

## X. GENETIC MAPS 2007

The following maps are based on the high-resolution framework of the IBM2 map, aided by physical mapping. The loci shown are genes that have been defined by function or phenotype. All of the accompanying markers on IBM2, and the core bin markers, will be included in maps that are to be posted in MaizeGDB, as will supporting data notes. The IBM coordinates have been adjusted to represent conventional cM by dividing by 4, following the close approximation for short intervals per Winkler et al. (Genetics 164:741, 2003), which the present analysis has found to bear markedly close relationship to conventional classical mapping, e.g., with testcross data.

The maps were developed as follows:

1. All loci mapped on the IBM population itself, which included some genes, served as the main framework. See IBM2 maps in MaizeGDB.
2. Genes for which base sequences existed, which could be uniquely placed by BLAST matching to a Cornsensus overgo in the NCBI nr database, were added to the framework based on the physical map location in IBM2 FPC0507 maps, supported by other mapping data whenever possible. Matching BACs in the NCBI htgs database were sought in AGOL WebFPC contigs and were used to define location relative to neighboring loci within the same contig in IBM2 FPC0507.
3. Genes matching Genoplante gpm, ISU IDP, and UMC Indel/SNP sequences that could be identified by BLAST were added based on IBM2 FPC0507.
4. For genes lacking sequences, or not otherwise placed, recombination data and map locations from other populations were employed in relation to common markers. Orders and distances were estimated and loci were added for which uncertainty was no greater than 4 cM. Less-certain loci are not included in these maps.
5. Core bin markers lacking in IBM2, and the centromeres, were placed as in (2) and (4) above.

Again, the complete maps are to be posted in MaizeGDB soon. I need and request your FEEDBACK, now or after, on the gene placements and content. IS YOUR GENE MISSING? I hope to make further updates as new data are reported and to keep the map dynamic as new research, sequencing, and annotation advance. It is worth nothing that, up to the present stage of sequencing, fully 96% of 1,448 sequenced genes could be placed reliably onto a sequenced BAC.

Ed Coe, December 2007

### KEY TO SYMBOLS

Symbol	Full Name	Symbol	Full Name
a	anthocyanin	als	acetolactate synthase
aaa	adenosylmethionine aminotransferase	amo	amine oxidase
aap	acylaminoacyl-peptidase	amp	aminopeptidase
abc	ABC(yeast) homolog	amy	alpha amylase
abp	auxin binding protein	amy	beta amylase
acc	acetyl-CoA carboxylase	an	anther ear
aco	aconitase	an	kaurene synthase
acp	acid phosphatase	ane	androgonic embryo
acpt	acyl carrier protein	anl	anthocyaninless lethal
act	actin	ant	adenine nucleotide translocator
ad	adherent	aoc	allene oxide cyclase
adh	alcohol dehydrogenase	aos	allene oxide synthase
adk	adenylate kinase	aox	alternative oxidase
ae	amylose extender	ap	clathrin coat assembly protein AP1
ago	argonaute	aprl	adenosine 5'-phosphosulfate reductase
agp	ADP glucose pyrophosphorylase large subunit embryo	apx	ascorbate peroxidase
agpsl	ADP glucose pyrophosphorylase small subunit leaf	ar	argentina
ahh	adenosyl homocysteine hydrolase	arf	ADP-ribosylation factor homolog
aic	auxin import carrier	as	asynaptic
akh	aspartate kinase homoserine dehydrogenase	ask	aspartate kinase
akr	aldo/keto reductase AKR	asn	Zea asparagine synthetase homolog
al	albescence plant	atp	ATP synthase
ald	aldolase	atpc	ATP synthase gamma subunit
aldh	aldehyde dehydrogenase	b	colored plant
alp	aluminum-induced protein homolog	ba	barren stalk
		baf	barren stalk fastigiate

Symbol	Full Name
bap	basal layer antifungal protein
bas	beta alanine synthase
bd	branched silkless
bet	glycinebetaine
betl	basal endosperm transfer layer
bf	blue fluorescent
bgaf	beta glucosidase aggregating factor
bif	barren inflorescence
bip	Binding protein homolog
bk	brittle stalk
bm	brown midrib
bn	brown aleurone
br	brachytic
brk	brick
brn	brown kernel
bsd	bundle sheath defective
bss	bundle sheath strands specific
bt	brittle endosperm
btf	putative transcription factor
bv	brevis plant
bx	benzoxazin
bz	bronze
bzip	bZIP transcription factor
c	colored aleurone
caat	CAAT box binding protein
cad	cinnamyl alcohol dehydrogenase
caf	crs2 associated factor
cal	calmodulin
cas	cycloartenol synthase
cat	catalase
cax	calcium exchanger
cbp	calmodulin binding protein
ccp	cysteine protease
ccr	cytochrome c reductase
cdj	chaperone DNA J
cdpk	calcium dependent protein kinase
cef	CEFD homolog
cenH	centromeric histone H
cenpc	centromere protein C
cent	centromere chromosome
cesa	cellulose synthase
cg	corngrass
cgs	cystathionine gamma-synthase
ch	chocolate pericarp
chi	chalcone flavanone isomerase
chn	chitinase
chr	chromatin complex subunit A 10
chs	chitin synthase homolog
cka	CK2 protein kinase alpha
cko	cytokinin oxidase
cks	CMP-KDO synthetase
cl	chlorophyll
cld	cold regulated protein homolog
clx	calnexin homolog
cncr	cinnamoyl CoA reductase
cop	coatomer protein

Symbol	Full Name
cp	collapsed kernel
cpn	chaperonin
cpx	coproporphyrinogen III oxidase
cr	crinkly
crp	chloroplast RNA processing
crr	cytokinin response regulator
crs	chloroplast RNA splicing
crt	calreticulin
csy	chloroplast SecY-
ct	compact plant
cta	chitinase A
cx	catechol oxidase
cyc	cyclin
cyp	cytochrome P450
cys	cysteine synthase
czog	cis-zeatin O-glucosyltransferase
d	dwarf plant
dap	dappled aleurone
dar	monodehydroascorbate reductase
dba	DNA binding activity
dcl	dicer-like
dek	defective kernel
der	derlin
dfr	dihydroflavanoid reductase-like
dhn	dehydrin
dia	diaphorase
dmt	DNA methyl transferase
dnp	diphosphonucleotide phosphatase
dof	DNA binding with one finger
drh	DEAD box RNA helicase
dsc	discolored kernel
Dt	Dotted
dts	aspartyl-tRNA synthetase
du	dull endosperm
dxs	deoxy xylulose synthase
dzs	delta zein structural1
e	esterase
ebe	embryo-sac basal-endosperm-layer embryo-surrounding-region
ech	enoyl-CoA hydratase
ef	endosperm factor
eg	expanded glumes
eif	eucaryotic initiation factor
ein	ethylene insensitive
elfa	elongation factor alpha
elfg	elongation factor gamma
emp	empty pericarp
eno	enolase
enp	endopeptidase
eoh	E. coli origin of replication homolog
eps	enolpyruvylshikimate phosphate synthase
ers	ethylene receptor1-2
esp	embryo specific protein
esr	embryo surrounding region
et	etched
exg	exoglucanase

Symbol	Full Name
expa	alpha expansin
expb	beta expansin
f	fine stripe
fab	fatty acid biosynthesis
fad	fatty acid desaturase
fat	fatty acyl thioesterase
fcr	ferric-chelate reductase (NADH)
fdad	false DAD
fdh	formate dehydrogenase
fdx	ferredoxin
fea	fasciated ear
fer	ferritin
fgp	folylpolyglutamate synthetase
fht	flavanone 3-hydroxylase
fie	fertilization independent endosperm
fl	floury
fnr	ferredoxin NADP reductase
ftr	ferredoxin-thioredoxin
g	golden plant
ga	gametophyte factor
gar	gibberellin responsive
gbp	GTP binding protein
gcsH	glycine cleavage system protein H
gdcP	glycine decarboxylase
gdh	glutamic dehydrogenase
gl	glossy
glb	globulin
glct	glucose translocator
gln	glutamine synthetase
glu	beta glucosidase
gly	glycine
gn	gnarley
gol	goliath
got	glutamate-oxaloacetate transaminase
gpa	glyceraldehyde-3-phosphate dehydrogenase A
gpb	glyceraldehyde phosphate dehydrogenase B
gpc	glyceraldehyde-3-phosphate dehydrogenase C
gpdH	glucose-6-phosphate dehydrogenase
grf	general regulatory factor
grp	glycine-rich protein
grx	glutaredoxin homolog
gs	green stripe
gsh	gamma-glutamylcysteine synthetase
gsr	glutathione reductase
gst	glutathione-S-transferase
gtr	glutamyl-tRNA reductase
hag	histone acetyl transferase GNAT/MYST 10
hat	histone acetyltransferase
hb	hemoglobin
hcf	high chlorophyll fluorescence
hex	hexokinase
hfi	corn-activated Hageman factor inhibitor
hir	hypersensitive induced response
his	histone
hm	Helminthosporium carbonum susceptibility
hmg	high mobility group protein

Symbol	Full Name
hmgA	high mobility group family A
hon	histone
hox	homeobox
hp	histidine-containing phosphotransfer protein
hrg	hydroxyproline rich glycoprotein
hsbp	heat shock factor binding protein
hsbp	herbicide safener binding protein
hscf	heat shock complementing factor
hsf	hairy sheath frayed
hsk	high-sulfur keratin homolog
hsp	heat shock protein
hstf	heat shock transcription factor
ht	Helminthosporium turcicum resistance
htn	Helminthosporium turcicum resistanceN
hyp	hybrid proline-rich protein
iaglu	indol-3-ylacetyl glucosyl transferase
ibp	initiator binding protein
icl	isocitrate lyase
id	indeterminate growth
idc	iron deficiency candidate
idh	isocitrate dehydrogenase
ids	indeterminate spikelet
ig	indeterminate gametophyte
igl	indole-3-glycerol phosphate lyase
ij	iojap striping
im30p	IM30 protein
imd	isopropylmalate dehydrogenase
imp	importin
in	intensifier
incw	invertase cell wall
irl	isoflavone reductase-like
isp	iron-sulfur protein
isr	inhibitor of striate
ivr	invertase
j	japonica striping
K6L	Knob on 6L
kik	kinase interacting kinase
kin	kinesin-like protein
kin	knotted1 induced
kn	knotted
knox	knotted related homeobox
kpp	kinase associated protein phosphatase
kri	ketol-acid reductoisomerase
krp	kinesin-like protein
l	luteus
la	lazy plant
lc	red leaf color
ldp	luminidependens protein
leg	legumin
lem	lethal embryo mutant
les	lesion
lg	liguleless
lhca	light harvesting complex A
lhcb	light harvesting chlorophyll a/b binding protein
li	lineate leaves
lip	low temperature-induced protein1

Symbol	Full Name
lls	lethal leaf spot
ln	linoleic acid
lo	lethal ovule
lon	LON peptidase
lop	lo1 pI allergen homolog
lox	lipoxygenase
lpa	low phytic acid
lpe	leaf permease
lrk	Ser/Thr receptor-like kinase
lrs	liguleless related sequence
ltk	leucine-rich transmembrane protein kinase
lw	lemon white
lxm	lax midrib
mac	multiple archesporial cells
mads	MADS
mas	malate synthase
mde	mouse DNA EBV homolog
mdh	malate dehydrogenase
mdm	maize dwarf mosaic virus resistance
mdr	maternal derepression of R
me	NADP malic enzyme
meg	maternally expressed gene
mek	MEK homolog
mez	enhancer of zeste
mgs	male gametophyte specific
mha	membrane H(+)-ATPase
mha	plasma-membrane H+ATPase
mip	major intrinsic membrane protein
mir	maize insect resistance
mlg	lea protein group
mlo	barley mlo defense gene homolog
mmm	modifier of mitochondrial malate dehydrogenases
mn	miniature seed
mop	mediator of paramutation
mpl	miniplant
mrp	Myb related protein
ms	male sterile
msf	mRNA splicing factor
mst	modifier of R1-st
msv	maize streak virus tolerance
mtl	metallothionein
mus	mismatch binding protein Mus
mus	MutS homolog
myb	myb transcription factor
myc	myc transcription factor
na	nana plant
nac	NaCl stress protein
nad	NADH dehydrogenase
nad	NADH ubiquinone oxidoreductase
nbp	nucleic acid binding protein
ndk	nucleotide diphosphate kinase
nec	necrotic
nii	nitrite reductase
nl	narrow leaf
nnr	nitrate reductase
nrt	nitrate transport

Symbol	Full Name
nrx	nucleoredoxin
ns	narrow sheath
ntf	nuclear transport factor
o	opaque endosperm
obf	octopine synthase binding factor
ocl	outer cell layer
odo	alpha keto dehydrogenase candidate
oec	oxygen evolving complex2
og	old gold stripe
ohp	opaque2 heterodimerizing protein
ole	oleosin
omt	Caffeoyl CoA O-methyltransferase
opr	12-oxo-phytodienoic acid reductase
orc	origin recognition complex
orp	orange pericarp
ost	oligosaccharide transferase
oy	oil yellow
p	pericarp color
pac	pale aleurone color
pal	phenylalanine ammonia lyase
pao	polyamine oxidase
parp	poly(ADP-ribose) polymerase
pbf	prolamin-box binding factor
pck	phosphoenolpyruvate carboxykinase homolog
pcna	proliferating cell nuclear antigen
pcr	protochlorophyllide reductase
pcd	pyruvate decarboxylase
pdh	pyruvate dehydrogenase
pdi	protein disulfide isomerase
pdlk	pyruvate dehydrogenase (lipoamide) kinase
pep	phosphoenolpyruvate carboxylase
pex	pollen extensin-like
pfk	phosphofructose kinase
pg	pale green
pgd	6-phosphogluconate dehydrogenase
pgm	phosphoglucomutase
phb	prohibitin
phi	phosphohexose isomerase
pho	phosphate regulatory homolog
phot	blue-light receptor phototropin
php	chloroplast phosphoprotein
phs	poor homologous synapsis
phyA	phytochromeA
phys	phytase
piip	physical impedance induced protein
pin	PIN-formed protein
pk	S-domain class receptor-like kinase
pki	protein kinase inhibitor
pl	purple plant
ploc	plastocyanin homolog
pls	phospholipid synthesis
plt	phospholipid transfer protein homolog
pm	pale midrib
pme	pectin methylesterase
pmg	phosphoglycerate mutase
po	polymitotic

Symbol	Full Name
pop	organelle permease
por	porin
ppi	peptidyl-prolyl isomerase
ppo	polyphenol oxidase
ppp	pyrophosphate-energized proton pump
ppr	pentricopeptide
ppt	plastid phosphate/phosphoenolpyruvate translocator
pr	red aleurone
prc	proteasome component
prf	profilin homolog
prg	pitted rough germless
prh	ser/thr protein phosphatase
pri	protease PrIC candidate
pro	proline responding
prp	pathogenesis-related protein
prr	putidaredoxin reductase homolog
ps	pink scutellum
psa	photosystem I reaction center
psad	photosystem I subunit d
psan	photosystem I subunit N
psbs	photosystem II subunit PsbS
psk	phytosulfokine peptide precursor
psy	phytoene synthase
pt	polytypic ear
ptd	pitted endosperm
ptk	receptor-like protein kinase
pur	pollen ubiquitin regulator
px	peroxidase
pyd	pale yellow deficiency
r	colored
ra	ramosa
rab	responsive to abscisic acid1
ras	ras related protein
rca	RUBISCO activase
rcm	rectifier
rcp	root cap protein
rcph	root-cap periphery
rd	reduced plant
ren	reduced endosperm
rf	restorer of fertility
rg	ragged leaves
rgd	ragged seedling
rgk	rough kernel
rhm	resistance to Helminthosporium maydis
rip	ribosome-inactivating protein
ris	iron-sulfur protein
rlc	rindless culm
rld	rolled leaf
roa	replication origin activator
rop	Rho-related protein
rp	resistance to Puccinia sorghi
rpl	60S ribosomal protein L1
rpo	RNA polymerase
rpot	RNA polymerase T phage-like
rpp	acidic ribosomal protein P
rpp	acidic ribosomal protein P4

Symbol	Full Name
rpp	resistance to Puccinia polysora and Puccinia sorghi
rps	40S ribosomal protein S2
rs	rough sheath
rt	rootless
rth	roothair defective
rtp	root preferential
rws	RNA recognition water-stress protein
rxo	reaction to X. oryzae
sad	shikimate dehydrogenase
sam	S-adenosyl methionine decarboxylase
saur	small auxin up RNA
sbe	starch branching enzyme
sbp	SBP-domain protein
sca	short chain alcohol dehydrogenase
sci	subtilisin-chymotrypsin inhibitor homolog
scl	scarecrow-like
sdg	SET domain group
sdh	sorbitol dehydrogenase homolog
sdw	semi-dwarf plant
se	sugary-enhancer
ser	seryl-tRNA synthetase
serk	somatic embryogenesis receptor-like kinase
sfb	SF1 binding protein candidate
sgo	shugosin centromeric cohesion
sh	shrunk
si	silky
sig	sigma-like factor
sk	silkless ears
sks	suppressor of KYS sterility
sl	slashed leaves
sm	salmon silks
smh	single myb histone
smt	sterol methyl transferase
sn	scutellar node color
snr	small nucleolar RNA
sod	superoxide dismutase
sos	Suppressor of sessile spikelets
spc	speckled
spk	salt-inducible protein kinase
spp	sucrose-phosphatase
spr	signal recognition particle receptor homolog
sps	sucrose phosphate synthase
spt	spotted
sqz	squalene synthase
sr	striae leaves
srk	S-receptor kinase
ssu	ribulose biphosphate carboxylase small subunit
stc	sesquiterpene cyclase
stk	serine threonine kinase
stp	sugar transport
su	sugary
sum	siroheme uroporphyrinogen methyltransferase
sus	sucrose synthase
sut	sucrose transporter
sxd	sucrose export defective
tacs	terminal acidic SANT

Symbol	Full Name
tak	Triticum aestivum kinase
tan	tangled
tb	teosinte branched
tbp	TATA-binding protein
tcb	teosinte crossing barrier
td	thick tassel dwarf
te	terminal ear
tga	teosinte glume architecture
tgd	dTDP-glucose dehydratase homolog csu21
tha	thylakoid assembly
thi	thiamine biosynthesis
thl	thiolase
thr	threonine synthase
tif	translation initiation factor
tip	tonoplast intrinsic protein
tlk	tousled protein kinase
tls	tasselless
tm	transmembrane protein
toc	translocon at outer membrane of chloroplast
tp	teopod
tpi	triose phosphate isomerase
tps	terpene synthase
trap	transposon associated protein
trg	trigonelline
trm	thioredoxin M
trn	trn
ts	tassel seed
tu	tunicate
tua	alpha tubulin
tub	beta tubulin
tufm	elongation factor TU mitochondrial
ubi	ubiquitin
uce	ubiquitin conjugating enzyme
uck	UMP/CMP kinase
ufo	unstable factor for orange
ugp	UDP-glucose pyrophosphorylase
umi	ustilago maydis induced
v	virescent
va	variable sterile
vacs	vacuolar sorting receptor homolog
vg	vestigial glume
vgt	vegetative to generative transition
vp	viviparous
vpe	vacuolar processing enzyme
vpp	vacuolar proton pump
w	white seedling
wc	white cap
wd	white deficiency
whp	white pollen
wip	wound inducible protein
wlu	white luteus
wlv	white leaf-virescent
wrk	wrinkled kernel
ws	white sheath
wsm	wheat streak mosaic virus resistance
wt	white tip

Symbol	Full Name
wx	waxy
xet	xyloglucan endotransglycosylase homolog
xth	xyloglucan endo-transglycosylase/hydrolase
xyl	xylanase
y	yellow endosperm
yab	yabby homolog
yg	yellow-green
ypt	ypt homolog
ys	yellow stripe
yy	yin-yang
zag	Zea AGAMOUS homolog
zap	Zea apetala homolog
zb	zebra crossbands
zfl	zea floricaula/leafy
zfp	putative zinc finger protein3
zl	zygotic lethal
zmm	Zea mays MADS
zn	zebra necrotic
znod	Zea nodulation homolog
zp	zein alpha protein
zpb	zein familyB3
zpu	pullulanase-type starch debranching enzyme

CHROMOSOME 1		CHROMOSOME 1		CHROMOSOME 1		CHROMOSOME 1	
Locus Name	cM	Locus Name	cM	Locus Name	cM	Locus Name	cM
<i>tub1</i>	0.63	<i>z11</i>	70.60	<i>T1-6a(1)</i>	155.00	<i>knox3</i>	222.79
<i>btf3</i>	2.75	<i>mez3</i>	71.76	<i>wlu5</i>	157.00	<i>tua1</i>	222.88
<i>fus6</i>	6.08	<i>nad1</i>	71.76	<i>amp2</i>	158.00	<i>tua2</i>	222.88
<i>dcl101</i>	11.00	<i>T1-2b(1)</i>	72.00	<i>kin4</i>	163.25	<i>gs1</i>	224.00
<i>mads1</i>	12.26	<i>kri1</i>	72.52	<i>acpt1</i>	163.26	<i>lw1</i>	224.00
<i>knox1</i>	12.26	<i>cal3</i>	72.52	<i>T1-9(4995)(1)</i>	164.00	<i>tbp1</i>	224.26
<i>gpb1</i>	17.00	<i>sbip2a</i>	72.52	<i>cncr1</i>	164.77	<i>adh1</i>	225.53
<i>mlo1</i>	17.08	<i>l16</i>	72.60	<i>hmga102</i>	164.79	<i>exg1</i>	228.32
<i>cat2</i>	20.76	<i>T1-9c(1)</i>	73.00	<i>crs1</i>	164.82	<i>mta1</i>	231.75
<i>gst11</i>	20.76	<i>pki1</i>	73.00	<i>agpsl1</i>	164.82	<i>cka1</i>	232.50
<i>gst10</i>	21.26	<i>T1-5(6899)(1)</i>	74.00	<i>T1-6b(1)</i>	165.00	<i>cka2</i>	232.50
<i>gst12</i>	21.30	<i>nec2</i>	79.00	<i>T1-9b(1)</i>	166.00	<i>tlk1</i>	233.63
<i>smt2</i>	21.51	<i>les22</i>	82.27	<i>br1</i>	170.00	<i>lem1</i>	237.76
<i>gst31</i>	21.51	<i>sus2</i>	82.27	<i>T1-7c(1)</i>	170.00	<i>atp3</i>	241.01
<i>prc3</i>	22.26	<i>sod4</i>	84.38	<i>T1-7a(1)</i>	171.00	<i>phi1</i>	241.01
<i>lls1</i>	25.75	<i>T1-3k(1)</i>	85.00	<i>vg1</i>	173.00	<i>fnr1</i>	243.26
<i>ct2</i>	27.00	<i>T1-6c(1)</i>	87.00	<i>f1</i>	174.00	<i>gst5</i>	243.26
<i>rab30</i>	28.05	<i>pdlk1</i>	87.81	<i>nip3a</i>	175.25	<i>cdj1</i>	243.26
<i>gsr1</i>	28.52	<i>T1-3a(1)</i>	88.00	<i>yab10</i>	178.01	<i>gdh1</i>	246.77
<i>ms26</i>	31.18	<i>nrx1</i>	90.25	<i>dcl102</i>	180.35	<i>vp8</i>	249.00
<i>esr2</i>	31.25	<i>msv1</i>	91.00	<i>amp1</i>	181.00	<i>rd1</i>	250.49
<i>esr3</i>	31.26	<i>agp1</i>	94.76	<i>mdh4</i>	186.15	<i>igl1</i>	253.73
<i>esr1</i>	31.26	<i>an2</i>	98.00	<i>T1-2a(1)</i>	189.00	<i>ohp1</i>	253.75
<i>T1-2(4464)(1)</i>	36.00	<i>aoc1</i>	98.26	<i>cpn2</i>	190.00	<i>hon110</i>	254.75
<i>T1-2c(1)</i>	36.00	<i>gst42</i>	99.51	<i>mmm1</i>	191.00	<i>ij2</i>	255.05
<i>T1-3(5597)(1)</i>	36.00	<i>gst32</i>	99.51	<i>ad1</i>	192.00	<i>sqs1</i>	257.76
<i>les2</i>	39.25	<i>mlo2</i>	101.27	<i>id1</i>	194.80	<i>ccr1</i>	257.76
<i>pg15</i>	39.25	<i>mtf2</i>	101.27	<i>an1</i>	196.33	<i>cesa5</i>	258.51
<i>sr1</i>	39.25	<i>pop1</i>	107.77	<i>bz2</i>	196.33	<i>bm2</i>	259.00
<i>ltk1</i>	40.25	<i>myc7</i>	107.80	<i>cyp8</i>	198.28	<i>dia2</i>	259.24
<i>pds1</i>	40.25	<i>lpa2</i>	108.00	<i>sdg123</i>	198.35	<i>ts6</i>	260.04
<i>vp5</i>	40.25	<i>ocl4</i>	108.53	<i>vp14</i>	202.51	<i>ids1</i>	262.77
<i>grp2</i>	42.02	<i>aic1</i>	109.78	<i>rpo1</i>	202.51	<i>chi1</i>	262.77
<i>lpa1</i>	42.51	<i>TB-1Sb(1)</i>	110.00	<i>cdj2</i>	203.08	<i>tls1</i>	264.00
<i>zmm14</i>	42.52	<i>obf1</i>	110.07	<i>T1-9(8389)(1)</i>	204.08	<i>T1-4g(1)</i>	270.00
<i>gln6</i>	42.52	<i>eno2</i>	113.51	<i>ptd1</i>	207.00	<i>cesa6</i>	274.01
<i>hsp26</i>	52.75	<i>cent1</i>	113.52	<i>glb1</i>	209.83	<i>fdx3</i>	274.60
<i>sig2B</i>	57.53	<i>bsd2</i>	113.52	<i>gbp2</i>	210.50	<i>phb4</i>	275.76
<i>ibp2</i>	57.54	<i>as1</i>	114.00	<i>rth1</i>	210.51	<i>tufm1</i>	280.48
<i>tgd1</i>	57.55	<i>rs2</i>	114.25	<i>gst40</i>	210.74	<i>acp4</i>	281.66
<i>zb4</i>	62.00	<i>cp3</i>	118.96	<i>iaglu1</i>	212.26	<i>spc2</i>	283.00
<i>pck1</i>	64.30	<i>TB-1La(1)</i>	120.71	<i>lpe1</i>	212.26	<i>sdh1</i>	284.00
<i>imd1</i>	64.81	<i>bif2</i>	121.52	<i>ts3</i>	217.00	<i>akin1</i>	284.00
<i>fad8</i>	65.18	<i>cys2</i>	121.54	<i>tb1</i>	220.68	<i>gbp1</i>	284.01
<i>asn1</i>	65.31	<i>grp1</i>	127.01	<i>w18</i>	220.68		
<i>pdcc3</i>	65.31	<i>uce1</i>	127.01	<i>ole4</i>	220.75		
<i>ms17</i>	68.00	<i>bx9</i>	127.01	<i>ers25</i>	220.76		
<i>ms9</i>	69.00	<i>dof1</i>	127.03	<i>mpl1</i>	220.76		
<i>T1-4b(1)</i>	69.00	<i>myb6</i>	128.68	<i>d8</i>	220.76		
<i>hcf3</i>	69.54	<i>ptk3</i>	136.03	<i>zb7</i>	221.30		
<i>ts2</i>	69.57	<i>zmm6</i>	139.76	<i>gln2</i>	221.77		
<i>dek1</i>	69.58	<i>ntf1</i>	142.70	<i>pgm1</i>	221.77		
<i>rth3</i>	69.58	<i>pdh2</i>	146.75	<i>phyA1</i>	222.53		
<i>p1</i>	69.58	<i>br2</i>	151.26	<i>chr101</i>	222.53		
<i>p2</i>	69.60	<i>hm1</i>	151.78	<i>kn1</i>	222.79		

CHROMOSOME 2	
Locus Name	cM
<i>mlo9</i>	0.00
<i>pcr1</i>	0.00
<i>crr1</i>	0.01
<i>ws3</i>	2.00
<i>al1</i>	6.00
<i>fht1</i>	7.76
<i>lg1</i>	11.75
<i>T2-3a(2)</i>	12.00
<i>kin6</i>	23.25
<i>aaa1</i>	23.52
<i>cad1</i>	23.52
<i>gl2</i>	30.52
<i>cpx1</i>	30.52
<i>eks1</i>	30.60
<i>d5</i>	35.00
<i>nec4</i>	35.00
<i>T2-3(5304)(2)</i>	36.00
<i>T2-5g(2)</i>	37.00
<i>aox1</i>	37.01
<i>zfl2</i>	37.01
<i>myb5</i>	37.30
<i>T2-9c(2)</i>	40.00
<i>hon101</i>	41.25
<i>ago106b</i>	46.14
<i>czog1</i>	49.26
<i>b1</i>	49.30
<i>gs2</i>	50.00
<i>T2-3c(2)</i>	52.00
<i>T2-9a(2)</i>	53.00
<i>ole1</i>	54.13
<i>rws1</i>	54.27
<i>ivr1</i>	55.28
<i>px14</i>	55.29
<i>sk1</i>	57.00
<i>les1</i>	60.00
<i>wt1</i>	64.00
<i>sam2</i>	66.70
<i>ba2</i>	67.00
<i>ts1</i>	67.00
<i>cta1</i>	67.52
<i>mas1</i>	68.51
<i>gpdh1</i>	68.51
<i>rab2a</i>	68.78
<i>mop1</i>	68.78
<i>stk2</i>	68.79
<i>T1-2(5255)(2)</i>	71.00
<i>prp2</i>	71.18
<i>gl11</i>	72.00
<i>grf1</i>	73.13
<i>mlo3</i>	74.03
<i>opr5</i>	74.03
<i>fl1</i>	75.70
<i>les10</i>	77.00
<i>T2-3(6270)(2)</i>	78.00
<i>T2-9b(2)</i>	79.00

CHROMOSOME 2	
Locus Name	cM
<i>aba1</i>	79.18
<i>T2-5a(2)</i>	80.00
<i>mn1</i>	80.79
<i>hrg1</i>	80.83
<i>T2-10a(2)</i>	81.00
<i>sdg112</i>	82.23
<i>clx1</i>	82.27
<i>sks1</i>	83.00
<i>hcf106</i>	83.01
<i>mde1</i>	84.76
<i>acc2</i>	85.26
<i>les15</i>	86.00
<i>cent2</i>	86.01
<i>ssu2</i>	86.05
<i>zpu1</i>	86.25
<i>gl14</i>	87.00
<i>v4</i>	87.00
<i>T2-3(7285)(2)</i>	87.00
<i>ns1</i>	87.80
<i>T1-2(4464)(2)</i>	88.00
<i>hsbp1</i>	88.05
<i>ask2</i>	89.00
<i>l18</i>	90.00
<i>cdpk2</i>	90.00
<i>pbf1</i>	92.03
<i>parp2</i>	93.53
<i>hfi1</i>	93.55
<i>cesa4a</i>	93.55
<i>dia1</i>	93.70
<i>hp2</i>	93.83
<i>dar1</i>	93.83
<i>phb1</i>	94.36
<i>agp1</i>	94.73
<i>akh2</i>	94.76
<i>ppt1</i>	94.76
<i>hir2</i>	95.51
<i>emp2</i>	95.75
<i>tha8</i>	95.77
<i>his2b3</i>	95.78
<i>amy3</i>	100.51
<i>dof2</i>	103.52
<i>tpi2</i>	107.00
<i>ugp1</i>	110.00
<i>v24</i>	111.00
<i>kin2</i>	113.51
<i>px1</i>	114.00
<i>spt1</i>	119.00
<i>T2-9d(2)</i>	121.00
<i>w3</i>	122.00
<i>ht1</i>	126.00
<i>tua5</i>	127.26
<i>EIF5A</i>	127.27
<i>fdx5</i>	137.30
<i>tacs1</i>	140.81
<i>pur1</i>	142.81

CHROMOSOME 2	
Locus Name	cM
<i>apx2</i>	143.51
<i>ap17</i>	144.51
<i>rDNA5S</i>	145.00
<i>whp1</i>	148.00
<i>ser1</i>	148.01
<i>betl1c</i>	150.27
<i>mha1</i>	150.53
<i>pex1</i>	150.55
<i>rf3</i>	152.54
<i>wlv1</i>	156.00
<i>srk1</i>	162.50
<i>ch1</i>	162.60
<i>se1</i>	177.00
<i>gn1</i>	181.26



CHROMOSOME 3	
Locus Name	cM
<i>g2</i>	0.50
<i>ein2</i>	7.01
<i>e8</i>	11.58
<i>zag4</i>	16.78
<i>bm1</i>	18.00
<i>me3</i>	19.78
<i>cr1</i>	20.00
<i>me1</i>	21.00
<i>eif3</i>	23.85
<i>cg1</i>	24.40
<i>cko1</i>	24.40
<i>hex1</i>	24.98
<i>hsp18f</i>	27.25
<i>mus2</i>	27.26
<i>d1</i>	30.00
<i>ra2</i>	32.76
<i>ccp1</i>	39.76
<i>tpi4</i>	42.02
<i>e4</i>	44.00
<i>ocl1</i>	47.75
<i>ltk3</i>	47.76
<i>cl1</i>	52.00
<i>rt1</i>	52.00
<i>cyc2</i>	53.82
<i>rf1</i>	54.00
<i>ago105</i>	54.43
<i>wrk1</i>	55.00
<i>cef1</i>	57.02
<i>lg3</i>	57.04
<i>caf2</i>	57.26
<i>bet1</i>	58.00
<i>rps25</i>	58.00
<i>tha1</i>	58.00
<i>TB-3Sb(3)</i>	58.00
<i>rp3</i>	68.75
<i>rg1</i>	69.00
<i>cent3</i>	70.02
<i>TB-3La(3)</i>	71.00
<i>ys3</i>	72.00
<i>incw4</i>	72.79
<i>T1-3(8995)(3)</i>	74.00
<i>TB-3Lf(3)</i>	74.00
<i>TB-3Lg(3)</i>	74.00
<i>wsm2</i>	76.14
<i>phys2</i>	76.75
<i>betl3</i>	76.79
<i>eif6</i>	76.79
<i>abp1</i>	76.80
<i>rad51b</i>	76.80
<i>pm1</i>	77.00
<i>mv1</i>	78.00
<i>ts4</i>	78.00
<i>gst18</i>	78.26
<i>zag2</i>	78.26
<i>cop1</i>	78.76

CHROMOSOME 3	
Locus Name	cM
<i>atp1</i>	79.50
<i>cyp7</i>	79.52
<i>rcph1</i>	79.52
<i>prc4</i>	79.53
<i>gst4</i>	80.00
<i>rps27</i>	81.51
<i>gl6</i>	82.00
<i>T3-9c(3)</i>	82.00
<i>crr5</i>	82.76
<i>gst28</i>	82.76
<i>gst7</i>	82.76
<i>cko2</i>	84.00
<i>pgd2</i>	86.00
<i>TB-3Lh(3)</i>	86.00
<i>TB-3Ld(3)</i>	86.00
<i>ldp1</i>	86.01
<i>myb2</i>	86.70
<i>agp3</i>	86.75
<i>sps2</i>	89.58
<i>sdw2</i>	91.00
<i>vp1</i>	92.75
<i>drh1</i>	92.76
<i>te1</i>	92.77
<i>rd4</i>	97.00
<i>im30p1</i>	97.85
<i>ig1</i>	98.00
<i>spc1</i>	99.00
<i>lxm1</i>	99.35
<i>zmm16</i>	99.55
<i>psbs1</i>	102.90
<i>T1-3k(3)</i>	103.00
<i>lg2</i>	103.25
<i>T1-3(5597)(3)</i>	105.00
<i>TB-3Lc(3)</i>	106.00
<i>TB-3Li(3)</i>	108.00
<i>TB-3Lj(3)</i>	108.00
<i>plt1</i>	108.50
<i>ba1</i>	109.00
<i>his2b4</i>	113.50
<i>expa1</i>	115.27
<i>na1</i>	120.00
<i>obf3.2</i>	122.03
<i>tub6b</i>	122.03
<i>cyc4b</i>	122.78
<i>gos1</i>	123.54
<i>K3L</i>	124.00
<i>wlu1</i>	128.00
<i>hox3</i>	136.01
<i>cesa11</i>	136.26
<i>dnp2</i>	136.27
<i>dhn6</i>	136.27
<i>mek1</i>	140.51
<i>T2-3(6270)(3)</i>	142.00
<i>smh4</i>	142.51
<i>y10</i>	145.28

CHROMOSOME 3	
Locus Name	cM
<i>gst2</i>	149.50
<i>thr1</i>	149.51
<i>gst20</i>	149.51
<i>gpm3</i>	149.52
<i>chn1</i>	154.76
<i>bzip1</i>	154.76
<i>mdh3</i>	158.10
<i>a3</i>	166.00
<i>w19</i>	174.75
<i>a1</i>	174.75
<i>x1</i>	174.75
<i>sh2</i>	174.75
<i>sum1</i>	174.75
<i>cyp10</i>	175.51
<i>cenpc1</i>	175.51
<i>thi2</i>	175.51
<i>lhcb1</i>	188.69
<i>aldh3</i>	188.91
<i>et1</i>	190.01
<i>ga7</i>	196.00
<i>phot1</i>	201.77
<i>rpl10</i>	201.77
<i>plt2</i>	206.85
<i>cyp1</i>	207.25

CHROMOSOME 4	
Locus Name	cM
<i>mtl1</i>	0.73
<i>rca1</i>	2.48
<i>msf1</i>	3.95
<i>gst6</i>	5.76
<i>cyp3</i>	6.26
<i>bx4</i>	9.38
<i>cyp4</i>	9.51
<i>bx8</i>	9.51
<i>cyp5</i>	11.90
<i>bx1</i>	12.01
<i>pex2</i>	12.01
<i>zpl1a</i>	15.00
<i>zpl1d</i>	18.00
<i>rp4</i>	19.00
<i>zpl1b</i>	19.00
<i>zpl1c</i>	19.00
<i>dzr1</i>	19.80
<i>pls1</i>	20.25
<i>zp22.1</i>	20.25
<i>zpl1e</i>	21.00
<i>sos1</i>	24.00
<i>zpl1f</i>	25.00
<i>ga1</i>	27.00
<i>sbip1a</i>	29.02
<i>bss1</i>	29.50
<i>adh2</i>	36.78
<i>pdi1</i>	38.26
<i>sig2A</i>	39.76
<i>ts5</i>	48.00
<i>gl5</i>	49.00
<i>pgd3</i>	50.08
<i>wip2</i>	51.25
<i>fl2</i>	51.50
<i>la1</i>	52.00
<i>ahh1</i>	53.25
<i>Dt6</i>	55.00
<i>psb3</i>	57.02
<i>ocl5a</i>	58.01
<i>cld1</i>	58.01
<i>zp1</i>	58.05
<i>gl7</i>	60.00
<i>tcb1</i>	61.00
<i>v17</i>	61.00
<i>aco1</i>	61.50
<i>cp2</i>	61.50
<i>bm3</i>	62.75
<i>bap2</i>	62.76
<i>fie1</i>	62.77
<i>orp1</i>	62.77
<i>dsc1</i>	63.00
<i>gpc1</i>	63.50
<i>expa2</i>	63.55
<i>su1</i>	63.55
<i>rpl44</i>	63.77
<i>tga1</i>	69.26

CHROMOSOME 4	
Locus Name	cM
<i>nnr1</i>	69.98
<i>T4-9g(4)</i>	70.00
<i>v23</i>	70.00
<i>bt2</i>	70.02
<i>zpl3a</i>	71.00
<i>his2b2</i>	71.51
<i>akh1</i>	71.77
<i>hda108</i>	71.77
<i>zpl2a</i>	72.00
<i>TB-4Sa(4)</i>	72.00
<i>TB-4Sg(4)</i>	72.00
<i>hir1</i>	73.52
<i>eng1</i>	73.54
<i>pep7</i>	73.54
<i>su3</i>	74.00
<i>als1</i>	74.50
<i>cent4</i>	74.51
<i>spk1</i>	75.01
<i>serk3</i>	75.06
<i>ypt3</i>	75.07
<i>spr1</i>	75.08
<i>gl8b</i>	75.50
<i>gpc3</i>	75.51
<i>fea2</i>	75.51
<i>mtl3</i>	75.51
<i>zb6</i>	77.00
<i>umc156a</i>	78.50
<i>nfa104</i>	78.73
<i>krp1</i>	83.04
<i>hmg3</i>	86.00
<i>lw4</i>	90.35
<i>tip2a</i>	90.50
<i>zag3</i>	90.75
<i>his2b5</i>	93.26
<i>aldh2</i>	93.2825
<i>gln5</i>	93.29
<i>ant2</i>	94.83
<i>gl4</i>	95.85
<i>pip1e</i>	98.05
<i>prh1</i>	98.06
<i>abc1</i>	98.06
<i>trg1</i>	98.10
<i>pcna2</i>	102.82
<i>lkrsdh1</i>	103.58
<i>nii2</i>	107.10
<i>dek31</i>	108.00
<i>umc127c</i>	110.85
<i>rpl29</i>	110.86
<i>o1</i>	115.00
<i>pdh1</i>	115.76
<i>fer1</i>	115.76
<i>gol1</i>	115.83
<i>tu1</i>	118.00
<i>v8</i>	118.00
<i>rtp1</i>	119.02

CHROMOSOME 4	
Locus Name	cM
<i>cax1</i>	119.02
<i>j2</i>	123.00
<i>ns2</i>	126.00
<i>gl3</i>	128.00
<i>rcph2</i>	129.00
<i>ssu1</i>	130.53
<i>T4-7(4698)(4)</i>	131.00
<i>ms44</i>	133.00
<i>c2</i>	133.01
<i>kin8</i>	134.52
<i>mlo4</i>	139.77
<i>mdr1</i>	142.00
<i>T1-4b(4)</i>	142.00
<i>ane1</i>	143.76
<i>T4-9b(4)</i>	150.00
<i>ris2</i>	150.26
<i>rp3</i>	150.28
<i>mgs2</i>	150.50
<i>ms41</i>	154.00
<i>vpp2</i>	154.27
<i>smh3</i>	154.50
<i>zfp30</i>	154.53
<i>lox1</i>	158.76
<i>knox7</i>	158.76
<i>cbp2</i>	158.76
<i>sbp2</i>	161.08
<i>vpp3</i>	164.25
<i>ubi2</i>	167.51
<i>dba1</i>	167.51
<i>EIF5</i>	167.51
<i>cas1</i>	167.51
<i>rop2</i>	167.51
<i>rpl32</i>	167.51
<i>wee1</i>	182.26
<i>cpn10</i>	182.26
<i>bip2</i>	184.45
<i>nrt2</i>	185.26
<i>cat3</i>	186.03

CHROMOSOME 5		CHROMOSOME 5		CHROMOSOME 5	
Locus Name	cM	Locus Name	cM	Locus Name	cM
<i>sig6</i>	0.00	<i>T4-5i(5)</i>	75.00	<i>pip2d</i>	108.00
<i>arf1</i>	13.77	<i>T5-9c</i>	75.00	<i>v12</i>	110.00
<i>sca1</i>	17.13	<i>ps1</i>	76.00	<i>lw3</i>	113.00
<i>ms42</i>	18.00	<i>T5-6(4933)(5)</i>	76.00	<i>snr14</i>	116.76
<i>psad1</i>	18.02	<i>sbp1</i>	76.90	<i>yab15</i>	116.76
<i>ohp2</i>	18.02	<i>amp3</i>	77.00	<i>ys1</i>	116.77
<i>zap1</i>	31.26	<i>T2-5a(5)</i>	78.00	<i>vpe1</i>	116.80
<i>hcf108</i>	33.00	<i>T5-6(8590)(5)</i>	78.00	<i>ypt2</i>	117.51
<i>tua4</i>	36.88	<i>knox6</i>	78.78	<i>rpl19</i>	117.75
<i>umc90</i>	37.75	<i>nec3</i>	79.00	<i>cal1</i>	119.26
<i>tua3</i>	37.75	<i>bm1</i>	79.25	<i>hmg2</i>	120.02
<i>pgm2</i>	39.26	<i>dmt3</i>	79.25	<i>pac1</i>	122.01
<i>knox10</i>	47.45	<i>T1-5(8041)(5)</i>	79.50	<i>prr1</i>	125.27
<i>d9</i>	47.50	<i>bt1</i>	80.01	<i>zag5</i>	126.00
<i>ers14</i>	47.50	<i>pep2</i>	80.01	<i>ren1</i>	128.00
<i>ole3</i>	47.50	<i>cent5</i>	80.05	<i>lec1</i>	129.04
<i>rab15</i>	47.51	<i>sxd1</i>	80.52	<i>hsf1</i>	130.00
<i>tub4</i>	49.25	<i>pho1</i>	80.76	<i>ant1</i>	130.03
<i>tbp2</i>	49.25	<i>ris1</i>	80.78	<i>gln4</i>	132.18
<i>rps15</i>	49.26	<i>mip1</i>	80.81	<i>rop1</i>	132.26
<i>csy1</i>	50.00	<i>cbp4</i>	80.82	<i>pin2</i>	132.26
<i>na2</i>	57.00	<i>rps24</i>	80.83	<i>atpc1</i>	132.27
<i>mdh5</i>	58.25	<i>v3</i>	81.00	<i>lhcb4</i>	147.51
<i>EIF7</i>	59.01	<i>T1-5(6197)(5)</i>	81.00	<i>ppp1</i>	147.51
<i>amy2</i>	59.01	<i>T1-5b(5)</i>	81.00	<i>dap1</i>	148.00
<i>cpn1</i>	59.01	<i>T5-9(4817)(5)</i>	81.00	<i>T5-9a(5)</i>	148.00
<i>px13</i>	60.75	<i>T1-5e(5)</i>	81.00	<i>nnr2</i>	149.88
<i>hag101</i>	61.51	<i>T1-5f(5)</i>	81.00	<i>eg1</i>	150.00
<i>ugu1</i>	61.51	<i>TB-5La(5)</i>	82.00	<i>gst24</i>	150.01
<i>anl1</i>	62.00	<i>TB-5Lb(5)</i>	82.00	<i>yg1</i>	152.00
<i>nl2</i>	62.00	<i>TB-5Ld(5)</i>	82.00	<i>K5L</i>	155.00
<i>T5-6d(5)</i>	65.00	<i>T2-5d</i>	82.00	<i>v2</i>	156.00
<i>gly1</i>	65.01	<i>bv1</i>	84.00	<i>zb1</i>	156.00
<i>xet1</i>	67.88	<i>ga2</i>	85.00	<i>got2</i>	161.00
<i>EIF4</i>	69.76	<i>als2</i>	86.75	<i>T5-6(8696)(5)</i>	164.00
<i>arpp3</i>	69.76	<i>ppi1</i>	86.77	<i>pcna1</i>	164.26
<i>td1</i>	70.28	<i>ae1</i>	87.80	<i>fdh1</i>	167.26
<i>piip2</i>	70.28	<i>ms5</i>	89.00	<i>brk1</i>	167.27
<i>gl17</i>	71.00	<i>myb3</i>	89.73	<i>pr1</i>	167.27
<i>chn3</i>	71.50	<i>dek33</i>	90.67	<i>rop4</i>	169.18
<i>sbe1</i>	71.50	<i>yy1</i>	92.79		
<i>cat1</i>	71.50	<i>incw1</i>	94.10		
<i>hmg1</i>	71.50	<i>csu93b</i>	96.75		
<i>nec6</i>	72.00	<i>pr1</i>	98.00		
<i>T5-6(5685)(5)</i>	72.00	<i>sh4</i>	98.00		
<i>T5-6(5906)(5)</i>	72.00	<i>cbp1</i>	98.18		
<i>T5-9(022-11)(5)</i>	72.00	<i>gst17</i>	99.25		
<i>a2</i>	72.01	<i>lw2</i>	100.00		
<i>ivr2</i>	72.01	<i>prg1</i>	100.00		
<i>bip1</i>	72.02	<i>gl8</i>	100.51		
<i>rop9</i>	72.03	<i>nbp35</i>	103.45		
<i>TB-5Sc(5)</i>	73.00	<i>gpc4</i>	103.51		
<i>dts1</i>	73.78	<i>pal1</i>	105.00		
<i>T5-6b(5)</i>	74.00	<i>phb3</i>	107.02		
<i>vp2</i>	75.00	<i>serk2</i>	107.08		

CHROMOSOME 6	
Locus Name	cM
<i>fdx1</i>	0.01
<i>fdx2</i>	0.01
<i>adk1</i>	4.50
<i>rps13</i>	7.50
<i>rhm1</i>	11.00
<i>gpc2</i>	14.18
<i>rxo1</i>	16.51
<i>po1</i>	17.00
NOR	17.27
<i>mdm1</i>	17.27
TB-6Sa(6)	17.27
<i>wsm1</i>	17.27
<i>rgd1</i>	18.00
<i>idc1</i>	18.01
<i>lip15</i>	18.25
<i>gsh1</i>	18.25
<i>cent6</i>	23.00
<i>mn3</i>	24.00
<i>uck1</i>	24.00
<i>myb1</i>	24.01
<i>pgd1</i>	24.01
<i>rcp1</i>	24.60
<i>zp15</i>	25.02
<i>leg1</i>	25.04
<i>dof3</i>	25.26
TB-6Ld(6)	26.50
TB-6Lc(6)	27.00
<i>w15</i>	28.00
T4-6(8428)(6)	28.00
T6-9(6019)(6)	28.00
T6-9e(6)	28.00
T6-9(6270)(6)	28.00
<i>l12</i>	29.00
<i>omt1</i>	29.01
<i>mez1</i>	29.02
<i>y1</i>	30.13
<i>cyc3</i>	30.28
<i>chn2</i>	30.28
<i>cdpk1</i>	30.29
<i>si1</i>	30.29
<i>enp1</i>	31.00
<i>l10</i>	31.00
<i>saur1</i>	31.26
<i>eif4a</i>	31.26
<i>oec33</i>	31.27
<i>mir1</i>	31.78
<i>mir2</i>	31.78
<i>ms1</i>	33.00
T4-6(6623)(6)	35.00
T6-9(043-1)(6)	35.00
T1-6(4456)(6)	35.00
T6-9b(6)	35.00
<i>sbp3</i>	38.43
<i>l15</i>	40.00
<i>pg11</i>	44.00

CHROMOSOME 6	
Locus Name	cM
<i>ln1</i>	45.48
<i>gst19</i>	45.50
<i>elfg1</i>	45.50
<i>kin5</i>	47.51
<i>ploc1</i>	51.27
<i>pl1</i>	52.88
<i>ebe2</i>	53.01
<i>l11</i>	54.00
<i>nip2b</i>	57.26
<i>su2</i>	57.26
<i>tm20</i>	59.04
<i>dzs18</i>	59.05
<i>vpp1</i>	59.06
<i>hex2</i>	59.90
<i>pfk1</i>	61.32
<i>kin9</i>	61.33
<i>sm1</i>	63.00
<i>imp1</i>	63.83
<i>cesa2</i>	63.84
T1-6a(6)	64.00
<i>pt1</i>	67.00
<i>zag1</i>	67.45
K6L2	67.51
TB-6Lb(6)	68.00
<i>rop3</i>	69.25
<i>ptk1</i>	69.26
<i>psan1</i>	71.02
<i>sod3</i>	71.02
<i>rps21</i>	73.00
<i>dhn1</i>	74.03
<i>me2</i>	74.29
<i>esp1</i>	75.51
<i>esp5</i>	75.51
<i>tan1</i>	77.75
K6L3	77.75
<i>gst41</i>	78.77
<i>mlo8</i>	78.77
<i>dxs1</i>	79.65
<i>w1</i>	80.00
<i>pdk1</i>	80.88
<i>pmg1</i>	81.48
<i>w14</i>	85.00
<i>nfy2</i>	93.51
<i>roa2</i>	93.52
<i>fcr2</i>	98.52
<i>cenH3</i>	98.52
<i>rop6</i>	106.50
<i>prf1</i>	108.76
<i>hsp101</i>	108.76
<i>hox2</i>	108.76
<i>mlg3</i>	113.18
<i>lhcb48</i>	128.51
<i>gbf1</i>	133.00
<i>idh2</i>	133.00
<i>mdh2</i>	133.00

CHROMOSOME 6	
Locus Name	cM
<i>agp2</i>	134.10
<i>asg7a</i>	134.10
<i>ago104</i>	135.75
<i>hir3</i>	136.13

CHROMOSOME 7		CHROMOSOME 7	
Locus Name	cM	Locus Name	cM
<i>hsp3</i>	1.38	<i>gl1</i>	66.00
<i>cka4</i>	3.45	<i>gst23</i>	74.50
<i>ppr2</i>	3.51	<i>tp1</i>	76.00
<i>psk1</i>	11.25	<i>sbp6</i>	80.78
<i>rs1</i>	17.25	<i>ij1</i>	82.78
<i>umi11</i>	17.25	<i>dfr1</i>	82.78
<i>psa6</i>	17.28	<i>sl1</i>	84.00
<i>w17</i>	20.00	<i>va1</i>	84.00
<i>hda110</i>	21.50	<i>ocl3</i>	87.77
<i>mdh6</i>	28.00	<i>T7-9a(7)</i>	88.00
<i>dmt101</i>	30.52	<i>T6-7(013-8)(7)</i>	90.00
<i>o2</i>	30.60	<i>lon1</i>	91.28
<i>his1a</i>	31.30	<i>lhcb2</i>	95.29
<i>meg3</i>	31.53	<i>gst16</i>	95.30
<i>y8</i>	34.00	<i>bas1</i>	95.55
<i>v5</i>	37.00	<i>rpl15</i>	95.56
<i>sgo1</i>	37.88	<i>ndk1</i>	95.65
<i>rcm1</i>	38.00	<i>grx1</i>	95.75
<i>rpl39</i>	38.01	<i>zmm7</i>	97.01
<i>zds1</i>	38.02	<i>icl1</i>	98.02
<i>smt1</i>	38.02	<i>tif1</i>	99.83
<i>vp9</i>	38.02	<i>amy5</i>	101.53
<i>sgo1</i>	38.02	<i>oec17</i>	101.53
<i>cesa9</i>	38.02	<i>crp1</i>	102.00
<i>zpl2b</i>	38.02	<i>kik1</i>	102.00
<i>ost1</i>	38.02	<i>pk3</i>	102.00
<i>embp1</i>	38.02	<i>psb29</i>	102.76
<i>kpp1</i>	38.95	<i>K7L</i>	103.01
<i>in1</i>	39.00	<i>tpi1</i>	107.77
<i>crt2</i>	42.70	<i>tua6</i>	107.77
<i>bgaf1</i>	42.76	<i>rad51a</i>	107.77
<i>cesa8</i>	42.77	<i>bn1</i>	110.00
<i>w16</i>	43.00	<i>e1</i>	112.00
<i>TB-7Sc(7)</i>	43.00	<i>ren2</i>	113.00
<i>cent7</i>	44.00	<i>mus1</i>	118.25
<i>mn2</i>	44.00	<i>rip2</i>	118.25
<i>cesa7</i>	44.25	<i>rpot1</i>	123.77
<i>cyp6</i>	44.98	<i>gst37</i>	129.53
<i>cncr2</i>	45.27	<i>sod2</i>	137.04
<i>nbp1</i>	45.27	<i>bd1</i>	137.05
<i>caf1</i>	45.30	<i>akr1</i>	152.06
<i>pip2c</i>	45.30	<i>ra3</i>	154.29
<i>TB-7Lb(7)</i>	45.50	<i>oec6</i>	154.56
<i>ppt2</i>	46.52	<i>kin1</i>	154.57
<i>pep4</i>	47.76		
<i>hat1</i>	48.27		
<i>piip1</i>	57.30		
<i>mus3</i>	62.26		
<i>rs4</i>	63.00		
<i>zpb36</i>	63.00		
<i>ra1</i>	63.01		
<i>o5</i>	64.00		
<i>his2b1</i>	64.50		
<i>les9</i>	65.00		
<i>ccp2</i>	65.51		

CHROMOSOME 8		CHROMOSOME 8	
Locus Name	cM	Locus Name	cM
<i>hsp1</i>	1.51	<i>prf2</i>	84.26
<i>rpl30</i>	1.51	<i>hox1</i>	84.30
<i>rf4</i>	4.00	<i>mrp1</i>	88.52
<i>cal2</i>	6.77	<i>dmt106</i>	88.52
<i>mp2</i>	13.00	<i>lg4</i>	89.53
<i>rps5</i>	13.79	<i>lg4b</i>	89.53
<i>ms23</i>	21.00	<i>sci1</i>	91.80
<i>ptk5</i>	26.30	<i>sdw1</i>	92.00
<i>lrk1</i>	26.30	<i>ht2</i>	93.00
<i>lrk pseudo</i>	26.30	<i>thi1</i>	94.57
<i>crs2</i>	28.82	<i>por1</i>	95.75
<i>glct1</i>	32.32	<i>smh1</i>	95.75
<i>tpi3</i>	33.08	<i>a4</i>	97.02
<i>pdcc2</i>	34.33	<i>idh1</i>	97.02
<i>hsp18c</i>	44.01	<i>dba2</i>	97.03
<i>zmm2</i>	45.02	<i>rap2</i>	97.05
<i>ech1</i>	51.01	<i>vgt1</i>	97.05
<i>parp1</i>	51.03	<i>nad2</i>	97.51
<i>lhcb3</i>	51.51	<i>gst1B</i>	98.00
<i>cent8</i>	51.77	<i>v16</i>	99.00
<i>cks1</i>	51.77	<i>aba2</i>	102.75
<i>rph1</i>	51.77	<i>bss1</i>	102.75
<i>atp2</i>	51.78	<i>ebe1</i>	102.77
<i>gpa1</i>	52.00	<i>htn1</i>	106.00
<i>mdh1</i>	54.00	<i>sbe3</i>	108.00
<i>bif1</i>	54.00	<i>sps1</i>	108.01
<i>irl1</i>	60.18	<i>ald1</i>	108.01
<i>rpl17</i>	61.53	<i>ms8</i>	113.00
<i>stp1</i>	62.76	<i>lrs1</i>	116.76
<i>rpl12</i>	62.76	<i>tpi5</i>	120.00
<i>scl1</i>	62.76	<i>j1</i>	122.00
<i>rps28</i>	67.50	<i>psy2</i>	122.43
<i>oec23</i>	68.26	<i>tub6</i>	128.76
<i>zmm18</i>	71.25	<i>emp3</i>	131.00
<i>zmm29</i>	71.25	<i>gst1</i>	142.88
<i>fl3</i>	72.00	<i>rgl1</i>	154.00
<i>T8-9d(8)</i>	72.00	<i>hstf2</i>	155.51
<i>tub2</i>	72.50	<i>kin16</i>	155.52
<i>TB-8Lc(8)</i>	73.00		
<i>pdk2</i>	73.75		
<i>der1</i>	73.76		
<i>rip1</i>	73.83		
<i>act1</i>	74.00		
<i>pro1</i>	74.00		
<i>spp1</i>	76.04		
<i>gl18</i>	77.00		
<i>caat1</i>	78.75		
<i>pdcc1</i>	79.00		
<i>cyc1</i>	79.01		
<i>nec1</i>	81.00		
<i>TB-8La(8)</i>	82.00		
<i>rop7</i>	84.25		
<i>hox1</i>	84.26		
<i>trap1</i>	84.26		
<i>kin3</i>	84.26		

CHROMOSOME 9		CHROMOSOME 9	
Locus Name	cM	Locus Name	cM
<i>K9S</i>	-4.50	<i>dxs2</i>	58.28
<i>Dt1</i>	-4.00	<i>elfa4</i>	59.00
<i>pyd1</i>	-3.50	<i>obf2</i>	59.00
<i>wd1</i>	-3.00	<i>gl15</i>	59.56
<i>yg2</i>	-3.00	<i>acp1</i>	60.75
<i>rop5</i>	1.26	<i>knox2</i>	63.00
<i>pin1</i>	1.26	<i>T8-9a(9)</i>	64.00
<i>aap1</i>	6.03	<i>tm1</i>	64.00
<i>c1</i>	16.18	<i>hm2</i>	64.60
<i>ftr1</i>	16.25	<i>tub7</i>	65.26
<i>sh1</i>	20.08	<i>sbp4</i>	66.50
<i>stc1</i>	21.01	<i>hscf1</i>	66.50
<i>stk1</i>	22.51	<i>expb1</i>	74.52
<i>bz1</i>	22.53	<i>cgs1</i>	54.52
<i>orc1</i>	23.95	<i>lop1</i>	74.52
<i>l6</i>	24.00	<i>sus1</i>	77.88
<i>g6</i>	30.00	<i>TB-9La(9)</i>	78.00
<i>hyp1</i>	31.51	<i>bk2</i>	78.50
<i>prc1</i>	31.51	<i>sod9</i>	80.78
<i>ss1</i>	32.77	<i>v30</i>	83.00
<i>omt2</i>	32.78	<i>hsp18a</i>	85.50
<i>zb8</i>	35.00	<i>vacs1</i>	88.54
<i>znod1</i>	35.78	<i>mez2</i>	93.26
<i>thl1</i>	37.03	<i>fad7</i>	96.27
<i>mgs3</i>	37.04	<i>ibp1</i>	96.50
<i>l7</i>	40.00	<i>ms45</i>	105.50
<i>les8</i>	40.00	<i>pck2</i>	105.51
<i>eno1</i>	40.79	<i>rps22</i>	107.51
<i>v31</i>	41.00	<i>toc34</i>	107.52
<i>lo2</i>	42.00	<i>lhca1</i>	107.52
<i>bafl</i>	46.00	<i>dba4</i>	108.00
<i>TB-9Sb(9)</i>	47.00	<i>psk3</i>	116.02
<i>wx1</i>	47.93	<i>aos1</i>	116.25
<i>dhn2</i>	48.00	<i>gln3</i>	123.03
<i>d3</i>	50.07	<i>zmm8</i>	123.03
<i>rpo2</i>	50.07	<i>hb1</i>	123.08
<i>fdad1</i>	50.10	<i>sbip1b</i>	131.50
<i>hsk1</i>	51.00	<i>xy11</i>	133.51
<i>TB-9Sd(9)</i>	52.00	<i>eps1</i>	134.25
<i>T9-10b(9)</i>	53.00	<i>gst30</i>	134.75
<i>w11</i>	54.00	<i>ltk2</i>	138.51
<i>cent9</i>	56.16	<i>rpp40</i>	138.51
<i>fdh2</i>	56.51	<i>prc2</i>	140.76
<i>dzs10</i>	56.51	<i>sut1</i>	144.65
<i>phs1</i>	56.52	<i>gst9</i>	144.77
<i>TB-9Lc(9)</i>	56.60	<i>gst13</i>	144.77
<i>ar1</i>	57.00	<i>wc1</i>	146.98
<i>pg12</i>	57.00	<i>T4-9(5788)(9)</i>	147.00
<i>ago101</i>	57.52	<i>bf1</i>	151.03
<i>hsbp2</i>	57.52	<i>rld1</i>	151.03
<i>fat1</i>	57.52	<i>gst35</i>	159.29
<i>rf2</i>	57.76	<i>bm4</i>	162.00
<i>ms2</i>	58.00		
<i>pep1</i>	58.00		
<i>v1</i>	58.00		

CHROMOSOME 10		CHROMOSOME 10		CHROMOSOME 10	
Locus Name	cM	Locus Name	cM	Locus Name	cM
<i>fer2</i>	0.0024	<i>TB-10L36(10)</i>	55.0000	<i>pme1</i>	72.0055
<i>rp5</i>	11.5000	<i>mpk6</i>	57.0049	<i>grf2</i>	72.0093
<i>rp1</i>	13.2638	<i>nac1</i>	57.0105	<i>phb2</i>	72.0096
<i>rpp9</i>	15.0000	<i>fgp1</i>	58.5750	<i>ras1</i>	72.0155
<i>rp6</i>	15.4000	<i>ef2</i>	59.0000	<i>TB-10L21(10)</i>	74.0000
<i>alp1</i>	16.0177	<i>li1</i>	61.0000	<i>TB-10L27(10)</i>	74.0000
<i>gdcp1</i>	24.4750	<i>T3-10a(10)</i>	61.0000	<i>tp2</i>	76.0000
<i>cr4</i>	26.0000	<i>TB-10L20(10)</i>	62.0000	<i>TB-10L15(10)</i>	76.0000
<i>oy1</i>	33.7586	<i>acc1</i>	62.0104	<i>sam1</i>	77.0000
<i>vpp4</i>	33.7601	<i>amo1</i>	63.0000	<i>TB-10L2(10)</i>	77.0000
<i>mac1</i>	41.0000	<i>ef3</i>	63.0000	<i>dcl103</i>	77.5000
<i>y9</i>	41.0000	<i>TB-10L10(10)</i>	63.0000	<i>g1</i>	78.0000
<i>gs4</i>	41.0000	<i>gar1</i>	63.5073	<i>TB-10L15(10)</i>	78.0000
<i>rlc1</i>	41.0000	<i>bf2</i>	63.5300	<i>wsm3</i>	84.0000
<i>sr3</i>	41.0000	<i>fab1</i>	63.5432	<i>kin15</i>	86.2525
<i>T9-10b(10)</i>	41.0000	<i>TB-10L1(10)</i>	64.0000	<i>TB-10L32(10)</i>	89.0000
<i>og1</i>	42.0000	<i>TB-10L25(10)</i>	64.0000	<i>ago106a</i>	93.0000
<i>TB-10Sc(10)</i>	42.0000	<i>TB-10L28(10)</i>	64.0000	<i>isr1</i>	95.0000
<i>dnp1</i>	42.0060	<i>TB-10L31(10)</i>	64.0000	<i>l1</i>	95.0000
<i>trm1</i>	42.0089	<i>TB-10L4(10)</i>	64.0000	<i>por2</i>	95.2506
<i>cent10</i>	42.0150	<i>TB-10L5(10)</i>	64.0000	<i>r1</i>	95.2537
<i>gcsh1</i>	42.0500	<i>TB-10L8(10)</i>	64.0000	<i>sn1</i>	95.2537
<i>TB-10L18(10)</i>	43.0000	<i>odo1</i>	64.3023	<i>ocl2</i>	95.2625
<i>TB-10L19(10)</i>	43.0000	<i>hcf106c</i>	64.3082	<i>lc1</i>	97.0000
<i>chs1</i>	43.5222	<i>TB-10L16(10)</i>	65.0000	<i>tip5</i>	98.1250
<i>ms11</i>	44.0000	<i>TB-10L17(10)</i>	65.0000	<i>zfl1</i>	100.0045
<i>zn1</i>	44.0000	<i>mgs1</i>	65.1250	<i>mst1</i>	101.0000
<i>TB-10L26(10)</i>	45.0000	<i>isp1</i>	65.4750	<i>cpx2</i>	102.7539
<i>glu1</i>	45.0085	<i>ms10</i>	66.0000	<i>rps11</i>	102.7540
<i>php1</i>	45.0100	<i>TB-10L7(10)</i>	66.0000	<i>gtr1</i>	112.7520
<i>apr16</i>	45.2540	<i>TB-10L11(10)</i>	66.0000	<i>cop2</i>	112.7550
<i>sad1</i>	45.2627	<i>TB-10L29(10)</i>	66.0000	<i>w2</i>	113.0000
<i>abp5</i>	45.7508	<i>TB-10L3(10)</i>	66.0000	<i>o7</i>	121.0000
<i>abp4</i>	45.7513	<i>TB-10L30</i>	66.0000	<i>mha2</i>	122.5041
<i>zmm1</i>	45.7775	<i>TB-10L34(10)</i>	66.0000	<i>gln1</i>	122.5053
<i>eoh1</i>	46.0000	<i>TB-10L35(10)</i>	66.0000	<i>kin11</i>	122.5063
<i>ufo1</i>	46.0000	<i>TB-10L9(10)</i>	66.0000	<i>l13</i>	126.0000
<i>du1</i>	46.7925	<i>sfb1</i>	67.7508	<i>crr2</i>	126.5118
<i>ppo1</i>	46.7930	<i>TB-10L14(10)</i>	68.0000	<i>dba3</i>	126.5150
<i>cx1</i>	47.0000	<i>TB-10La(10)</i>	68.0000	<i>sr2</i>	130.0000
<i>TB-10Lb(10)</i>	48.0000	<i>T5-10(4801)(10)</i>	68.0000		
<i>pao1</i>	48.8500	<i>incw3</i>	68.0500		
<i>T8-10b(10)</i>	49.0000	<i>TB-10L23(10)</i>	69.0000		
<i>xth1</i>	50.2936	<i>TB-10L12(10)</i>	70.0000		
<i>nl1</i>	52.0000	<i>TB-10L13(10)</i>	70.0000		
<i>rps3</i>	52.1250	<i>TB-10L16(10)</i>	70.0000		
<i>TB-10L22(10)</i>	53.0000	<i>TB-10L24(10)</i>	70.0000		
<i>T6-10a(10)</i>	53.0000	<i>TB-10L33(10)</i>	70.0000		
<i>tps5</i>	53.0163	<i>TB-10L37(10)</i>	70.0000		
<i>der2</i>	53.2536	<i>TB-10L38(10)</i>	70.0000		
<i>ane3</i>	53.7575	<i>TB-10Ld(10)</i>	70.0000		
<i>bap1</i>	53.7600	<i>tip1</i>	71.0372		
<i>ef1</i>	54.0000	<i>TB-10L6(10)</i>	72.0000		
<i>fie2</i>	54.5100	<i>serk1</i>	72.0025		
<i>orp2</i>	54.5100	<i>gpa2</i>	72.0055		