Supplemental Figure S1: Integrated networks that incorporate polymorphic markers, variation in candidate gene expression and variation in metabolite abundances associated with variation in organismal phenotypes. Orange nodes indicate metabolites correlated with the organismal phenotype and teal nodes indicate candidate genes correlated with these metabolites. Black nodes indicate mQTL associated with candidate genes. Nodes with red borders indicate a direct association with the organismal phenotype. The different shapes of the orange nodes indicate different metabolic super pathways. Red edges indicate positive correlations, while blue edges represent negative correlations. Black edges connect polymorphic markers with their associated genes. The polymorphic markers, candidate genes and metabolites presented in the figure are listed in Supplementary File S12.

◇ Amino Acid
⬡ Carbohydrate
△ Cofactors and Vitamins
○ Energy
▢ Lipid
⬡ Nucleotide
⬭ Peptide
▽ Xenobiotics

gamma-glutamylisoleucine*

gamma-glutamylmethionine

gamma-glutamylglutamine

1-palmitoyl-2-linoleoyl-GPI
(16:0/18:2)

1-stearoyl-2-linoleoyl-GPC
(18:0/18:2)*

1-palmitoyl-2-palmitoleoyl-GPC
(16:0/16:1)*

1,2-dipalmitoyl-GPC
(16:0/16:0)

histamine

Female
Body
Weight

1-palmitoyl-GPG
(18:0)*

glycerophosphoinositol*

2-stearoyl-GPE
(18:0)*

1-(1-enyl-stearoyl)-GPE
(P-18:0)*

1-stearoyl-GPE
(18:0)

N-acetyl-glucosamine
1-phosphate

threonine

gamma-aminobutyrate
(GABA)

Male
Body
Weight

thymidine

1-linoleoyl-GPC
(18:2)

lactosyl-N-palmitoyl-sphingosine

1-(1-enyl-palmitoyl)-2-linoleoyl-GPE
(P-16:0/18:2)*

urate

putrescine

stearoylcarnitine

N-acetylglucosamine
6-phosphate

mesaconate
(methylfumarate)

linoleoylcarnitine*

citraconate/glutaconate

myo-inositol

1-(1-enyl-stearoyl-2-linoleoyl-GPE
(P-18:0/18:2)*

pyruvate

N-acetylarginine

N-acetylphenylalanine

threonine

Male
Free
Glucose

N1-methyladenosine

maltopentaose

flavin
mononucleotide
(FMN)

proline

dihydroxyacetone
phosphate
(DHAP)

tetradecanedioate

kojibiose

1-(1-enyl-palmitoyl)-2-linoleoyl-GPC
(P-16:0/18:2)*

1-methyladenine

dodecanedioate

glucose

palmose

1-methylurate

isomaltose

glycosyl-N-stearoyl-sphingosine

1-palmitoyl-3-linoleoyl-glycerol
(16:0/18:2)*

3-hydroxypalmitate

1-oleoyl-3-linoleoyl-glycerol
(18:1/18:2)

1-methylhistidine

1-palmitoyl-2-linoleoyl-glycerol
(16:0/18:2)*

1-oleoyl-2-linoleoyl-glycerol
(18:1/18:2)

1-palmitoleoyl-2-oleoyl-glycerol
(16:1/18:1)

Free
Glycerol
M

glycerol

myristoleate
(14:1n5)

laurate
myristate (12:0)
(14:0)

N-acetylmethionine

1-(1-enyl-stearoyl)-2-oleoyl-GPE
(P-18:0/18:1)

1,2-dipalmitoleoyl-GPC
(16:1/16:1)*

dodecanedioate   pseudouridine

sarcosine   ribose
1-phosphate

Female
Glycogen

flavin
mononucleotide
(FMN)

1,2-dilinoleoyl-GPE
(18:2/18:2)*

2-palmitoyl-GPC
(16:0)*

N-acetylglucosamine
6-phosphate

pseudouridine

sucrose

glucose

isomaltose

1-methylurate

thymine

maltopentaose

1-stearoyl-GPI
(18:0)

3-hydroxy-3-methylglutarate

gluconate

glycerol
2-phosphate

azelate
(nonanedioate)

methionine
sulfoxide

N-acetylglutamine

N-acetylmethionine
sulfoxide

9,10-DiHOME

N-acetylasparagine

1-palmitoyl-2-linoleoyl-GPE
(16:0/18:2)

1-stearoyl-2-linoleoyl-GPE
(18:0/18:2)*

1-palmitoleoyl-2-linoleoyl-GPC
(16:1/18:2)*

Male
Glycogen

1-palmitoyl-2-linoleoyl-GPC
(16:0/18:2)*

glycerophosphoinositol*

1-palmitoyl-2-oleoyl-GPC
(16:0/18:1)

1-oleoyl-2-linoleoyl-GPC
(18:1/18:2)*

S-adenosylmethionine
(SAM)

phytosphingosine

methylsuccinate*

palmitoylcholine

13-HODE +
9-HODE

dihydroxyacetone
phosphate
(DHAP)

cytidine-5'-diphosphoethanolamine

glycerophosphorylcholine
(GPC)

gamma-glutamylisoleucine*

1-palmitoleoyl-3-oleoyl-glycerol
(16:1/18:1)*

adenosine
3'-monophosphate
(3'-AMP)

1-palmitoyl-2-palmitoleoyl-GPC
(16:0/16:1)*

xanthine

campesterol

ribose
1-phosphate

glutamate,
gamma-methyl
ester

phosphothreonine

guanosine
3'-monophosphate
(3'-GMP)

Female
Protein

adenine

glycerophosphoinositol*

3,4-dihydroxyphenylacetate

myristoleate
(14:1n5)

1-palmitoyl-GPG
(16:0)*

1-stearoyl-GPE
(18:0)

1-(1-enyl-stearoyl)-GPE
(P-18:0)*

2-stearoyl-GPE
(18:0)*

2'-deoxyguanosine

Isobar:
fructose
1,6-diphosphate,
glucose
1,6-diphosphate,
myo-inositol
1,4 or
1,3-diphosphate

maltotetraose

alanylleucine

homoserine
lactone

sarcosine

cysteinylglycine

1-methylurate

valylleucinamide

beta-hydroxyisovalerate

Male
Protein

1-methyladenine

acetylcarnitine

N1-methyladenosine

Female
Startle
Response

orotate

lysine

adenosine-2,3-cyclic
monophosphate

methylphosphate

glutamate

1-(1-enyl-palmitoyl)-2-linoleoyl-GPE
(P-16:0/18:2)*

arabonate/xylonate

1-palmitoyl-GPG
(16:0)*

thymine

2-hydroxyglutarate

nicotinate
ribonucleoside

alpha-ketoglutarate

kynurenate

pyridoxamine

3-ketosphinganine

glutarate
(pentanedioate)

pantothenate

Male Startle Response

N-methylalanine

pseudouridine

1-palmitoyl-2-linolenoyl-galactosylglycerol (16:0/18:3)*

1-palmitoyl-2-linoleoyl-galactosylglycerol (16:0/18:2)*

orotate

N-acetylalanine

kynurenate

N-acetylserine

3-phosphoglycerate

Female Thorax Length

1-oleoyl-GPE (18:1)

N-acetylhistamine

3-ketosphinganine

2-palmitoleoyl-GPC (16:1)*

5-aminolevulinate

1-kestose

1,2-dilinoleoyl-galactosylglycerol (18:2/18:2)*

glutarate (pentanedioate)

2-palmitoyl-GPC (16:0)*

1-methylhistamine

sucrose

flavin mononucleotide (FMN)

linolenate [alpha or gamma; (18:3n3 or 6)]

3-hydroxypropanoate

alpha-hydroxyisocaproate
myristoleate (14:1n5)
N-acetylphenylalanine
N-acetylthreonine
N-acetylserine
biopterin
Female Triglyceride
orotate
glycerol
3-methyl-2-oxobutyrate
ribose 1-phosphate
campesterol
1-palmitoyl-2-linoleoyl-glycerol (16:0/18:2)*

Male
Triglyceride

6-phosphogluconate

sarcosine

pseudouridine

ribose
1-phosphate

Isobar:
fructose
1,6-diphosphate,
glucose
1,6-diphosphate,
myo-inositol
1,4 or
1,3-diphosphate

adenosine

1-methylhistidine

N-acetyl-beta-alanine

arabitol/xylitol

Female Lifespan (V)

3-ketosphinganine

sphinganine

1-methylhistidine

oleoylcholine

palmitoylcholine

1-palmitoleoyl-3-oleoyl-glycerol (16:1/18:1)*

1-palmitoleoyl-2-oleoyl-glycerol (16:1/18:1)*

proline

3-hydroxymyristate

dimethylarginine (SDMA + ADMA)

ribose 5-phosphate

sucrose

UDP-N-acetylglucosamine   glycylisoleucine

phenylalanylglycine   glycylvaline   glycylleucine

N6-carboxymethyllysine   phenylalanine   methionine sulfoxide

N-acetylmethionine sulfoxide

uracil   serine

3-methyl-2-oxobutyrate   Male Waking Activity

phenyllactate (PLA)

cytosine   stachydrine

Agression

acotinate
[cis or
trans]

2-methylcitrate

uracil

methionine
sulfone

spermidine

propionylcarnitine

beta-sitosterol

linoleoylcarnitine*

myristoylcarnitine*

1-(1-enyl-stearoyl)-2-linoleoyl-GPE
(P-18:0/18:2)*

palmitoleoylcarnitine

isobutyrylcarnitine

mesaconate
(methylfumarate)

pyruvate

citraconate/glutaconate

citrate

ribitol

carboxyethyl-GABA

ribose

1-(1-enyl-palmitoyl)-2-oleoyl-GPE
(P-16:0/18:1)*

5-oxoproline

adenosine
5'-monophosphate
(5'-AMP)

alpha-hydroxyisocaproate

2-hydroxy-3-methylvalerate

gluconate

arabonate/xylonate

arabitol/xylitol