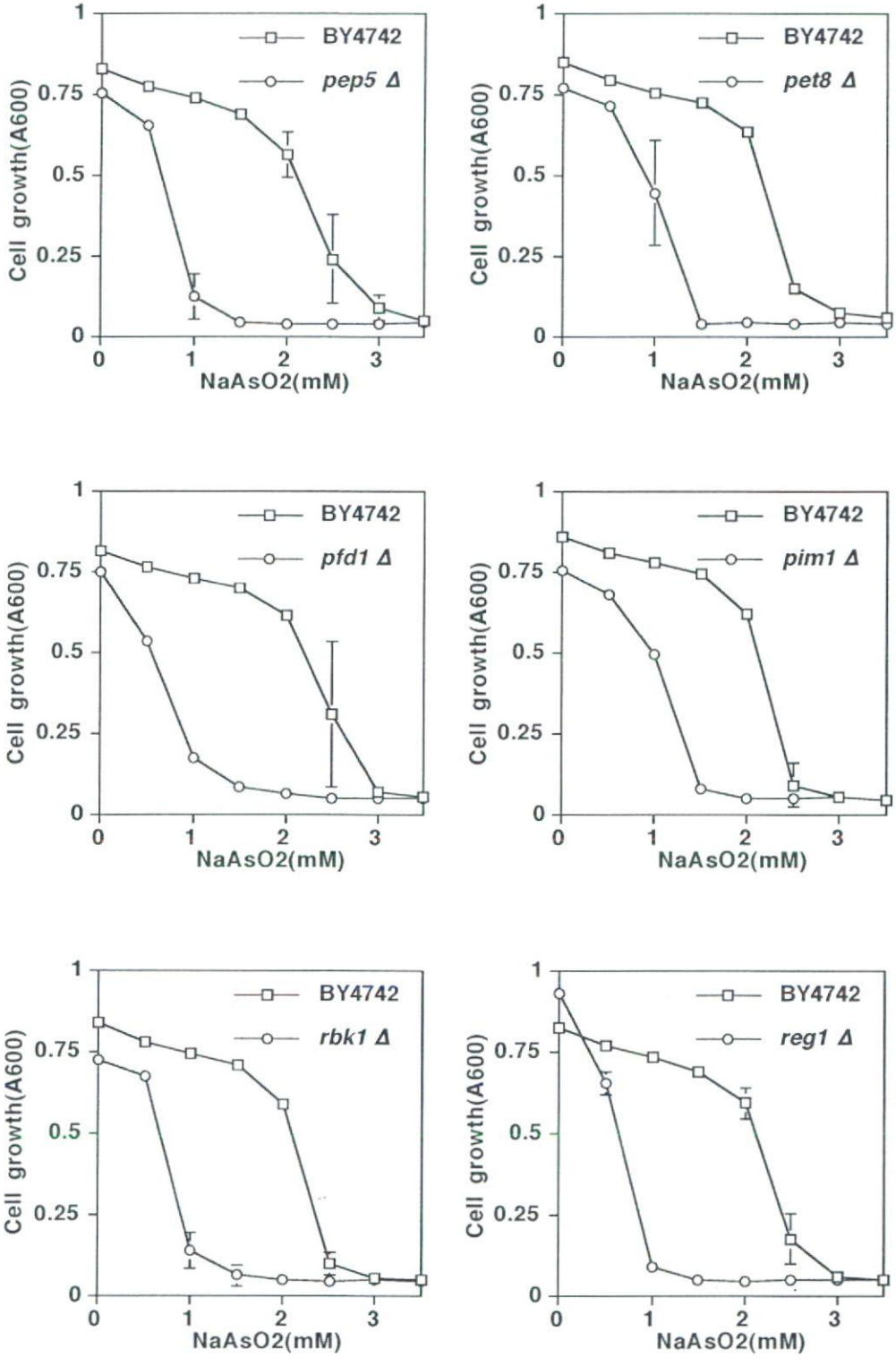


Fig.3-8　欠損により酵母に亜ヒ酸高感受性を与える遺伝子

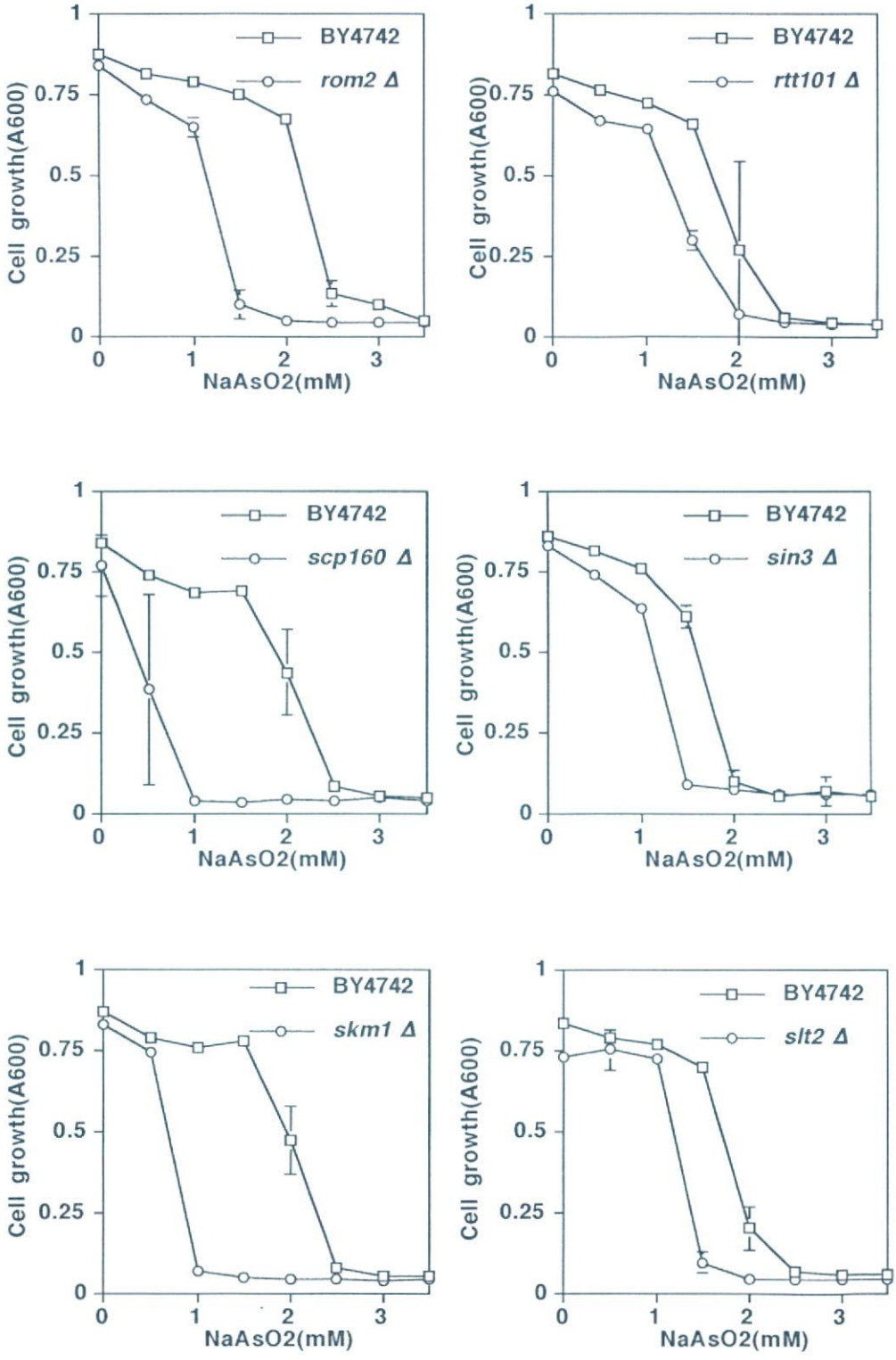


Fig.3-9　欠損により酵母に亜ヒ酸高感受性を与える遺伝子

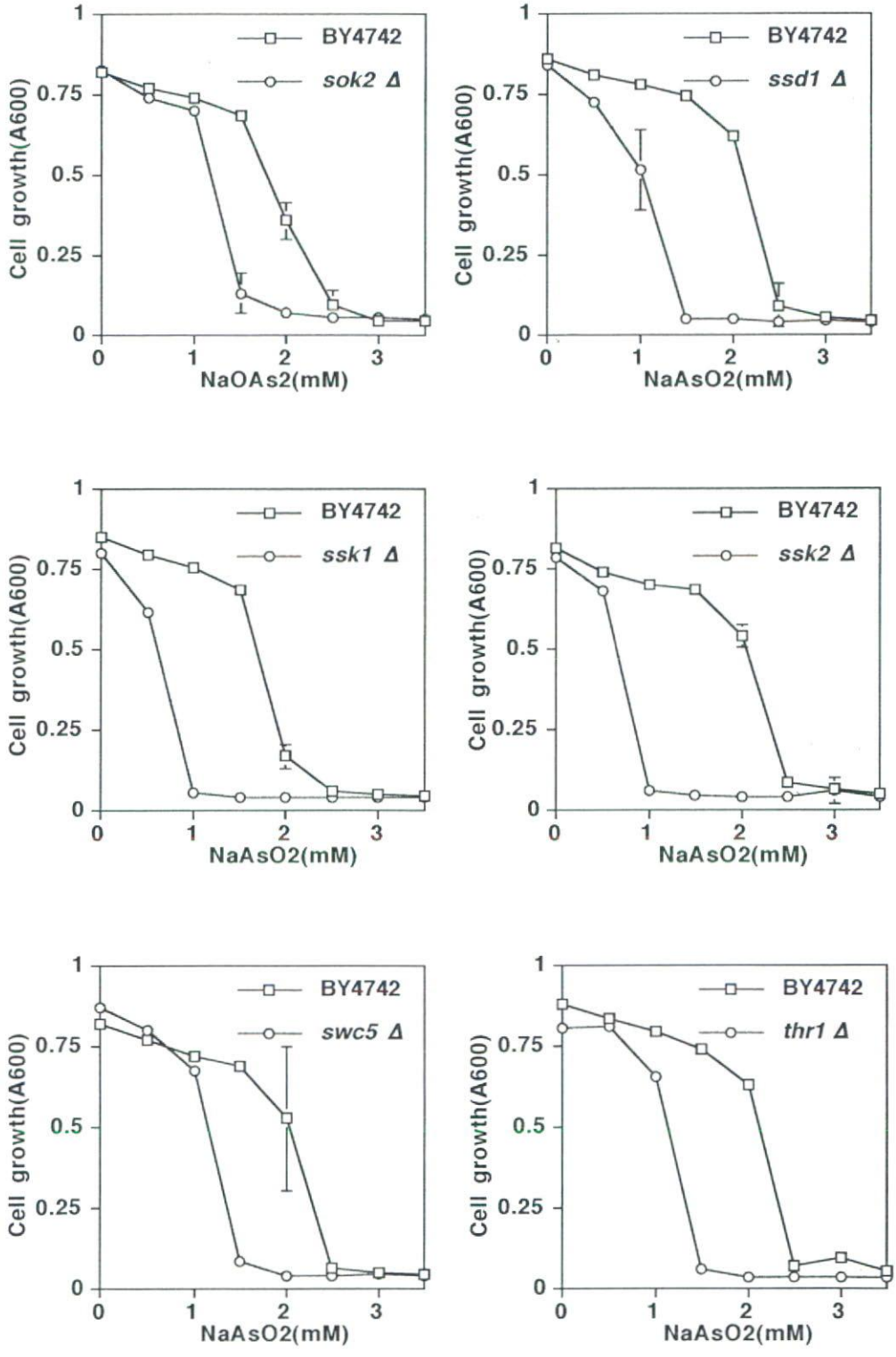


Fig.3-10　欠損により酵母に亜ヒ酸高感受性を与える遺伝子

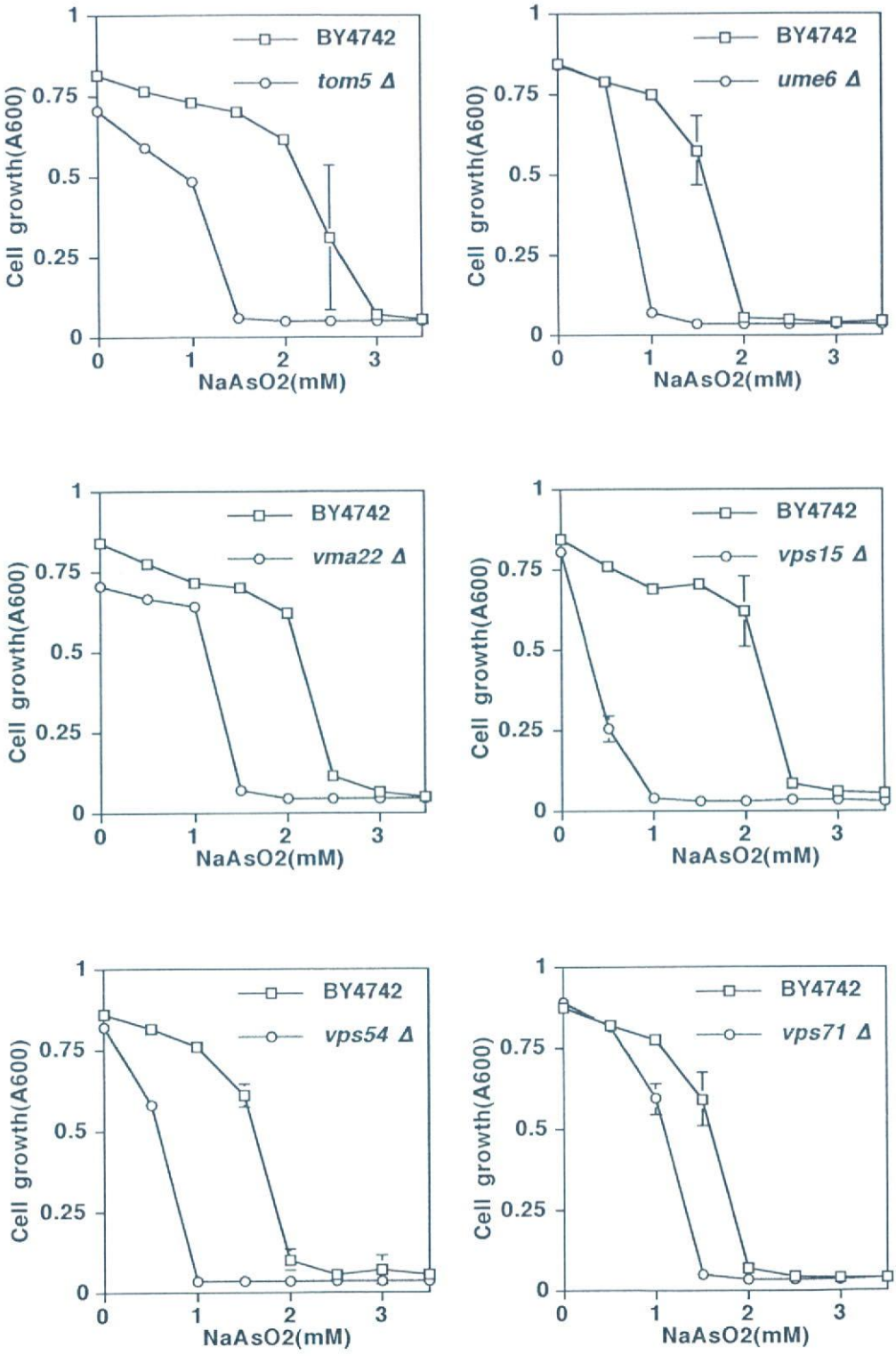


Fig.3-11　欠損により酵母に亜ヒ酸高感受性を与える遺伝子

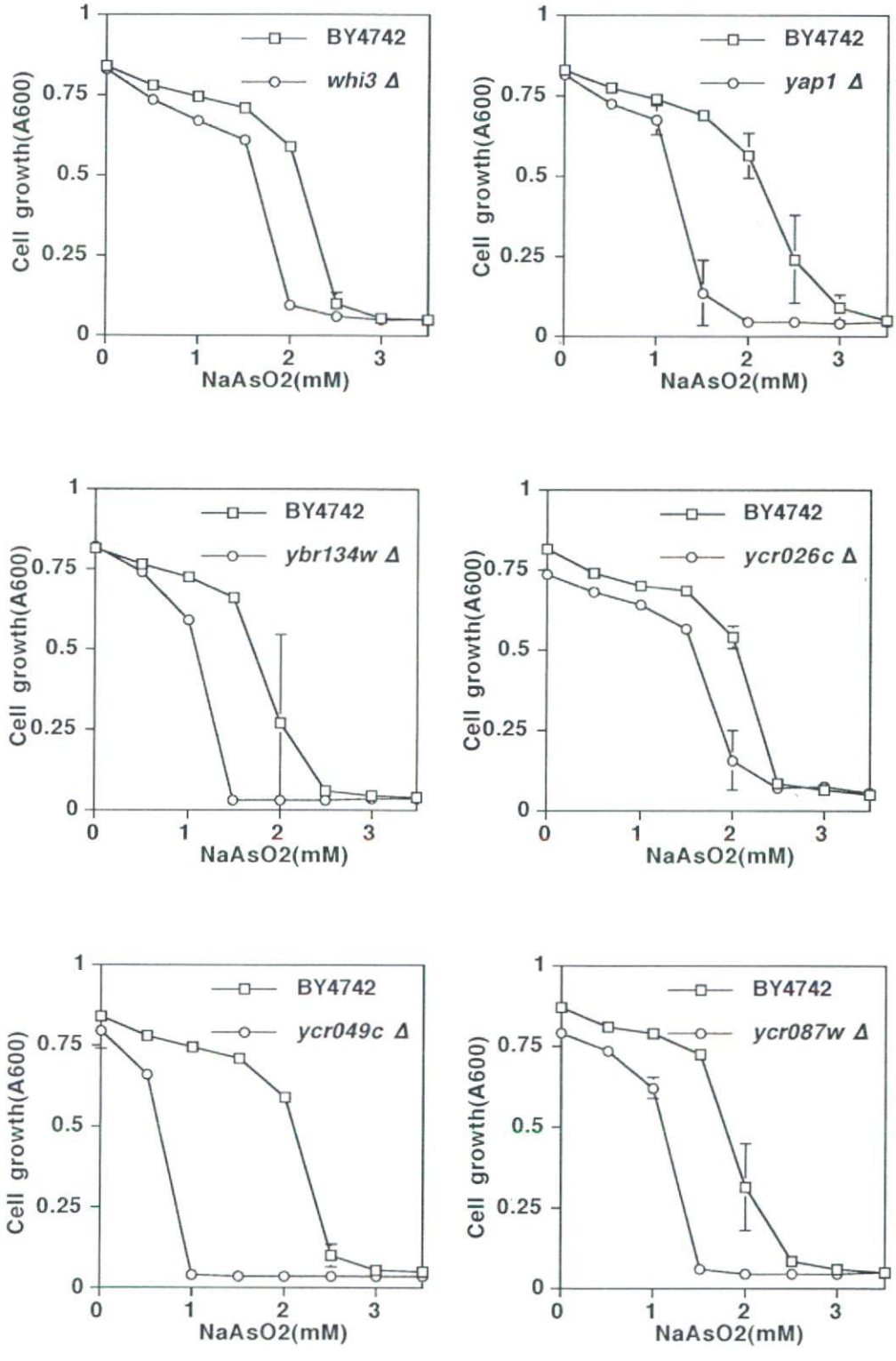


Fig.3-12　欠損により酵母に亜ヒ酸高感受性を与える遺伝子

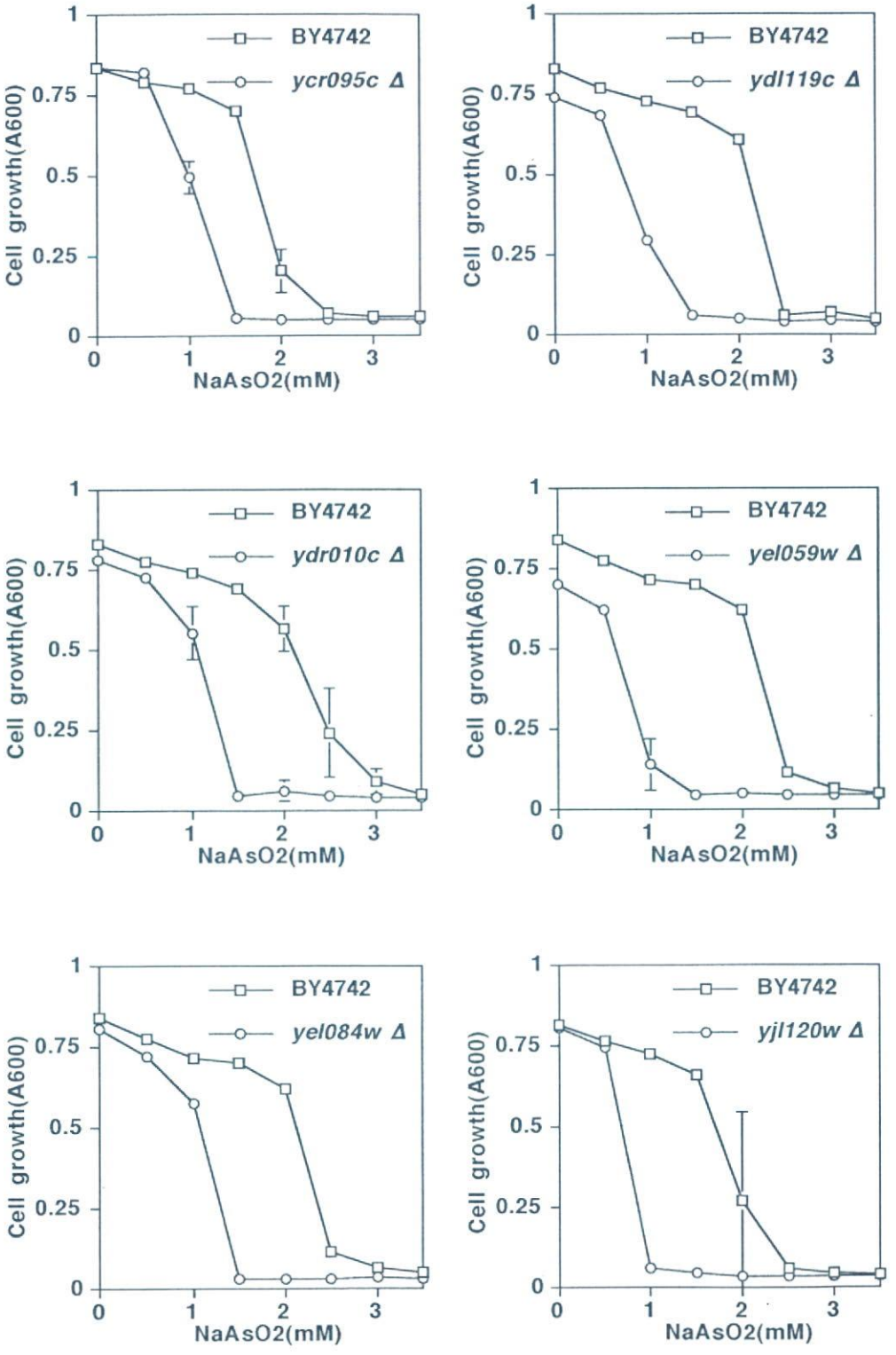


Fig.3-13　欠損により酵母に亜ヒ酸高感受性を与える遺伝子

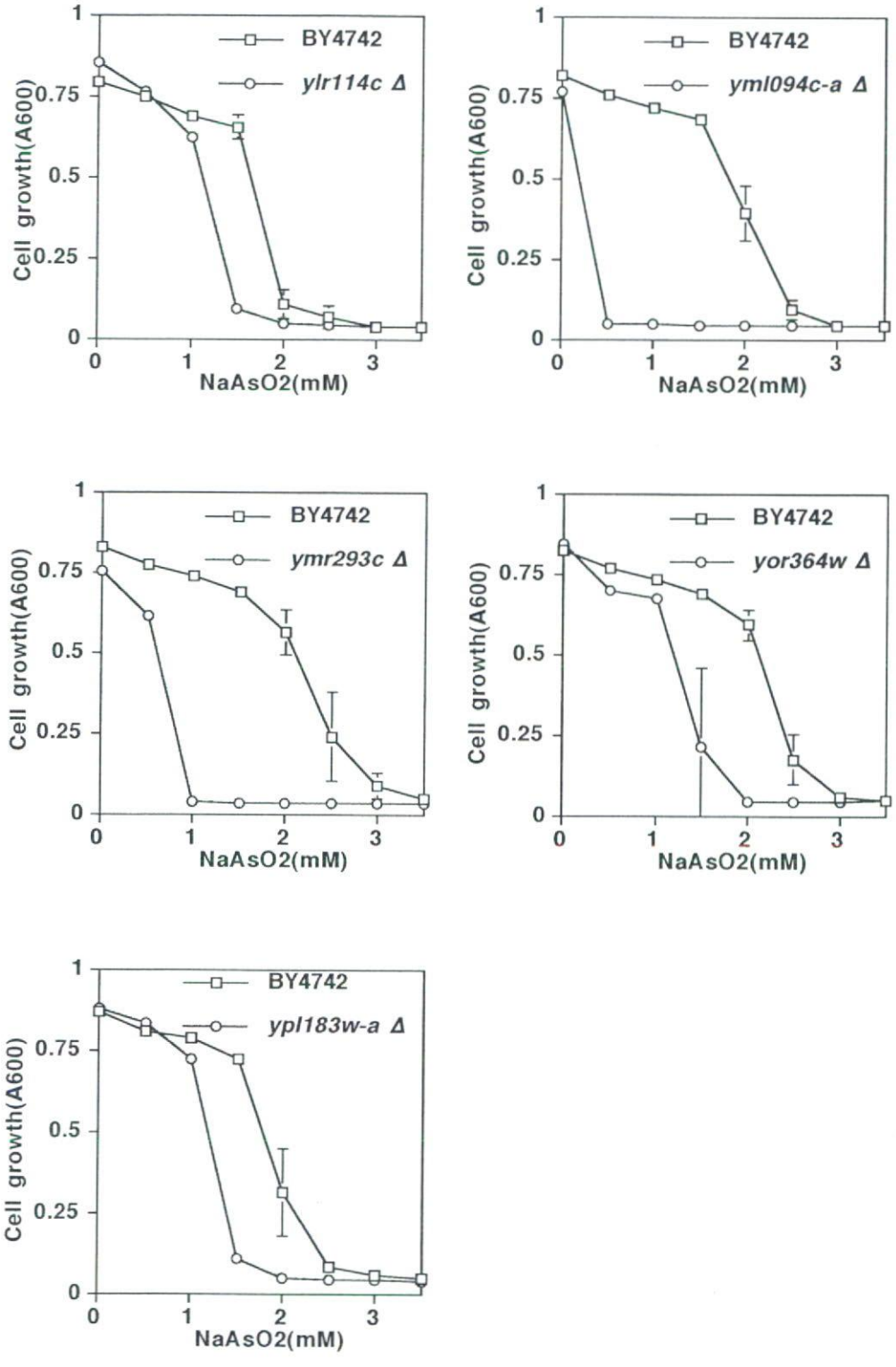


Fig.3-14　欠損により酵母に亜ヒ酸高感受性を与える遺伝子

Table. 2-1　欠損により酵母に亜ヒ酸高感受性を与える遺伝子がコードする蛋白の機能

遺伝子	機能
AAT2	Aspartate aminotransferase (2-oxoglutarate aminotransferase), cytosolic and peroxisomal
AKR1	Protein with palmitoyl transferase activity, has an inhibitory effect on signaling in the pheromone pathway, contains ankyrin repeats
API2	Protein involved in apical bud growth and formation of mating projection, required for stimulation of the low affinity Ca2+ influx system (LACS) that is activated in response to mating pheromone and is required for cell-cell fusion
ARC18	Component of the ARP2/3 actin-organizing complex, involved in actin assembly and function
ARP6	Protein involved in ER organization and biogenesis, has weak similarity to actin and actin-related proteins Arp2p, Arp3p, and Arp5p
ARR1	Transcription factor of the basic leucine zipper (bZIP) family involved in arsenic and antimony resistance, member of a fungal-specific family of bZIP proteins
ARR2	Arsenate reductase required for resistance to arsenic
ARR3	Arsenic-resistance protein, member of the arsenical resistance-3 (ACR3) family of secondary active membrane transporters
BCK1	Serine/threonine protein kinase of the MEKK family involved in the cell wall integrity (low-osmolarity) and nutrient sensing pathways

Table. 2-2　欠損により酵母に亜ヒ酸高感受性を与える遺伝子がコードする蛋白の機能

遺伝子	機能
BEM1	Protein required for cell polarization and bud formation, contains two SH3 domains and a PX (phox) domain
BEM4	Bud emergence protein that interacts with Rho-type GTPases
BNI1	Protein involved in cytoskeletal control, stimulates actin (Act1p) filament assembly and protects growing actin ends from excess capping protein, required for bipolar budding pattern
BRO1	Protein that interacts with components of the PKC1-MAP kinase pathway, involved in the multivesicular bodies (MVB) pathway
BUD16	Protein involved in budding, has similarity to human PDXK pyridoxal kinase
CBP3	Protein required for assembly of ubiquinol cytochrome c reductase complex (cytochrome bc1 complex)
CHS5	Protein required for chitin synthase III activity
CTF4	Protein required for DNA synthesis, binds DNA polymerase alpha
DBF2	Serine/threonine protein kinase related to Dbf20p, required for events in anaphase/telophase, component of the CCR4-NOT transcriptional complex
DEF1	Protein involved in vacuolar import and degradation, glutamine rich; required for DNA damage-induced degradation of RNA polymerase II
DOA4	Ubiquitin-specific protease (ubiquitin C-terminal hydrolase), involved in recycling ubiquitin from protein substrates targeted to the proteasome and the vacuole

Table. 2-3　欠損により酵母に亜ヒ酸高感受性を与える遺伝子がコードする蛋白の機能

遺伝子	機能
DUR1,2	Urea amidolyase, contains urea carboxylase and allophanate hydrolase activities fused together in a single polypeptide
ERG3	C-5 sterol desaturase, an iron, non-heme, oxygen-requiring enzyme of the ergosterol biosynthesis pathway
ERG4	Sterol C-24 (28) reductase
ERG5	Cytochrome P450, delta 22(23) sterol desaturase, catalyzes an intermediate pathway step in the biosynthesis of ergosterol
ERG6	S-adenosylmethionine delta-24-sterol-C-methyltransferase, carries out methylation of zymosterol as part of the ergosterol biosynthesis pathway
GAS1	1,3-beta-Glucanosyltransferase, glycophospholipid-anchored surface glycoprotein that regulates the crosslinking of beta-1,6-glucans in the cell wall
GIM4	Prefoldin subunit 2, component of the Gim protein complex that promotes formation of functional alpha- and gamma-tubulin, and actin
GIM5	Prefoldin subunit 5, component of the Gim protein complex that promotes formation of functional alpha-tubulin, gamma-tubulin, and actin
GLC8	Modulator of protein serine/threonine phosphatase Glc7p, involved in control of vacuole fusion
HDA1	Histone deacetylase, catalyzes removal of acetyl groups from histones, required for repression of many genes

Table. 2-4　欠損により酵母に亜ヒ酸高感受性を与える遺伝子がコードする蛋白の機能

遺伝子	機能
HEM14	Protoporphyrinogen oxidase, converts protoporphyrinogen to protoporphyrin during heme biosynthesis
HOG1	MAP kinase (MAPK), principal component of the high-osmolarity signal transduction pathway
LRE1	Protein involved in regulation of beta-1,3-glucan biosynthesis, activation of Pkc1p-MAPK pathway, and laminarinase resistance
LTE1	GDP/GTP exchange factor, required for termination of M phase
MAL31	Maltose permease, a high affinity maltose/H[+] symporter, member of the hexose transporter family of the major facilitator superfamily (MFS)
MDM10	Protein involved in coupling mitochondria to the actin cytoskeleton and in mitochondrial morphology and inheritance, plays a role in maintenance of functional mitochondrial genome
MEF1	Mitochondrial translation elongation factor G, promotes GTP-dependent translocation of nascent chain from A-site to P-site of ribosome
MRP7	Mitochondrial ribosomal protein of the large subunit (YmL2) (E. coli L27)
MRPL22	Protein of the mitochondrial large ribosomal subunit, involved in the internalization step of endocytosis
MRPL51	Protein of the mitochondrial large ribosomal subunit

Table. 2-5　欠損により酵母に亜ヒ酸高感受性を与える遺伝子がコードする蛋白の機能

遺伝子	機能
OPI3	Phospholipid-N-methyltransferase, carries out the second and third methylation steps of the phosphatidylcholine biosynthesis pathway
PAC10	Prefoldin subunit 3, component of the Gim protein complex that promotes formation of functional alpha- and gamma-tubulin, and actin
PBS2	MAP kinase kinase (MEK) activated by high osmolarity through the Sln1p-Ypd1p-Ssk1p two-component osmosensor and the Sho1p osmosensor
PEP5	Vacuolar peripheral membrane protein required for vacuole biogenesis
PET8	S-adenosylmethionine carrier, member of the mitochondrial carrier (MCF) family of membrane transporters, has similarity to Mrs4p and Mrs3p
PFD1	Component of the Gim protein complex that promotes formation of functional alpha- and gamma-tubulin and actin, has similarity to bovine prefoldin subunit 1
PIM1	Serine protease required for intramitochondrial proteolysis and maintenance of respiratory function, related to E. coli ATP-dependent protease La, member of the AAA+ family of putative ATPases
RBK1	Ribokinase, member of a family of sugar kinases that includes Pfk2p
REG1	Regulatory subunit for protein phosphatase Glc7p, required for glucose repression
ROM2	GDP-GTP exchange factor for Rho1p that is activated by cell wall defects, involved in ethanol tolerance

Table. 2-6　欠損により酵母に亜ヒ酸高感受性を与える遺伝子がコードする蛋白の機能

遺伝子	機能
RTT101	Protein of the cullin family that has ubiquitin-protein ligase activity, involved in the regulation of Ty1 transposition, has similarity to Cdc53p
SCP160	Protein involved in control of mitotic chromosome transmission, acts as an effector for Gpa1p in the mating response pathway, contains 14 KH domains which are found in RNA-binding proteins such as Mer1p and mouse hnRNP X
SIN3	Component of histone deacetylase B and transcriptional regulator of RNA polymerase II, has negative and positive effects on gene expression
SKM1	Serine/threonine protein kinase with similarity to Ste20p and Cla4p
SLT2	Serine/threonine protein kinase of MAP kinase family involved in the cell wall integrity (low-osmolarity) pathway and in G2 phase cell-cycle checkpoint control
SOK2	Transcription factor with dual roles as both activator and repressor, negatively regulates meiosis, involved in regulation of cAMP-dependent kinase-stimulated growth, pseudohyphal differentiation, and sporulation
SSD1	Protein involved in regulating formation and composition of the cell wall, resistance to the tobacco antifungal agent osmotin, and calcium tolerance, single-copy enhancer of arl1 null mutation, single-copy suppressor of many different mutations

Table. 2-7　欠損により酵母に亜ヒ酸高感受性を与える遺伝子がコードする蛋白の機能

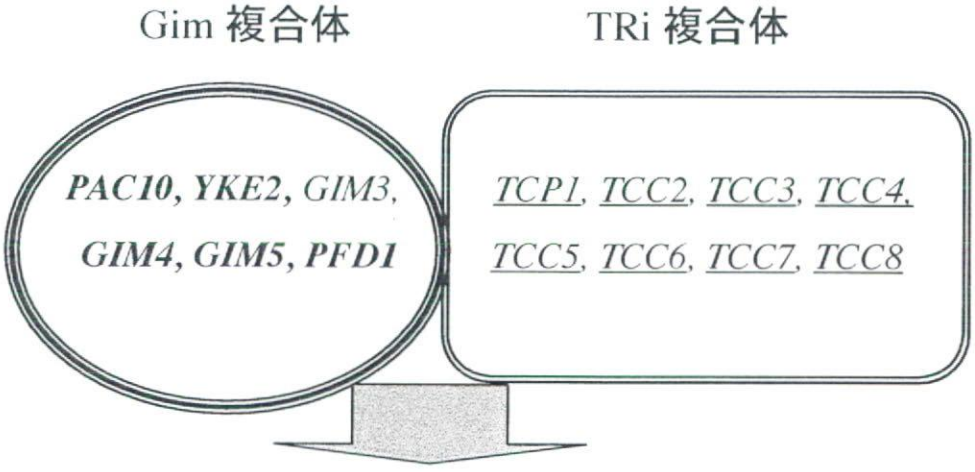
遺伝子	機能
SSK1	Two-component signal transducer that receives phosphate from the Sln1p-Ypd1p phosphorelay as part of the high-osmolarity signal transduction MAP kinase pathway
SSK2	MAP kinase kinase kinase (MAPKKK) involved in the high-osmolarity signal transduction pathway
SWC5	Protein involved in Prc1p and Pep4p trafficking to the vacuole and required to maintain wild-type abundance of polarized actin cables, component of SWR1 chromatin remodeling complex
THR1	Homoserine kinase (ATP:L-homoserine-O-P-transferase), first step in the threonine biosynthesis pathway, involved in sensitivity to UV irradiation
TOM5	Component of the general import complex and component of the mitochondrial translocase of the outer membrane that transfers precursor proteins from the outer membrane receptors to the general import pore
UME6	Global transcriptional regulator containing a zinc binuclear cluster domain involved in pathway specific repression or induction
VMA22	Protein involved in vacuolar H(+)-ATPase (V-ATPase) assembly or function, essential for V-ATPase activity
VPS15	Serine/threonine protein kinase involved in vacuolar protein sorting
VPS54	Subunit of the VFT (Sac2p-Vps53p-Luv1p) complex, involved in protein sorting in the late Golgi

Table. 2-8　欠損により酵母に亜ヒ酸高感受性を与える遺伝子がコードする蛋白の機能

遺伝子	機能
VPS71	Component of the Swr1p-containing (SWR-C) complex, which may be involved in establishing the boundaries of heterochromatin
WHI3	Protein that downregulates Cln3p function and is involved in sporulation, filamentous growth, and regulation of cell size, contains one RNA recognition motif (RRM) domain
YAP1	Transcriptional activator of the basic leucine zipper (bZIP) family, possible redox sensor involved in oxidative stress response
YBR134W	Protein of unknown function
YCR026C	Member of the type I phosphodiesterase or nucleotide pyrophosphatase family, has a region of low similarity to a region of ectonucleotide phosphodiesterase 3 (rat LOC54410), which releases monophosphates from phosphodiester and pyrophosphate bonds
YCR049C	Protein of unknown function
YCR087W	Protein of unknown function
YCR095C	Member of the tyrosine phosphatase family, has low similarity to uncharacterized C. albicans Ipf2023p
YDL119C	Putative mitochondrial membrane transporter
YDR010C	Protein of unknown function
YEL059W	Protein of unknown function
YER084W	Protein of unknown function
YJL120W	Protein of unknown function

Table. 2-9　欠損により酵母に亜ヒ酸高感受性を与える遺伝子がコードする蛋白の機能

遺伝子	機能
YLR114C	Protein of unknown function, has low similarity to uncharacterized A. fumigatus AfA5C11.11
YML095C-A	Protein of unknown function
YMR293C	Protein with similarity to amidases, may be involved in mitochondrial function
YOR364W	Protein of unknown function
YPL183W-A	Possible mitochondrial ribosomal proteins, has strong similarity to prokaryotic ribosomal proteins L36



細胞骨格を構成する蛋白質の折畳み

※ 下線のある遺伝子は、欠損により致死となる。**太字**は、欠損により亜ヒ酸高感受性になる遺伝子。*GIM3, TCP1* については検討していない。

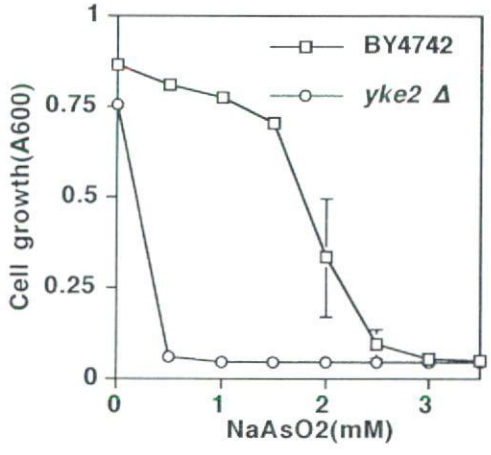
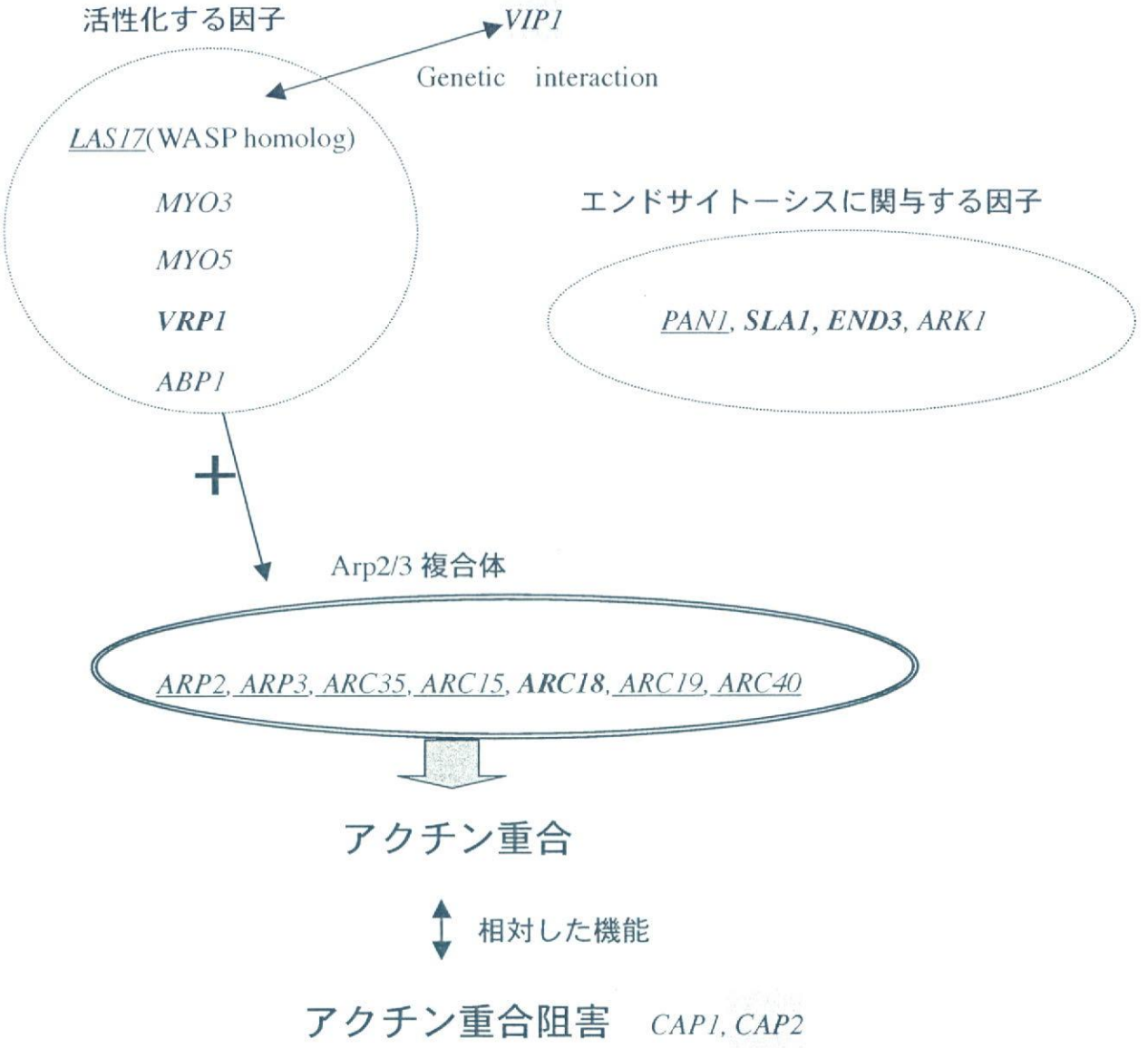


Fig. 4　Gim 複合体構成因子 *YKE2* の欠損による

亜ヒ酸感受性への影響



※ WASP：Wiskott-Aldrich syndrome protein

※ 下線のある遺伝子は、欠損により致死となる。編みかけは、欠損により亜ヒ酸耐性になる遺伝子。**太字**は、欠損により亜ヒ酸感受性になる遺伝子。細字は、欠損により亜ヒ酸感受性に影響がない遺伝子。

Fig. 5-1　Arp2/3 複合体とそれに関連する因子のモデルと亜ヒ酸感受性への影響

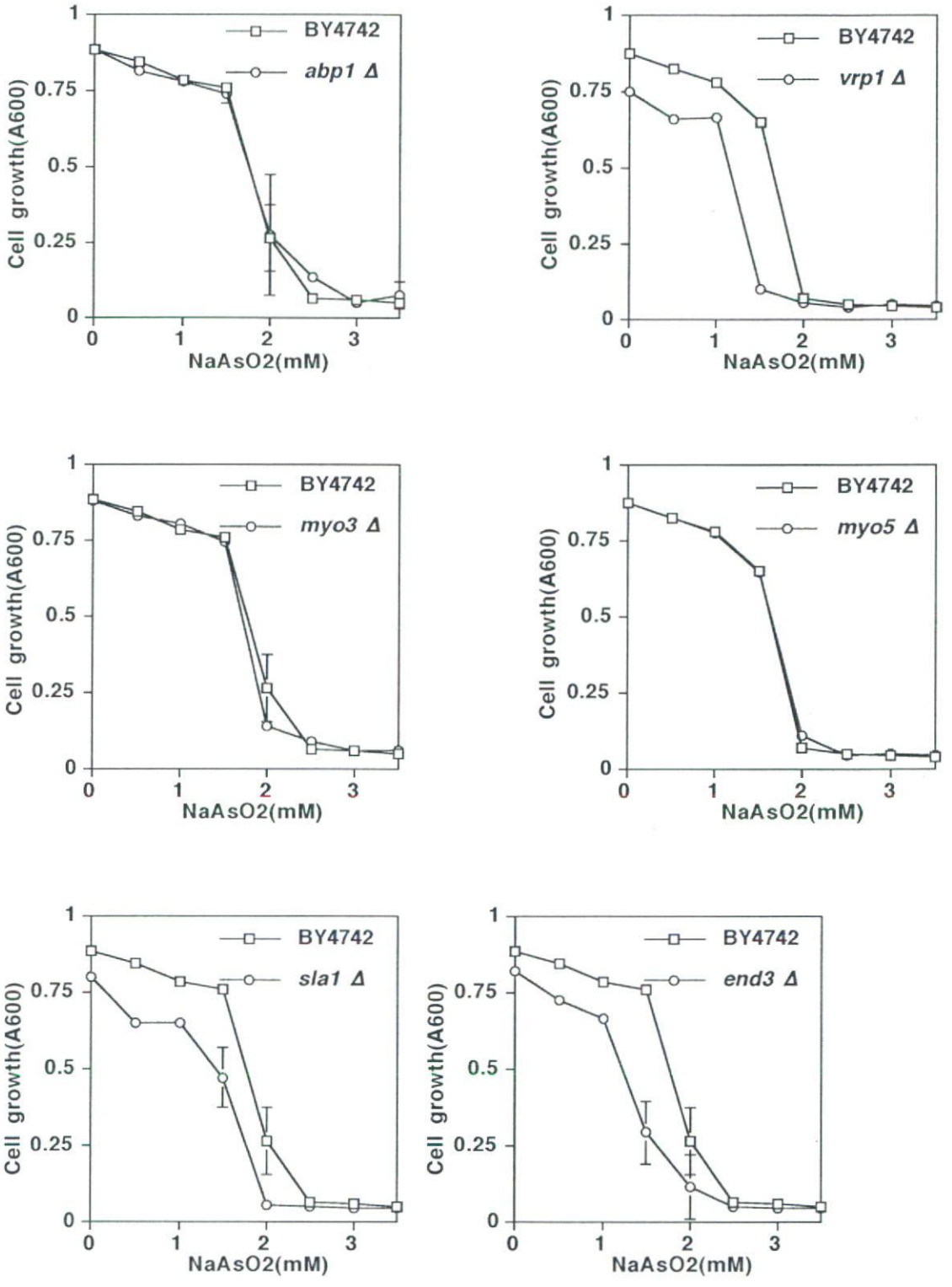


Fig. 5-2　Arp2/3 複合体とそれに関連する因子の
亜ヒ酸感受性への影響

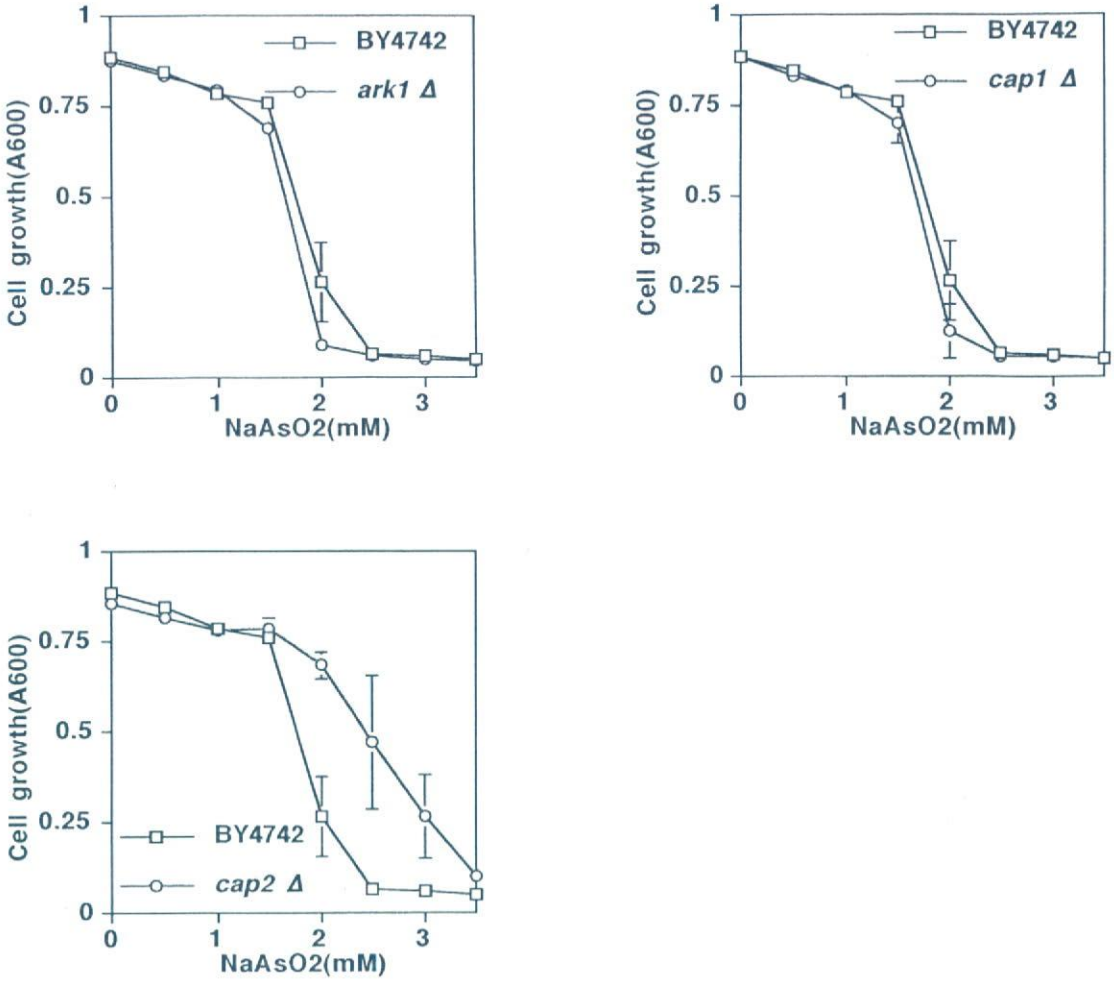


Fig. 5-3　Arp2/3 複合体とそれに関連する因子の
亜ヒ酸感受性への影響