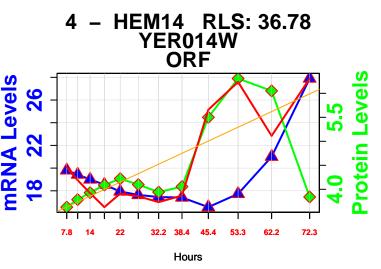
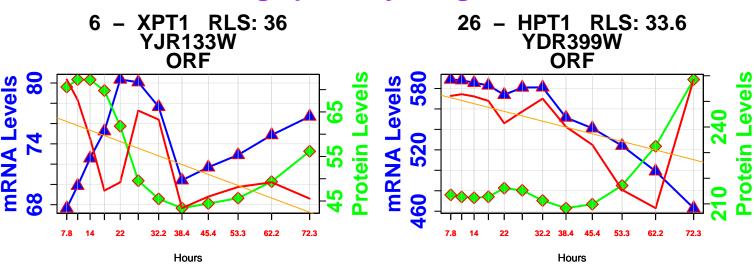
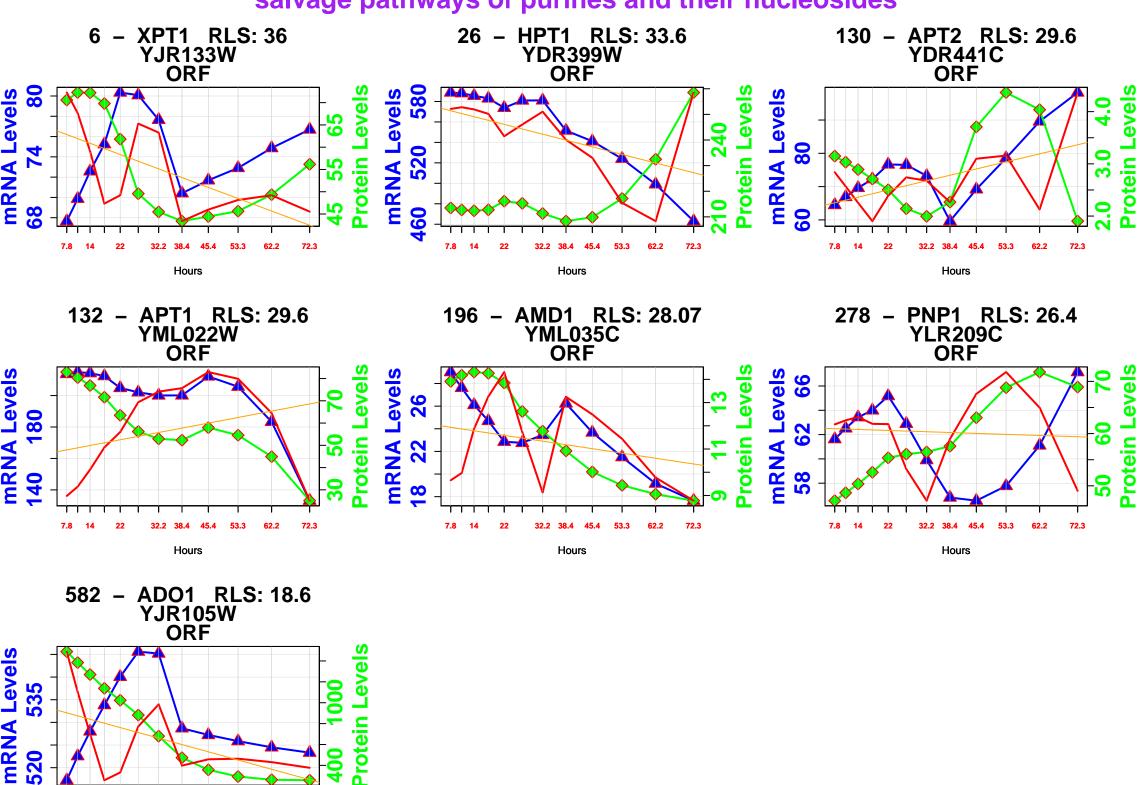
# heme biosynthesis



#### salvage pathways of guanine, xanthine and their nucleosides

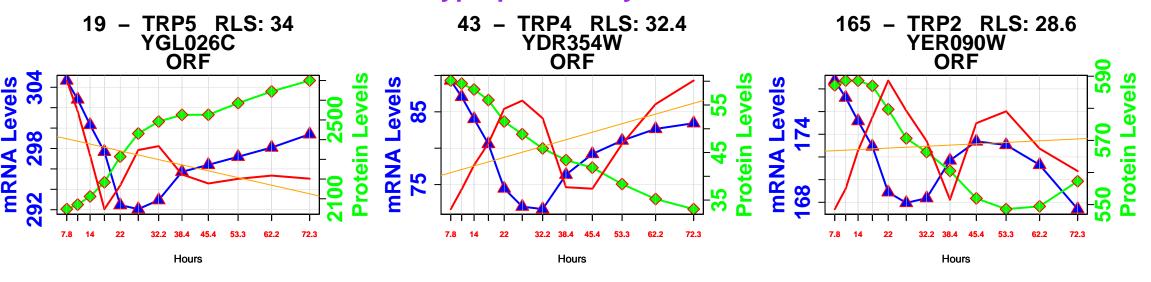


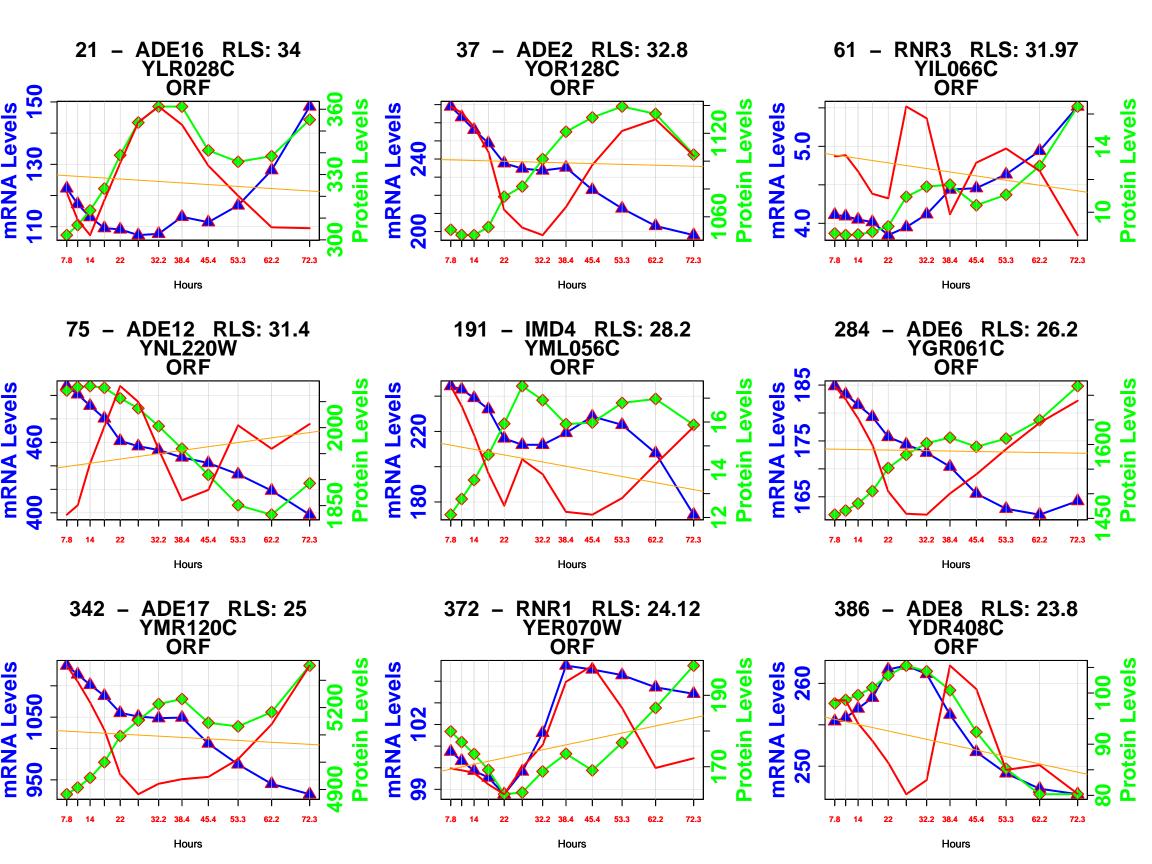
#### salvage pathways of purines and their nucleosides



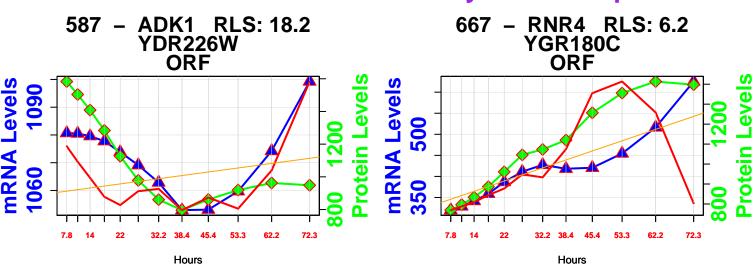
Hours

#### tryptophan biosynthesis

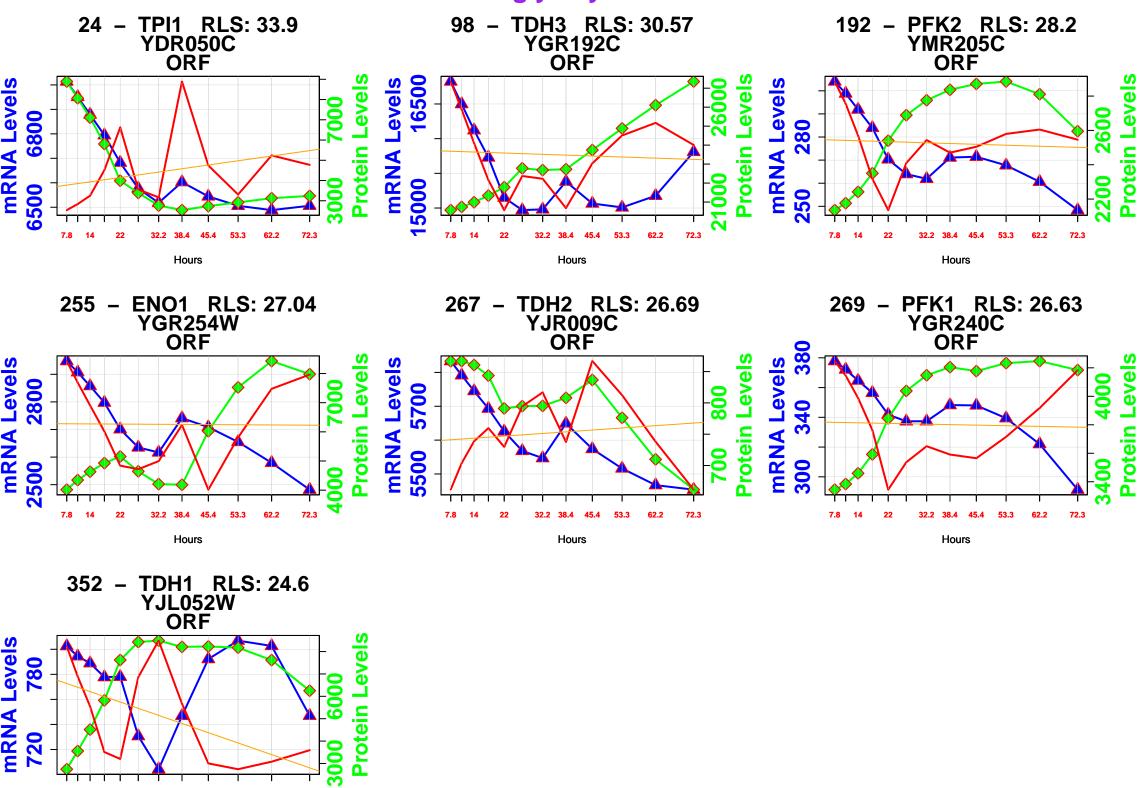




#### de novo biosynthesis of purine nucleotides



#### glycolysis

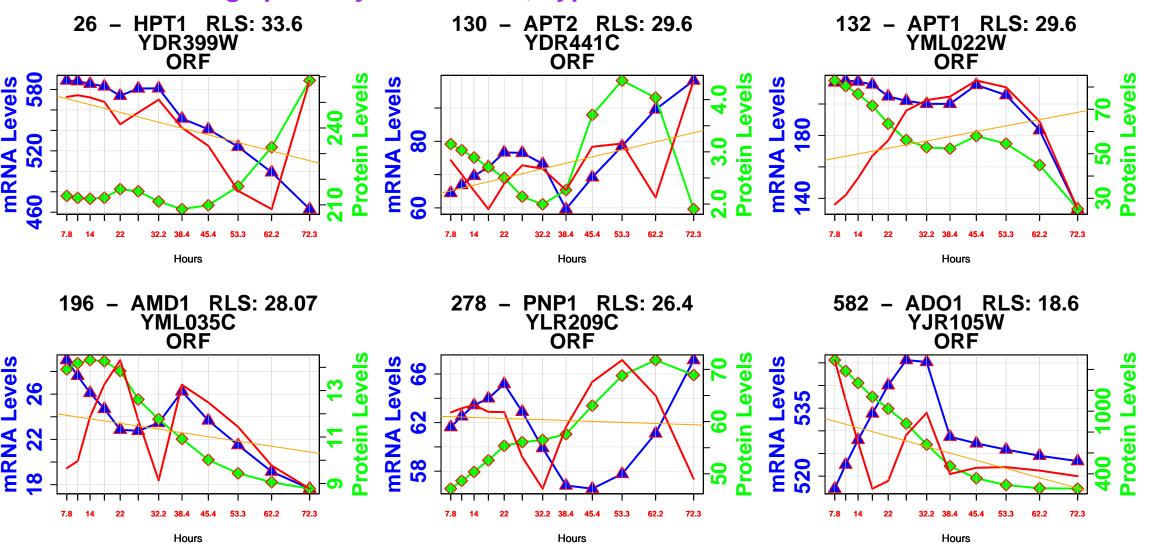


22

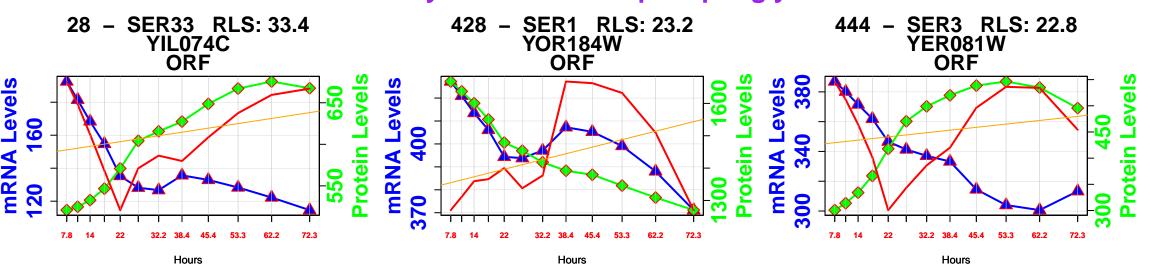
Hours

72.3

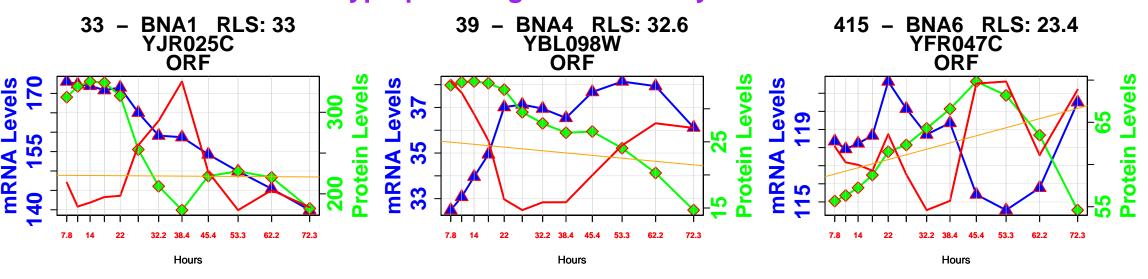
#### salvage pathways of adenine, hypoxanthine and their nucleosides



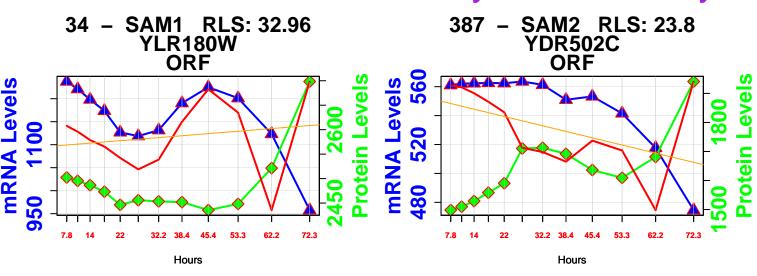
#### serine biosynthesis from 3-phosphoglycerate



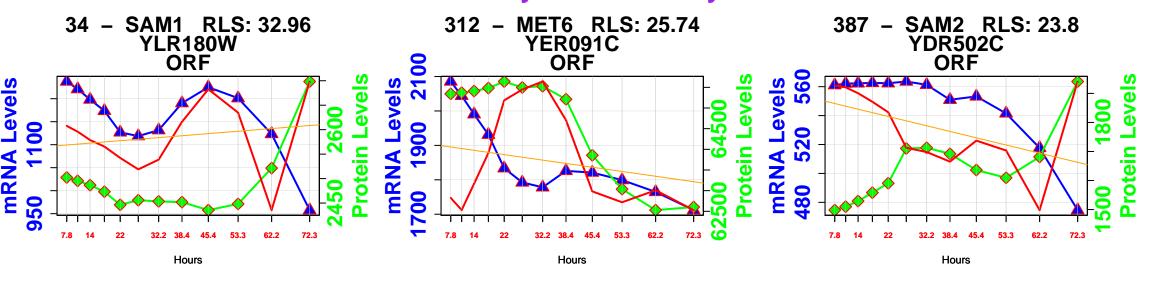
#### tryptophan degradation via kynurenine



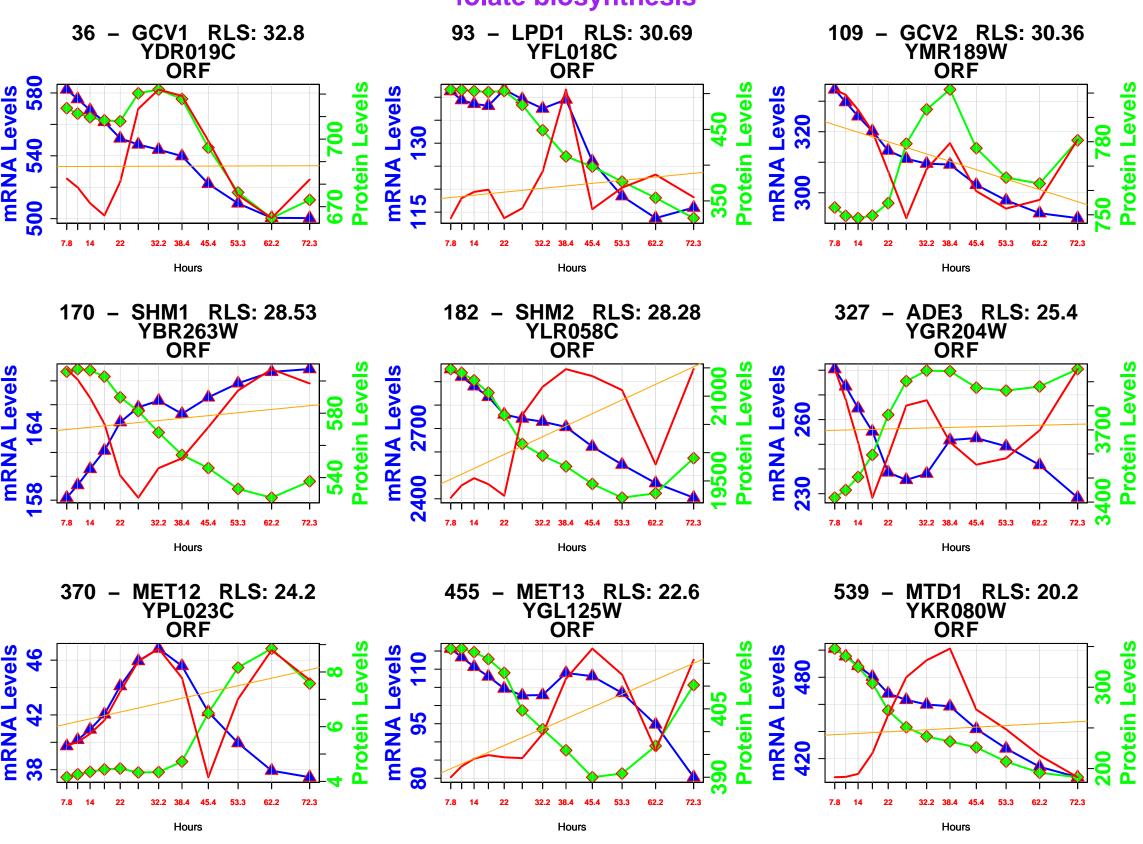
#### S-adenosylmethionine biosynthesis



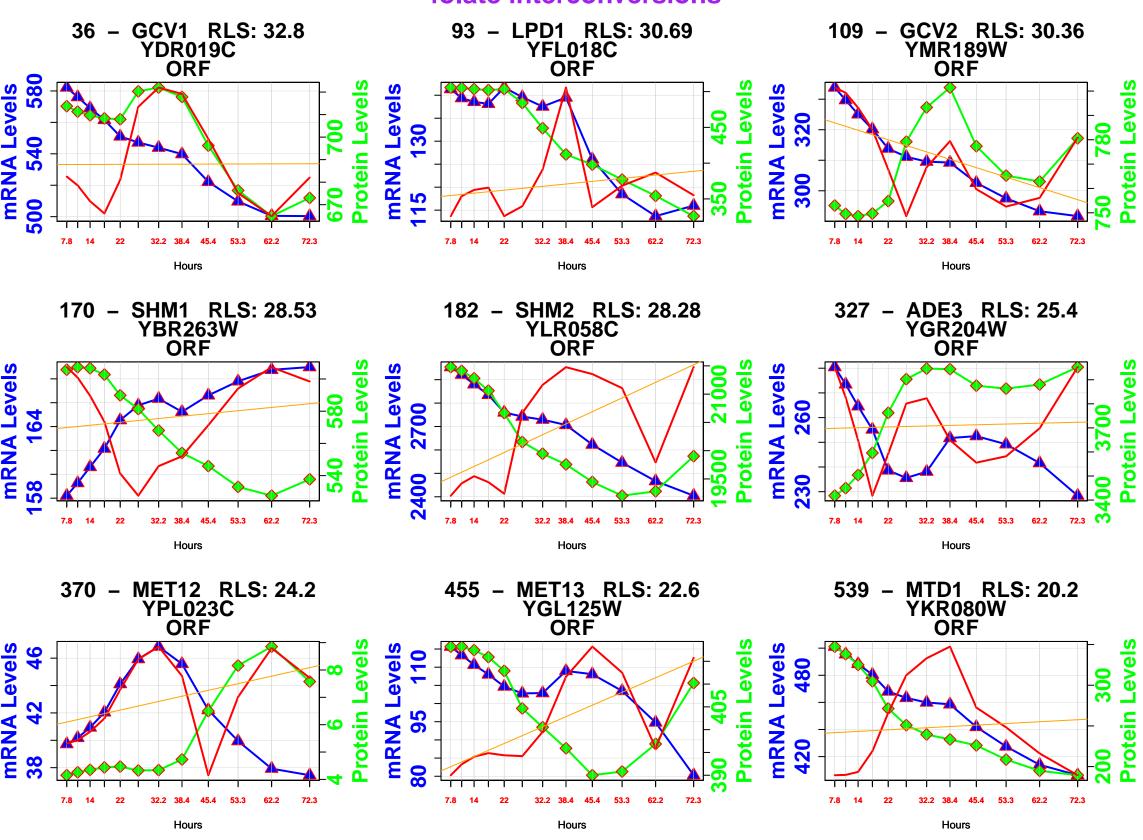
#### S-adenosylmethionine cycle



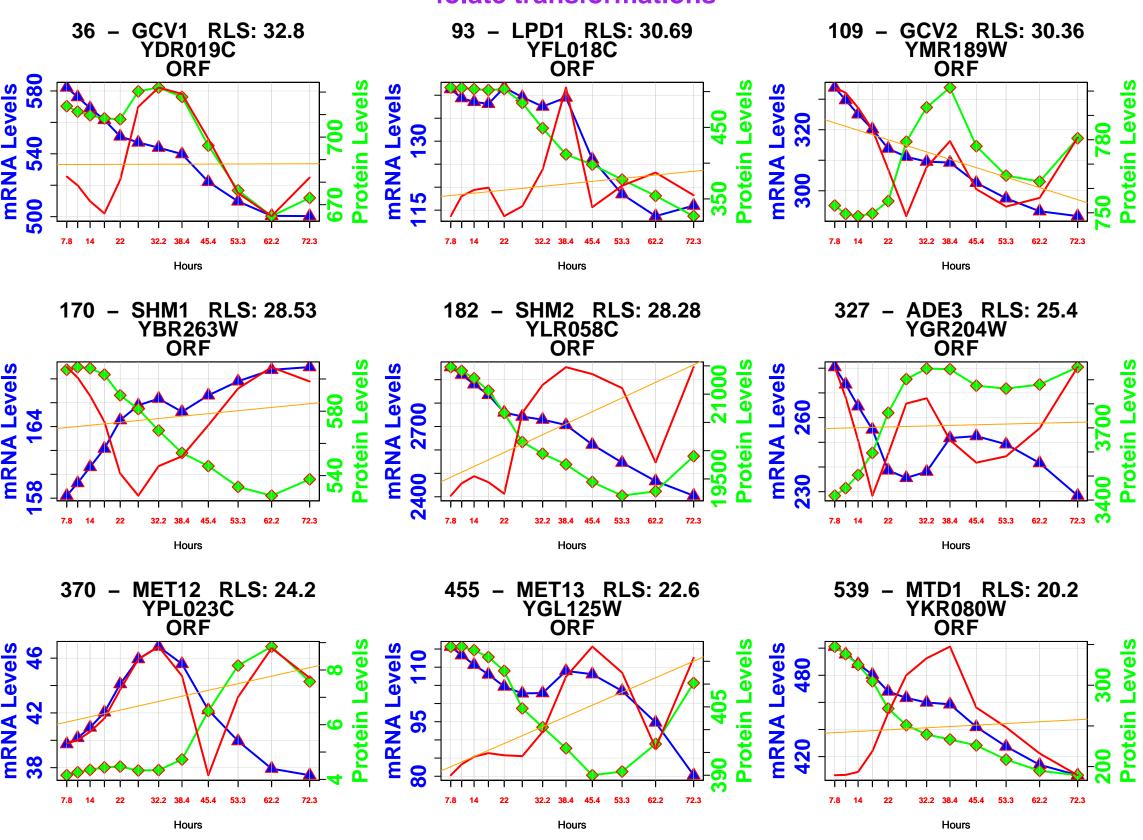
#### folate biosynthesis



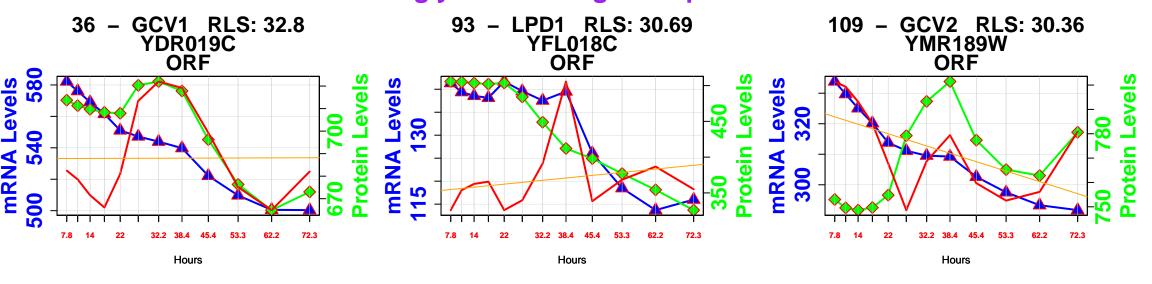
#### folate interconversions



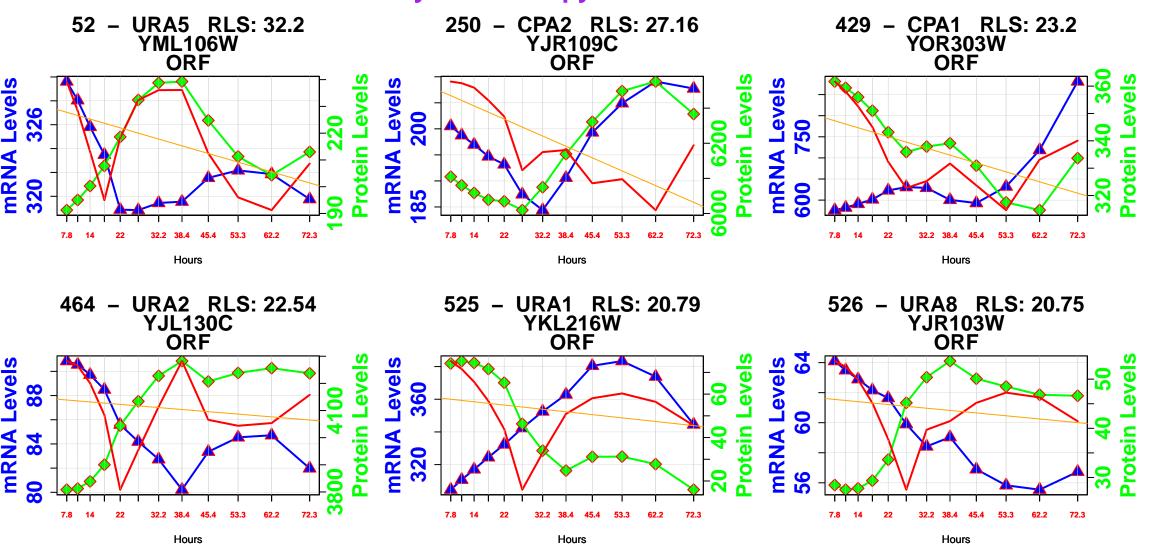
#### folate transformations



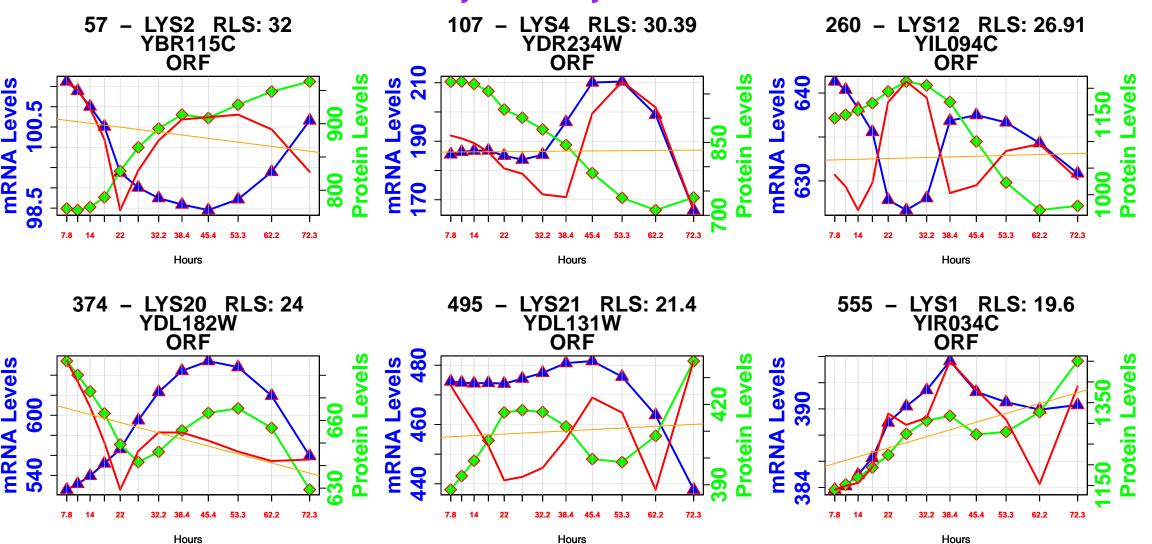
# glycine cleavage complex



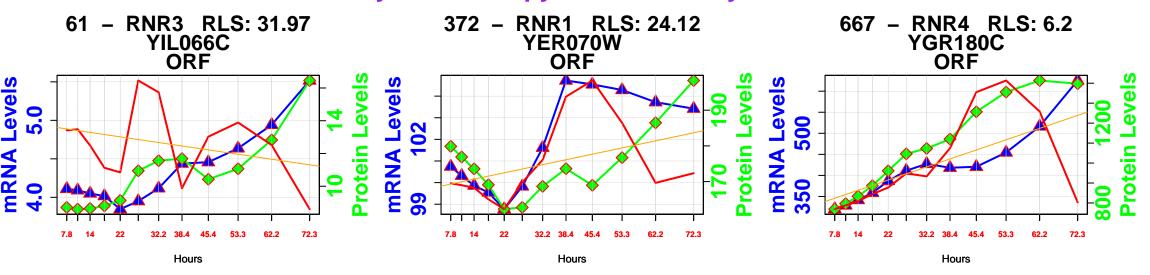
#### de novo biosynthesis of pyrimidine ribonucleotides



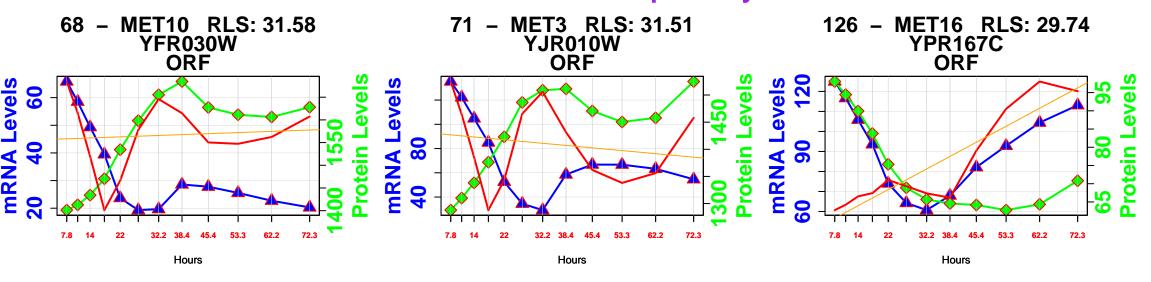
#### lysine biosynthesis



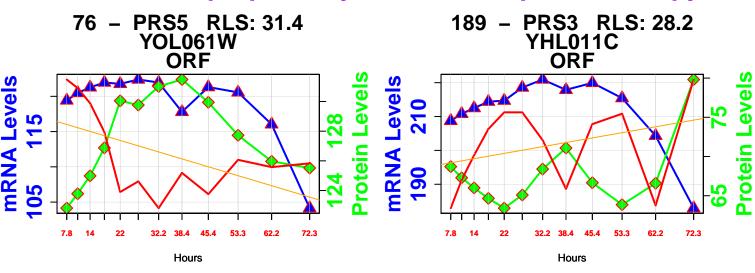
#### de novo biosynthesis of pyrimidine deoxyribonucleotides



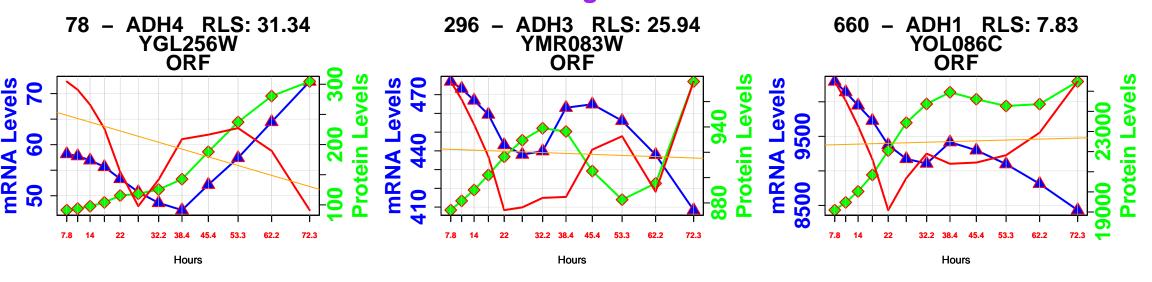
#### sulfate assimilation pathway



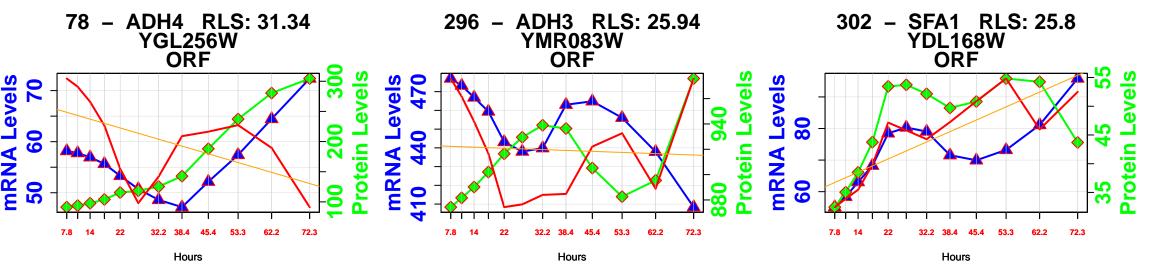
#### superpathway of histidine, purine, and pyrimidine biosynthesis

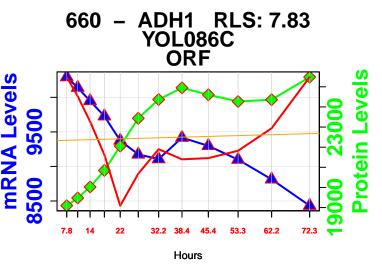


#### ethanol degradation

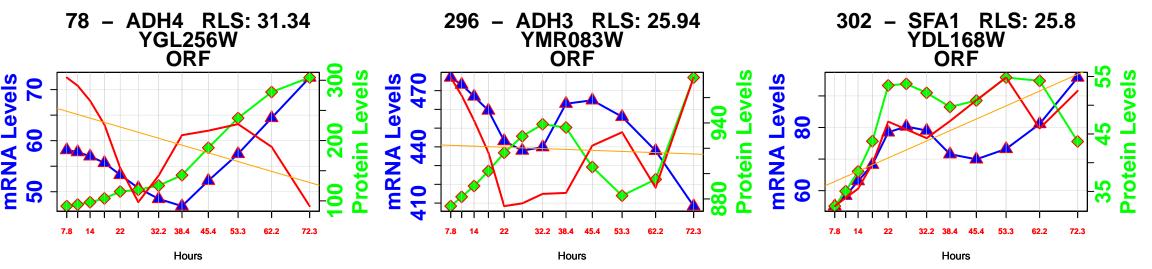


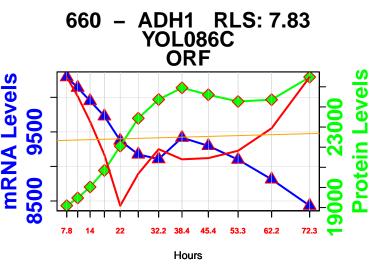
# isoleucine degradation



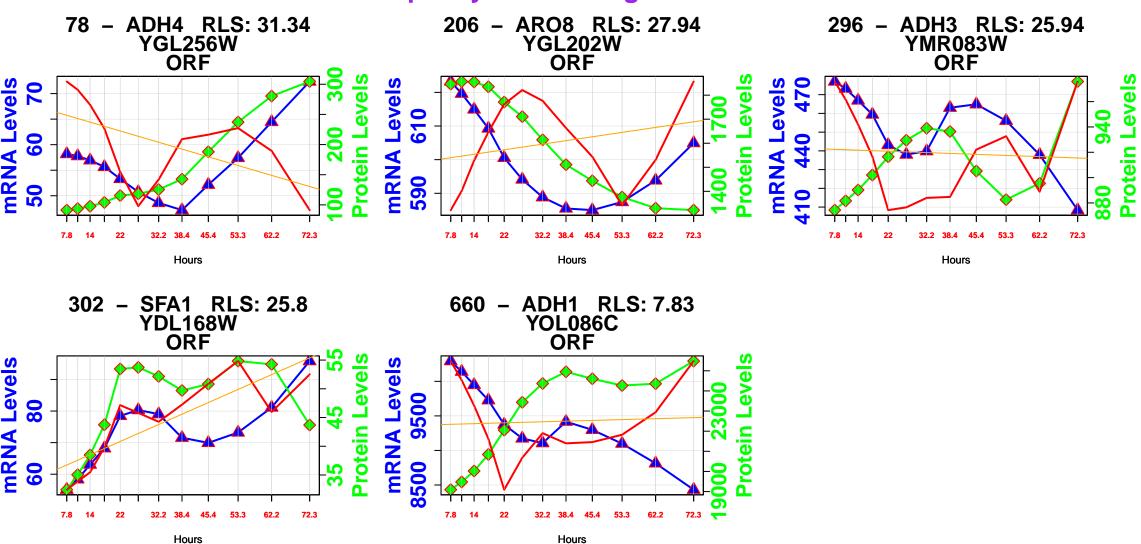


#### leucine degradation

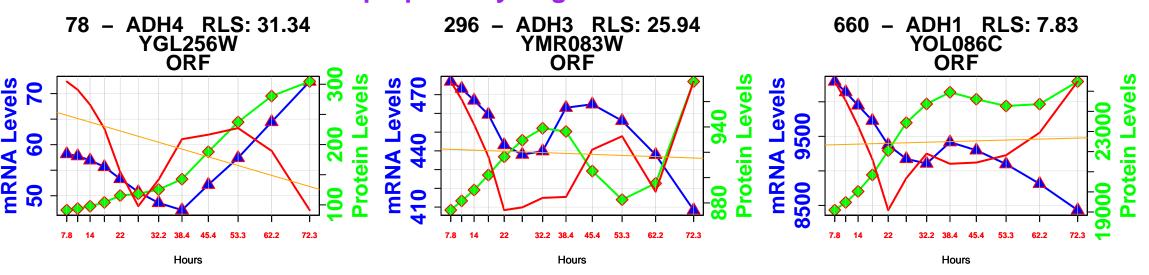




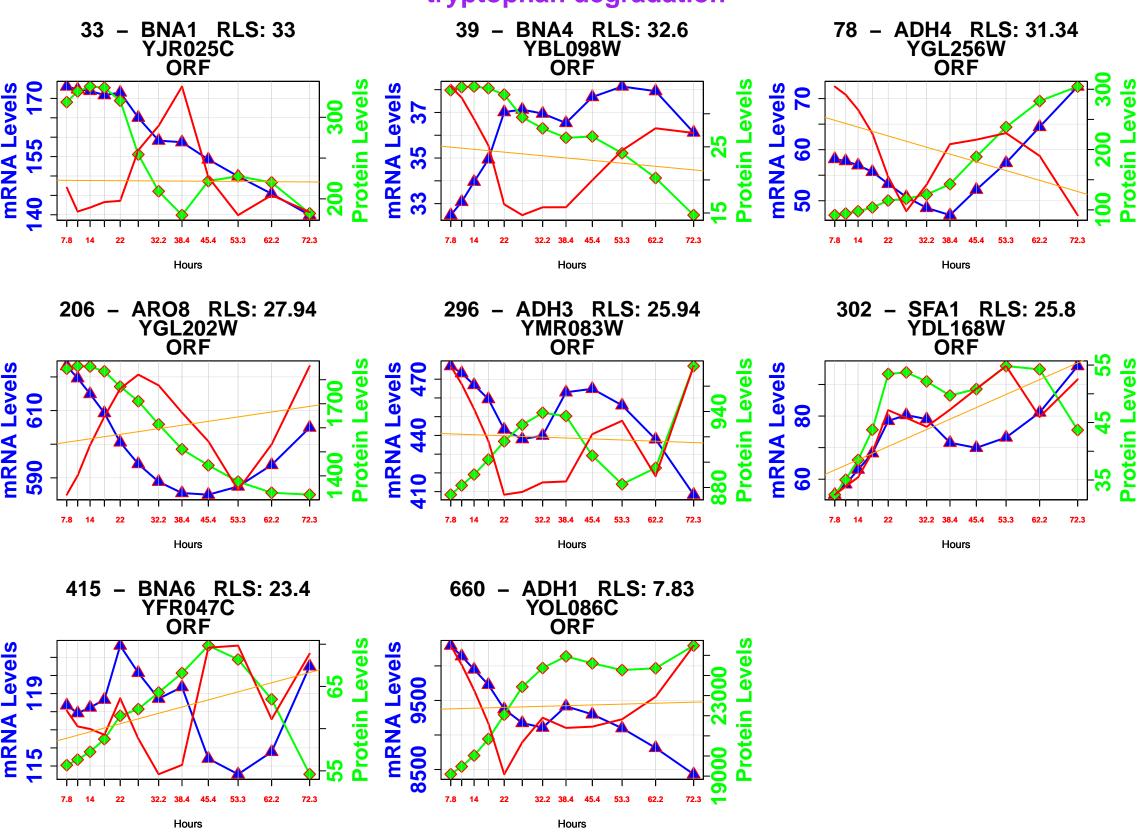
#### phenylalanine degradation



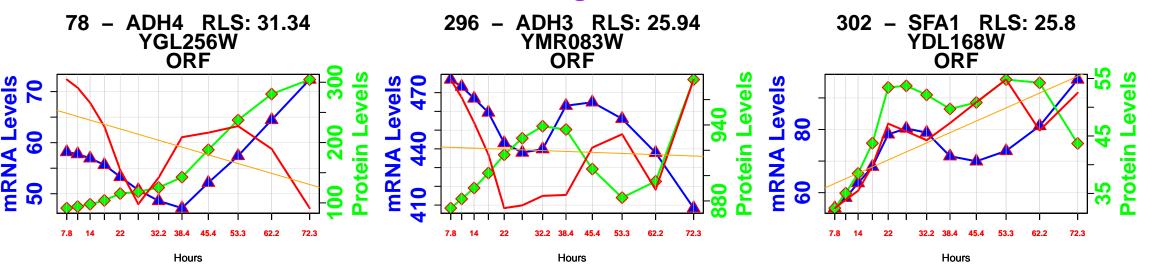
#### superpathway of glucose fermentation

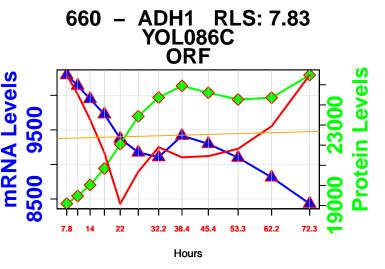


#### tryptophan degradation

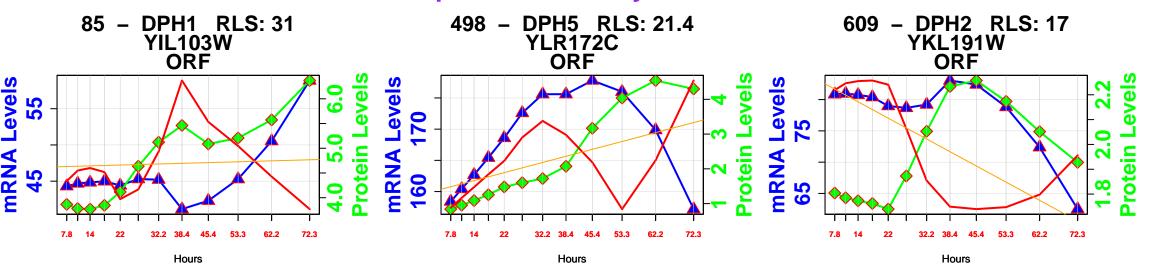


#### valine degradation

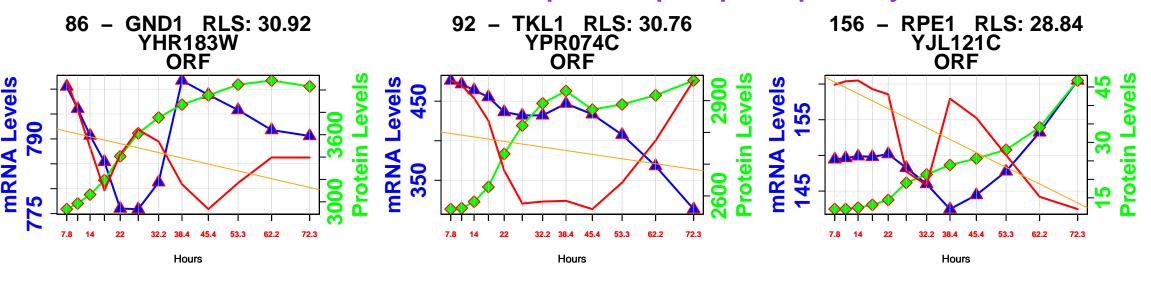


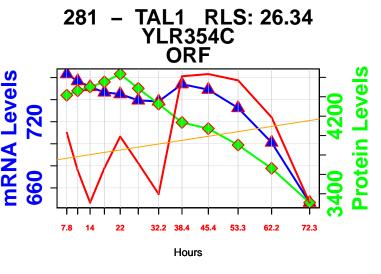


#### diphthamide biosynthesis

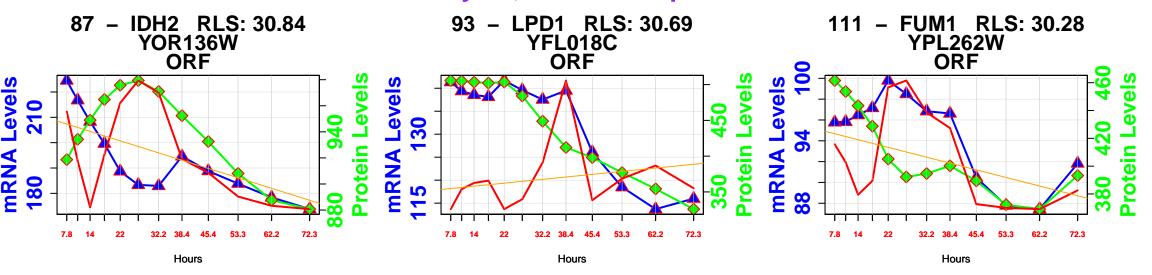


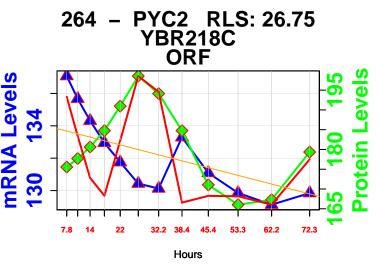
#### oxidative branch of the pentose phosphate pathway



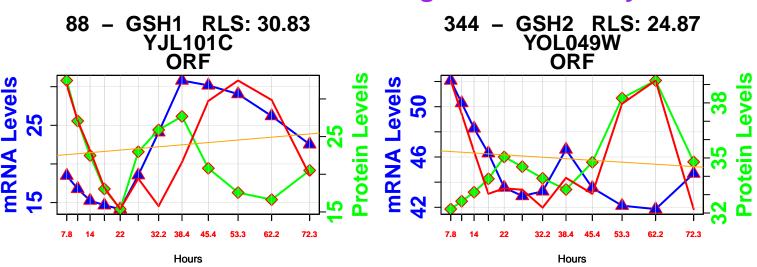


#### TCA cycle, aerobic respiration

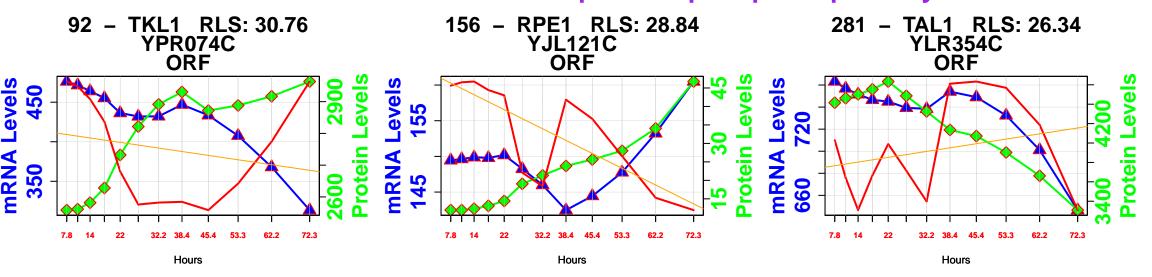




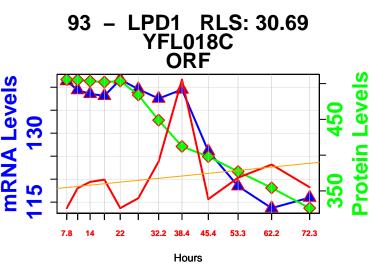
#### glutathione biosynthesis



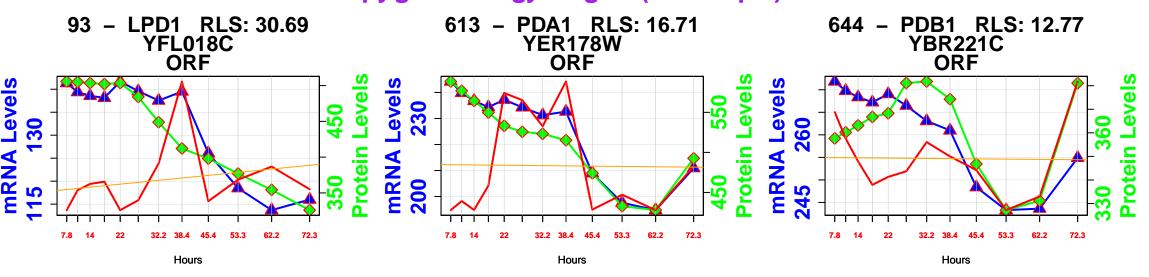
# non-oxidative branch of the pentose phosphate pathway



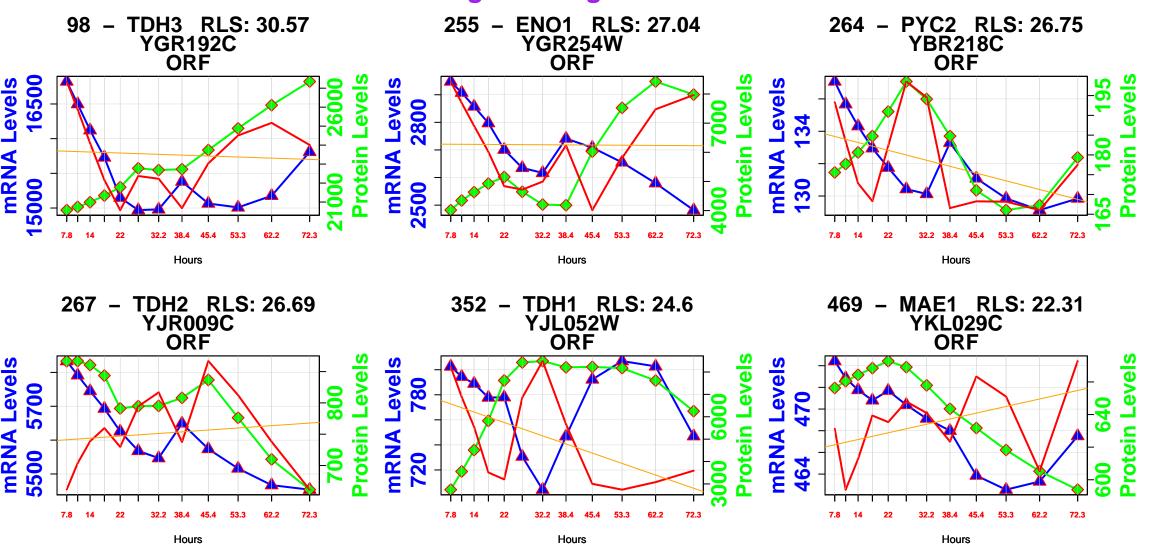
# 2-ketoglutarate dehydrogenase complex



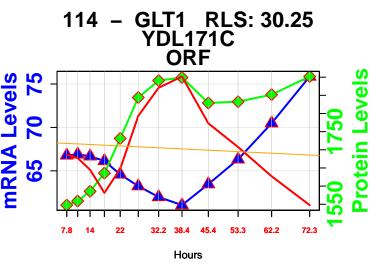
# parginate debyablationa(se zerobie)



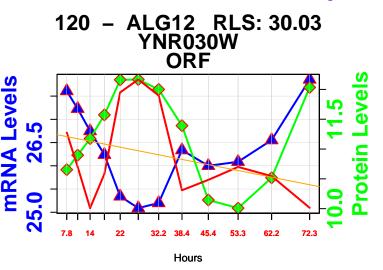
#### gluconeogenesis



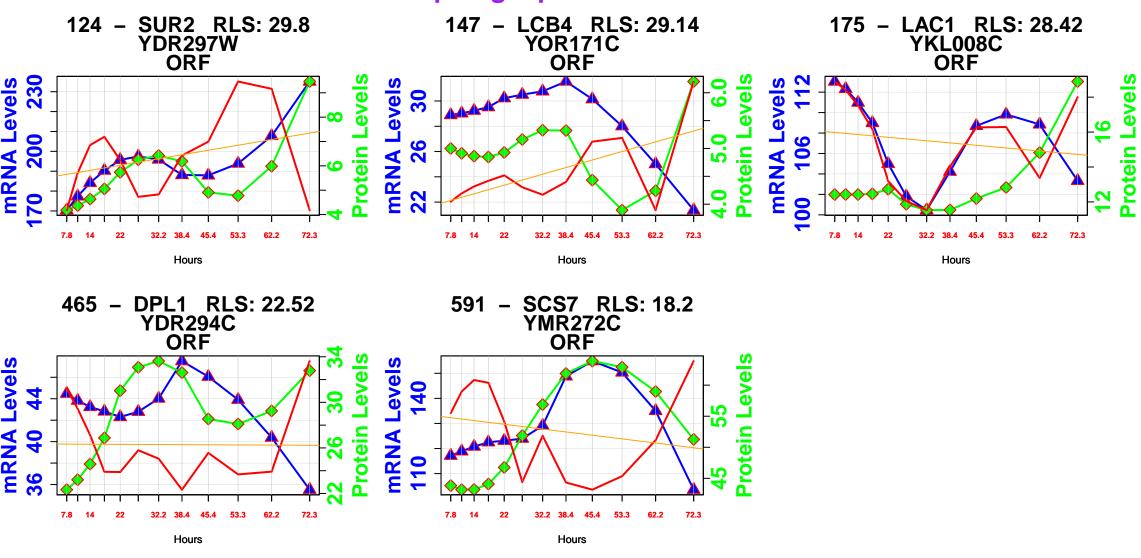
## phosphatipaite biiosymthesiis (fikemeldy apathevay)



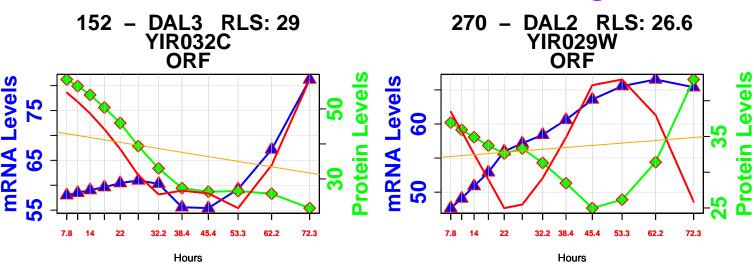
## lipid-linked oligosaccharide biosynthesis



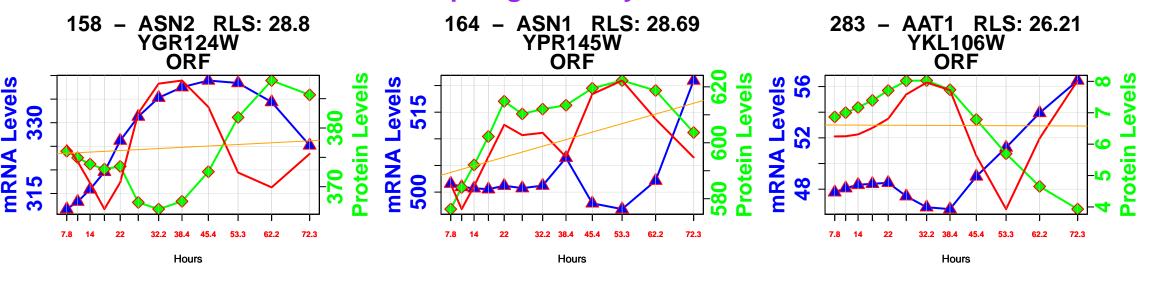
#### sphingolipid metabolism

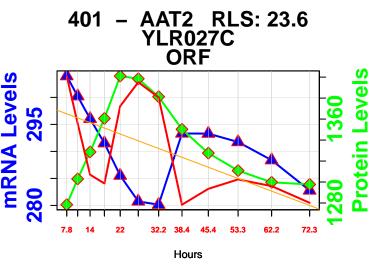


# allantoin degradation

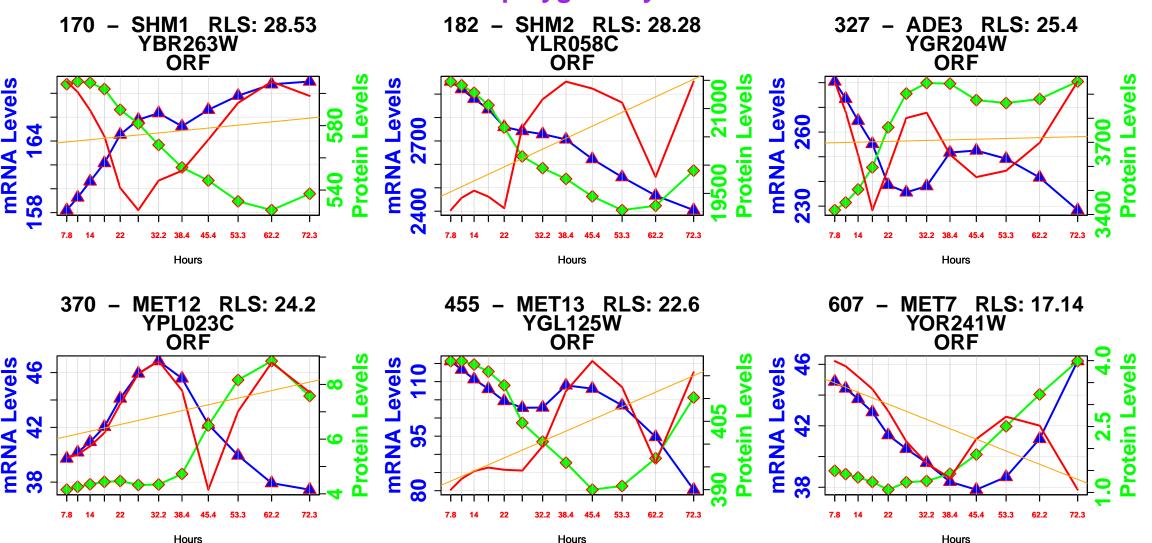


#### asparagine biosynthesis

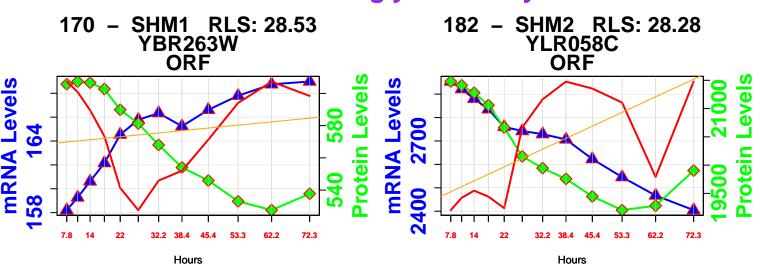




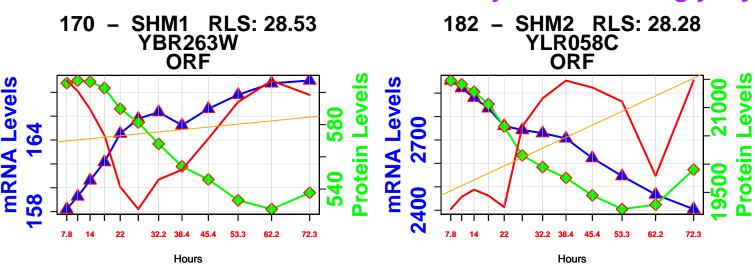
#### folate polyglutamylation



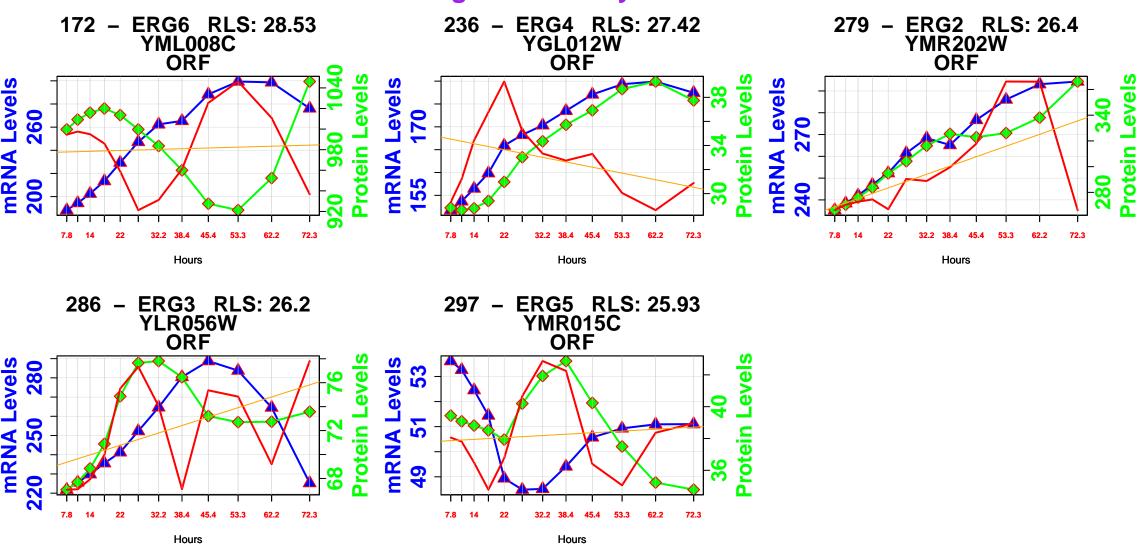
### glycine biosynthesis from serine



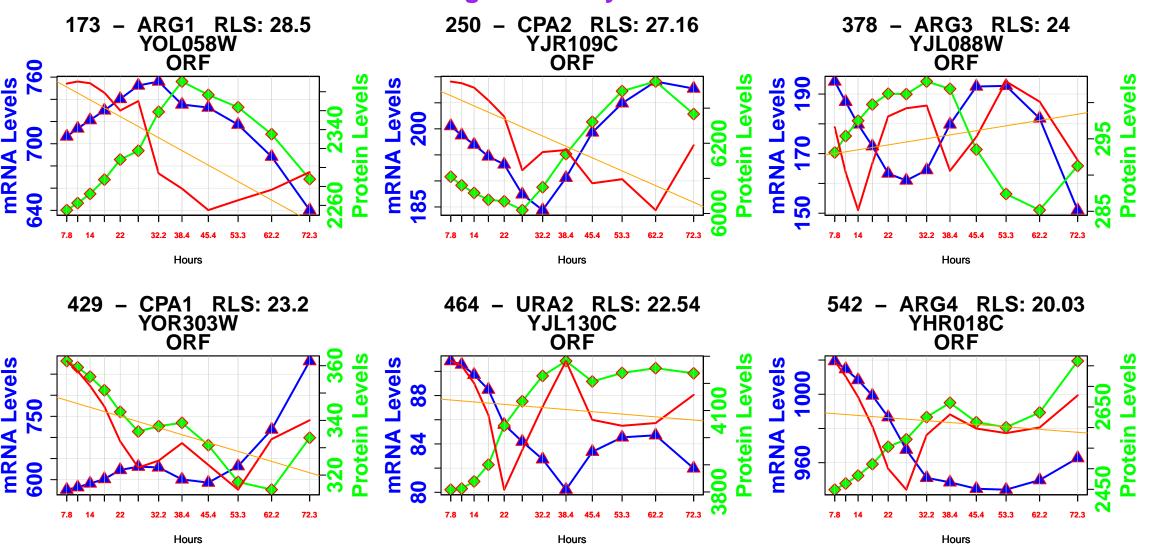
### serine biosynthesis from glyoxylate



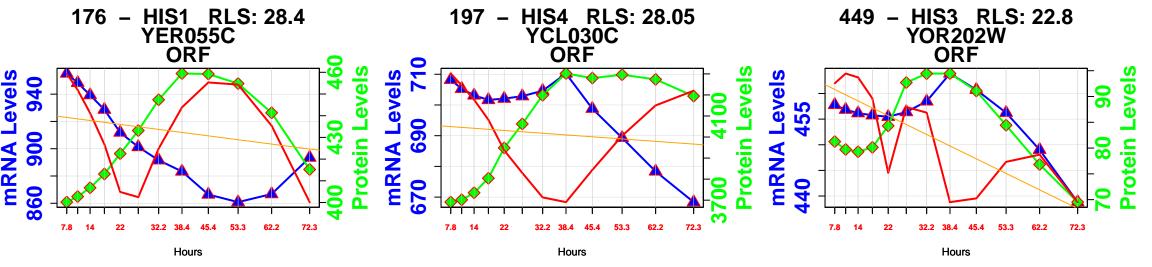
#### ergosterol biosynthesis

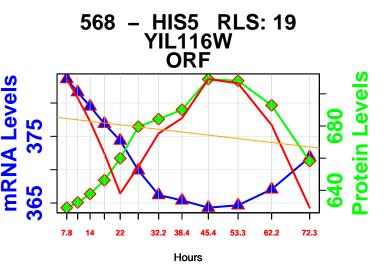


#### arginine biosynthesis

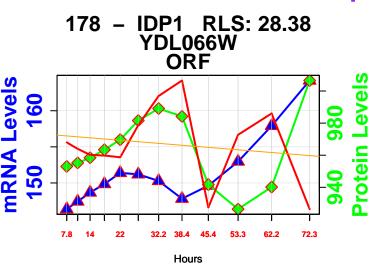


#### histidine biosynthesis

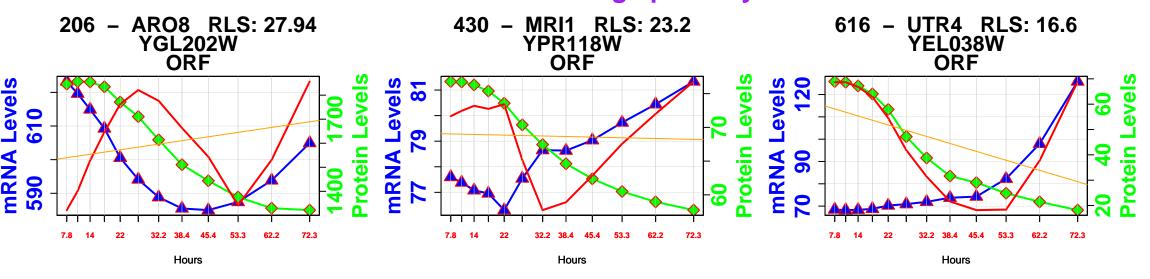




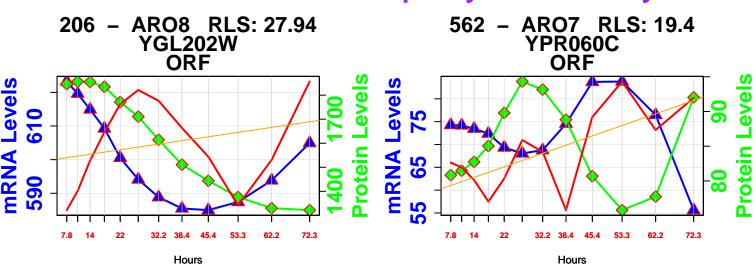
## superpathway of glutamate biosynthesis



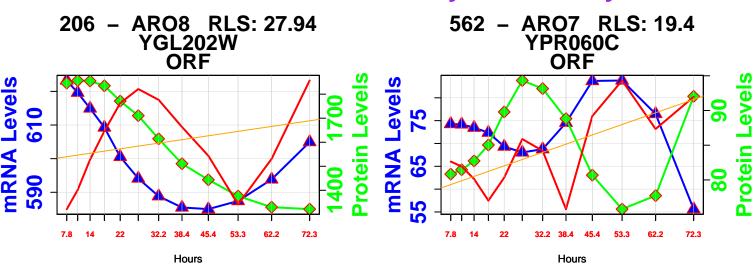
## methionine salvage pathway



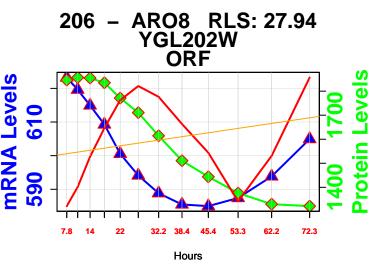
### phenylalanine biosynthesis



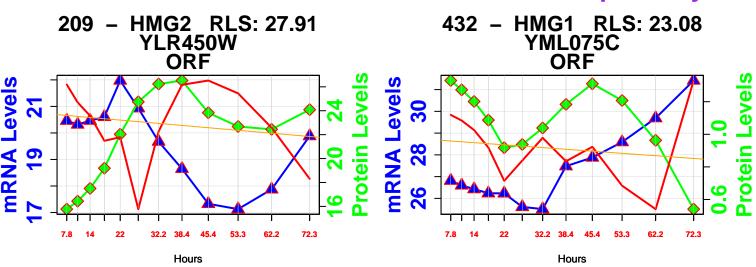
### tyrosine biosynthesis



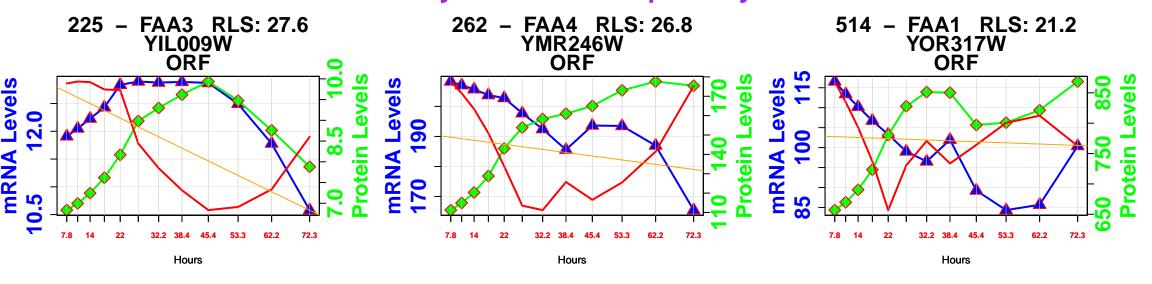
## tyrosine degradation



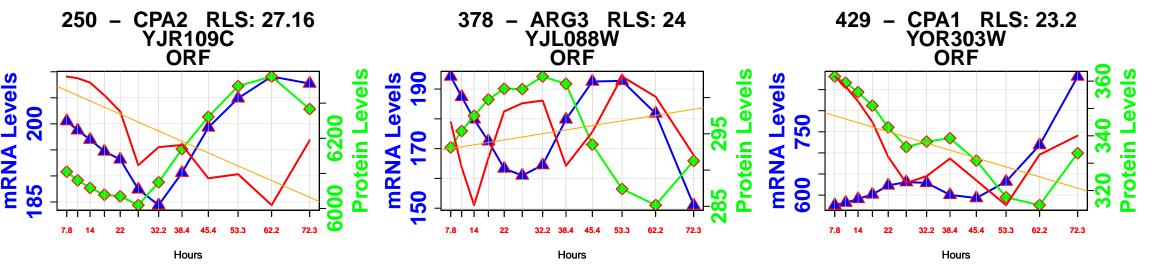
## mevalonate pathway

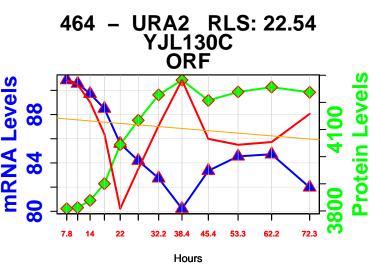


#### fatty acid oxidation pathway

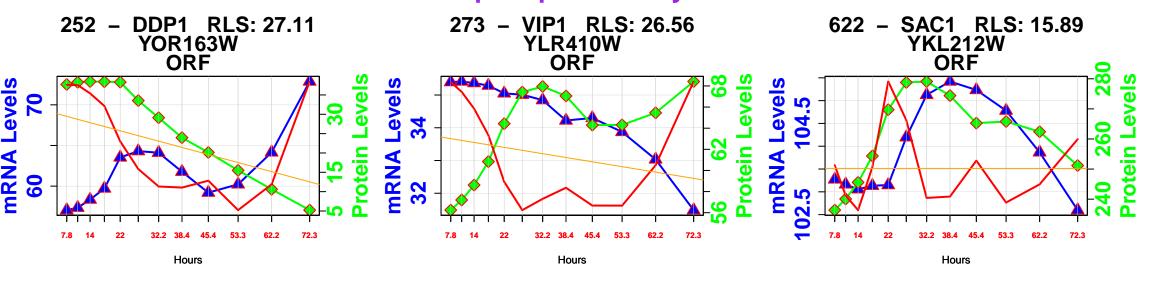


#### citrulline biosynthesis

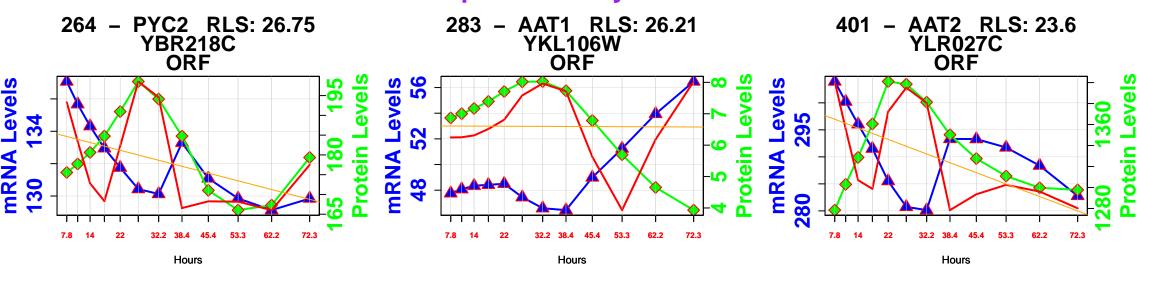




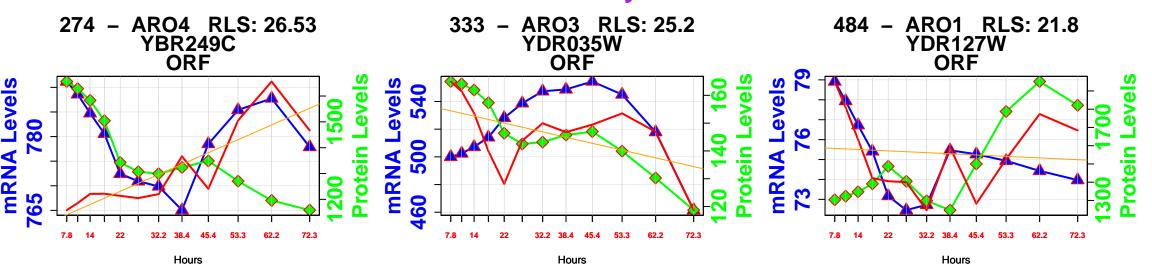
#### inositol phosphate biosynthesis

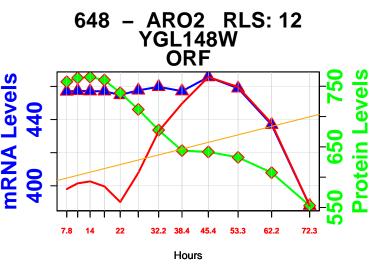


#### aspartate biosynthesis

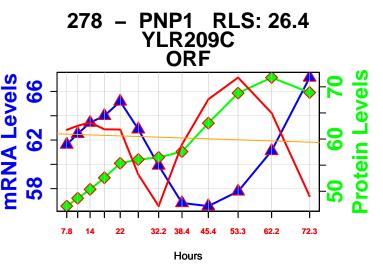


#### chorismate biosynthesis

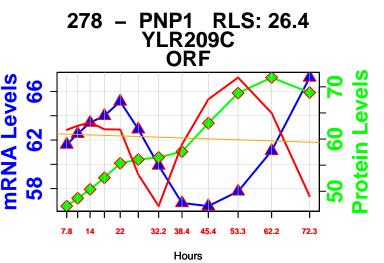




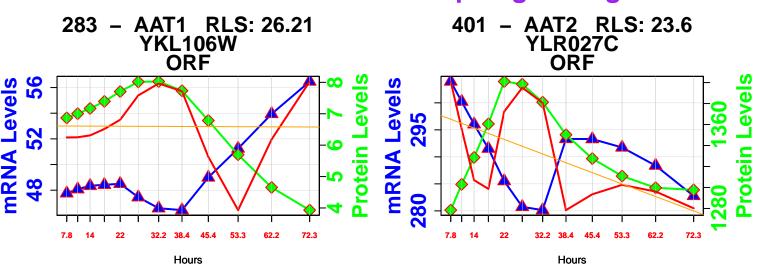
## nicotinamide riboside salvage pathway II



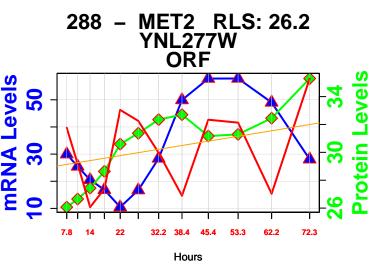
## nicotinate riboside salvage pathway II



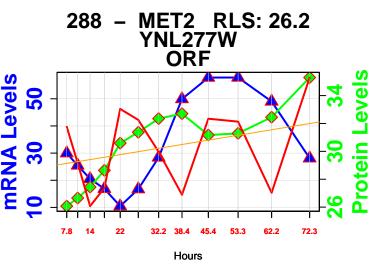
## asparagine degradation



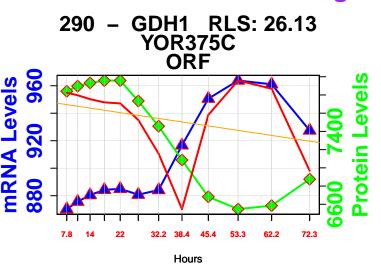
## homocysteine biosynthesis



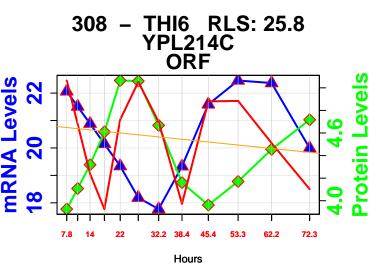
## superpathway of sulfur amino acid biosynthesis



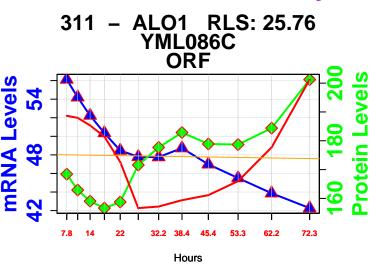
## formalgleltanhatækblationtHe(gisifathnoane-ndepiandent)



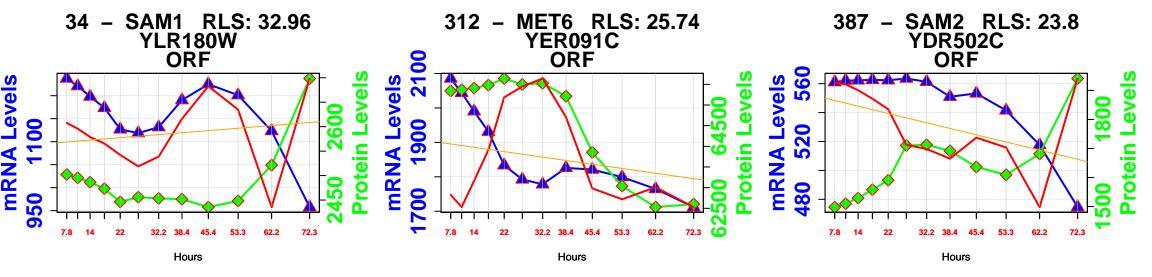
## thiamine biosynthesis

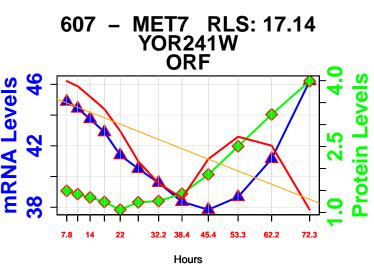


## dehydro-D-arabinono-1,4-lactone biosynthesis

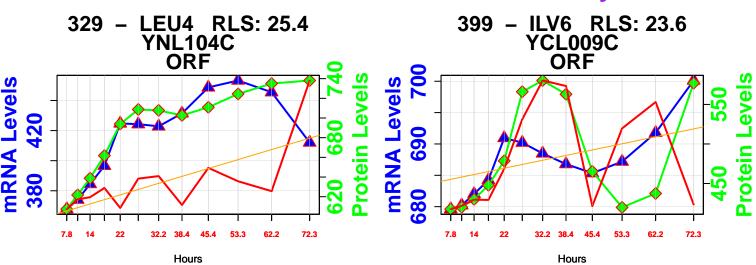


#### methionine biosynthesis

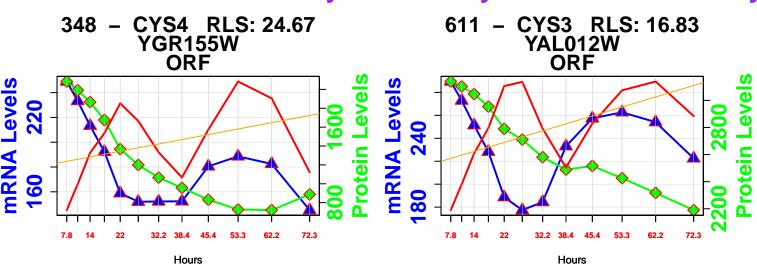




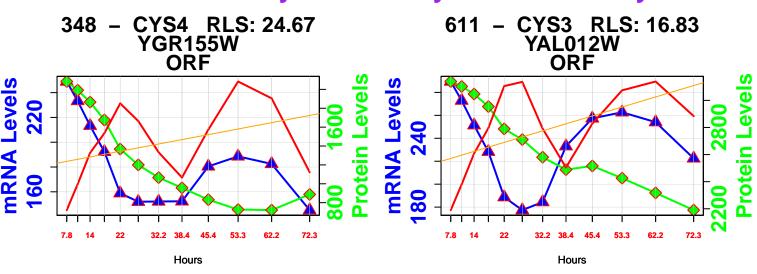
### leucine biosynthesis



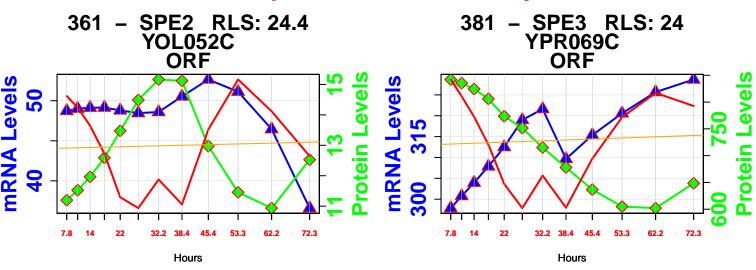
# cysteine biosynthesis from homocysteine



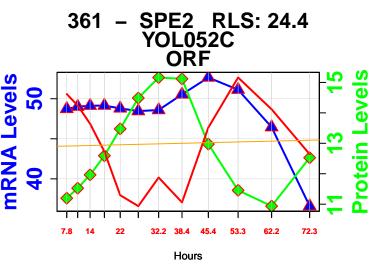
### cysteine biosynthesis/homocysteine degradation



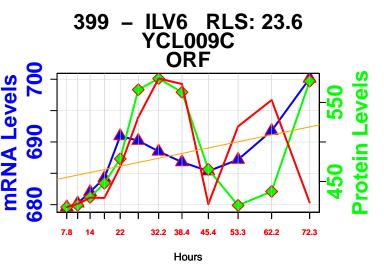
### spermidine and methylthioadenosine biosynthesis



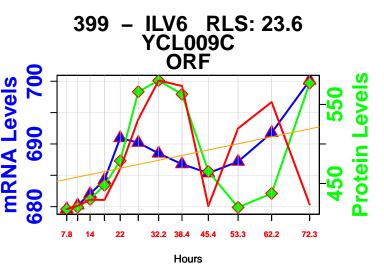
## spermine and methylthioadenosine biosynthesis



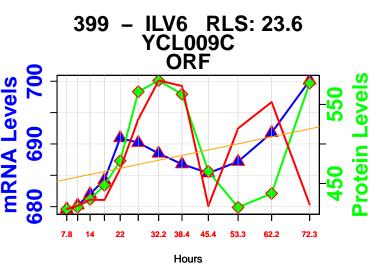
# acetoin biosynthesis



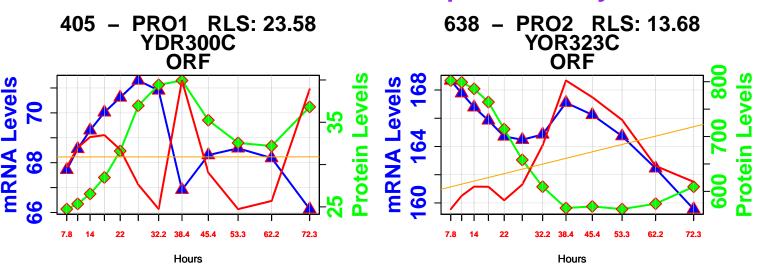
# isoleucine biosynthesis



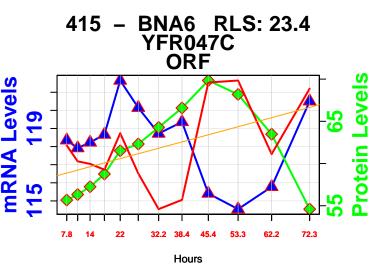
# valine biosynthesis



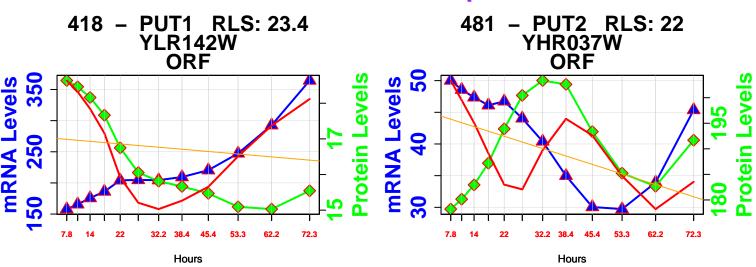
## proline biosynthesis



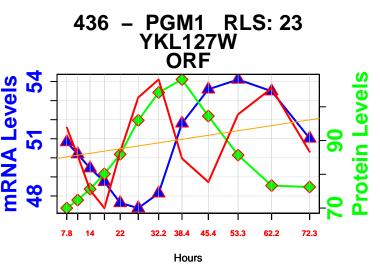
# de novo NAD biosynthesis



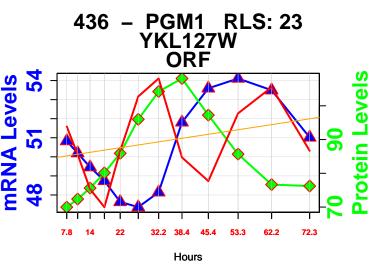
## proline utilization



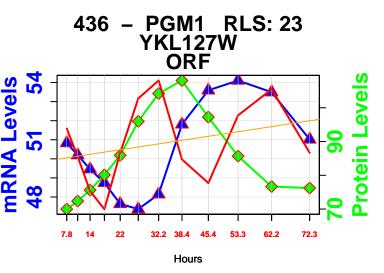
# dolichyl glucosyl phosphate biosynthesis



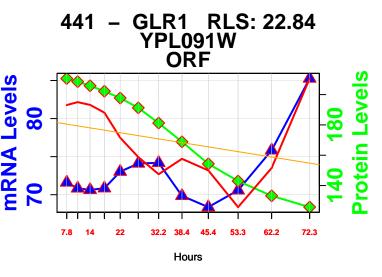
# galactose degradation



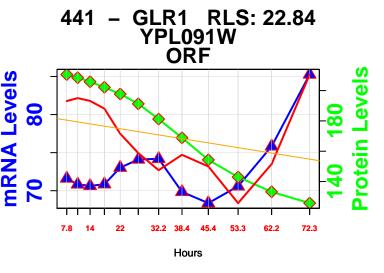
# glycogen biosynthesis



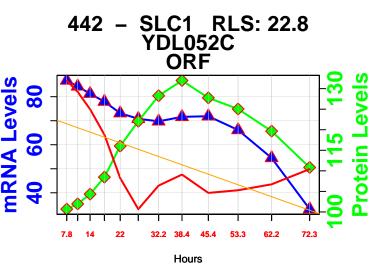
# glutathione-glutaredoxin redox reactions



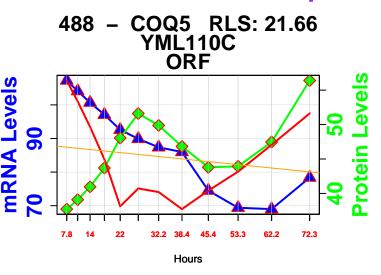
# phphphptidtittabighigtathittaissils(lilittaglgidayidlss)statnesphatatay)ay)



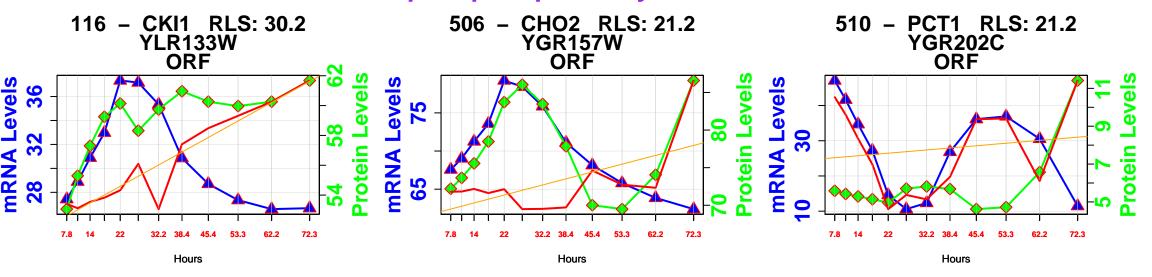
# triglyceride biosynthesis

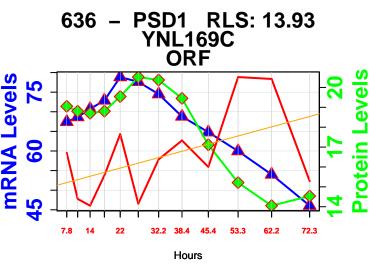


# ubiquinone biosynthesis from 4-hydroxybenzoate

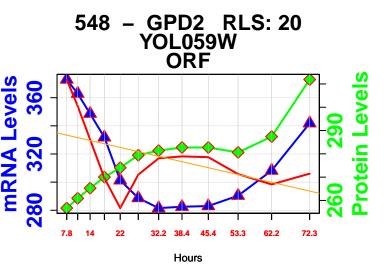


## phospholipid biosynthesis

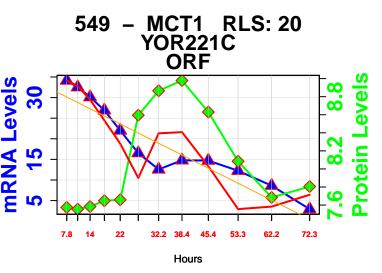




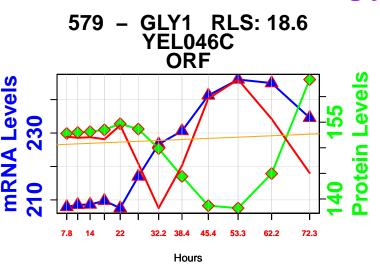
# glycerol biosynthesis



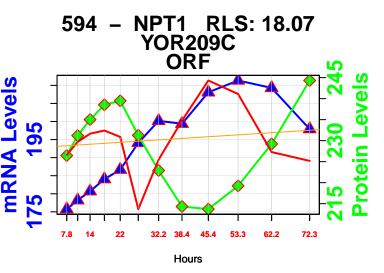
# fatty acid biosynthesis, initial steps



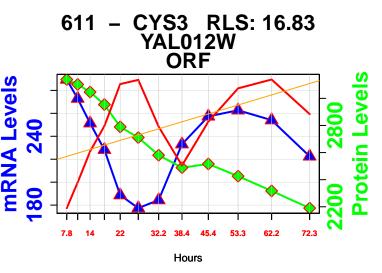
# glycine biosynthesis from threonine



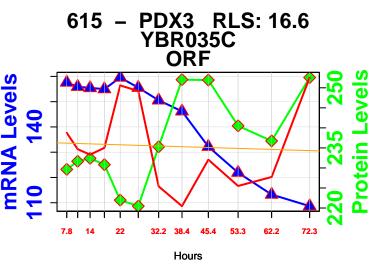
# NAD salvage pathway



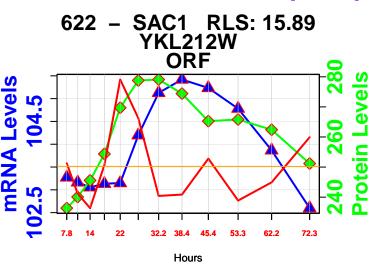
# threonine degradation



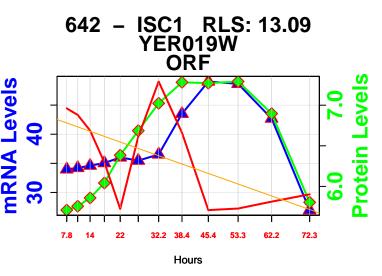
# pyridoxal 5'-phosphate salvage pathway



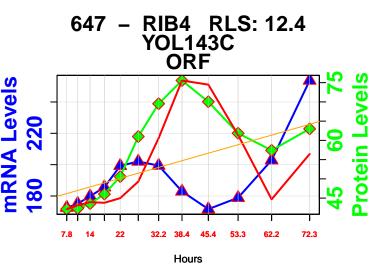
# phosphatidylinositol phosphate biosynthesis



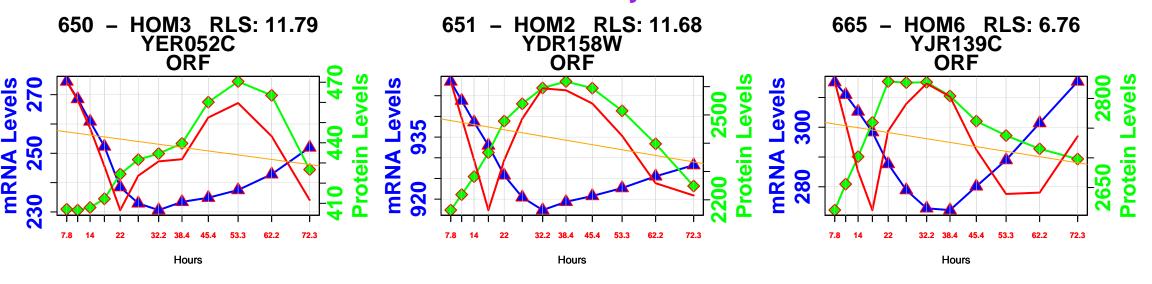
# phospholipids degradation



# riboflavin, FMN and FAD biosynthesis



## homoserine biosynthesis



# threonine biosynthesis

