Supplementary Table S7. Genes found in MG-III Metabolic Pathways

	Epipelagic MG-III	Bathy1	Bathy2
Glycolysis			
hexokinase (glk)	--	--	--
phosphoglucoisomerase(pgi)	X	X	X
phosphofructokinase (pfkA)	X	--	--
aldolase (fba/dhnA)	X	X	X
triosephosphate isomerase(tpi)	X	X	--
glyceraldehyde 3-phosphate dehydrogenase (gapA)	X	X	X
3-phosphoglycerate kinase (pgk)	X	X	X
phosphoglyceromutase (pgm/yibO)	X	X	--
enolase(eno)	X	X	--
pyruvate kinase (pykA)	--	--	--
Gluconeogenesis			
phosphoenolpyruvate synthase (ppsA)	X	X	X
enolase (eno)	X	X	--
phosphoglyceromutase (pgm)	X	--	--
3-phosphoglycerate kinase (pgk)	X	X	X
glyceraldehyde 3-phosphate dehydrogenase (gapA)	X	X	X
triosephosphate isomerase(tpi)	X	X	--
aldolase (fba/dhnA)	X	X	X
fructose bisphosphatase (suhB)	X	X	X
phosphoglucoisomerase (pgi)	X	X	X
Pentose phosphate shunt and pentose biosynthesis			
glucose-6-phosphate dehydrogenase (zwf)	--	--	--
6-phosphogluconate dehydrogenase (gnd)	--	--	--
transketolase (tktA)	X	X	X
transaldolase (talA)	--	--	--
pentose-5-phosphate-3-epimerase (yhfD)	X	X	--
ribose 5-phosphate isomerase (rpiA)	X	X	X
deoxyribose-phosphate aldolase (deoC)	--	--	--
Entner–Doudoroff pathway			
glucose-6-phosphate dehydrogenase (zwf)	--	--	--
6-phosphogluconate dehydratase (edd)	--	--	--
2-keto-3-deoxy-6-phosphogluconate aldolase (eda)	--	--	--
TCA cycle			
citrate synthase (gltA)	X	X	--
aconitase(acnA)	X	X	X
isocitrate dehydrogenase (icd)	X	--	--
a-ketoglutarate dehydrogenase (sucA, sucB)	X	--	--
succinyl-CoA synthase (sucC, sucD)	X	X	--
fumarate reductase (frdA, frdB)	X	--	--
fumarase (fumA)	X	X	X
malate dehydrogenase (mdh)	X	X	--
Purine biosynthesis			
phosphosphoribosylpyrophosphate synthase (prsA)	X	X	X
amidophosphoribosyltransferase (purF)	X	X	X
GAR synthase (purD)	X	X	--
GAR transformylase(purN/purT)	X	X	X
FGAM synthase (purL)	X	X	X
AIR synthase (purM)	X	X	X
NCAIR synthase (purK)	--	--	--
NCAIR mutase (purE)	X	--	X
SAICAR synthase (purC)	X	X	--
adenylosuccinate lyase (purB)	X	X	X
AICAR transformylase (purH2)	X	X	X
IMP cyclohydrolase (purH1)	X	X	X
adenylosuccinate synthase (purA)	X	X	--
IMP dehydrogenase (guaB)	X	--	X
GMP synthase (guaA)	X	X	--
Pyrimidine biosynthesis			
carbamoylphosphate synthase(carA, carB)	X	--	X
aspartate carbamoyltransferase (pyrB)	X	X	--
dihydroorotase (pyrC/ygeZ)	--	--	--
dihydroorotate dehydrogenase(pyrD)	X	X	X
orotate phosphoribosyl-transferase (pyrE)	X	X	X
orotidine-5'-phosphate decarboxylase (pyrF)	X	--	--
UMP kinase (pyrH)	--	--	--

NDP kinase (ndk)	X	X	X
CTP synthase (pyrG)	X	X	--
Histidine biosynthesis			
phosphosphoribosylpyrophosphate synthase (prsA)	X	X	X
ATP-phosphoribosyltransferase (hisG)	--	--	--
phosphoribosyl-ATP pyrophosphatase (hisI2)	--	--	--
phosphoribosyl-AMP cyclohydrolase(hisI1)	--	--	--
58-ProFAR isomerase (hisA)	--	--	--
imidazoleglycerol phosphate synthase (hisH, hisF)	--	--	--
imidazoleglycerol phosphate dehydratase (hisB2)	--	--	--
histidinoll phosphate aminotransferase (hisC)	X	X	--
histidinol phosphatase (hisB1)	--	--	--
histidinol dehydrogenase (hisD)	--	--	--
Branched chain amino acids biosynthesis			
threonine deaminase (ilvA)	X	--	X
acetohydroxyacid synthase (ilvB, ilvN)	--	X	--
acetohydroxyacid isomeroreductase (ilvC)	--	--	--
dihydroxyacid dehydratase (ilvD)	--	--	--
2-isopropylmalate synthase (leuA)	--	--	--
isopropylmalate isomerase (leuC, leuD)	--	--	--
3-isopropyl-malate dehydrogenase (leuB)	--	--	--
glutamate transaminase (ilvE)	X	X	--
Aromatic amino acids biosynthesis			
3-deoxyheptulosonate 7-phosphate synthase (aroG/kdsA)	--	--	--
3-dehydroquinate synthase (aroB)	--	--	--
3-dehydroquinate dehydratase (aroD)	--	--	--
shikimate dehydrogenase (aroE)	--	--	--
shikimate kinase (aroK)	--	--	--
5-enolpyruvoylshikimate 3-phosphate synthase (aroA)	--	--	--
chorismate synthase (aroC)	--	--	--
chorismate mutase (pheA1)	--	--	--
prephenate dehydratase (pheA2)	--	--	--
prephenate dehydrogenase (tyrA2)	--	--	--
tyrosine aminotransferase (tyrB)	--	--	--
antranilate synthase (trpD1, trpE)	--	--	--
antranilate phosphoribosyl-transferase (trpD2)	--	--	--
phosphoribosylantranilate isomerase (trpC2)	--	--	--
indole-glycerol phosphate synthase (trpC1)	--	--	--
tryptophan synthase (trpA, trpB)	X	--	--
Threonine biosynthesis			
aspartokinase (thrA1)	--	--	--
aspartate semialdehyde dehydrogenase (asd)	--	--	--
homoserine dehydrogenase (thrA2)	--	--	--
homoserine kinase (thrB)	--	--	--
threonine synthase (thrC)	--	--	--
Methionine biosynthesis			
aspartokinase (metL1)	--	--	--
aspartate semialdehyde dehydrogenase (asd)	--	--	--
homoserine dehydrogenase (metL2)	--	--	--
homoserine transsuccinylase (metA)	--	--	--
cystathionine g-synthase (metB)	X	X	X
b-cystathionase (metC)	--	--	--
methionine synthase (metE/metH)	--	--	--
Arginine biosynthesis			
acetylglutamate synthase (argA2)	--	--	--
acetylglutamate kinase (argB)	X	--	--
acetylglutamate phosphate reductase (argC)	--	--	--
acetylornithine aminotransferase (argD)	X	--	--
acetylornithinase (argE)	X	--	--
ornithine carbamoyltransferase (argF)	X	X	--
argininosuccinate synthase (argG)	--	--	--
argininosuccinate lyase (argH)	--	--	--
NAD biosynthesis			
aspartate oxidase (nadB)	--	--	--
quinolinate synthase (nadA)	X	X	--
quinolinate phosphoribosyltransferase (nadC)	X	X	--
nicotinic acid mononucleotide adenylyltransferase (nadD)	--	--	--
deamido-NAD ammonia ligase (nadE)	X	X	X

Riboflavin biosynthesis			
GTP cyclohydrolase II (ribA)	X	X	--
pyrimidine deaminase (ribD1)	--	--	--
pyrimidine reductase (ribD2)	X	X	X
3,4-dihydroxybutanone-4-phosphate synthase (ribB)	X	X	--
6,7-dimethyl-8-ribityllumazine synthase (ribE)	X	X	--
riboflavin synthase (ribC)	X	X	--
Siroheme biosynthesis			
Glutamyl-tRNA reductase (hemA)	--	--	--
glutamate 1-semialdehyde aminotransferase (hemL)	--	--	--
probilinogen III synthase (hemB)	--	--	--
hydroxymethylbilane synthase (hemC)	--	--	--
uroporphyrinogen III synthase (hemD)	--	--	--
uroporphirinogen methyltransferase (cysG2)	--	--	--
dimethyluroporphirinogen III dehydrogenase (cysG1)	--	--	--
Cobalamin biosynthesis			
uroporphyrinogen III methylase (cysG2)	--	--	--
precorrin-2 methylase (cbiL)	--	--	--
precorrin-3B methylase (cbiH)	--	--	--
precorrin-4 methylase (cbiF)	--	--	--
precorrin-6A reductase (cbiJ)	--	--	--
precorrin 6B methylase (cbiE)	--	--	--
precorrin 6B decarboxylase (cbiT)	--	--	--
precorrin-8x isomerase (cbiC)	--	--	--
cobyrinic acid a,c-diamide synthase (cbiA)	--	--	--
cobalt insertion protein (cobN)	--	--	--
cob(I)alamin adenosyltransferase (cobA)	--	--	--
cobyric acid synthase (cbiP)	--	--	--
cobyric acid aminotransferase (cobD)	--	--	--
cobinamide synthase (cbiB)	--	--	--
nicotinate-nucleotide:dimethylbenzimidazole phosphoribosyltransferase (cobT)	--	--	--
cobalamin synthase (cobS)	--	--	--
Biotin biosynthesis			
pimeloyl-CoA synthetase (bioW)	--	--	--
7-keto-8-aminopelargonate synthetase (bioF)	X	X	--
7,8-diaminopelargonate aminotransferase (bioA)	--	--	--
dethiobiotin synthetase (bioD)	--	--	--
biotin synthetase (bioB)	--	--	--
biotin-[acetyl-CoA carboxylase] holoenzyme synthetase (birA)	X	X	X

Cells marked with a "X" means that the protein was found.