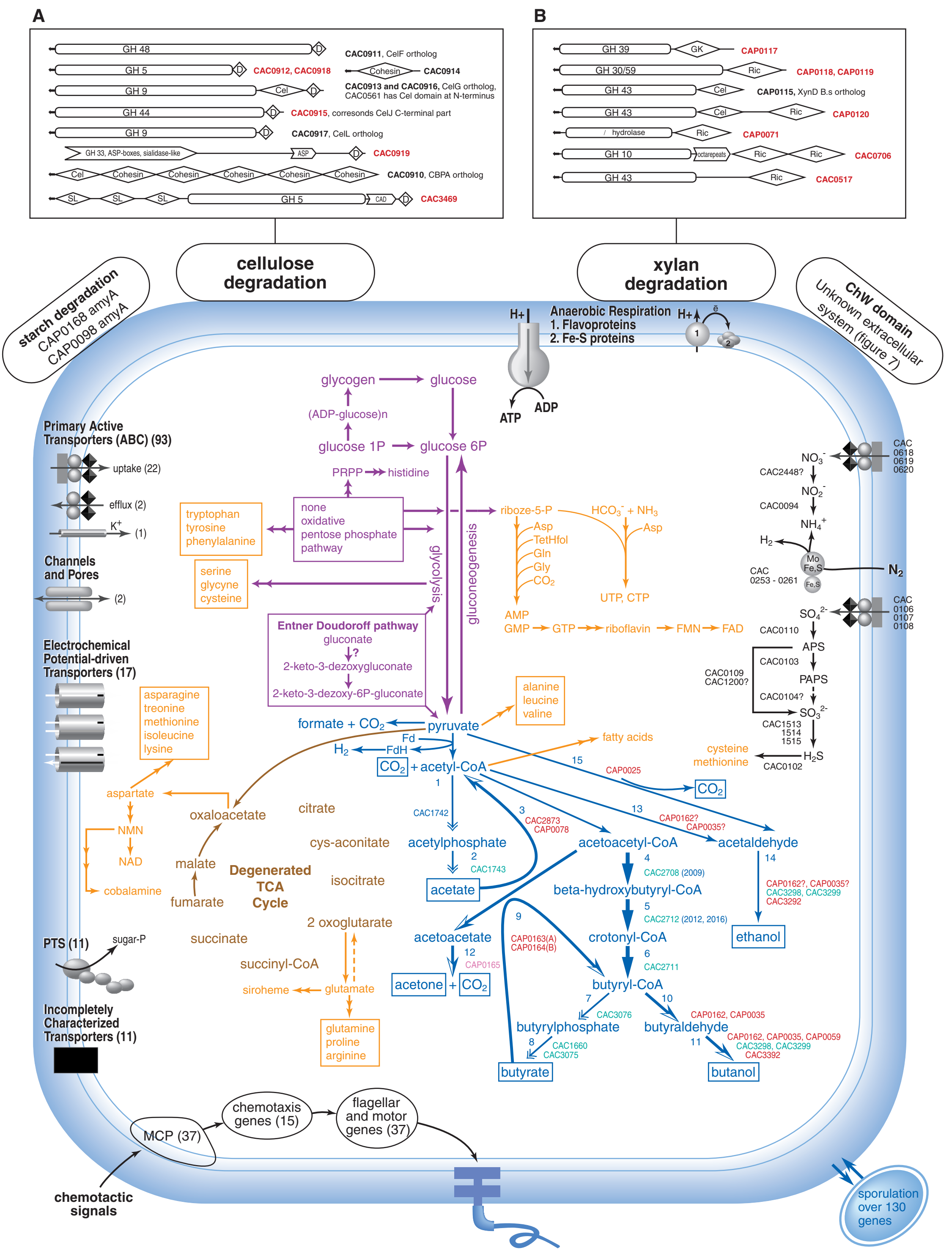
A
GH 48
CAC0911, CelF ortholog
GH 5
CAC0912, CAC0918
Cohesin
CAC0914
GH 9
Cel
CAC0913 and CAC0916, CelG ortholog, CAC0561 has Cel domain at N-terminus
GH 44
CAC0915, corresonds CelJ C-terminal part
GH 9
CAC0917, CelL ortholog
GH 33, ASP-boxes, sialidase-like
ASP
CAC0919
Cel
Cohesin
CAC0910, CBPA ortholog
SL
GH 5
CAD
CAC3469
B
GH 39
GK
CAP0117
GH 30/59
Ric
CAP0118, CAP0119
GH 43
Cel
CAP0115, XynD B.s ortholog
CAP0120
hydrolase
CAP0071
GH 10
octarepeats
CAC0706
CAC0517
cellulose degradation
xylan degradation
starch degradation
CAP0168 amyA
CAP0098 amyA
ChW domain
Unknown extracellular system (figure 7)
Anaerobic Respiration
1. Flavoproteins
2. Fe-S proteins
H+
ATP
ADP
glycogen
glucose
(ADP-glucose)n
glucose 1P
glucose 6P
PRPP
histidine
Primary Active Transporters (ABC) (93)
uptake (22)
efflux (2)
(1)
Channels and Pores
(2)
tryptophan
tyrosine
phenylalanine
none
oxidative
pentose phosphate
pathway
serine
glycyne
cysteine
glycolysis
gluconeogenesis
riboze-5-P
Asp
TetHfol
Gln
Gly
CO2
HCO3- + NH3
Asp
UTP, CTP
AMP
GMP
GTP
riboflavin
FMN
FAD
Entner Doudoroff pathway
gluconate
2-keto-3-dezoxygluconate
2-keto-3-dezoxy-6P-gluconate
Electrochemical Potential-driven Transporters (17)
asparagine
treonine
methionine
isoleucine
lysine
alanine
leucine
valine
formate + CO2
pyruvate
Fd
FdH
H2
CO2 + acetyl-CoA
fatty acids
CAP0025
CO2
aspartate
oxaloacetate
citrate
cys-aconitate
isocitrate
NMN
NAD
cobalamine
malate
fumarate
Degenerated TCA Cycle
succinate
succinyl-CoA
2 oxoglutarate
siroheme
glutamate
glutamine
proline
arginine
CAC1742
acetylphosphate
CAC1743
acetate
CAC2873
CAP0078
CAP0162?
CAP0035?
acetoacetyl-CoA
acetaldehyde
CAC2708 (2009)
beta-hydroxybutyryl-CoA
CAC2712 (2012, 2016)
crotonyl-CoA
CAP0162?, CAP0035?
CAC3298, CAC3299
CAC3292
ethanol
acetoacetate
CAP0165
acetone + CO2
CAP0163(A)
CAP0164(B)
CAC2711
butyryl-CoA
CAC3076
butyrylphosphate
CAP0162, CAP0035
butyraldehyde
CAC1660
CAC3075
butyrate
CAP0162, CAP0035, CAP0059
CAC3298, CAC3299
CAC3392
butanol
NO3-
CAC2448?
NO2-
CAC0094
NH4+
H2
Mo Fe,S
Fe,S
CAC 0253 - 0261
N2
CAC 0618 0619 0620
SO4 2-
CAC0110
APS
CAC0103
PAPS
CAC0109
CAC1200?
CAC0104?
SO3 2-
CAC1513 1514 1515
H2S
CAC0102
cysteine
methionine
CAC 0106 0107 0108
PTS (11)
sugar-P
Incompletely Characterized Transporters (11)
MCP (37)
chemotaxis genes (15)
flagellar and motor genes (37)
chemotactic signals
sporulation over 130 genes