slc7a9/Hist1h2bb/Zfp182/Agmo/Rnf182/Abi2/Pla2g4e/Pon2/Ighd/Cyp2d12/Naalad11/Med19/Pdp1/Agr3/Cyp2c68/Ttpa/Cdca8/Wwc2/Sgta/Ncald/Nptx2/Syt5/Nphp1/Slc40a1/Ngef/Cyp2c67/Cyp2w1/Pde3a/Sfmbt1/Rcan1/Tfip11/Cyp39a1/Cpb2/Cyp3a25/Aldh18a1/Ripk3/Mgst1/Ccn11/Nfu1/Zbtb33/Aldh1a3/Rbms1/Tob2/Isg20/Rpl35a/Cacna1h/Pmaip1/Mlxip1/Tdh/Rhot1/Fads3/Hist2h2ab/Gm14137/Gm6484/Clstn2/Trpv6/Herpud1/Ptges/Mrps24/Cndp2/Cxcl16/Cnpy4/Myo3a/Asf1b/Sdha/Rnf212/Qprt/Poc5/Reg4/Plxnd1/2810417H13Rik/Crip2/Ccdc88c/C8g/Tnfsf13/Dapk1/Chn2/Cmtm8/Ccbl1/Afap1/Unc13d/Fam175a/4930506M07Rik/Car13/Esco2/Fndc3b/Mccc1/Plekhl1/Hepacam/Tubb2b/Slc6a19/Spag17/Prr3/Pfn3/Cmtm2b/C2cd4b/Tcam1/Gstk1/Gpt/Abcc3/Ckmt2/Dok5/IL33/Akr1c21/Limch1/Polq/Helz/Nol3/Lias/IL24/Pcdhgb1/Acox2/Tm2d1/Sgsm2/D2hgdh

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GO:0016491

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GO:0005515

Psip1/Pan2/Atf5/Lin7a/At13/Sobp/Maob/Pcca/Acadm/Ache/Acp2/Acr/Acta1/Aspa/Adra1b/Avil/Gla/Alcam/Anxa3/Anxa4/Apoa1/App/Arc/Areg/Atf3/Atf4/Ngfrap1/Bmp7/Btg2/Cacnale/Cacnb3/Cat/Cd44/Cebpd/Chga/Cxcr4/Plk3/Crabp2/Vcan/Dab1/Gadd45a/Ddit3/Dok1/Dtnb/Edn1/Efnb3/Egr1/Egr2/Enc1/Epha2/Kcnn3/Fcgrt/Fgfr1/Fkbp7/Fos/Fzd5/Gata6/Gch1/Gstm4/H2-T10/Hbegf/Nr4a1/Foxa1/Hoxb1/Hspe1/Iapp/Ier3/Ifrd1/Cyr61/Ins13/Itga2/Itgb5/Jun/Junb/Kcnh1/Kif1a/Kif1b/Kifc3/Kpna2/Lif/Lpl/Ltc4s/Crb1/Met/Sik1/Mthfr/Mx1/Ppp1r15a/My17/Nab1/Neurod1/Nfatc2ip/Nefm/Hspa41/Pcsk6/Pde6g/Enpp1/Pecam1/Cdk14/Pik3r1/Pla2g5/Plcb2/Plscr2/Ppl/Pipox/Ptger3/Hps4/Ptpn2/Ptpm/Rasgrf2/Rbp4/Rgs2/Rpgr/Rras/S100a11/Sel1/Sh3bp1/Slc22a1/Slc3a1/Snta1/Serpina1b/Aurka/Cpeb3/Tifa/Plekh2/Trim38/Ugp2/Mis18bp1/Tff2/Thbs1/Tia1/Cenpj/Tnf/Trf/Tob1/Trpc1/Tsg101/Nr1h3/Vamp8/Vim/Vldlr/Wnt5a/Rbm11/Plcl2/Pcgf2/Zfp36/Camk1d/Frmd5/Tshz2/Zc3h12a/Tmf1/Nlrp2/Aars/Plscr4/Nox1/Npc11/Ets1/Gdf15/Cdh24/Pebp1/Ldb3/Zfp385b/Frem2/Grin3a/Raver2/Dlgap3/Ppp1r9a/Rgs13/Lgs

n/Gphn/Pclo/Pon3/Slc7a9/Hist1h2bb/Abi2/Pon2/Med19/Pdp1/Agr3/Cdca8/Wwc2/Sgta/Ncald/Syt5/Nphp1/Slc40a1/Ngef/Sfmbt1/Rcan1/Tfip11/Ripk3/Mgst1/Ccn11/Nful/Zbtb33/Aldh1a3/Tob2/Cacna1h/Pmaip1/Mlxip1/Hist2h2ab/Gm14137/Gm6484/Trpv6/Herpud1/Cxcl16/Cnpy4/Myo3a/Asf1b/Qprt/Poc5/Plxnd1/Crip2/Ccdc88c/C8g/Tnfsf13/Dapk1/Cmtm8/Ccbl1/Afap1/Unc13d/Fam175a/4930506M07Rik/Hepacam/Slc6a19/Spag17/Pfn3/Cmtm2b/Tcam1/Gstk1/Dok5/I133/Limch1/Helz/Nol3/I124/Pcdhgb1/Acox2/Sgsm2

GO:0003824

Cyp3a59/Pafah2/Ces2a/Pan2/Aspg/Akr1c18/Rimklb/At13/Maob/Glo1/Pcca/Acadl/Acadm/Acadvl/Ache/Acp2/Acr/Aspa/Gla/Ak4/Alox8/Steap4/Cat/Cd44/Cdc7/Clk4/Plk3/Cyp2d9/Egr2/Epha2/Pofut1/Fgfr1/Fkbp7/Fmo1/Gch1/Gpam/Gsta3/Gstm4/Gstt1/Hmbs/Hsd17b2/Kcnh1/Kif1a/Kif1b/Kifc3/Klk1b5/Anpep/Lpl/Ltc4s/Bco2/Met/Sik1/Mthfr/Mx1/Otc/Pcsk6/Pde6g/Enpp1/Cdk14/Pik3r1/Pla2g2a/Pla2g5/Plcb2/Pole/Prim2/Tmprss15/Pipox/Duspl/Ptpn2/Ptprm/Abcd4/Ras/Sars/Frrs1/Sepw1/Slc3a1/Sephs2/Aurka/Pank3/Suox/Prpsap2/Ugp2/Gcnt4/Tpst2/Ugt8a/Upp1/Soat2/Pi4ka/Plcl2/St8sia5/Zadh2/Camk1d/Gbgt1/Clca2/Gba2/Zc3h12a/Ces2e/Aars/Spg7/Pdk3/Nox1/Zc3h12d/Fb111/Clca1/Klk7/Neur11b/Hsd17b13/Pcmt2/Lgsn/Gphn/Inpp4a/Pla2g2e/Pon3/Gcdh/Abcc6/Agpat3/Dusp4/Agmo/Rnf182/Pla2g4e/Pon2/Far2/Cyp2d12/Naaladl1/Pdp1/Ces1b/Cyp2c68/Prss16/Cyp2c67/Cyp2w1/Pde3a/Cyp39a1/Cpb2/Cyp3a25/Aldh18a1/Ripk3/Mgst1/Aldh1a3/Isg20/Tdh/Rhot1/Fads3/Ptges/Cndp2/Myo3a/Sdha/Gatm/Rnf212/Qprt/Isoc2b/Klhl13/Iah1/Aadac/Sult1c2/Dapk1/Ndufaf1/Mettl7a1/Ccbl1/Iyd/Car13/Esco2/Mccc1/Ces2g/Hsd12/Tubb2b/Dusp9/Lpo/Gstk1/Gpt/Abcc3/Ckmt2/Akr1c21/Polq/Rdh12/Helz/Lias/Acox2/D2hgdh/Rdh10/Lpcat4

##	Count
## GO:0005488	374
## GO:0003674	565
## GO:0043167	188
## GO:0016491	48
## GO:0005515	239
## GO:0003824	180



GO gene set enrichment analysis

```
## [1] "calculating observed enrichment scores..."
## [1] "calculating permutation scores..."
##
|
|
## [1] "calculating p values..."
## [1] "done..."
```

```
##                               ID                               Description
## GO:0003008 GO:0003008                               system process
## GO:0006082 GO:0006082                               organic acid metabolic process
## GO:0006139 GO:0006139 nucleobase-containing compound metabolic process
## GO:0006351 GO:0006351                               transcription, DNA-templated
## GO:0006355 GO:0006355       regulation of transcription, DNA-templated
## GO:0006412 GO:0006412                               translation
##      setSize enrichmentScore      pvalue      p.adjust      qvalues
## GO:0003008      376      -0.2194194 0.000999001 0.005644356 0.003023292
## GO:0006082      322       0.1654089 0.000999001 0.005644356 0.003023292
## GO:0006139     1089     -0.1025868 0.000999001 0.005644356 0.003023292
## GO:0006351      657     -0.1331686 0.000999001 0.005644356 0.003023292
## GO:0006355      647     -0.1258255 0.000999001 0.005644356 0.003023292
## GO:0006412      131     -0.2002041 0.000999001 0.005644356 0.003023292
```

KEGG pathways analysis

For any of the specific pathways we can generate visual layout with highlighted differential expression

KEGG over-representation analysis

```
## [1] ID           Description GeneRatio   BgRatio      pvalue      p.adjust
## [7] qvalue         Count
## <0 rows> (or 0-length row.names)
```

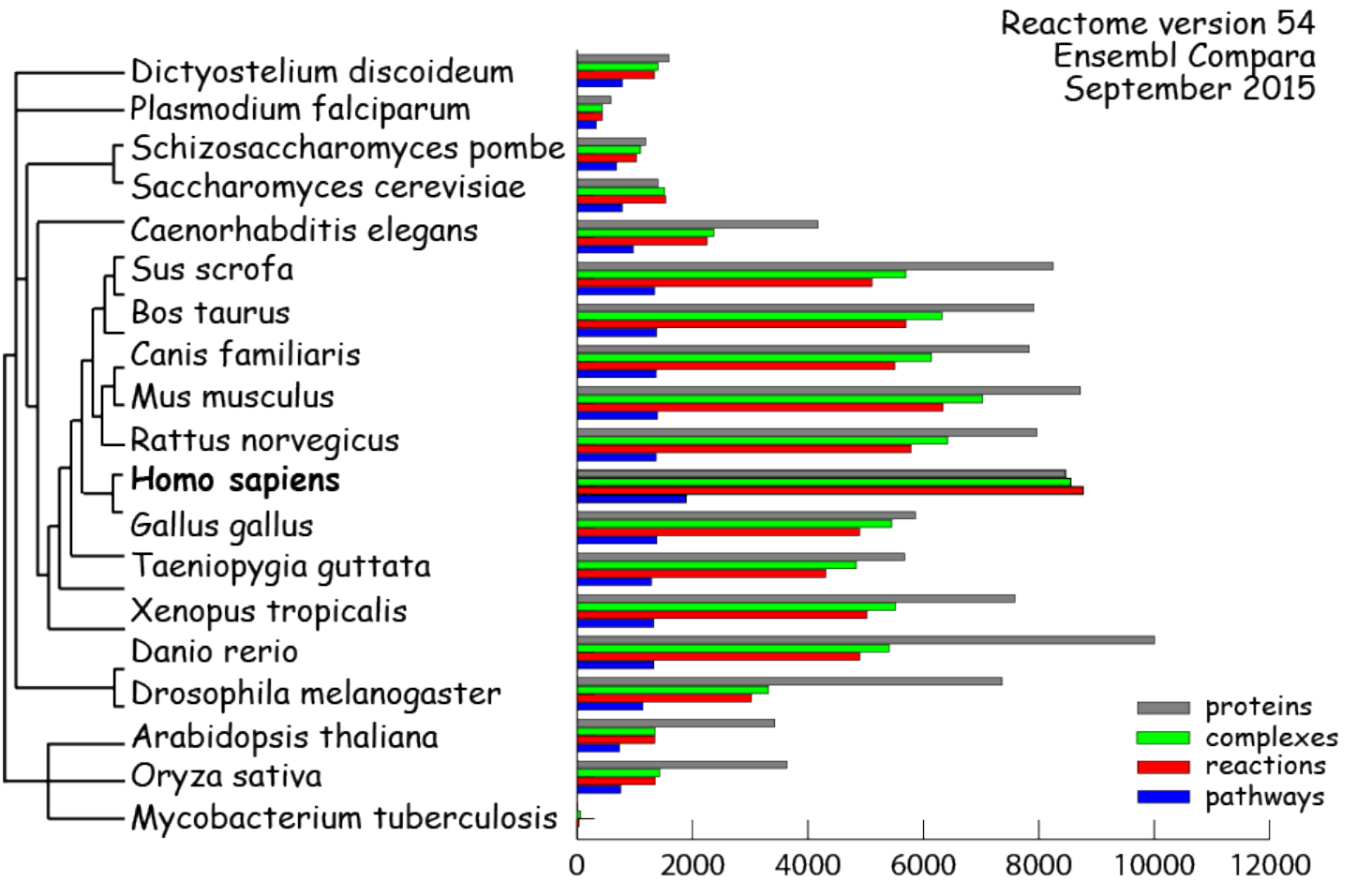
KEGG Gene set enrichment analysis

```
## [1] "calculating observed enrichment scores..."
## [1] "calculating permutation scores..."
##
|
|
## [1] "calculating p values..."
## [1] "done..."
```

##	ID	Description	setSize		
##	mmu00010	mmu00010 Glycolysis / Gluconeogenesis	32		
##	mmu00071	mmu00071 Fatty acid degradation	22		
##	mmu00230	mmu00230 Purine metabolism	55		
##	mmu00240	mmu00240 Pyrimidine metabolism	35		
##	mmu00280	mmu00280 Valine, leucine and isoleucine degradation	27		
##	mmu00340	mmu00340 Histidine metabolism	11		
##	enrichmentScore	pvalue	p.adjust	qvalues	
##	mmu00010	0.4652353	0.000999001	0.01361139	0.008478364
##	mmu00071	0.6335252	0.000999001	0.01361139	0.008478364
##	mmu00230	-0.3081950	0.000999001	0.01361139	0.008478364
##	mmu00240	-0.3687453	0.000999001	0.01361139	0.008478364
##	mmu00280	0.5321374	0.000999001	0.01361139	0.008478364
##	mmu00340	0.7727697	0.000999001	0.01361139	0.008478364

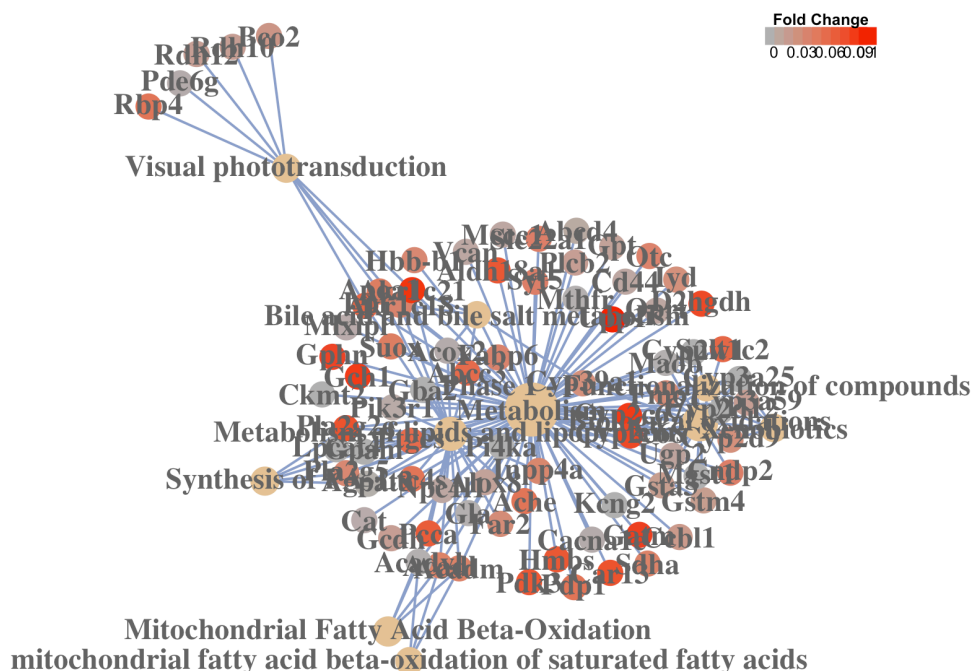
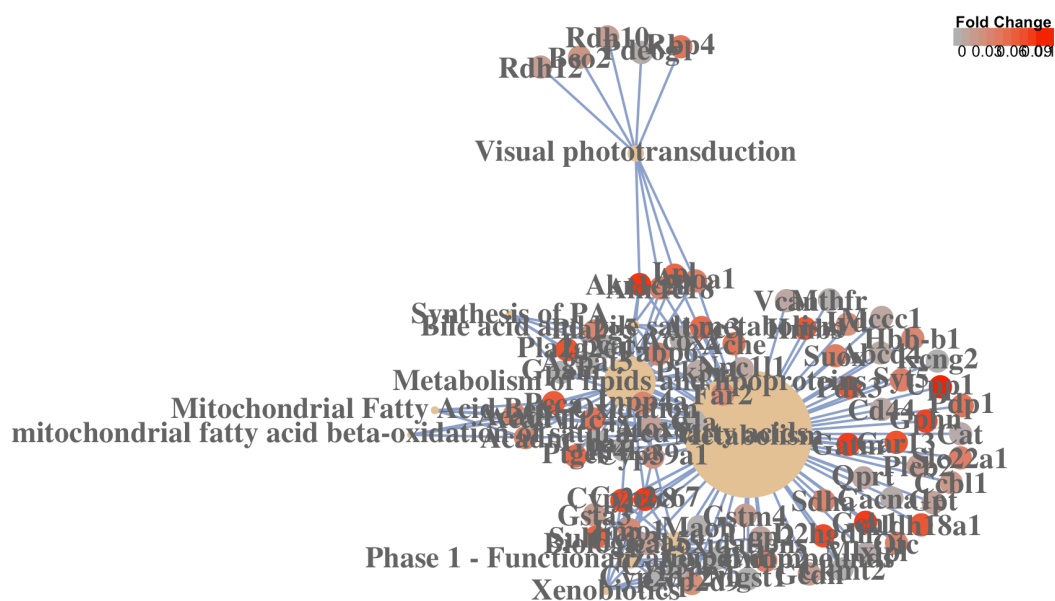
Analysis of Reactome Pathways

Reactome data bases consist of curated biochemical pathways including metabolic and transport reactions describing details of protein complexes involved in particular processes. Currently it spans 8000 proteins and reactions in human and equally reach knowledge for multiple other species (<http://www.reactome.org> (<http://www.reactome.org>)):



Reactome over-representation analysis

##	ID	Description	GeneRatio		
##	5991024	5991024	Metabolism	75/213	
##	5991029	5991029	Biological oxidations	16/213	
##	5991065	5991065	Metabolism of lipids and lipoproteins	30/213	
##	5991063	5991063	Mitochondrial Fatty Acid Beta-Oxidation	4/213	
##	5991241	5991241	Synthesis of PA	5/213	
##	5991134	5991134	Visual phototransduction	9/213	
##	BgRatio	pvalue	p.adjust	qvalue	
##	5991024	1535/7111	2.474768e-06	0.001361123	0.001284274
##	5991029	191/7111	1.815517e-04	0.049926707	0.047107879
##	5991065	517/7111	3.209743e-04	0.058845284	0.055522919
##	5991063	15/7111	8.237231e-04	0.091270722	0.086117639
##	5991241	27/7111	1.083845e-03	0.091270722	0.086117639
##	5991134	87/7111	1.108328e-03	0.091270722	0.086117639
##	geneID				
##	5991024	Abcc3/Abcd4/Acadl/Acadm/Acadvl/Ache/Acox2/Agpat3/Akr1c18/Akr1c21/Aldh18a1/Alox8/Apoa1/Cacna1e/Car13/Cat/Ccbl1/Cd44/Ckmt2/Cndp2/Cyp2c67/Cyp2c68/Cyp2d12/Cyp2d9/Cyp2w1/Cyp39a1/Cyp3a25/Cyp3a59/D2hgdh/Fabp6/Far2/Fmo1/Gatm/Gba2/Gcdh/Gch1/Gla/Gpam/Gphn/Gpt/Gsta3/Gstm4/Hbb-b1/Hmbs/Inpp4a/Iyd/Kcng2/Lpcat4/Lpl/Ltc4s/Maob/Mccc1/Mgst1/Mlxipl/Mthfr/Npc1l1/Otc/Pcca/Pdk3/Pdp1/Pi4ka/Pik3r1/Pla2g2e/Pla2g5/Plcb2/Ptges/Qprt/Sdha/Slc22a1/Sult1c2/Suox/Syt5/Ugp2/Upp1/Vcan			
##	5991029	Cndp2/Cyp2c67/Cyp2c68/Cyp2d12/Cyp2d9/Cyp2w1/Cyp39a1/Cyp3a25/Cyp3a59/Fmo1/Gsta3/Gstm4/Maob/Mgst1/Sult1c2/Ugp2			
##	5991065	Abcc3/Acadl/Acadm/Acadvl/Ache/Acox2/Agpat3/Akr1c18/Akr1c21/Alox8/Apoa1/Cyp2c67/Cyp2c68/Cyp39a1/Fabp6/Far2/Gba2/Gla/Gpam/Inpp4a/Lpcat4/Lpl/Ltc4s/Npc1l1/Pcca/Pi4ka/Pik3r1/Pla2g2e/Pla2g5/Ptges			
##	5991063	Acadl/Acadm/Acadvl/Pcca			
##	5991241	Agpat3/Gpam/Lpcat4/Pla2g2e/Pla2g5			
##	5991134	Akr1c18/Akr1c21/Apoa1/Bco2/Lpl/Pde6g/Rbp4/Rdh10/Rdh12			
##	Count				
##	5991024	75			
##	5991029	16			
##	5991065	30			
##	5991063	4			
##	5991241	5			
##	5991134	9			



Reactome Gene set enrichment analysis

```
##          ID          Description setSize enrichmentScore
## 5990979 5990979      Cell Cycle, Mitotic      166      0.1707119
## 5991037 5991037      Gene Expression      172      -0.2168698
## 5991408 5991408 GPCR downstream signaling      125      -0.2968286
## 5991155 5991155      Innate Immune System      127      -0.1597486
## 5991024 5991024      Metabolism      509      0.1407577
## 5991071 5991071      Signal Transduction      472      -0.1255011
##          pvalue  p.adjust  qvalues
## 5990979 0.00990099 0.01608911 0.005211047
## 5991037 0.00990099 0.01608911 0.005211047
## 5991408 0.00990099 0.01608911 0.005211047
## 5991155 0.00990099 0.01608911 0.005211047
## 5991024 0.00990099 0.01608911 0.005211047
## 5991071 0.00990099 0.01608911 0.005211047
```