

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
<i>SSK1</i>	Two-component signal transducer that receives phosphate from the Sln1p-Ypd1p phosphorelay as part of the high-osmolarity signal transduction MAP kinase pathway
<i>SSK2</i>	MAP kinase kinase kinase (MAPKKK) involved in the high-osmolarity signal transduction pathway
<i>SWC5</i>	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
<i>THR1</i>	Homoserine kinase (ATP:L-homoserine-O-P-transferase), first step in the threonine biosynthesis pathway, involved in sensitivity to UV irradiation
<i>TOM5</i>	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
<i>UME6</i>	Global transcriptional regulator containing a zinc binuclear cluster domain involved in pathway specific repression or induction
<i>VMA22</i>	Protein involved in vacuolar H(+)-ATPase (V-ATPase) assembly or function, essential for V-ATPase activity
<i>VPS15</i>	Serine/threonine protein kinase involved in vacuolar protein sorting
<i>VPS54</i>	Subunit of the VFT (Sac2p-Vps53p-Luv1p) complex, involved in protein sorting in the late Golgi

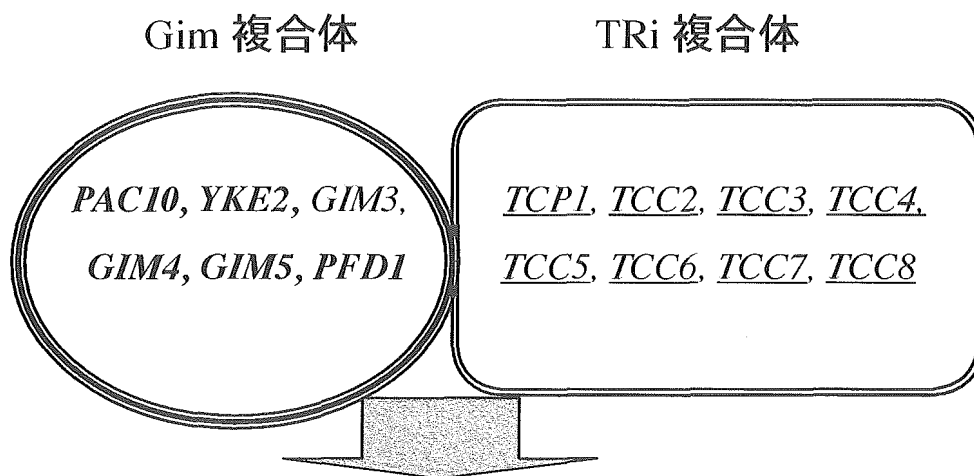
Table. 2-8 欠損により酵母に亜ヒ酸高感受性を与える遺伝子がコードする  
 蛋白の機能

遺伝子	機能
<i>VPS71</i>	Component of the Swr1p-containing (SWR-C) complex, which may be involved in establishing the boundaries of heterochromatin
<i>WHI3</i>	Protein that downregulates Cln3p function and is involved in sporulation, filamentous growth, and regulation of cell size, contains one RNA recognition motif (RRM) domain
<i>YAP1</i>	Transcriptional activator of the basic leucine zipper (bZIP) family, possible redox sensor involved in oxidative stress response
<i>YBR134W</i>	Protein of unknown function
<i>YCR026C</i>	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
<i>YCR049C</i>	Protein of unknown function
<i>YCR087W</i>	Protein of unknown function
<i>YCR095C</i>	Member of the tyrosine phosphatase family, has low similarity to uncharacterized <i>C. albicans</i> Ipf2023p
<i>YDL119C</i>	Putative mitochondrial membrane transporter
<i>YDR010C</i>	Protein of unknown function
<i>YEL059W</i>	Protein of unknown function
<i>YER084W</i>	Protein of unknown function
<i>YJL120W</i>	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
<i>YLR114C</i>	Protein of unknown function, has low similarity to uncharacterized A. fumigatus AfA5C11.11
<i>YML095C-A</i>	Protein of unknown function
<i>YMR293C</i>	Protein with similarity to amidases, may be involved in mitochondrial function
<i>YOR364W</i>	Protein of unknown function
<i>YPL183W-A</i>	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。

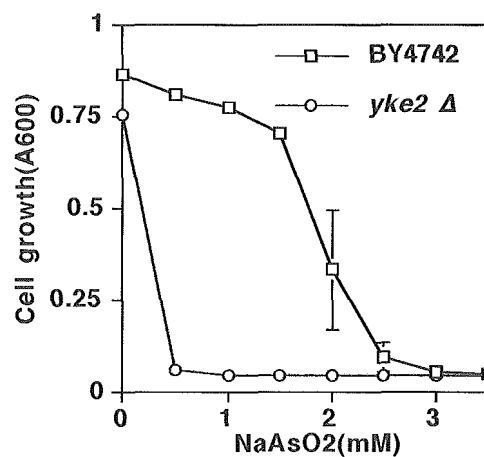
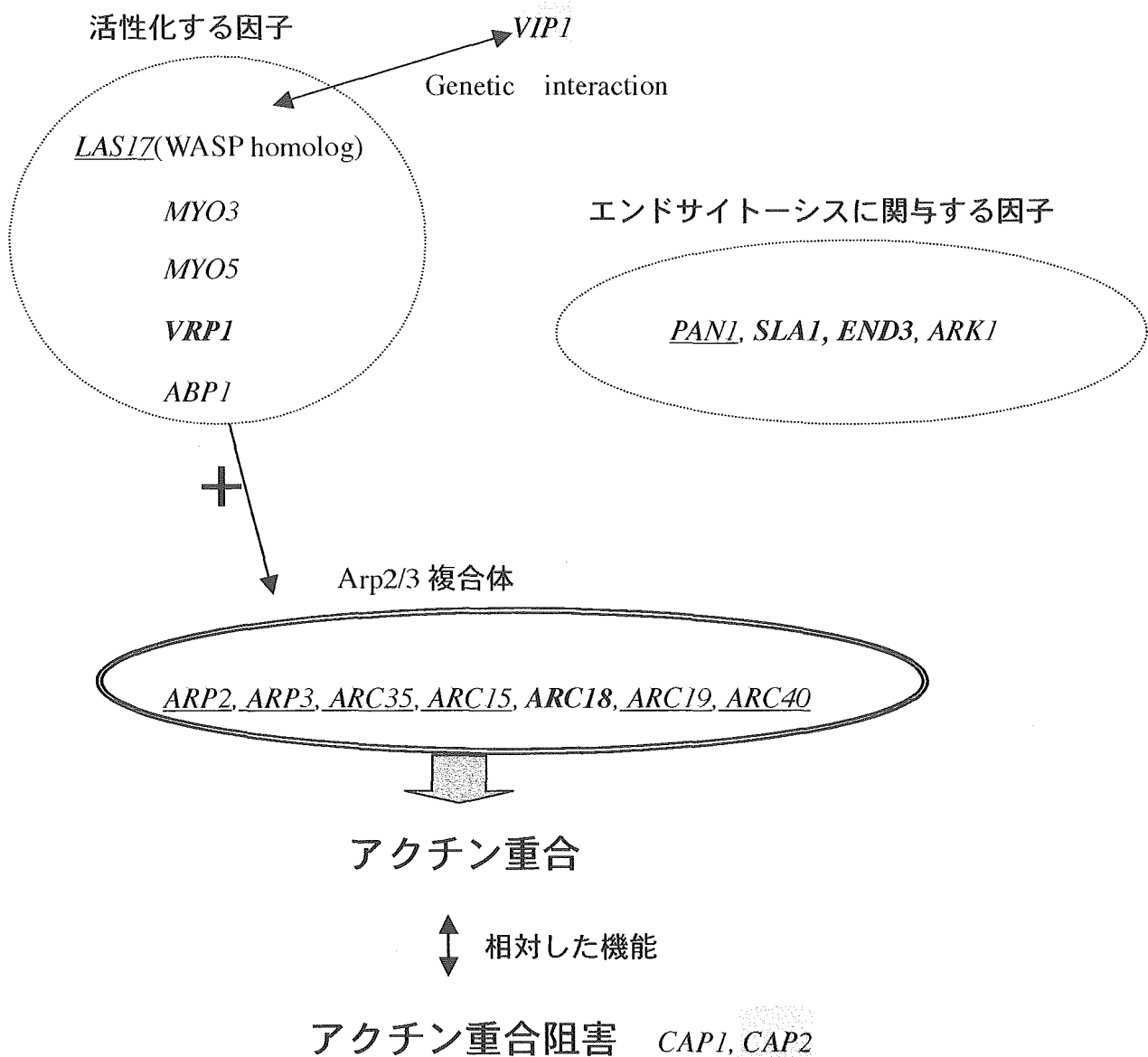


Fig. 4 Gim 複合体構成因子 *YKE2* の欠損による

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、欠損により垂ヒ酸耐性になる遺伝子。太字は、欠損により垂ヒ酸感受性になる遺伝子。細字は、欠損により垂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

### 垂ヒ酸感受性への影響

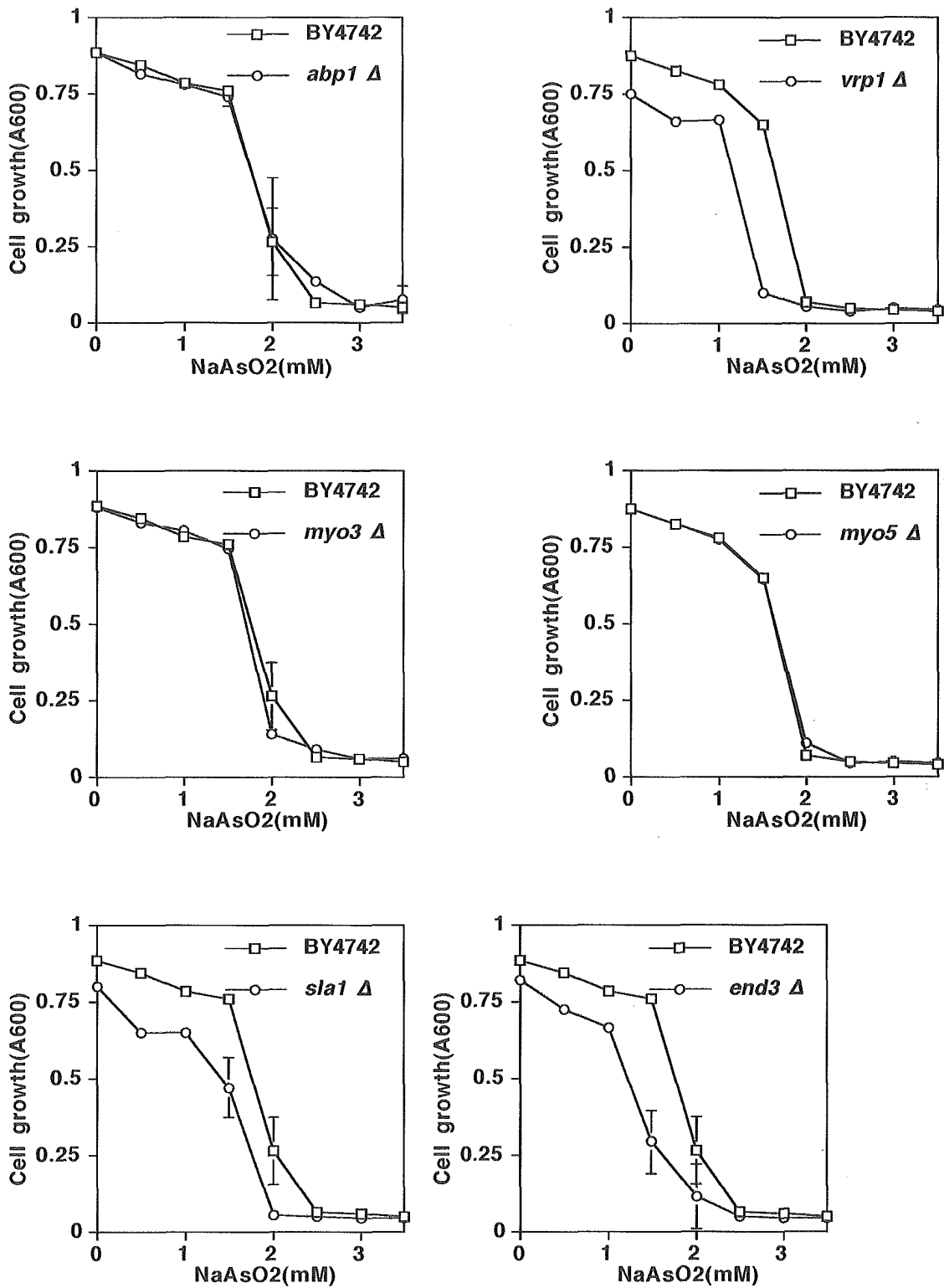


Fig. 5-2 Arp2/3 複合体とそれに関連する因子の  
亜ヒ酸感受性への影響

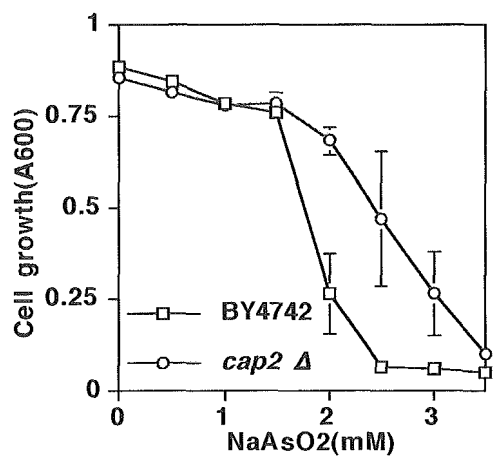
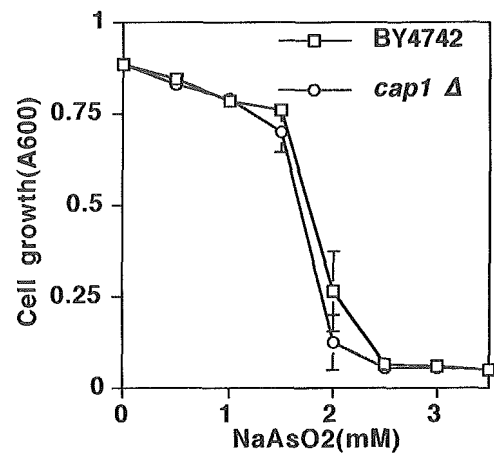
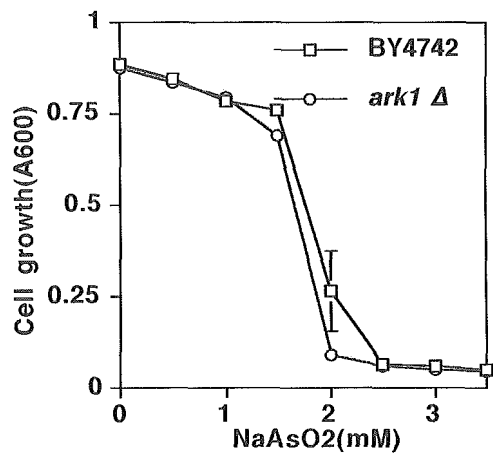
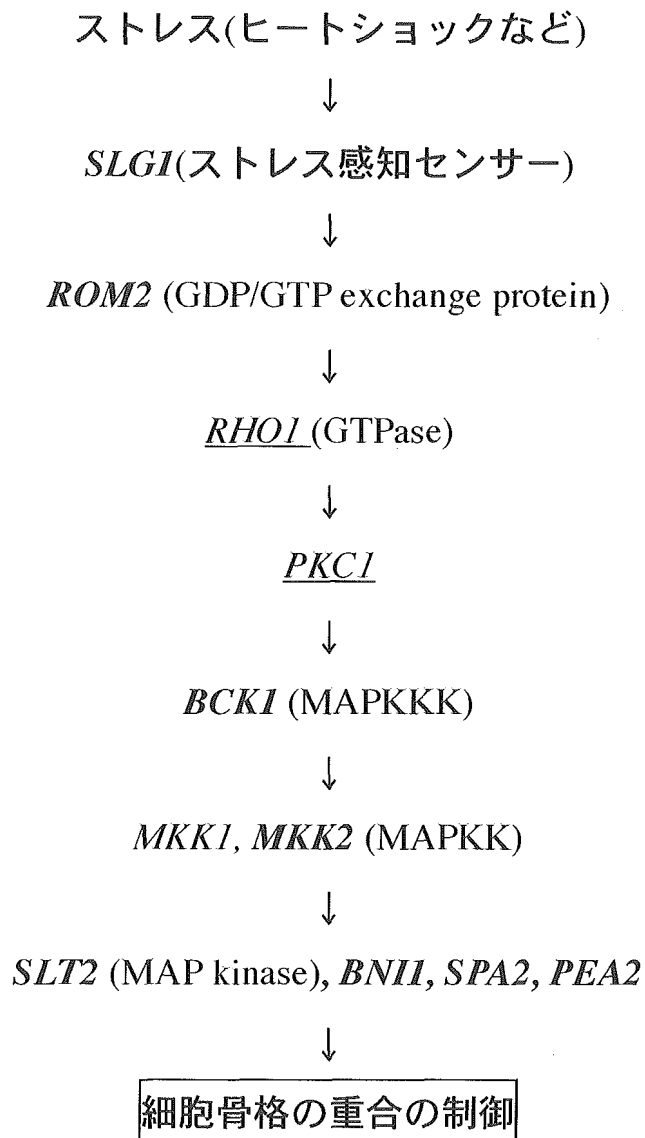


Fig. 5-3 Arp2/3 複合体とそれに関連する因子の  
亜ヒ酸感受性への影響



※ 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. 6-1 ストレスに応答して細胞骨格の制御を行う

シグナル伝達経路中の因子と亜ヒ酸感受性への影響



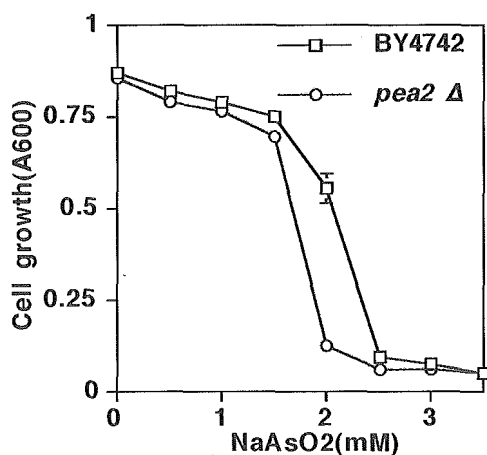
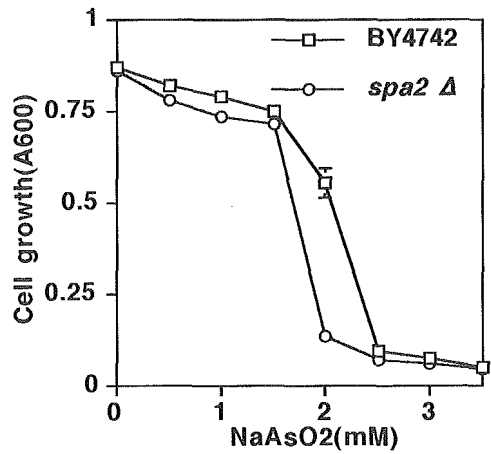
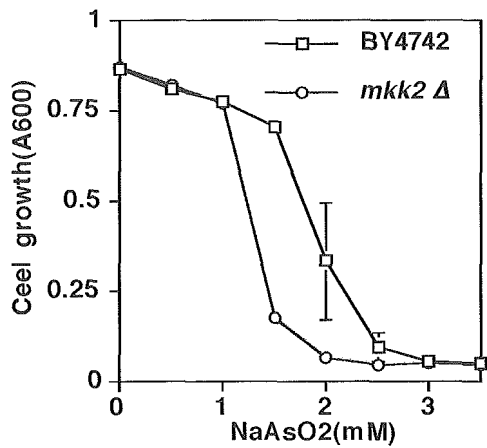
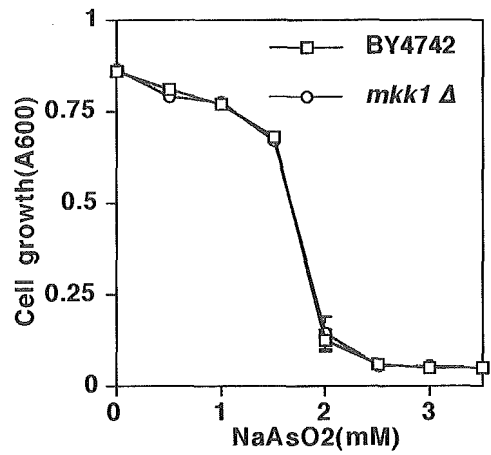
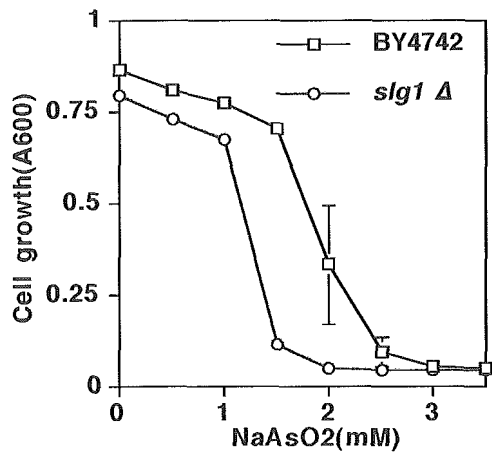


Fig. 6-2 ストレスに応答して細胞骨格の制御を行うシグナル伝達経路中の因子と亜ヒ酸感受性への影響

Table. 3-1 細胞骨格に関する遺伝子がコードする蛋白の機能

遺伝子	機能
<i>YKE2</i>	Prefoldin subunit 6, component of the Gim protein complex that promotes formation of functional alpha- and gamma-tubulin, and actin
<i>ABP1</i>	Actin-binding protein of the cortical actin cytoskeleton, important for activation of the Arp2/3 complex that plays a key role actin in cytoskeleton organization
<i>VRP1</i>	Involved in cytoskeletal organization and cellular growth; Proline-rich protein verprolin
<i>MYO3</i>	One of two type I myosins; localizes to actin cortical patches; deletion of MYO3 has little effect on growth, but myo3 myo5 double deletion causes severe defects in growth and actin cytoskeleton organization
<i>MYO5</i>	One of two type I myosins; contains proline-rich tail homology 2 (TH2) and SH3 domains; MYO5 deletion has little effect on growth, but myo3 myo5 double deletion causes severe defects in growth and actin cytoskeleton organization
<i>SLA1</i>	Protein involved in assembly of cortical actin cytoskeleton, has three SH3 domains
<i>END3</i>	Protein required for endocytosis and cytoskeletal organization
<i>ARK1</i>	Serine/threonine protein kinase associated with cortical actin cytoskeleton
<i>CAP1</i>	Actin-capping protein, alpha subunit
<i>CAP2</i>	Actin-capping protein, beta subunit
<i>SLG1</i>	Plasma membrane protein required for maintenance of cell wall integrity and for the stress response during vegetative growth

Table. 3-2 細胞骨格に関する遺伝子がコードする蛋白の機能

遺伝子	機能
<i>MKK1</i>	Serine/threonine protein kinase of the MAP kinase kinase (MEK) family involved in cell wall integrity (low-osmolarity) pathway
<i>MKK2</i>	MAP kinase kinase (MEK) serine/threonine protein kinase, involved in cell wall integrity (low-osmolarity) pathway
<i>SPA2</i>	Protein involved in cell polarity and cell fusion during mating, required for stimulation of the low affinity Ca <sup>2+</sup> influx system (LACS) that is activated during the pheromone response and is required for cell-cell fusion
<i>PEA2</i>	Protein involved in oriented growth toward mating partner, required for stimulation of the low affinity Ca <sup>2+</sup> influx system (LACS) that is activated in response to mating pheromone and is required for cell-cell fusion

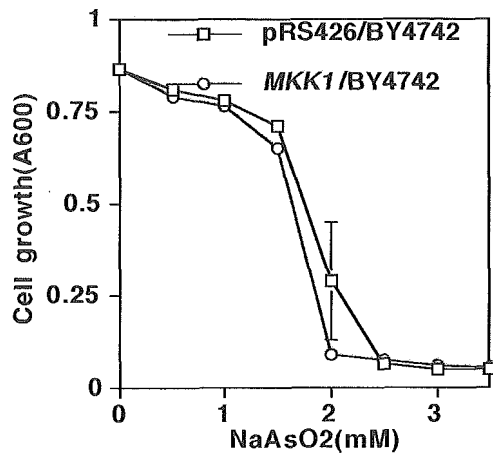
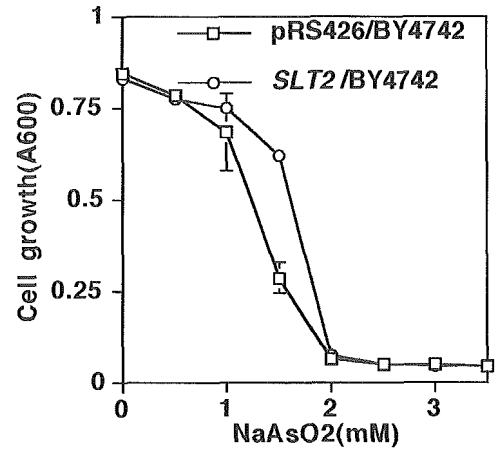
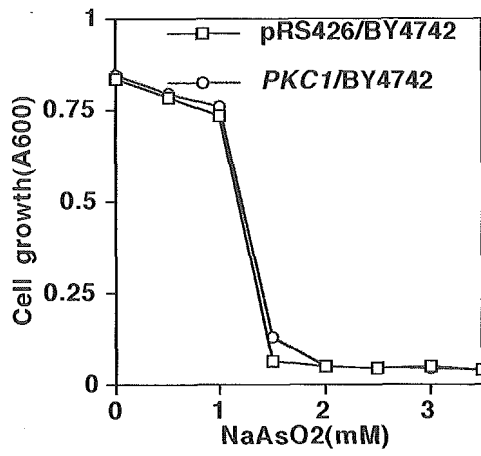


Fig. 7-1 高発現による亜ヒ酸感受性への影響

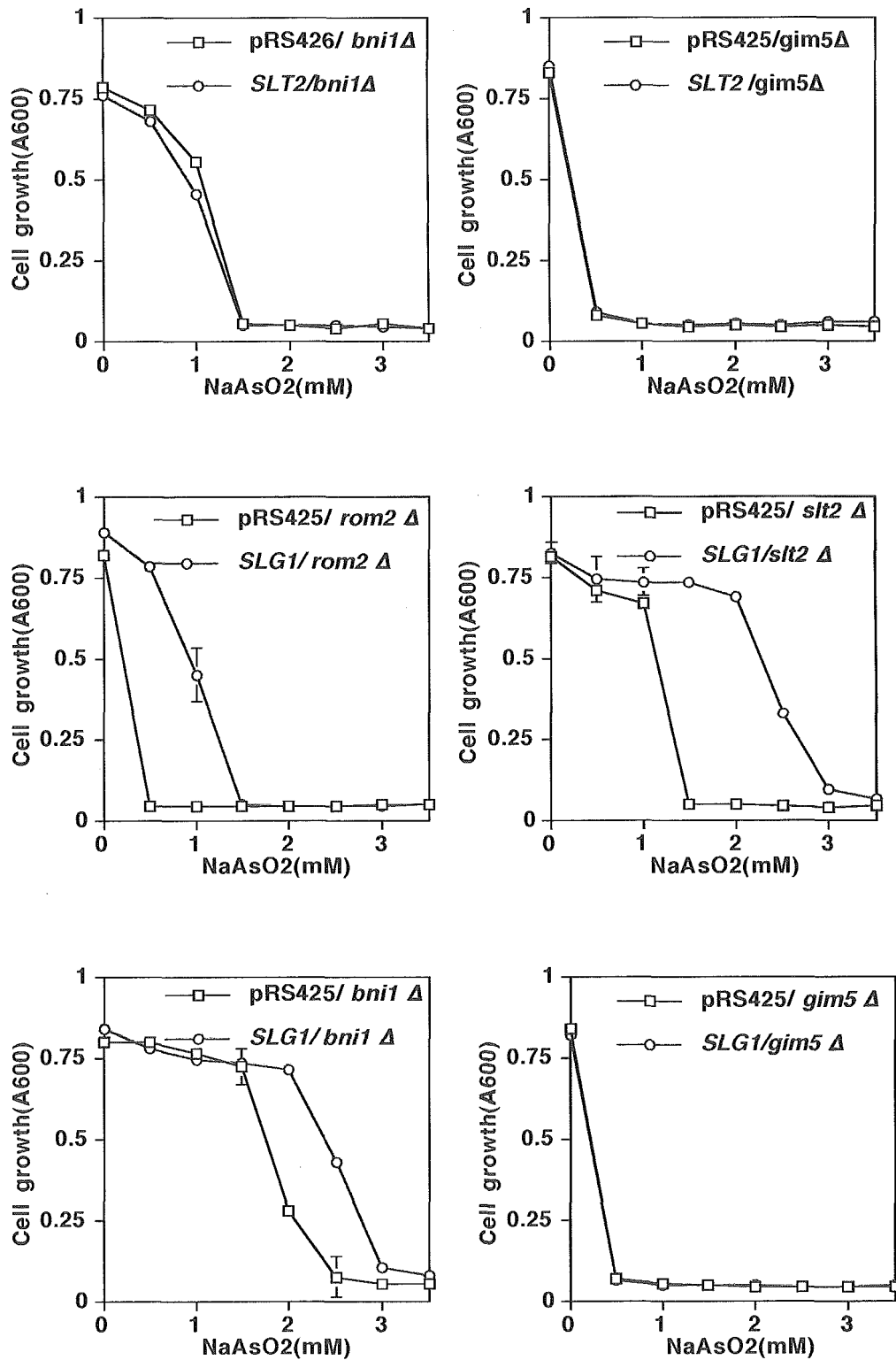


Fig. 7-2 高発現による亜ヒ酸感受性への影響

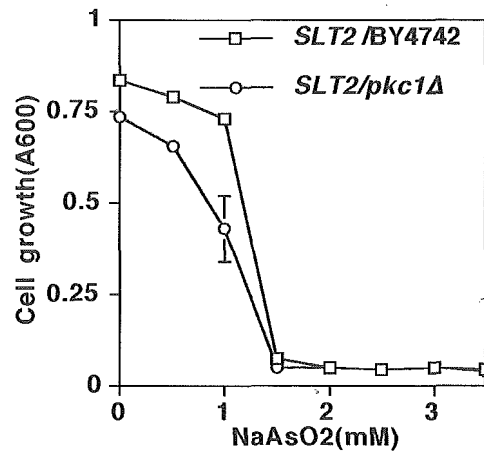


Fig. 7-3 高発現による亜ヒ酸感受性への影響

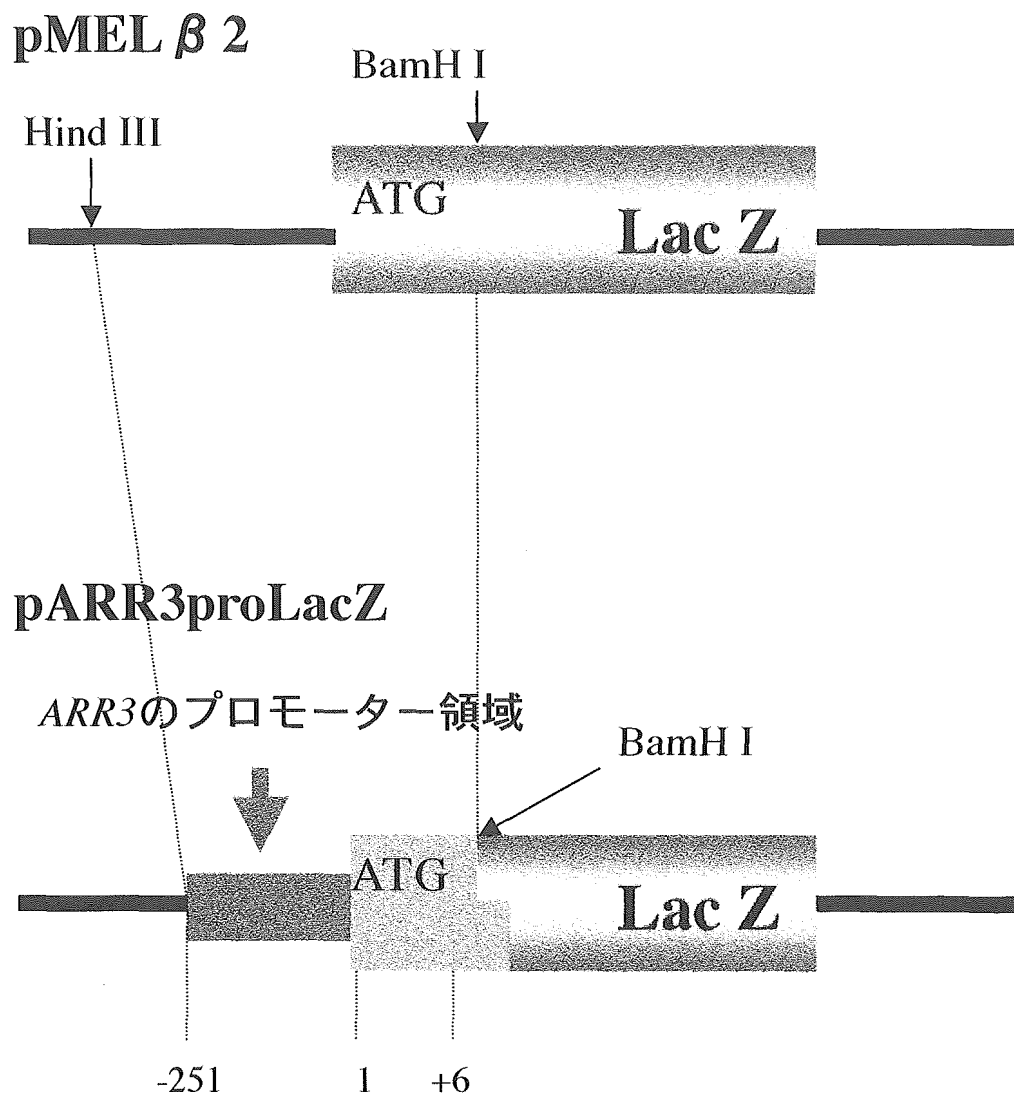


Fig. 8 *ARR3* のプロモーター領域を Lac Z 遺伝子に  
 連結したプラスミド

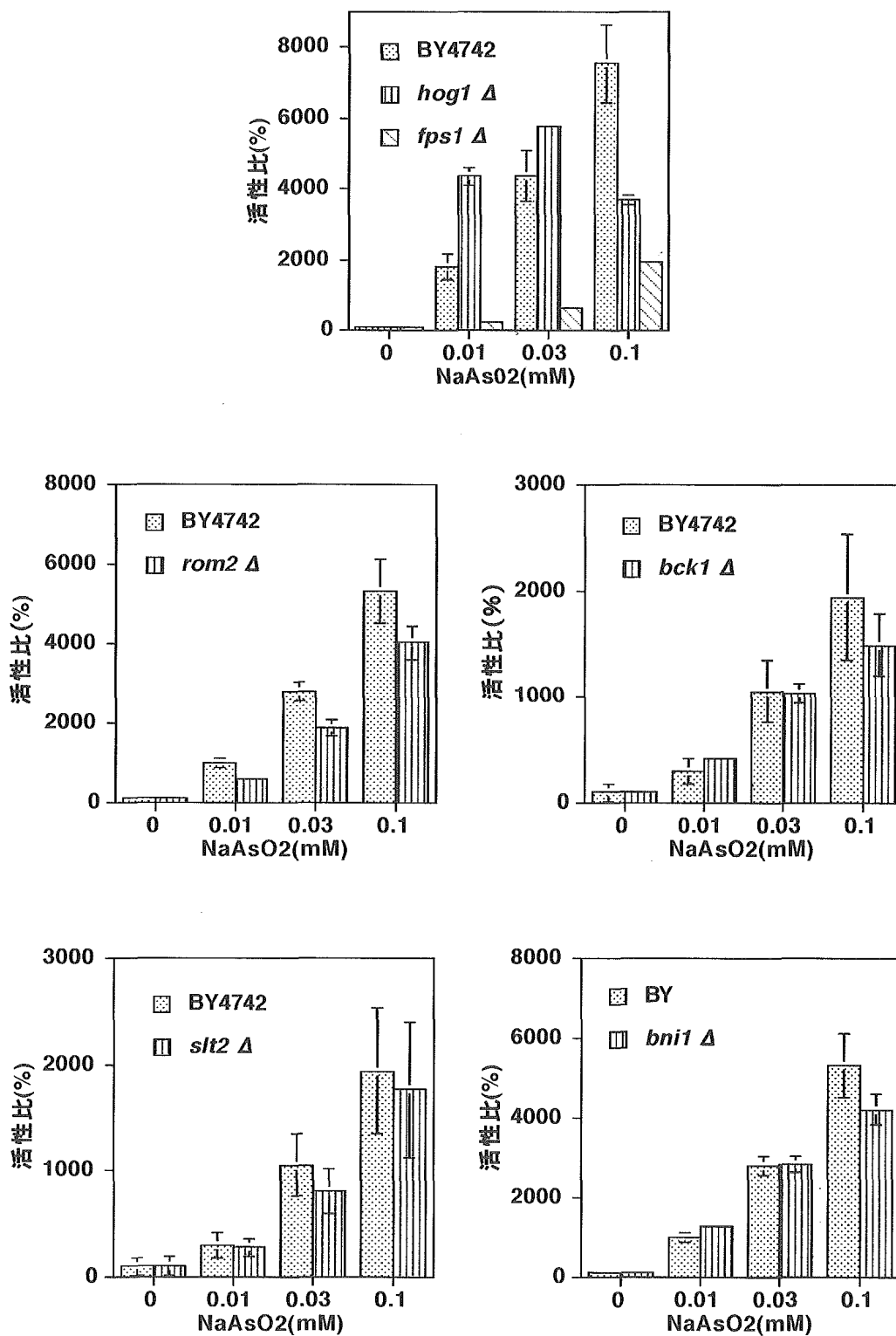


Fig. 9 亜ヒ酸処理による *ARR3* の転写活性比の変化



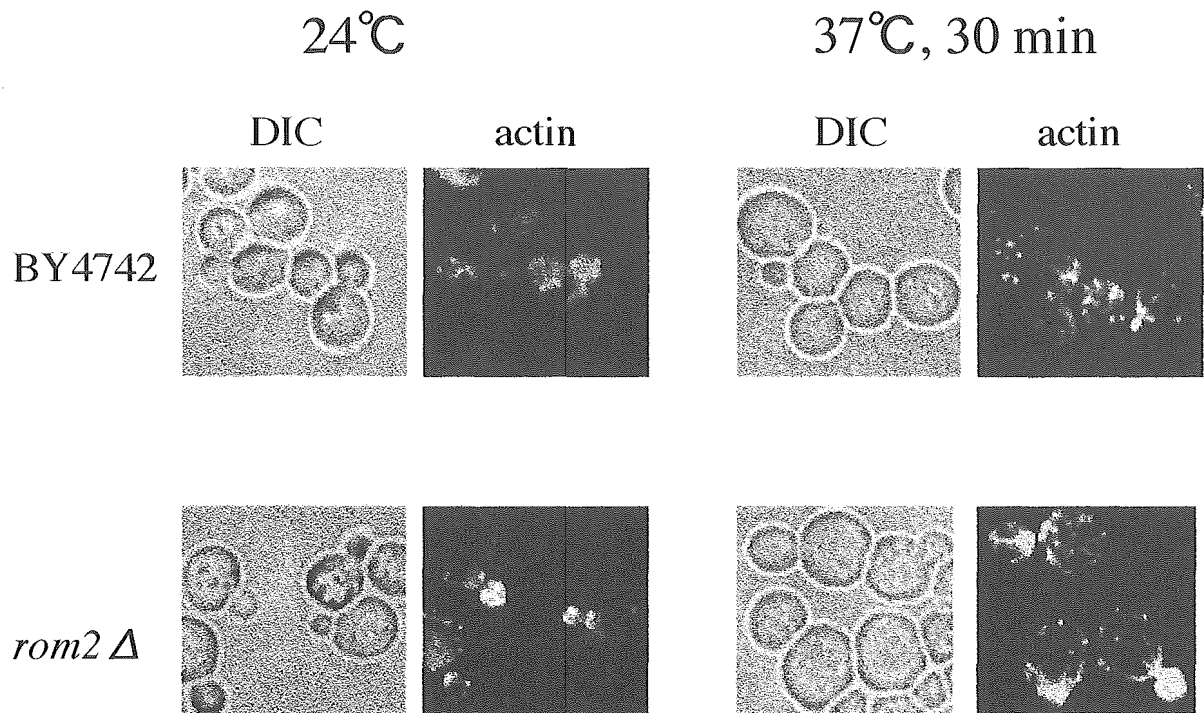


Fig.10 ヒートショックによるアクチンの分布の変化

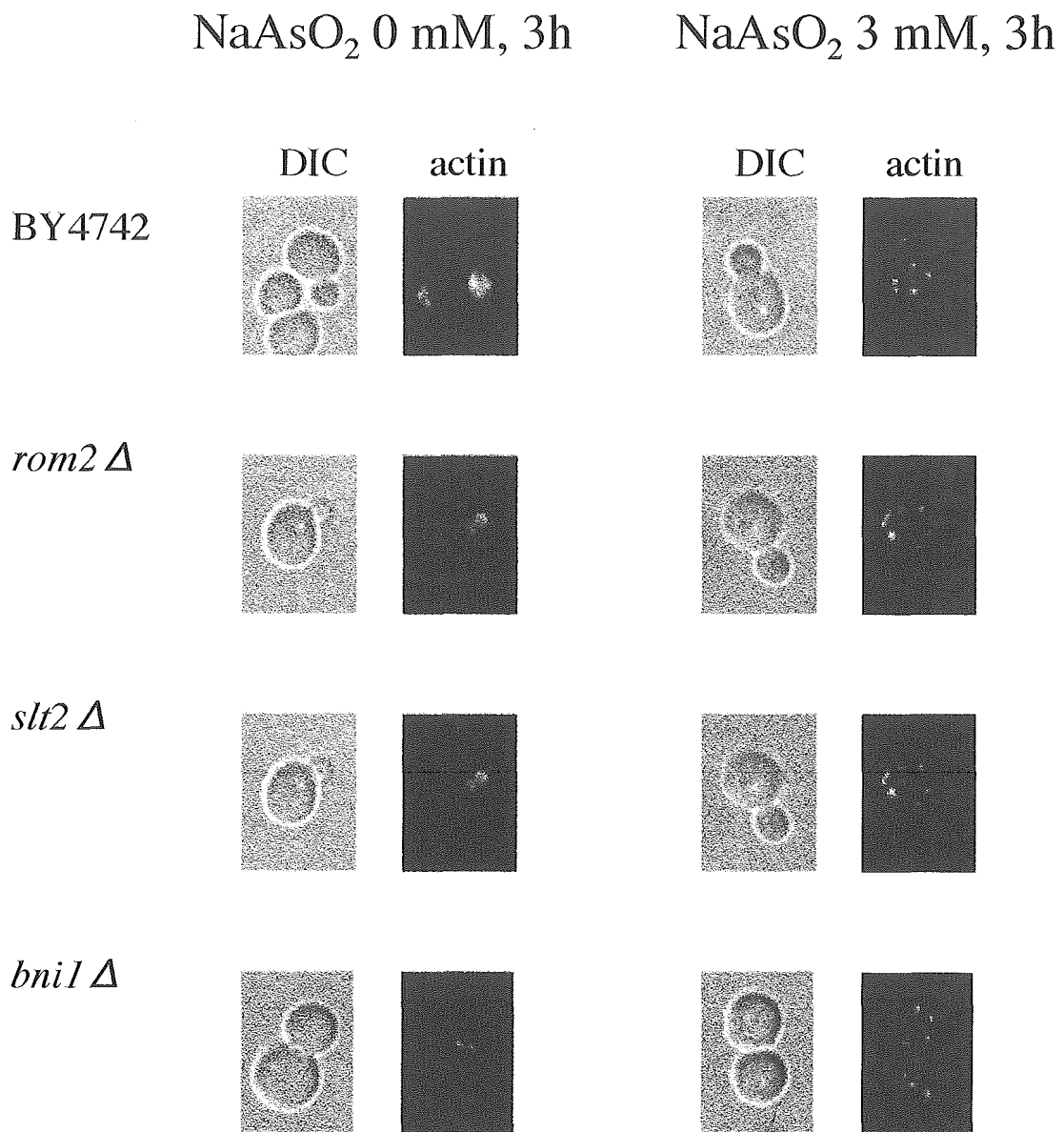


Fig. 11 亜ヒ酸処理によるアクチンの分布の変化

### III. 研究成果の刊行に関する一覧表

研究成果の刊行に関する一覧表

書籍

なし。

雑誌

発表者氏名	論文タイトル	発表雑誌名	巻号	ページ	出版年
Hwang GW, Sasaki D, Naganuma A.	Overexpression of Rad23 confers resistance to methylmercury in <i>Saccharomyces cerevisiae</i> via inhibition of the degradation of ubiquitinated proteins	Mol Pharmacol	68	1074-1078	2005
Hwang GW, Furuoya Y, Hiroshima A, Naganuma A et al.	Overexpression of Bop3 confers resistance to methylmercury in <i>Saccharomyces cerevisiae</i> through interaction with other proteins such as Fkh1, Rts1 and Msn2	Biochem Biophys Res Commun	330	378-385	2005
Takahashi T, Furuchi T, Naganuma A	A novel role for Bsd2 in the resistance of <i>Saccharomyces cerevisiae</i> to adriamycin	J Cell Physiol	202	100-104	2005
Okazaki S, Naganuma A, Kuge S	Peroxiredoxin-mediated redox regulation of the nuclear localization of Yap1, a transcription factor in budding yeast	Antioxid Redox Signal	7	327-334	2005