Appendix

Appendix A1 TAP-MS analysis of Lsm8-TAP Lsm8 containing CBP and Protein A at C-terminal end was used as bait. Proteins were identified with the aid of MASCOT.

Lsm8(C-TAP)

NCBI Gene ID	Gene Name	MASCOT Score	Unique Peptide Number	Description
856570	PRP8	4362	72	Pre-mRNA-splicing factor 8 GN=PRP8
856919	BRR2	3458	57	Pre-mRNA-splicing helicase BRR2 GN=BRR2
853681	SNU114	2639	40	114 kDa U5 small nuclear ribonucleoprotein component GN=SNU114
852344	PRP6	2540	41	Pre-mRNA-splicing factor 6 GN=PRP6
855845	FAS2	2226	42	Fatty acid synthase subunit alpha GN=FAS2
853653	FAS1	1994	35	Fatty acid synthase subunit beta GN=FAS1
856912	PAB1	1921	26	Polyadenylate-binding protein; cytoplasmic and nuclear GN=PAB1
851369	SSB1	1902	25	Heat shock protein SSB1 GN=SSB1
852084	PRP3	1886	29	U4/U6 small nuclear ribonucleoprotein PRP3 GN=PRP3
855025	CLU1	1666	30	Protein TIF31 GN=TIF31
853118	ADE3	1526	25	C-1-tetrahydrofolate synthase; cytoplasmic GN=ADE3
852983	PRP31	1525	21	Pre-mRNA-processing factor 31 GN=PRP31
854379	DED1	1326	21	
856307	PRP4	1260	17	U4/U6 small nuclear ribonucleoprotein PRP4 GN=PRP4
851152	IMD3	1178	15	Probable inosine-5'-monophosphate dehydrogenase IMD3 GN=IMD3
856195	TEF1	1073	20	Elongation factor 1-alpha GN=TEF1
850843	STM1	1041	16	Suppressor protein STM1 GN=STM1
854301	EFT1	1032	18	Elongation factor 2 GN=EFT1
0		982	16	40S ribosomal protein S1-A;
0		979	5	40S ribosomal protein S1-B;
854485	SNU66	978	13	66 kDa U4/U6.U5 small nuclear ribonucleoprotein component GN=SNU66
850370	PGK1	887	17	Phosphoglycerate kinase GN=PGK1
856351	SBP1	865	12	Single-stranded nucleic acid-binding protein GN=SBP1
852378	MIS1	863	17	C-1-tetrahydrofolate synthase; mitochondrial GN=MIS1
852565	SHM1	852	14	Serine hydroxymethyltransferase; mitochondrial GN=SHM1
851196	FUN12	810	16	Eukaryotic translation initiation factor 5B GN=FUN12
854948	IMD4	758	1	Probable inosine-5'-monophosphate dehydrogenase IMD4 GN=IMD4
856751	SMB1	726	13	Small nuclear ribonucleoprotein-associated

				protein B GN=SMB1
854373	BFR1	703	12	Nuclear segregation protein BFR1 GN=BFR1
850951	YEF3	685	13	Elongation factor 3A GN=YEF3
855998	SSE1	672	13	Heat shock protein homolog SSE1 GN=SSE1
851193	CDC19	653	11	Pyruvate kinase 1 GN=PYK1
853202	ZUO1	598	10	Zuotin GN=ZUO1
854068	ADH1	586	9	Alcohol dehydrogenase 1 GN=ADH1
853365	SCP160	541	12	Protein SCP160 GN=SCP160
855310	PRP24	528	9	U4/U6 snRNA-associated-splicing factor PRP24 GN=PRP24
856551	CRP1	526	8	Uncharacterized protein YHR146W GN=YHR146W
855669	POR1	525	7	Mitochondrial outer membrane protein porin 1 GN=POR1
852255	LSM2	502	8	U6 snRNA-associated Sm-like protein LSm2 GN=LSM2
856461	SSZ1	494	9	Ribosome-associated complex subunit SSZ1 GN=SSZ1
853106	TDH3	475	9	Glyceraldehyde-3-phosphate dehydrogenase 3 GN=TDH3
853479	LSM8	434	5	U6 snRNA-associated Sm-like protein LSm8 GN=LSM8
851988	YRA1	431	7	RNA annealing protein YRA1 GN=YRA1
854732	THS1	428	9	Threonyl-tRNA synthetase; cytoplasmic GN=THS1
851984	LSM6	427	5	
853097	TYS1	414	9	Tyrosyl-tRNA synthetase; cytoplasmic GN=TYS1
854681	KGD1	411	8	2-oxoglutarate dehydrogenase; mitochondrial GN=KGD1
851548	NOP1	410	9	rRNA 2'-O-methyltransferase fibrillarin GN=NOP1
850981	SMD2	409	6	Small nuclear ribonucleoprotein Sm D2 GN=SMD2
851521	NAT1	406	9	N-terminal acetyltransferase A complex subunit NAT1 GN=NAT1
851607	KRS1	392	10	Lysyl-tRNA synthetase; cytoplasmic GN=KRS1
850877	SAM1	377	6	S-adenosylmethionine synthase 1 GN=SAM1
856746	GCD11	377	7	Eukaryotic translation initiation factor 2 subunit gamma GN=GCD11
855725	SIS1	376	7	Protein SIS1 GN=SIS1
851726	KGD2	363	5	Dihydrolipoyllysine-residue succinyltransferase component of 2-oxoglutarate dehydrogenase complex; mitochondrial GN=KGD2
850733	PDC1	357	7	Pyruvate decarboxylase isozyme 1 GN=PDC1 SV=7
850839	SMD3	347	5	Small nuclear ribonucleoprotein Sm D3 GN=SMD3
856579	ENO2	344	7	Enolase 2 GN=ENO2
852042	NPL3	334	6	Nucleolar protein 3 GN=NPL3
852702	KEM1	332	7	5'-3' exoribonuclease 1 GN=KEM1

856925	PDA1	318	6	Pyruvate dehydrogenase E1 component subunit alpha; mitochondrial GN=PDA1
856197	DIB1	299	4	Spliceosomal protein DIB1 GN=DIB1
855611	DBP2	292	5	
855701	HHF2	291	5	Histone H4 GN=HHF1
855653	LAT1	289	6	Dihydrolipoyllysine-residue acetyltransferase component of pyruvate dehydrogenase complex; mitochondrial GN=PDA2
855838	SUI3	286	5	Eukaryotic translation initiation factor 2 subunit beta GN=SUI3
856059	CAM1	280	5	Elongation factor 1-gamma 1 GN=CAM1
853071	TIF4631	277	5	Eukaryotic initiation factor 4F subunit p150 GN=TIF4631
850844	PCD1	273	5	Peroxisomal coenzyme A diphosphatase 1; peroxisomal GN=PCD1
852522	PDB1	272	4	Pyruvate dehydrogenase E1 component subunit beta; mitochondrial GN=PDB1
852187	MAP2	269	6	Methionine aminopeptidase 2 GN=MAP2
853585	ATP2	262	5	ATP synthase subunit beta; mitochondrial GN=ATP2
854026	CDC33	252	4	Eukaryotic translation initiation factor 4E GN=TIF45
852945	YGR054W	251	5	Eukaryotic translation initiation factor 2A GN=YGR054W
852964	SMD1	250	5	Small nuclear ribonucleoprotein Sm D1 GN=SMD1
853781	TEF4	249	3	Elongation factor 1-gamma 2 GN=TEF4
851195	RBG1	240	4	GTP-binding protein RBG1 GN=RBG1
856889	LSM5	236	3	U6 snRNA-associated Sm-like protein LSm5 GN=LSM5
851159	LSM3	234	4	U6 snRNA-associated Sm-like protein LSm3 GN=LSM3
856848	LSM4	233	5	U6 snRNA-associated Sm-like protein LSm4 GN=LSM4
855984	DBP1	231	1	
856258	YPR137C-A	230	3	
851810	HTB1	220	4	Histone H2B.1 GN=HTB1
854991	PSP2	218	4	Protein PSP2 GN=PSP2
852779	LSG1	212	4	Large subunit GTPase 1 GN=LSG1
856687	SNU13	205	4	13 kDa ribonucleoprotein-associated protein GN=SNU13
853418	KAR2	202	3	78 kDa glucose-regulated protein homolog GN=KAR2
855575	LSM7	201	3	U6 snRNA-associated Sm-like protein LSm7 GN=LSM7
854116	NOP12	200	4	Nucleolar protein 12 GN=NOP12
852995	NOP7	197	4	Pescadillo homolog GN=NOP7
853064	NSR1	194	4	Nuclear localization sequence-binding protein GN=NSR1
852982	UTP22	191	4	U3 small nucleolar RNA-associated protein 22

				GN=UTP22
853463	SUI2	185	3	Eukaryotic translation initiation factor 2 subunit alpha GN=SUI2
853311	URA2	185	4	Protein URA1 GN=URA2
854519	RPA190	180	3	DNA-directed RNA polymerase I subunit RPA1 GN=RPA1
855547	NOP13	178	3	Nucleolar protein 13 GN=NOP13
851754	HMO1	172	3	High mobility group protein 1 GN=HMO1
853155	PFK1	171	4	6-phosphofructokinase subunit alpha GN=PFK1
856758	ARB1	166	3	ABC transporter ATP-binding protein ARB1 GN=ARB1
850528	SMX2	160	3	Small nuclear ribonucleoprotein G GN=SMX2
856924	BMH1	157	3	Protein BMH1 GN=BMH1
851887	SSD1	154	4	Protein SSD1 GN=SSD1
854303	IDH2	154	3	Isocitrate dehydrogenase [NAD] subunit 2; mitochondrial GN=IDH2
850320	SRO9	148	3	RNA-binding protein SRO9 GN=SRO9
850530	MDJ1	147	4	DnaJ homolog 1; mitochondrial GN=MDJ1
852250	PET9	142	3	ADP;ATP carrier protein 2 GN=AAC2
856226	RPC40	136	3	DNA-directed RNA polymerases I and III subunit RPAC1 GN=RPC40
853705	GPM1	127	3	Phosphoglycerate mutase 1 GN=GPM1
854065	MPD2	124	3	Protein disulfide isomerase MPD2 GN=MPD2
851504	PSA1	124	2	Mannose-1-phosphate guanyltransferase GN=MPG1
855335	HAS1	119	2	ATP-dependent RNA helicase HAS1 GN=HAS1
853318	LSM1	114	2	Sm-like protein LSm1 GN=LSM1
854474	MBF1	113	3	Multiprotein-bridging factor 1 GN=MBF1
853933	TIF1	111	2	
854664	CCT2	111	2	T-complex protein 1 subunit beta GN=CCT2
855976	HHO1	107	2	Histone H1 GN=HHO1
856145	HTS1	102	2	Histidyl-tRNA synthetase; mitochondrial GN=HTS1
853997	HRP1	101	2	Nuclear polyadenylated RNA-binding protein 4 GN=HRP1
856404	ARD1	101	2	N-terminal acetyltransferase A complex catalytic subunit ARD1 GN=ARD1
854150	HTZ1	98	2	Histone H2A.Z GN=HTZ1
855664	NOP2	97	2	Putative ribosomal RNA methyltransferase Nop2 GN=NOP2
851643	PAA1	96	1	Polyamine N-acetyltransferase 1 GN=PAA1
853805	FBA1	96	2	Fructose-bisphosphate aldolase GN=FBA1
850894	NOP56	94	2	Nucleolar protein 56 GN=NOP56
851260	EFB1	94	2	Elongation factor 1-beta GN=EFB1
853860	MRT4	92	2	mRNA turnover protein 4 GN=MRT4
853089	PBP1	88	2	PAB1-binding protein 1 GN=PBP1
852833	TIF4632	88	2	Eukaryotic initiation factor 4F subunit p130 GN=TIF4632
0		88	1	Cell wall protein ECM33;

850747	SHM2	87	2	Serine hydroxymethyltransferase; cytosolic GN=SHM2
853870	VPS1	87	2	Vacuolar protein sorting-associated protein 1 GN=VPS1
852773	ARC1	84	2	GU4 nucleic-binding protein 1 GN=ARC1
856312	SMX3	83	2	Small nuclear ribonucleoprotein F GN=SMX3
856723	NUG1	80	2	Nuclear GTP-binding protein NUG1 GN=NUG1
852403	PHO88	79	1	Inorganic phosphate transport protein PHO88 GN=PHO88
855700	HHT2	78	2	Histone H3 GN=HHT1
853723	APL2	78	1	AP-1 complex subunit beta-1 GN=APL2
855949	PEP4	76	2	Saccharopepsin GN=PEP4
850449	YCR087C-A	75	2	UPF0743 protein YCR087C-A GN=YCR087C-A
852177	ATP1	74	1	ATP synthase subunit alpha; mitochondrial GN=ATP1
855055	SUB1	74	2	RNA polymerase II transcriptional coactivator SUB1 GN=SUB1
856165	NHP6A	73	1	Non-histone chromosomal protein 6A GN=NHP6A
853956	RPF2	73	2	Ribosome biogenesis protein RPF2 GN=RPF2
850450	ABP1	73	2	Actin-binding protein GN=ABP1
851431	CDC48	71	2	Cell division control protein 48 GN=CDC48
852386	NHP6B	71	1	Non-histone chromosomal protein 6B GN=NHP6B
854435	RPN8	69	1	26S proteasome regulatory subunit RPN8 GN=RPN8
856489	GAR1	69	2	H/ACA ribonucleoprotein complex subunit 1 GN=GAR1
850346	GBP2	68	1	Single-strand telomeric DNA-binding protein GBP2 GN=GBP2
853196	SCW4	67	1	Probable family 17 glucosidase SCW4 GN=SCW4
851659	SSS1	66	1	Protein transport protein SSS1 GN=SSS1
850314	PDI1	66	2	Protein disulfide-isomerase GN=PDI1
851768	CCT6	66	1	T-complex protein 1 subunit zeta GN=CCT6
855408	KRI1	66	1	Protein KRI1 GN=KRI1
851313	NOP6	65	1	Nucleolar protein 6 GN=NOP6
854770	GVP36	65	1	Protein GVP36 GN=GVP36
852666	CHC1	64	2	Clathrin heavy chain GN=CHC1
851095	SEC61	64	1	Protein transport protein SEC61 GN=SEC61
856119	RPA135	63	1	DNA-directed RNA polymerase I subunit RPA2 GN=RPA2
850799	AHP1	62	1	Peroxiredoxin type-2 GN=AHP1
855473	RPA49	61	1	DNA-directed RNA polymerase I subunit RPA49 GN=RPA49
856767	ERG28	61	1	Ergosterol biosynthetic protein 28 GN=ERG28
850499	SEC53	61	1	Phosphomannomutase GN=SEC53
853669	TRP3	60	1	Anthranilate synthase component 2 GN=TRP3
853811	DEF1	60	1	Uncharacterized protein YKL054C

				GN=YKL054C
855094	ABF2	60	1	ARS-binding factor 2; mitochondrial GN=ABF2
855135	ILV2	59	2	Acetolactate synthase catalytic subunit; mitochondrial GN=ILV2
856740	SBH2	59	1	Protein transport protein SEB2 GN=SEB2
850614	HXK1	59	1	Hexokinase-1 GN=HXK1
854983	YML6	58	1	54S ribosomal protein YmL6; mitochondrial GN=YML6
851811	HTA1	57	1	Histone H2A.1 GN=HTA1
853107	PDX1	56	1	Pyruvate dehydrogenase complex protein X component; mitochondrial GN=PDX1
852233	EDE1	56	1	EH domain-containing and endocytosis protein 1 GN=EDE1
851460	SNU23	56	1	23 kDa U4/U6.U5 small nuclear ribonucleoprotein component GN=SNU23
851168	VMA6	55	1	V-type proton ATPase subunit d GN=VMA6
852371	RPG1	55	1	Eukaryotic translation initiation factor 3 subunit A GN=TIF32
851487	YET3	55	1	Endoplasmic reticulum transmembrane protein 3 GN=YET3
850846	ACS2	55	1	Acetyl-coenzyme A synthetase 2 GN=ACS2
852235	COR1	54	1	Cytochrome b-c1 complex subunit 1; mitochondrial GN=COR1
850643	DPS1	54	1	Aspartyl-tRNA synthetase; cytoplasmic GN=DPS1
852122	SMT3	53	1	Ubiquitin-like protein SMT3 GN=SMT3
852449	SPP381	53	1	
851332	SEC31	52	1	Protein transport protein SEC31 GN=SEC31
851742	SEC1	52	1	Protein transport protein SEC1 GN=SEC1
855609	RPC19	52	1	DNA-directed RNA polymerases I and III subunit RPAC2 GN=RPC19
851819	RTN1	51	1	Reticulon-like protein 1 GN=RTN1
		51	1	Pumilio domain-containing protein YJL010C GN=YJL010C
856289	GPH1	51	1	Glycogen phosphorylase GN=GPH1
		50	1	Uncharacterized protein YPL009C GN=YPL009C
851678	ARX1	50	1	Probable metalloprotease ARX1 GN=ARX1
854444	VPH1	49	1	V-type proton ATPase subunit a; vacuolar isoform GN=VPH1
854426	TMA16	49	1	Translation machinery-associated protein 16 GN=TMA16
855728	HRB1	49	1	Protein HRB1 GN=HRB1
854258	TMA46	48	1	Translation machinery-associated protein 46 GN=TMA46
851319	NHP2	48	1	H/ACA ribonucleoprotein complex subunit 2 GN=NHP2
0		48	1	40S ribosomal protein S0-A;
853845	YKL023W	46	1	Uncharacterized protein YKL023W GN=YKL023W
853409	NSP1	45	1	Nucleoporin NSP1 GN=NSP1

854980	TSA1	44	1	Peroxiredoxin TSA1 GN=TSA1
851126	VIP1	44	1	Inositol hexakisphosphate and diphosphoinositol-pentakisphosphate kinase GN=VIP1
854330	SME1	44	1	Small nuclear ribonucleoprotein E GN=SME1
856321	QCR2	43	1	Cytochrome b-c1 complex subunit 2; mitochondrial GN=QCR2
856600	EGD2	42	1	Nascent polypeptide-associated complex subunit alpha GN=EGD2
856856	SCS2	42	1	Vesicle-associated membrane protein-associated protein SCS2 GN=SCS2
850307	APA1	39	1	Protein APA1 GN=APA1
855587	FPR1	39	1	FK506-binding protein 1 GN=FPR1
850905	SEC13	38	1	Protein transport protein SEC13 GN=SEC13
855787	BRE5	37	1	UBP3-associated protein BRE5 GN=BRE5
856063	NOP4	37	1	Nucleolar protein 4 GN=NOP4
856088	VTC3	36	1	Vacuolar transporter chaperone 3 GN=VTC3
		36	1	Endoplasmic reticulum vesicle protein 25 GN=ERV25
852606	GUS1	36	1	Glutamyl-tRNA synthetase; cytoplasmic GN=GUS1
851507	PBP4	36	1	Protein PBP4 GN=PBP4
852248	HEK2	35	1	KH domain-containing protein YBL032W GN=YBL032W
851466	SRP14	35	1	Signal recognition particle subunit SRP14 GN=SRP14
853631	EAP1	35	1	Protein EAP1 GN=EAP1
851672	GRX3	35	1	Monothiol glutaredoxin-3 GN=GRX3
853682	EBP2	35	1	rRNA-processing protein EBP2 GN=EBP2
852314	ETR1	34	1	Enoyl-[acyl-carrier protein] reductase [NADPH; B-specific]; mitochondrial GN=ETR1
854322	RPB2	34	1	DNA-directed RNA polymerase II subunit RPB2 GN=RPB2
855943	CDC60	34	1	Leucyl-tRNA synthetase; cytoplasmic GN=CDC60
854223	ASE1	34	1	Anaphase spindle elongation protein GN=ASE1
854084	NBA1	34	1	Protein NBA1 GN=NBA1
854266	KTR1	34	1	Alpha-1;2 mannosyltransferase KTR1 GN=KTR1
851698	TRM1	34	1	N(2);N(2)-dimethylguanosine tRNA methyltransferase; mitochondrial GN=TRM1
853059	CYS4	33	1	Cystathionine beta-synthase GN=CYS4
855602	TOM70	33	1	
854227	CKA2	33	1	Casein kinase II subunit alpha' GN=CKA2
855750	ACC1	32	1	Acetyl-CoA carboxylase GN=FAS3
850326	RRP7	32	1	Ribosomal RNA-processing protein 7 GN=RRP7
853757	GFA1	32	1	Glucosamine--fructose-6-phosphate aminotransferase [isomerizing] GN=GFA1
856070	EGD1	32	1	
852915	MSP1	31	1	Protein MSP1 GN=MSP1

851100	IKI3	31	1	Elongator complex protein 1 GN=IKI3
853181	MES1	31	1	Methionyl-tRNA synthetase; cytoplasmic GN=MES1
852876	PMA1	31	1	Plasma membrane ATPase 1 GN=PMA1
856716	WBP1	31	1	Dolichyl-diphosphooligosaccharide--protein glycosyltransferase subunit WBP1 GN=WBP1
851627	YOS9	30	1	Protein OS-9 homolog GN=YOS9
850375	YCR016W	30	1	Uncharacterized protein YCR016W GN=YCR016W
852811	MNP1	30	1	54S ribosomal protein L12; mitochondrial GN=MNP1
856782	HIS1	29	1	ATP phosphoribosyltransferase GN=HIS1
		29	1	Uncharacterized ATP-dependent helicase YHR031C GN=YHR031C
851969	ESF1	29	1	Pre-rRNA-processing protein ESF1 GN=ESF1
853475	ESS1	29	1	Peptidyl-prolyl cis-trans isomerase ESS1 GN=ESS1
856317	RPO26	29	1	DNA-directed RNA polymerases I; II; and III subunit RPABC2 GN=RPO26
856725	TMA20	29	1	Translation machinery-associated protein 20 GN=TMA20
850982	DBP9	28	1	
855357	NIP1	28	1	
853353	SRS2	28	1	ATP-dependent DNA helicase SRS2 GN=SRS2
850395	RIM1	27	1	Single-stranded DNA-binding protein RIM1; mitochondrial GN=RIM1
855323	CAT8	27	1	Regulatory protein CAT8 GN=CAT8

Appendix A2 TAP-MS analysis of Lsm1-TAP Lsm1 containing CBP and Protein A at C-terminal end was used as bait. Proteins were identified with the aid of MASCOT.

LSM1 (C-TAP)

NCBI GeneID	Gene Name	MASCOT Score	Unique Peptide Number	Description
853653	FAS1	3132	54	Fatty acid synthase subunit beta GN=FAS1
855845	FAS2	2511	45	Fatty acid synthase subunit alpha GN=FAS2
851394	DHH1	2439	32	Cytoplasmic DExD/H-box helicase, stimulates mRNA decapping
855025	CLU1	2425	42	Protein TIF31 GN=TIF31
852702	KEM1	2409	43	5'-3' exoribonuclease 1 GN=KEM1
850440	PAT1	2379	37	DNA topoisomerase 2-associated protein PAT1 GN=PAT1
851369	SSB1	2340	2	Heat shock protein SSB1 GN=SSB1
854379	DED1	2113	29	ATP-dependent DEAD (Asp-Glu-Ala-Asp)-box RNA helicase
853118	ADE3	1944	32	C-1-tetrahydrofolate synthase; cytoplasmic GN=ADE3
851152	IMD3	1846	21	Probable inosine-5'-monophosphate dehydrogenase IMD3 GN=IMD3
856912	PAB1	1754	25	Polyadenylate-binding protein; cytoplasmic and nuclear GN=PAB1
854301	EFT1	1707	31	Elongation factor 2 GN=EFT1
854948	IMD4	1499	8	Probable inosine-5'-monophosphate dehydrogenase IMD4 GN=IMD4
854373	BFR1	1461	25	Nuclear segregation protein BFR1 GN=BFR1
850951	YEF3	1438	27	Elongation factor 3A GN=YEF3
856626	IMD2	1323	3	Inosine-5'-monophosphate dehydrogenase IMD2 GN=IMD2
853071	TIF4631	1261	21	Eukaryotic initiation factor 4F subunit p150 GN=TIF4631
855838	SUI3	1254	21	Eukaryotic translation initiation factor 2 subunit beta GN=SUI3
850843	STM1	1215	16	Suppressor protein STM1 GN=STM1
851196	FUN12	1199	21	Eukaryotic translation initiation factor 5B GN=FUN12
855611	DBP2	1196	20	Putative ATP-dependent RNA helicase of the DEAD-box protein family;
0		1193	19	40S ribosomal protein S1-B;
0		1170	4	40S ribosomal protein S1-A;
852378	MIS1	1163	21	C-1-tetrahydrofolate synthase; mitochondrial GN=MIS1
851521	NAT1	1147	21	N-terminal acetyltransferase A complex subunit NAT1 GN=NAT1

852255	LSM2	1077	16	U6 snRNA-associated Sm-like protein LSm2 GN=LSM2
856195	TEF1	1057	19	Elongation factor 1-alpha GN=TEF1
850877	SAM1	1057	15	S-adenosylmethionine synthase 1 GN=SAM1
	YHR146W	1016	14	Uncharacterized protein YHR146W GN=YHR146W
850894	NOP56	983	20	Nucleolar protein 56 GN=NOP56
856461	SSZ1	974	16	Ribosome-associated complex subunit SSZ1 GN=SSZ1
853064	NSR1	974	16	Nuclear localization sequence-binding protein GN=NSR1
851548	NOP1	968	17	rRNA 2'-O-methyltransferase fibrillarin GN=NOP1
856746	GCD11	951	17	Eukaryotic translation initiation factor 2 subunit gamma GN=GCD11
852565	SHM1	926	14	Serine hydroxymethyltransferase; mitochondrial GN=SHM1
856351	SBP1	924	15	Single-stranded nucleic acid-binding protein GN=SBP1
854732	THS1	867	17	Threonyl-tRNA synthetase; cytoplasmic GN=THS1
853202	ZUO1	855	14	Zuotin GN=ZUO1
853318	LSM1	826	13	Sm-like protein LSm1 GN=LSM1
850320	SRO9	802	11	RNA-binding protein SRO9 GN=SRO9
852945	YGR054W	793	13	Eukaryotic translation initiation factor 2A GN=YGR054W
851195	RBG1	774	15	GTP-binding protein RBG1 GN=RBG1
851193	CDC19	734	11	Pyruvate kinase 1 GN=PYK1
854068	ADH1	718	13	Alcohol dehydrogenase 1 GN=ADH1
856758	ARB1	703	12	ABC transporter ATP-binding protein ARB1 GN=ARB1
855335	HAS1	702	13	ATP-dependent RNA helicase HAS1 GN=HAS1
855605	DCP2	698	14	mRNA-decapping enzyme subunit 2 GN=DCP2
855998	SSE1	686	13	Heat shock protein homolog SSE1 GN=SSE1
856258	YPR137C-A	686	10	
854519	RPA190	680	14	DNA-directed RNA polymerase I subunit RPA1 GN=RPA1
852042	NPL3	665	10	Nucleolar protein 3 GN=NPL3
852187	MAP2	625	11	Methionine aminopeptidase 2 GN=MAP2
853106	TDH3	619	11	Glyceraldehyde-3-phosphate dehydrogenase 3 GN=TDH3
853781	TEF4	601	10	Elongation factor 1-gamma 2 GN=TEF4
851984	LSM6	593	7	
853463	SUI2	588	10	Eukaryotic translation initiation factor 2 subunit alpha GN=SUI2

854487	NOP58	543	10	
852113	SAM2	535	1	S-adenosylmethionine synthase 2 GN=SAM2
855408	KRI1	518	10	Protein KRI1 GN=KRI1
851752	SUP35	516	10	Eukaryotic peptide chain release factor GTP-binding subunit GN=SUP35
850370	PGK1	512	10	Phosphoglycerate kinase GN=PGK1
852606	GUS1	512	11	Glutamyl-tRNA synthetase; cytoplasmic GN=GUS1
855976	HHO1	512	8	Histone H1 GN=HHO1
853097	TYS1	496	10	Tyrosyl-tRNA synthetase; cytoplasmic GN=TYS1
855547	NOP13	485	8	Nucleolar protein 13 GN=NOP13
850346	GBP2	476	9	Single-strand telomeric DNA-binding protein GBP2 GN=GBP2
853418	KAR2	473	7	78 kDa glucose-regulated protein homolog GN=KAR2
		473	8	Uncharacterized protein YKL054C GN=YKL054C
850643	DPS1	449	8	Aspartyl-tRNA synthetase; cytoplasmic GN=DPS1
855862	DIM1	443	9	Dimethyladenosine transferase GN=DIM1
856012	NOG1	440	10	Nucleolar GTP-binding protein 1 GN=NOG1
851754	HMO1	438	7	High mobility group protein 1 GN=HMO1
853682	EBP2	437	7	rRNA-processing protein EBP2 GN=EBP2
852833	TIF4632	421	7	Eukaryotic initiation factor 4F subunit p130 GN=TIF4632
856412	DED81	414	5	Asparaginyl-tRNA synthetase; cytoplasmic GN=DED81
856889	LSM5	412	5	U6 snRNA-associated Sm-like protein LSm5 GN=LSM5
855701	HHF2	405	7	Histone H4 GN=HHF1
852995	NOP7	392	7	Pescadillo homolog GN=NOP7
		388	7	KH domain-containing protein YBL032W GN=YBL032W
851504	PSA1	373	6	Mannose-1-phosphate guanyltransferase GN=MPG1
855473	RPA49	371	7	DNA-directed RNA polymerase I subunit RPA49 GN=RPA49
851988	YRA1	368	6	RNA annealing protein YRA1 GN=YRA1
856925	PDA1	361	8	Pyruvate dehydrogenase E1 component subunit alpha; mitochondrial GN=PDA1
854543	PRT1	359	9	
850307	APA1	352	6	Protein APA1 GN=APA1
853365	SCP160	350	7	Protein SCP160 GN=SCP160
855949	PEP4	340	6	Saccharopepsin GN=PEP4
855664	NOP2	340	7	Putative ribosomal RNA

				methyltransferase Nop2 GN=NOP2
855653	LAT1	337	7	Dihydrolipoyllysine-residue acetyltransferase component of pyruvate dehydrogenase complex; mitochondrial GN=PDA2
856226	RPC40	335	6	DNA-directed RNA polymerases I and III subunit RPAC1 GN=RPC40
851260	EFB1	334	6	Elongation factor 1-beta GN=EFB1
856119	RPA135	327	6	DNA-directed RNA polymerase I subunit RPA2 GN=RPA2
854474	MBF1	326	7	Multiprotein-bridging factor 1 GN=MBF1
854770	GVP36	322	5	Protein GVP36 GN=GVP36
852327	ATP3	318	6	ATP synthase subunit gamma; mitochondrial GN=ATP3
853997	HRP1	311	5	Nuclear polyadenylated RNA-binding protein 4 GN=HRP1
854258	TMA46	302	6	Translation machinery-associated protein 46 GN=TMA46
853870	VPS1	301	6	Vacuolar protein sorting-associated protein 1 GN=VPS1
851969	ESF1	301	7	Pre-rRNA-processing protein ESF1 GN=ESF1
855575	LSM7	287	4	U6 snRNA-associated Sm-like protein LSm7 GN=LSM7
851431	CDC48	283	5	Cell division control protein 48 GN=CDC48
854016	DCP1	281	6	mRNA-decapping enzyme subunit 1 GN=DCP1
852039	TIF35	280	5	Eukaryotic translation initiation factor 3 subunit G GN=TIF35
853155	PFK1	278	4	6-phosphofructokinase subunit alpha GN=PFK1
852177	ATP1	275	5	ATP synthase subunit alpha; mitochondrial GN=ATP1
852522	PDB1	272	5	Pyruvate dehydrogenase E1 component subunit beta; mitochondrial GN=PDB1
855934	MEX67	270	4	mRNA export factor MEX67 GN=MEX67
854065	MPD2	266	6	Protein disulfide isomerase MPD2 GN=MPD2
856848	LSM4	265	5	U6 snRNA-associated Sm-like protein LSm4 GN=LSM4
851810	HTB1	265	4	Histone H2B.1 GN=HTB1
856373	OTU2	264	5	OTU domain-containing protein 2 GN=OTU2
856059	CAM1	257	2	Elongation factor 1-gamma 1 GN=CAM1
0		256	5	40S ribosomal protein S0-A;
856404	ARD1	255	5	N-terminal acetyltransferase A complex catalytic subunit ARD1 GN=ARD1
853181	MES1	255	5	Methionyl-tRNA synthetase; cytoplasmic GN=MES1
854078	BRX1	250	4	Ribosome biogenesis protein BRX1

				GN=BRX1
856579	ENO2	242	5	Enolase 2 GN=ENO2
856449	CIC1	241	5	Proteasome-interacting protein CIC1 GN=CIC1
850844	PCD1	240	5	Peroxisomal coenzyme A diphosphatase 1; peroxisomal GN=PCD1
855669	POR1	236	5	Mitochondrial outer membrane protein porin 1 GN=POR1
851381	PAR32	234	5	Protein PAR32 GN=PAR32
853609	MGM101	229	4	Mitochondrial genome maintenance protein MGM101 GN=MGM101
855094	ABF2	227	6	ARS-binding factor 2; mitochondrial GN=ABF2
854435	RPN8	227	4	26S proteasome regulatory subunit RPN8 GN=RPN8
850689	CMS1	224	4	Protein CMS1 GN=CMS1
851698	TRM1	222	5	N(2);N(2)-dimethylguanosine tRNA methyltransferase; mitochondrial GN=TRM1
852107	PUF6	221	5	Pumilio homology domain family member 6 GN=PUF6
850395	RIM1	219	3	Single-stranded DNA-binding protein RIM1; mitochondrial GN=RIM1
854681	KGD1	217	4	2-oxoglutarate dehydrogenase; mitochondrial GN=KGD1
856063	NOP4	216	4	Nucleolar protein 4 GN=NOP4
850298	KRR1	215	5	Ribosomal RNA assembly protein KRR1 GN=KRR1
851159	LSM3	214	4	U6 snRNA-associated Sm-like protein LSm3 GN=LSM3
852802	DBP3	212	5	
	LAH1	211	5	La protein homolog GN=LAH1
856700	EDC3	207	4	Enhancer of mRNA-decapping protein 3 GN=EDC3
856145	HTS1	203	3	Histidyl-tRNA synthetase; mitochondrial GN=HTS1
852757	PRP43	202	5	Pre-mRNA-splicing factor ATP-dependent RNA helicase PRP43 GN=PRP43
853757	GFA1	200	4	Glucosamine--fructose-6-phosphate aminotransferase [isomerizing] GN=GFA1
850872	CBF5	200	5	H/ACA ribonucleoprotein complex subunit 4 GN=CBF5
853089	PBP1	199	4	PAB1-binding protein 1 GN=PBP1
854426	TMA16	194	4	Translation machinery-associated protein 16 GN=TMA16
855466	GIS2	194	4	Zinc finger protein GIS2 GN=GIS2
855725	SIS1	193	4	Protein SIS1 GN=SIS1
854991	PSP2	193	3	Protein PSP2 GN=PSP2
854664	CCT2	191	3	T-complex protein 1 subunit beta GN=CCT2

		191	4	Partitioning protein REP2 GN=REP2
853860	MRT4	189	4	mRNA turnover protein 4 GN=MRT4
854817	SGN1	187	3	RNA-binding protein SGN1 GN=SGN1
851607	KRS1	187	4	Lysyl-tRNA synthetase; cytoplasmic GN=KRS1
856744	PRO3	184	4	Pyrroline-5-carboxylate reductase GN=PRO3
855730	RLP7	177	3	Ribosome biogenesis protein RLP7 GN=RLP7
856489	GAR1	176	3	H/ACA ribonucleoprotein complex subunit 1 GN=GAR1
851266	RFA1	173	3	Replication factor A protein 1 GN=RFA1
856719	NOP16	169	3	Nucleolar protein 16 GN=NOP16
855055	SUB1	168	4	RNA polymerase II transcriptional coactivator SUB1 GN=SUB1
856687	SNU13	166	3	13 kDa ribonucleoprotein-associated protein GN=SNU13
854518	RPA43	165	3	DNA-directed RNA polymerase I subunit RPA43 GN=RPA43
854026	CDC33	164	3	Eukaryotic translation initiation factor 4E GN=TIF45
854866	SEC65	162	4	Signal recognition particle subunit SEC65 GN=SEC65
852371	RPG1	161	2	Eukaryotic translation initiation factor 3 subunit A GN=TIF32
851678	ARX1	161	3	Probable metalloprotease ARX1 GN=ARX1
853967	SRP40	160	3	Suppressor protein SRP40 GN=SRP40
852811	MNP1	159	3	54S ribosomal protein L12; mitochondrial GN=MNP1
851557	RPT2	153	4	26S protease regulatory subunit 4 homolog GN=RPT2
855269	RRP5	153	1	rRNA biogenesis protein RRP5 GN=RRP5
852773	ARC1	153	3	GU4 nucleic-binding protein 1 GN=ARC1
850733	PDC1	152	3	Pyruvate decarboxylase isozyme 1 GN=PDC1 SV=7
851726	KGD2	148	2	Dihydrolipoyllysine-residue succinyltransferase component of 2-oxoglutarate dehydrogenase complex; mitochondrial GN=KGD2
850314	PDI1	147	3	Protein disulfide-isomerase GN=PDI1
855841	RVB2	146	3	RuvB-like protein 2 GN=RVB2
852257	NCL1	145	3	tRNA (cytosine-5-)-methyltransferase NCL1 GN=NCL1
851313	NOP6	144	2	Nucleolar protein 6 GN=NOP6
855897	HRR25	144	3	Casein kinase I homolog HRR25 GN=HRR25
851466	SRP14	144	3	Signal recognition particle subunit SRP14 GN=SRP14
856471	NOP10	143	3	H/ACA ribonucleoprotein complex subunit 3 GN=NOP10

856413	YHR020W	141	3	Putative prolyl-tRNA synthetase YHR020W GN=YHR020W
852313	OLA1	139	3	Uncharacterized GTP-binding protein OLA1 GN=OLA1
851656	RRP8	139	3	Ribosomal RNA-processing protein 8 GN=RRP8
855591	KRE33	137	3	UPF0202 protein KRE33 GN=KRE33
854758	RHR2	136	3	(DL)-glycerol-3-phosphatase 1 GN=GPP1
850747	SHM2	136	2	Serine hydroxymethyltransferase; cytosolic GN=SHM2
854284	RPT5	135	2	26S protease regulatory subunit 6A GN=RPT5
852424	VMA2	134	3	V-type proton ATPase subunit B GN=VMA2
853107	PDX1	133	2	Pyruvate dehydrogenase complex protein X component; mitochondrial GN=PDX1
853266	RFA3	133	2	Replication factor A protein 3 GN=RFA3
853293	RPA34	133	3	DNA-directed RNA polymerase I subunit RPA34 GN=RPA34
855161	RRB1	132	3	Ribosome assembly protein RRB1 GN=RRB1
850893	PWP1	131	3	Periodic tryptophan protein 1 GN=PWP1
855343	PRC1	128	2	Carboxypeptidase Y GN=PRC1
854433	RPT4	127	3	26S protease subunit RPT4 GN=RPT4
856547	RPC10	125	2	DNA-directed RNA polymerases I; II; and III subunit RPABC4 GN=RPC10
854116	NOP12	124	2	Nucleolar protein 12 GN=NOP12
853669	TRP3	124	2	Anthranilate synthase component 2 GN=TRP3
856165	NHP6A	124	2	Non-histone chromosomal protein 6A GN=NHP6A
854901	FPR3	122	3	FK506-binding nuclear protein GN=FPR3
852876	PMA1	122	2	Plasma membrane ATPase 1 GN=PMA1
		121	2	Uncharacterized protein YPL009C GN=YPL009C
853585	ATP2	120	2	ATP synthase subunit beta; mitochondrial GN=ATP2
851695	TMA64	120	3	Translation machinery-associated protein 64 GN=TMA64
850945	MAP1	120	2	Methionine aminopeptidase 1 GN=MAP1
856863	NSA2	118	3	
855155	STO1	115	3	Nuclear cap-binding protein complex subunit 1 GN=STO1
855355	GAS1	114	2	1;3-beta-glucanosyltransferase GAS1 GN=GAS1
852440	SUP45	113	2	Eukaryotic peptide chain release factor subunit 1 GN=SUP1
855104	NAM7	110	2	ATP-dependent helicase NAM7 GN=NAM7

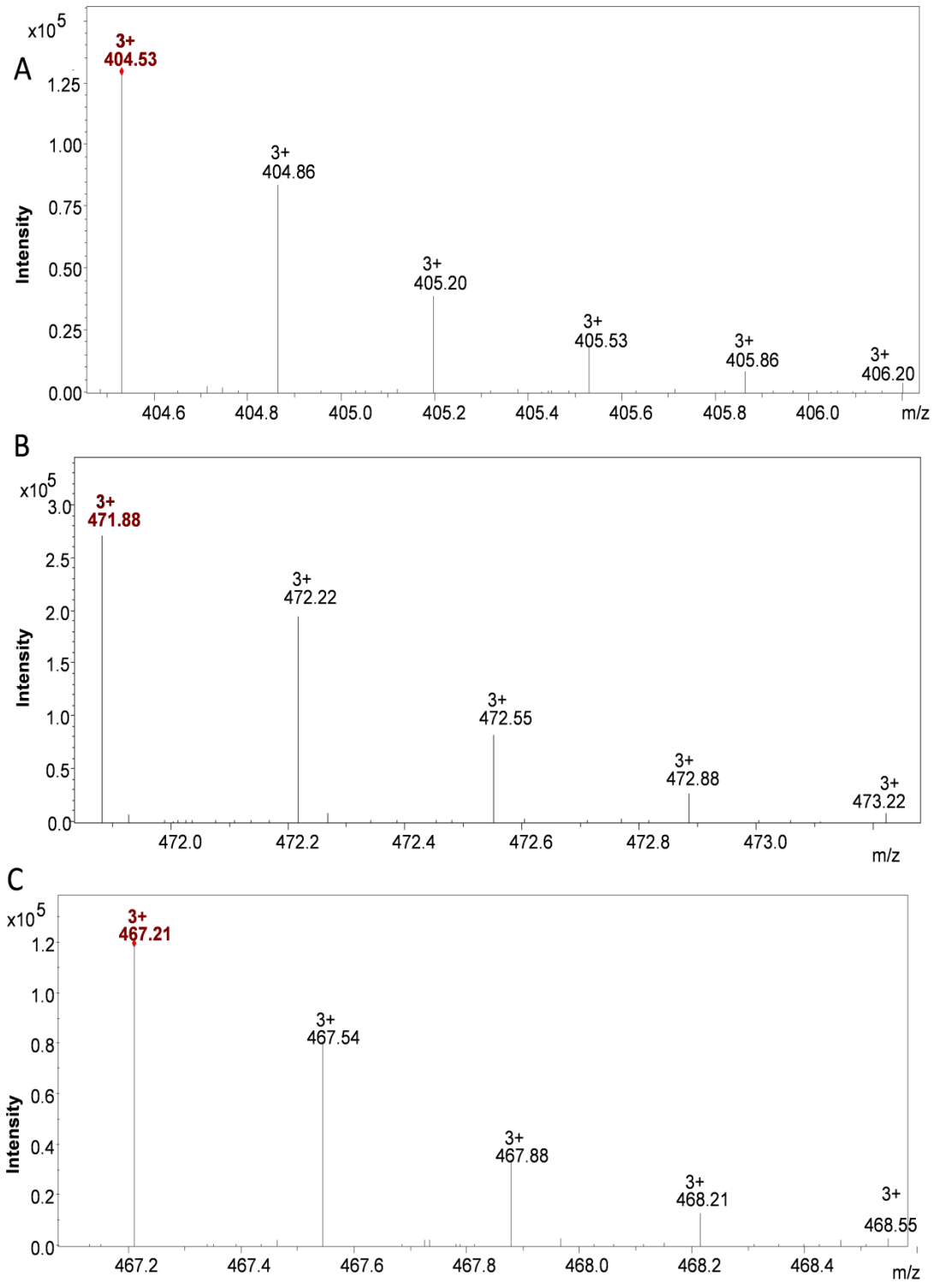
853535	NPA3	110	2	GTPase NPA3 GN=NPA3
856154	TIF5	108	3	Eukaryotic translation initiation factor 5 GN=TIF5
851170	FPR4	108	2	FK506-binding protein 4 GN=FPR4
855716	PUB1	107	2	Nuclear and cytoplasmic polyadenylated RNA-binding protein PUB1 GN=PUB1
851403	SAS10	105	2	Something about silencing protein 10 GN=SAS10
851319	NHP2	105	2	H/ACA ribonucleoprotein complex subunit 2 GN=NHP2
852406	CMD1	104	2	Calmodulin GN=CMD1
854221	NOB1	104	2	20S-pre-rRNA D-site endonuclease NOB1 GN=NOB1
855143	ASC1	100	2	Guanine nucleotide-binding protein subunit beta-like protein GN=ASC1
853839	MAE1	100	2	NAD-dependent malic enzyme; mitochondrial GN=MAE1
852779	LSG1	99	2	Large subunit GTPase 1 GN=LSG1
855245	PFK2	99	3	6-phosphofructokinase subunit beta GN=PFK2
855700	HHT2	99	3	Histone H3 GN=HHT1
854303	IDH2	97	2	Isocitrate dehydrogenase [NAD] subunit 2; mitochondrial GN=IDH2
0		96	2	Cell wall protein ECM33;
853631	EAP1	94	2	Protein EAP1 GN=EAP1
852418	GRS1	93	2	Glycyl-tRNA synthetase 1 GN=GRS1
855875	NEW1	93	2	[NU+] prion formation protein 1 GN=NEW1
852982	UTP22	92	2	U3 small nucleolar RNA-associated protein 22 GN=UTP22
850649	SOF1	92	2	Protein SOF1 GN=SOF1
854983	YML6	91	2	54S ribosomal protein YmL6; mitochondrial GN=YML6
854980	TSA1	90	2	Peroxiredoxin TSA1 GN=TSA1
851507	PBP4	85	1	Protein PBP4 GN=PBP4
850449	YCR087C-A	83	2	UPF0743 protein YCR087C-A GN=YCR087C-A
853780	RRP14	81	1	Ribosomal RNA-processing protein 14 GN=RRP14
856856	SCS2	79	2	Vesicle-associated membrane protein-associated protein SCS2 GN=SCS2
851621	DET1	78	2	Putative phosphoglycerate mutase DET1 GN=DET1
855177	TIF34	75	2	
853445	NOP9	74	2	Pumilio domain-containing protein YJL010C GN=YJL010C
852241	URA7	73	2	CTP synthase 1 GN=URA7
856251	SPN1	73	1	Transcription factor IWS1 GN=IWS1
853956	RPF2	71	2	Ribosome biogenesis protein RPF2 GN=RPF2

855957	NOP53	71	2	Ribosome biogenesis protein NOP53 GN=NOP53
851659	SSS1	70	1	Protein transport protein SSS1 GN=SSS1
	YMR098C	70	1	Uncharacterized protein YMR098C GN=YMR098C
851240	ECM1	70	1	Protein ECM1 GN=ECM1
854469	RRS1	70	1	Regulator of ribosome biosynthesis GN=RRS1
853199	BGL2	68	1	Glucan 1;3-beta-glucosidase GN=BGL2
850499	SEC53	67	1	Phosphomannomutase GN=SEC53
852250	PET9	67	1	ADP;ATP carrier protein 2 GN=AAC2
855789	NOG2	66	2	Nucleolar GTP-binding protein 2 GN=NOG2
851126	VIP1	66	2	Inositol hexakisphosphate and diphosphoinositol-pentakisphosphate kinase GN=VIP1
853934	UTP30	66	2	Ribosome biogenesis protein UTP30 GN=UTP30
856140	YOP1	65	2	Protein YOP1 GN=YOP1
856723	NUG1	65	1	Nuclear GTP-binding protein NUG1 GN=NUG1
850360	YCP4	65	1	Flavoprotein-like protein YCP4 GN=YCP4
850450	ABP1	65	1	Actin-binding protein GN=ABP1
855609	RPC19	64	1	DNA-directed RNA polymerases I and III subunit RPAC2 GN=RPC19
851643	PAA1	64	1	Polyamine N-acetyltransferase 1 GN=PAA1
854165	UTP23	64	1	rRNA-processing protein UTP23 GN=UTP23
854317	PNO1	63	1	Pre-rRNA-processing protein PNO1 GN=PNO1
856908	SPT2	63	1	Protein SPT2 GN=SPT2
854150	HTZ1	62	1	Histone H2A.Z GN=HTZ1
852771	RMD9	62	2	Protein RMD9; mitochondrial GN=RMD9
853936	TFA2	62	1	Transcription initiation factor IIE subunit beta GN=TFA2
855763	YNR029C	62	1	Uncharacterized protein YNR029C GN=YNR029C
0		61	1	U3 small nucleolar RNA-associated protein 11;
850554	RPN11	61	1	26S proteasome regulatory subunit RPN11 GN=RPN11
855288	FAA4	61	1	Long-chain-fatty-acid--CoA ligase 4 GN=FAA4
854381	NOC2	60	1	Nucleolar complex protein 2 GN=NOC2
850688	NOC3	58	1	Nucleolar complex-associated protein 3 GN=NOC3
854204	CKB2	58	1	Casein kinase II subunit beta' GN=CKB2
850434	IMG2	57	1	54S ribosomal protein IMG2; mitochondrial GN=IMG2

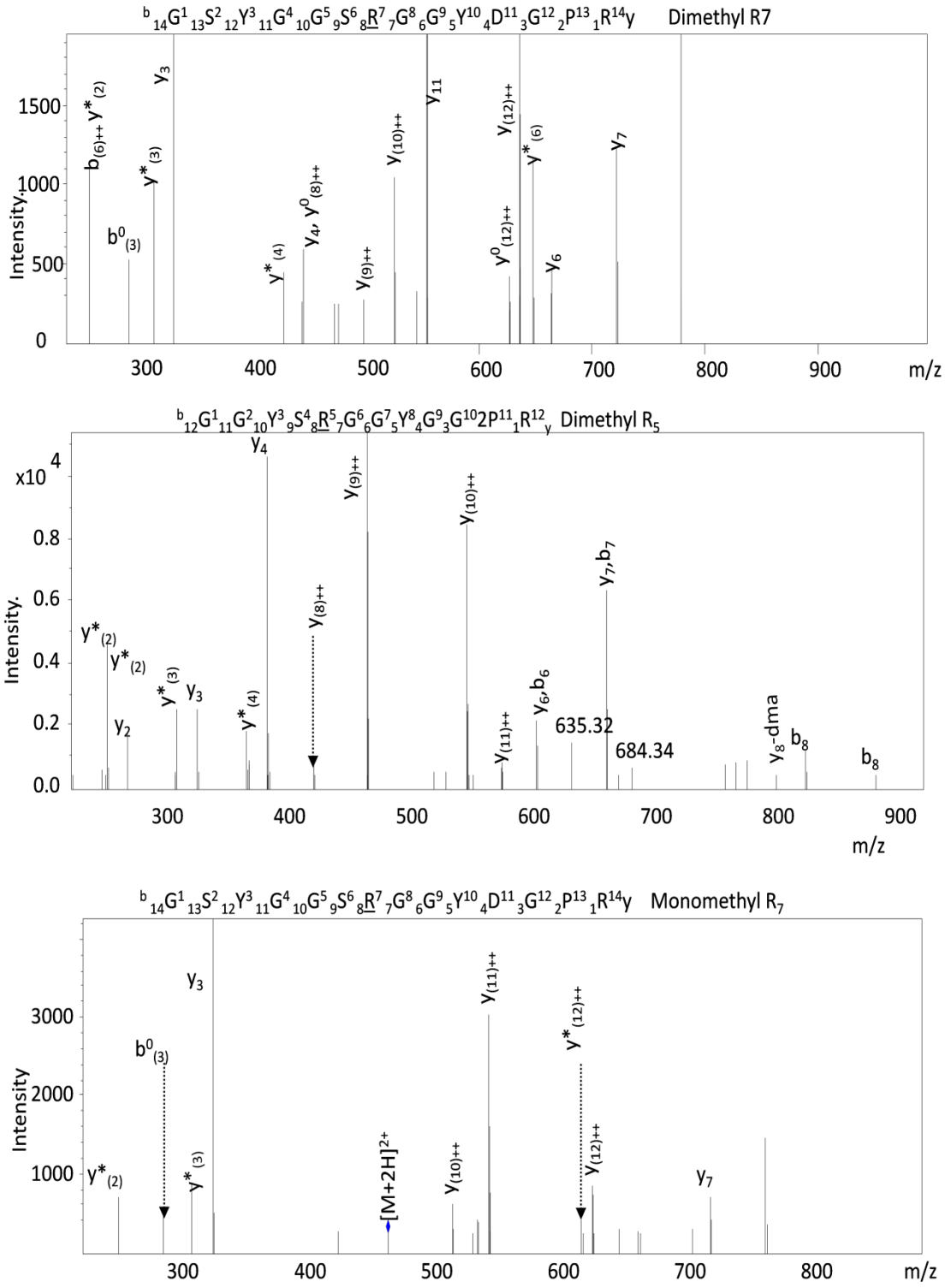
853311	URA2	57	1	Protein URA1 GN=URA2
856375	PRS3	57	1	Ribose-phosphate pyrophosphokinase 3 GN=PRS3
855017	TAF4	57	1	
850889	HCR1	57	1	Eukaryotic translation initiation factor 3 subunit J GN=HCR1
855728	HRB1	57	1	Protein HRB1 GN=HRB1
851887	SSD1	57	2	Protein SSD1 GN=SSD1
856264	RRP15	56	1	Ribosomal RNA-processing protein 15 GN=RRP15
856870	GLC7	56	1	Serine/threonine-protein phosphatase PP1-2 GN=GLC7
855883	SAR1	56	1	Small COPII coat GTPase SAR1 GN=SAR1
850598	RSC8	55	1	Chromatin structure-remodeling complex protein RSC8 GN=RSC8
853333	CCT7	55	1	T-complex protein 1 subunit eta GN=CCT7
853196	SCW4	55	1	Probable family 17 glucosidase SCW4 GN=SCW4
856317	RPO26	54	1	DNA-directed RNA polymerases I; II; and III subunit RPABC2 GN=RPO26
856019	ELP3	53	1	Elongator complex protein 3 GN=ELP3
856070	EGD1	52	1	
853668	SAC1	52	1	Phosphoinositide phosphatase SAC1 GN=SAC1
851565	YRB1	52	1	Ran-specific GTPase-activating protein 1 GN=YRB1
850905	SEC13	52	1	Protein transport protein SEC13 GN=SEC13
855544	MRPL22	51	1	54S ribosomal protein L22; mitochondrial GN=MRPL22
851660	RRP1	51	1	Ribosomal RNA-processing protein 1 GN=RRP1
850704	MEU1	51	1	Multicopy enhancer of UAS2 GN=MEU1
855357	NIP1	49	1	
855118	UTP15	49	1	U3 small nucleolar RNA-associated protein 15 GN=UTP15
854266	KTR1	49	1	Alpha-1;2 mannosyltransferase KTR1 GN=KTR1
855758	MPP6	48	1	M-phase phosphoprotein 6 homolog GN=MPP6
856223	RPN7	47	1	26S proteasome regulatory subunit RPN7 GN=RPN7
852276	SLA1	47	1	
852105	RSM28	46	1	37S ribosomal protein RSM28; mitochondrial GN=RSM28
851412	CCT4	46	1	T-complex protein 1 subunit delta GN=CCT4
856462	RRP3	46	1	
855331	DSS1	46	1	Exoribonuclease II; mitochondrial GN=MSU1

853538	HOC1	46	1	Putative glycosyltransferase HOC1 GN=HOC1
851672	GRX3	45	1	Monothiol glutaredoxin-3 GN=GRX3
853227	PRP21	44	1	Pre-mRNA-splicing factor PRP21 GN=PRP21
851731	ENT5	44	1	Epsin-5 GN=ENT5
851811	HTA1	44	1	Histone H2A.1 GN=HTA1
851742	SEC1	44	1	Protein transport protein SEC1 GN=SEC1
855404	RFA2	43	1	Replication factor A protein 2 GN=RFA2
853188	EFG1	43	1	
854399	RPB8	43	1	DNA-directed RNA polymerases I; II; and III subunit RPABC3 GN=RPB8
851734	RPA14	43	1	DNA-directed RNA polymerase I subunit RPA14 GN=RPA14
856815	UTP7	41	1	U3 small nucleolar RNA-associated protein 7 GN=UTP7
853059	CYS4	40	1	Cystathionine beta-synthase GN=CYS4
855363	YMR315W	40	1	Uncharacterized protein YMR315W GN=YMR315W
856782	HIS1	40	1	ATP phosphoribosyltransferase GN=HIS1
855855	SAM4	40	1	Homocysteine S-methyltransferase 2 GN=SAM4
852977	PIL1	40	1	Sphingolipid long chain base-responsive protein PIL1 GN=PIL1
852778	SEH1	40	1	Nucleoporin SEH1 GN=SEH1
855243	TOM40	39	1	Mitochondrial import receptor subunit TOM40 GN=TOM40
856126	TIF6	39	1	Eukaryotic translation initiation factor 6 GN=TIF6
850343	NFS1	39	1	Cysteine desulfurase; mitochondrial GN=NFS1
850732	TRX1	38	1	Thioredoxin-1 GN=TRX1
850367	RVS161	38	1	Reduced viability upon starvation protein 161 GN=RVS161
855884	BMS1	38	1	Ribosome biogenesis protein BMS1 GN=BMS1
856822	DOT6	38	1	Transcriptional regulatory protein DOT6 GN=DOT6
850496	EMP47	37	1	Protein EMP47 GN=EMP47
850580	LSB3	37	1	
856742	RPN3	37	1	26S proteasome regulatory subunit RPN3 GN=RPN3
855135	ILV2	37	1	Acetolactate synthase catalytic subunit; mitochondrial GN=ILV2
856924	BMH1	36	1	Protein BMH1 GN=BMH1
852755	NAB2	36	1	Nuclear polyadenylated RNA-binding protein NAB2 GN=NAB2
851217	TPD3	36	1	Protein phosphatase PP2A regulatory subunit A GN=TPD3
854227	CKA2	35	1	Casein kinase II subunit alpha' GN=CKA2

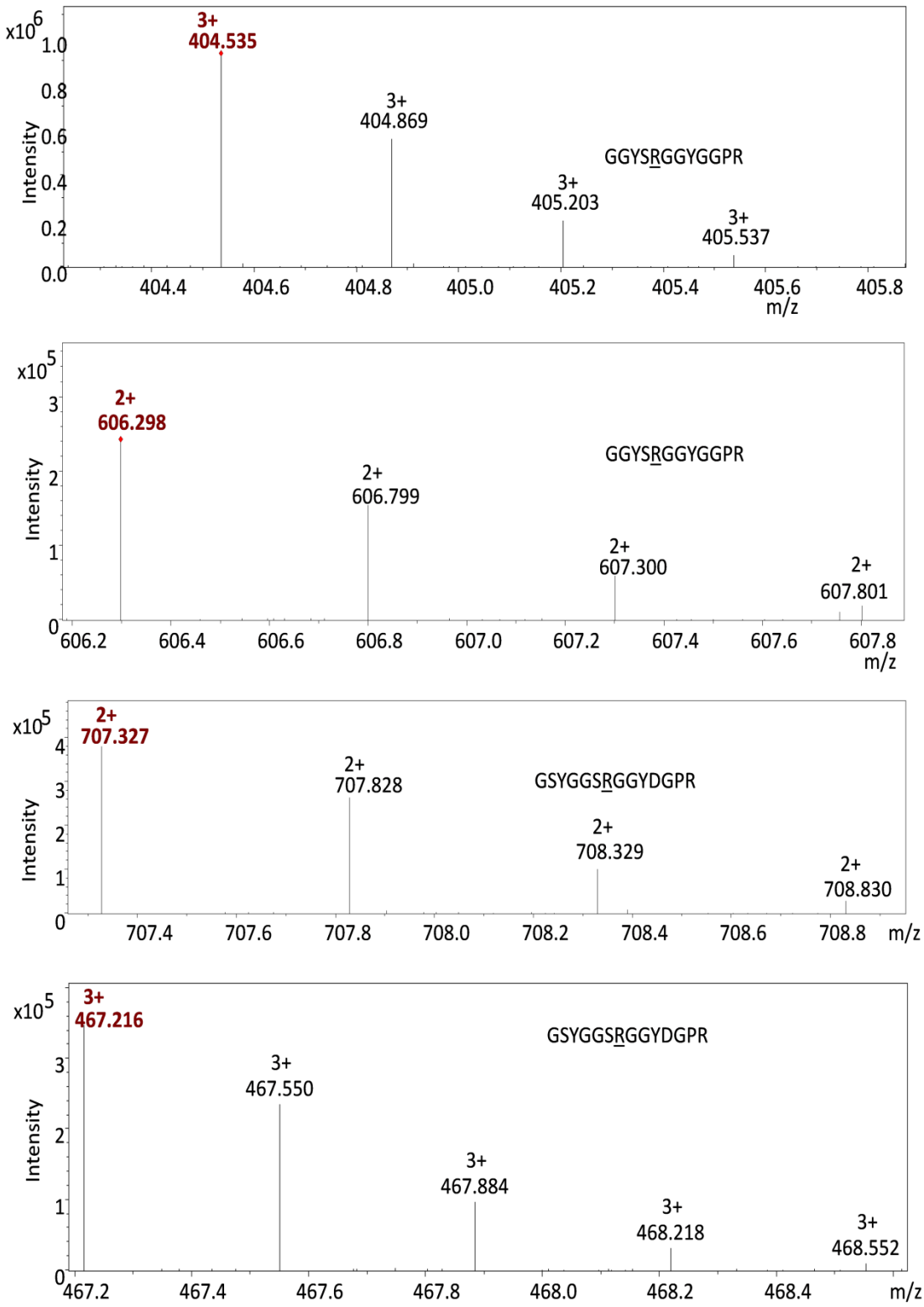
854957	GSF2	35	1	Glucose-signaling factor 2 GN=GSF2
851148	CRN1	35	1	Coronin-like protein GN=CRN1
856574	DBP8	35	1	
850846	ACS2	34	1	Acetyl-coenzyme A synthetase 2 GN=ACS2
856911	CHD1	34	1	Chromo domain-containing protein 1 GN=CHD1
851168	VMA6	33	1	V-type proton ATPase subunit d GN=VMA6
856311	SEC23	33	1	Protein transport protein SEC23 GN=SEC23
850414	BUD23	32	1	Putative methyltransferase BUD23 GN=BUD23
855584	SRV2	32	1	Adenylyl cyclase-associated protein GN=SRV2
853788	MUD2	31	1	Splicing factor MUD2 GN=MUD2
850375	YCR016W	31	1	Uncharacterized protein YCR016W GN=YCR016W
851499	TSR1	31	1	Ribosome biogenesis protein TSR1 GN=TSR1
852964	SMD1	31	1	Small nuclear ribonucleoprotein Sm D1 GN=SMD1
850982	DBP9	30	1	
852122	SMT3	30	1	Ubiquitin-like protein SMT3 GN=SMT3
853746	APN1	30	1	DNA-(apurinic or apyrimidinic site) lyase 1 GN=APN1
853271	SET2	30	1	Histone-lysine N-methyltransferase; H3 lysine-36 specific GN=SET2
855338	HER2	30	1	4-aminobutyrate aminotransferase GN=UGA1
852888	TFG2	30	1	Transcription initiation factor IIF subunit beta GN=TFG2
851140	RPN13	29	1	26S proteasome regulatory subunit RPN13 GN=RPN13
851530	DBP10	29	1	ATP-dependent RNA helicase DBP10;
853522	PTK2	27	1	Serine/threonine-protein kinase PTK2/STK2 GN=PTK2
851727	NUM1	27	1	Nuclear migration protein NUM1 GN=NUM1



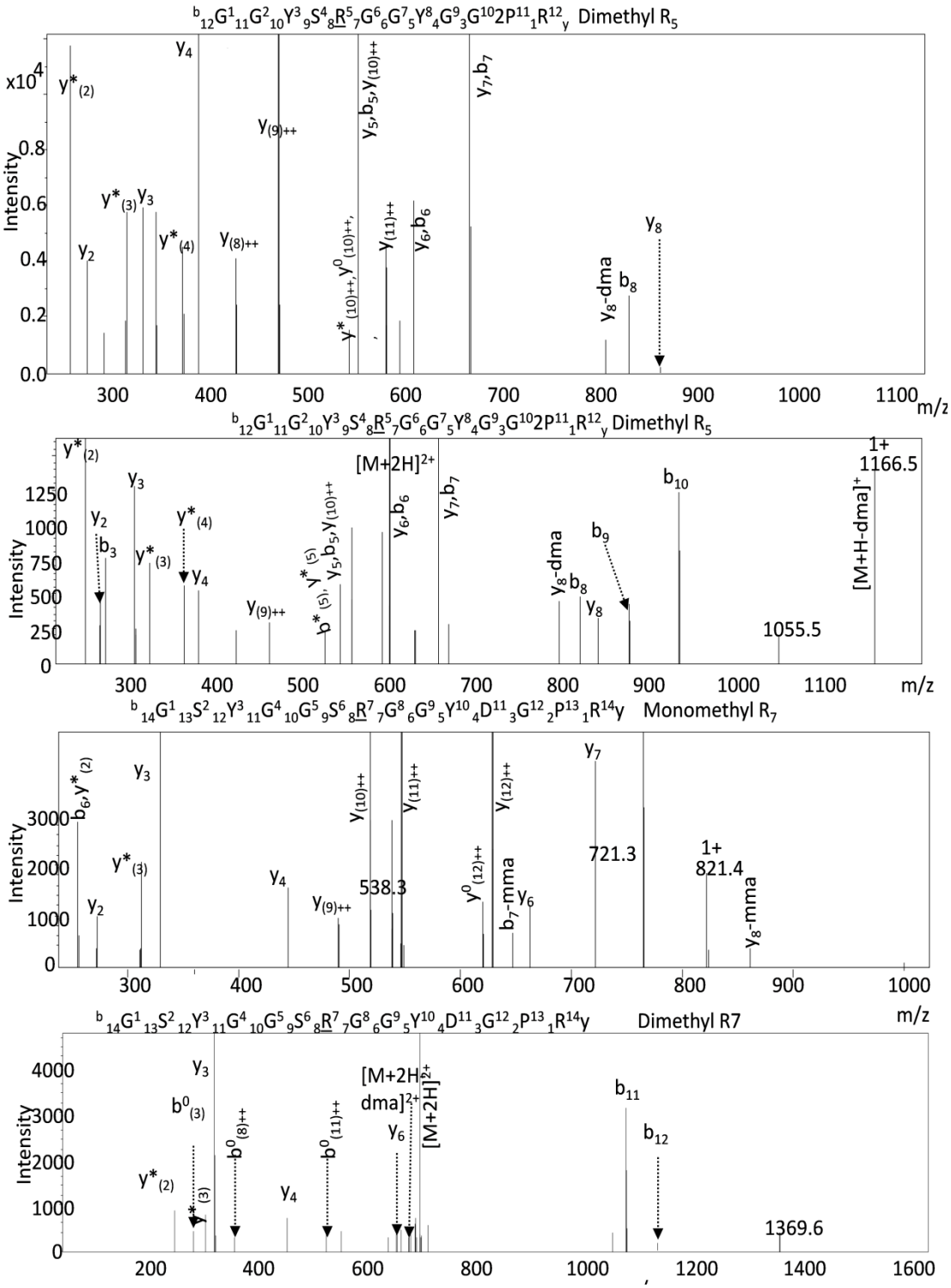
Appendix B1 UHR-TOF MS analysis of peptide, GGYS<u>R</u>GGYGGPR (arg^{363}) and GSYGGS<u>R</u>GGYDGPR (arg^{384}) From Lsm8-TAP Npl3p. (A) MS analysis for the 404.3 (3+) ion for the peptide showing that the ion peak corresponding to the mass of the dimethylated R_5 (Mr = 1210.56) (at arg^{263} site) peptide is present. (B)MS deconvolution of 471.9 (3+) peptide ion corresponds to dimethylated R_7 (Mr = 1412.6433). C) MS deconvolution of 467.216 (3+) corresponds to a monomethylated R_7 (Mr= 1398.6262).



Appendix B2 UHR-TOF tandem MS analysis of peptide, GGYSRGGYGGPR (arg^{363}) and GSYGGSRGGYDGPR (arg^{384}) For Lsm8-TAP Npl3p. (A)CID MS/MS of GSYGGS(dimeR)GGYDGPR $(M + 3H)^{3+}$. B) CID MS/MS analysis of GGYS(dimeR)GGYGGPR $(M + 3H)^{3+}$ showing neutral loss of dimethylamine (DMA). C) CID MS/MS analysis of GSYGGS(monomethylR)GGYDGPR $(M + 3H)^{3+}$. The prominent y and b ions are highlighted.



Appendix B3 UHR-TOF MS analysis of peptide, GGYSRGGYGGPR (arg^{363}) and GSYGGSRGGYDGPR (arg^{384}) For Lsm1-TAP Npl3p (Enhanced view). (A) MS analysis for the 404.3 (3+) ion for the peptide showing that the ion peak corresponding to the mass of the dimethylated R_5 (Mr = 1210.56, arg^{263} site) peptide is present. (B)MS deconvolution of 606.3 (2+) peptide ion corresponds to dimethylated R_5 (Mr = 1210.56). C) MS deconvolution of 707.3(2+) corresponds to a dimethylated R_7 (Mr = 1412.6394). D) MS deconvolution of 467.216 (3+) corresponds to a monomethylated R_7 (Mr= 1398.6262).



Appendix B4 UHR-TOF tandem MS analysis of the methylated peptide GGYSRGGYGGPR and GSYGGSRGGYDGPR (Lsm1-TAP) (A)CID MS/MS of GGYS(dimeR)GGYGGPR $(M + 3H)^{3+}$. B) CID MS/MS analysis of GGYS(dimeR)GGYGGPR $(M + 2H)^{2+}$ showing neutral loss of dimethylamine (DMA). C) CID MS/MS analysis of GSYGGS(monomethylR)GGYDGPR $(M + 3H)^{3+}$. D) CID MS/MS analysis of GSYGGS(dimeR)GGYDGPR $(M + 2H)^{2+}$ showing neutral loss of dimethylamine (DMA) .The prominent y and b ions are highlighted The prominent y and b ions are highlighted.

Appendix C1 TAP-MS analysis of Hsh155-TAP (-DTT) Hsh155 containing CBP and Protein A at C-terminal end was used as bait. 10 mM DTT was excluded in the TAP. Proteins were identified with the aid of MASCOT.

-DTT HSH155 (C-TAP) Gene ID = 855332

GeneID	Gene Name	MASCOT Score	Unique Peptide Number	Description
855332	HSH155	1823	36	U2 snRNP component HSH155 GN=HSH155
855281	CUS1	1806	39	Protein CUS1 GN=CUS1
854379	DED1	1800	32	
856912	PAB1	1620	34	Polyadenylate-binding protein; cytoplasmic and nuclear GN=PAB1
851369	SSB1	1576	1	Heat shock protein SSB1 GN=SSB1
851752	SUP35	1513	37	Eukaryotic peptide chain release factor GTP-binding subunit GN=SUP35
854956	RSE1	1408	28	Pre-mRNA-splicing factor RSE1 GN=RSE1
854999	SPT5	1301	28	Transcription elongation factor SPT5 GN=SPT5
0		587	13	40S ribosomal protein S1-B;
0		431	2	40S ribosomal protein S1-A;
851887	SSD1	422	9	Protein SSD1 GN=SSD1
854497	HSH49	385	8	Protein HSH49 GN=HSH49
853071	TIF4631	366	9	Eukaryotic initiation factor 4F subunit p150 GN=TIF4631
855984	DBP1	362	1	
856895	UBP3	341	8	Ubiquitin carboxyl-terminal hydrolase 3 GN=UBP3
853811	DEF1	308	7	Uncharacterized protein YKL054C GN=YKL054C
851152	IMD3	270	6	Probable inosine-5'-monophosphate dehydrogenase IMD3 GN=IMD3
851984	LSM6	256	4	
855787	BRE5	231	6	UBP3-associated protein BRE5 GN=BRE5
852833	TIF4632	220	5	Eukaryotic initiation factor 4F subunit p130 GN=TIF4632
850320	SRO9	215	5	RNA-binding protein SRO9 GN=SRO9
852255	LSM2	213	3	U6 snRNA-associated Sm-like protein LSm2 GN=LSM2
853681	SNU114	207	5	114 kDa U5 small nuclear ribonucleoprotein component GN=SNU114
853631	EAP1	202	4	Protein EAP1 GN=EAP1
851742	SEC1	189	5	Protein transport protein SEC1 GN=SEC1
853089	PBP1	186	5	PAB1-binding protein 1 GN=PBP1
852042	NPL3	182	3	Nucleolar protein 3 GN=NPL3
851499	TSR1	179	5	Ribosome biogenesis protein TSR1 GN=TSR1
856195	TEF1	170	4	Elongation factor 1-alpha GN=TEF1
851988	YRA1	164	4	RNA annealing protein YRA1 GN=YRA1

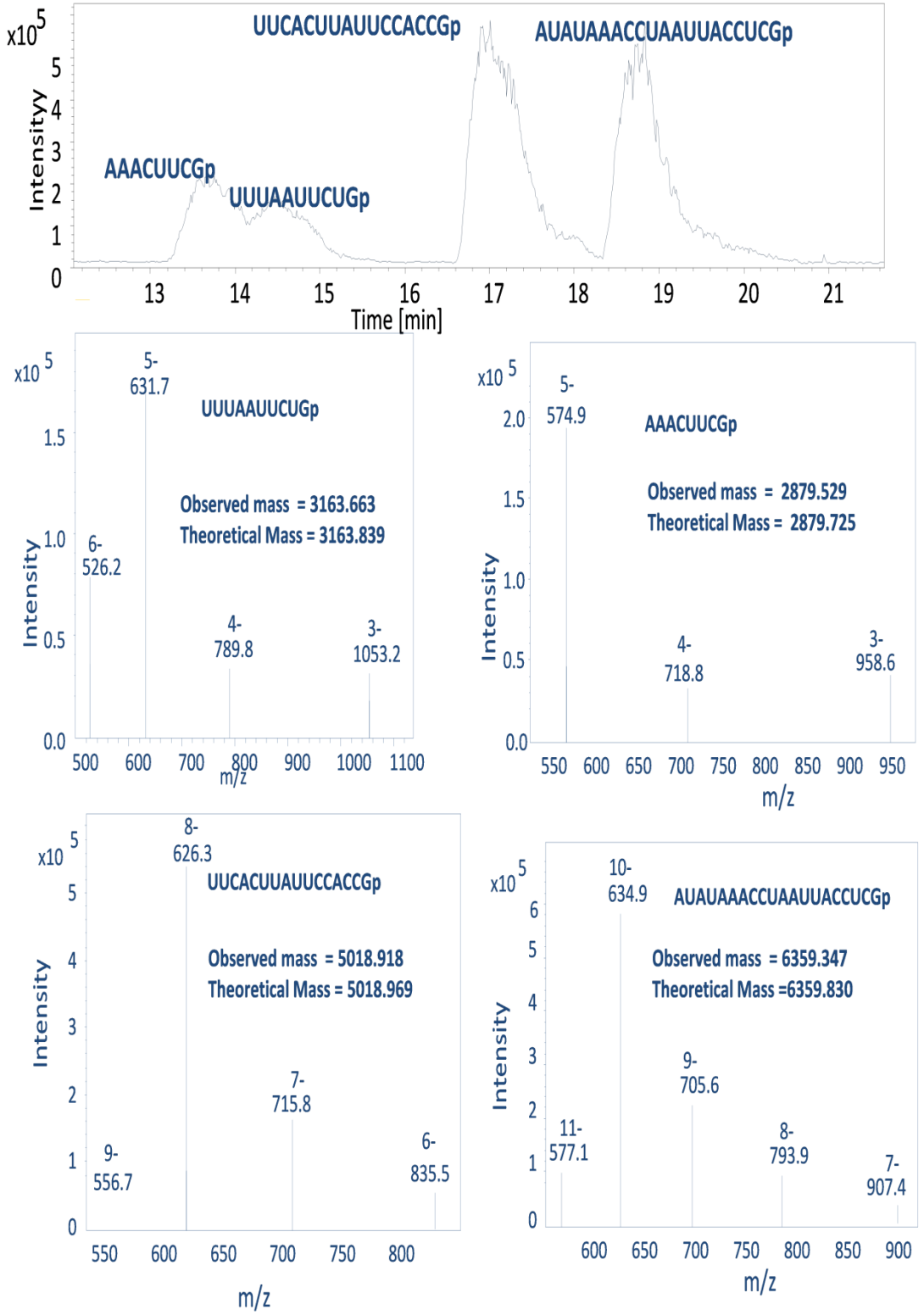
855253	CEF1	154	4	Pre-mRNA-splicing factor CEF1 GN=CEF1
851507	PBP4	152	3	Protein PBP4 GN=PBP4
855245	PFK2	152	3	6-phosphofructokinase subunit beta GN=PFK2
855653	LAT1	136	3	Dihydrolipoyllysine-residue acetyltransferase component of pyruvate dehydrogenase complex; mitochondrial GN=PDA2
855473	RPA49	130	3	DNA-directed RNA polymerase I subunit RPA49 GN=RPA49
850951	YEF3	127	3	Elongation factor 3A GN=YEF3
852378	MIS1	124	3	C-1-tetrahydrofolate synthase; mitochondrial GN=MIS1
852025	SYF1	120	2	Pre-mRNA-splicing factor SYF1 GN=SYF1
850367	RVS161	120	2	Reduced viability upon starvation protein 161 GN=RVS161
851996	RVS167	111	3	Reduced viability upon starvation protein 167 GN=RVS167
850839	SMD3	102	2	Small nuclear ribonucleoprotein Sm D3 GN=SMD3
852371	RPG1	97	3	Eukaryotic translation initiation factor 3 subunit A GN=TIF32
852424	VMA2	93	2	V-type proton ATPase subunit B GN=VMA2
852357	ECM2	86	2	Pre-mRNA-splicing factor SLT11 GN=ECM2
853509	ISY1	86	2	Pre-mRNA-splicing factor ISY1 GN=ISY1
856751	SMB1	85	2	Small nuclear ribonucleoprotein-associated protein B GN=SMB1
852945	YGR054W	83	2	Eukaryotic translation initiation factor 2A GN=YGR054W
850449	YCR087C-A	82	2	UPF0743 protein YCR087C-A GN=YCR087C-A
856521	LSM12	82	2	Protein LSM12 GN=LSM12
850894	NOP56	77	2	Nucleolar protein 56 GN=NOP56
855957	NOP53	77	2	Ribosome biogenesis protein NOP53 GN=NOP53
856553	IMP3	76	2	U3 small nucleolar ribonucleoprotein protein IMP3 GN=IMP3
854426	TMA16	75	2	Translation machinery-associated protein 16 GN=TMA16
853106	TDH3	69	2	Glyceraldehyde-3-phosphate dehydrogenase 3 GN=TDH3
852351	AKL1	69	2	Serine/threonine-protein kinase AKL1 GN=AKL1
850877	SAM1	67	1	S-adenosylmethionine synthase 1 GN=SAM1
853271	SET2	66	2	Histone-lysine N-methyltransferase; H3 lysine-36 specific GN=SET2
856579	ENO2	63	2	Enolase 2 GN=ENO2
851318	CWC2	60	2	Pre-mRNA-splicing factor CWC2 GN=CWC2
855998	SSE1	55	1	Heat shock protein homolog SSE1 GN=SSE1
854742	SEC6	54	1	Exocyst complex component SEC6 GN=SEC6
854758	RHR2	48	1	(DL)-glycerol-3-phosphatase 1 GN=GPP1
856002	ELP4	48	1	Elongator complex protein 4 GN=ELP4

850329	RNQ1	44	1	[PIN+] prion protein RNQ1 GN=RNQ1
856721	FMP52	44	1	Protein FMP52; mitochondrial GN=FMP52
850419	RSC6	44	1	Chromatin structure-remodeling complex protein RSC6 GN=RSC6
856844	GLE2	41	1	Nucleoporin GLE2 GN=GLE2
852486	NTC20	40	1	Pre-mRNA-splicing factor NTC20 GN=NTC20
856846	KAP123	38	1	Importin subunit beta-4 GN=KAP123
851117	DUS3	38	1	
853320	ALB1	37	1	
851195	RBG1	37	1	GTP-binding protein RBG1 GN=RBG1
852127	SLF1	37	1	Protein SLF1 GN=SLF1
851407	NOP14	37	1	Nucleolar complex protein 14 GN=NOP14
851698	TRM1	37	1	N(2);N(2)-dimethylguanosine tRNA methyltransferase; mitochondrial GN=TRM1
855318	BUL1	37	1	Ubiquitin ligase-binding protein BUL1 GN=BUL1
850396	SYP1	36	1	Suppressor of yeast profilin deletion GN=SYP1
854068	ADH1	36	1	Alcohol dehydrogenase 1 GN=ADH1
		34	1	Pentatricopeptide repeat-containing protein YGR150C GN=YGR150C
852229	PIN4	34	1	RNA-binding protein PIN4 GN=PIN4
853512	RAD7	34	1	DNA repair protein RAD7 GN=RAD7
855882	PCL8	33	1	PHO85 cyclin-8 GN=PCL8
855875	NEW1	33	1	[NU+] prion formation protein 1 GN=NEW1

Appendix C2 TAP-MS analysis of Hsh155-TAP (+ DTT) Hsh155 containing CBP and Protein A at C-terminal end was used as bait. 10 mM DTT was included in the TAP. Proteins were identified with the aid of MASCOT.

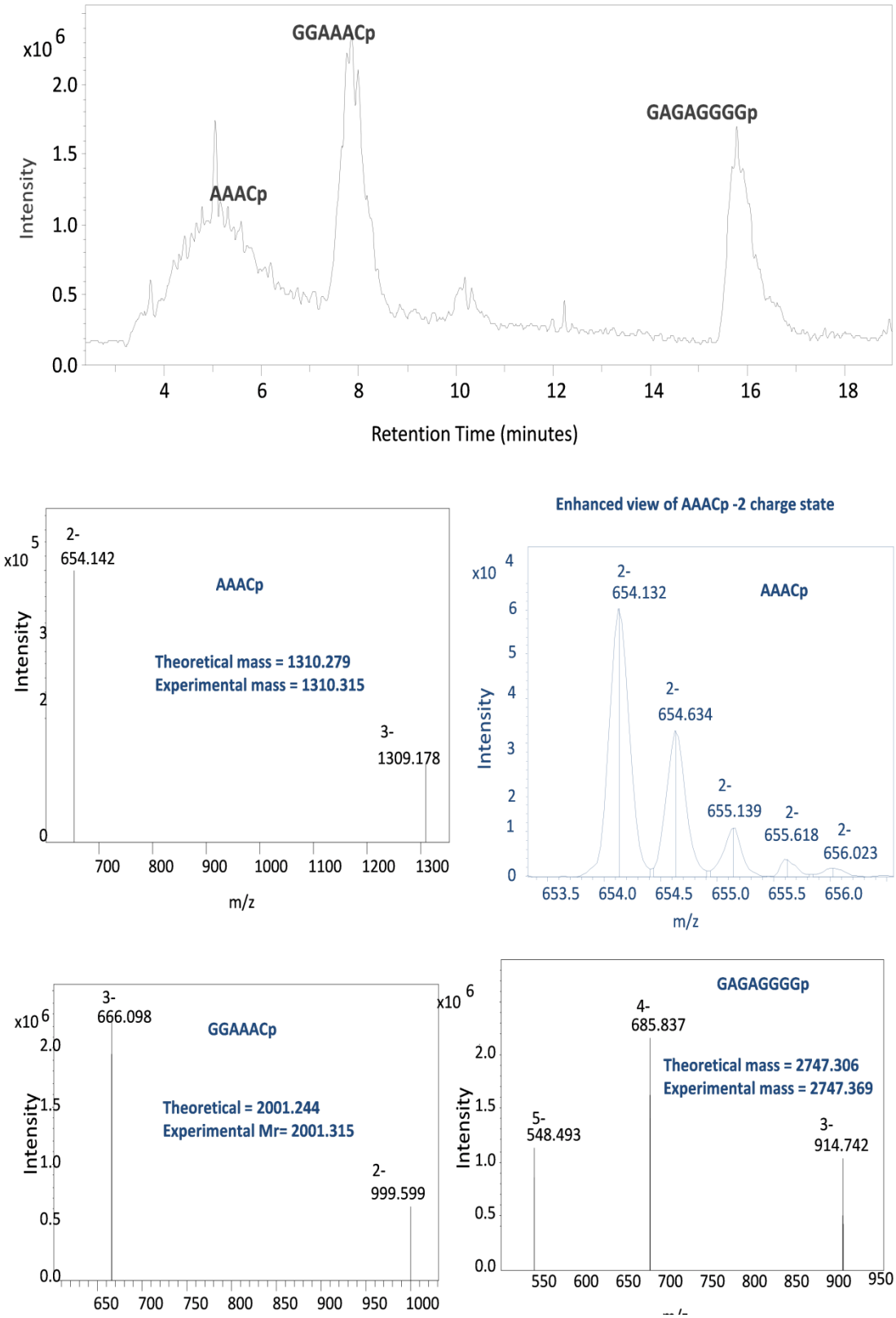
+DTT HSH155 (C-TAP) Gene ID = 855332

Hit GeneID	Hit Gene Name	Hit MASCOT Score	Unique Peptide Number	Hit Description
854956	RSE1	3080	53	Pre-mRNA-splicing factor RSE1 GN=RSE1
855332	HSH155	2047	36	U2 snRNP component HSH155 GN=HSH155
855281	CUS1	1664	30	Protein CUS1 GN=CUS1
850623	PRP19	910	16	Pre-mRNA-splicing factor 19 GN=PRP19
0		633	14	40S ribosomal protein S1-B;
0		590	3	40S ribosomal protein S1-A;
854497	HSH49	479	9	Protein HSH49 GN=HSH49
856195	TEF1	444	9	Elongation factor 1-alpha GN=TEF1
853681	SNU114	216	4	114 kDa U5 small nuclear ribonucleoprotein component GN=SNU114
851531	PRP9	215	5	Pre-mRNA-splicing factor PRP9 GN=PRP9
853195	CWC22	193	4	Pre-mRNA-splicing factor CWC22 GN=CWC22
855888	LEA1	193	5	U2 small nuclear ribonucleoprotein A' GN=LEA1
855952	PRP46	189	4	Pre-mRNA-splicing factor PRP46 GN=PRP46
856579	ENO2	188	5	Enolase 2 GN=ENO2
853106	TDH3	133	3	Glyceraldehyde-3-phosphate dehydrogenase 3 GN=TDH3
852357	ECM2	124	3	Pre-mRNA-splicing factor SLT11 GN=ECM2
851318	CWC2	70	2	Pre-mRNA-splicing factor CWC2 GN=CWC2
850843	STM1	63	1	Suppressor protein STM1 GN=STM1
856751	SMB1	46	1	Small nuclear ribonucleoprotein-associated protein B GN=SMB1
854068	ADH1	42	1	Alcohol dehydrogenase 1 GN=ADH1
855669	POR1	41	1	Mitochondrial outer membrane protein porin 1 GN=POR1
851369	SSB1	40	1	Heat shock protein SSB1 GN=SSB1
852737	YGL140C	37	1	Uncharacterized membrane protein YGL140C GN=YGL140C
855132	YKU80	33	1	ATP-dependent DNA helicase II subunit 2 GN=YKU80
		33	1	Probable serine/threonine-protein kinase YMR291W GN=YMR291W
856655	POL5	30	1	DNA polymerase V GN=POL5

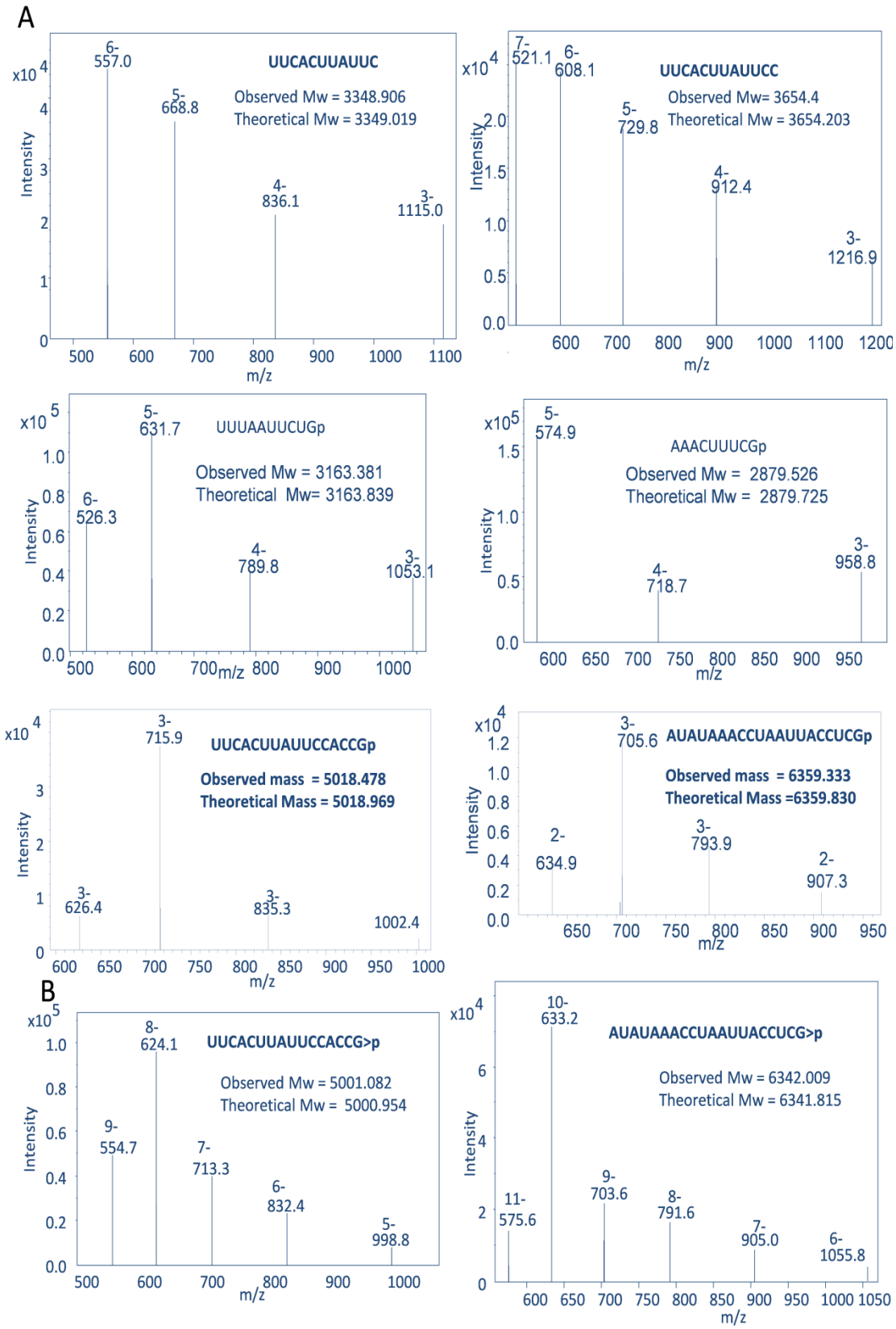


Appendix D1 Oligonucleotide mapping of *Streptococcus thermophilus* unmature CRISPR RNA. A) MS Base peak Chromatogram of Rnase T1 digest. The predominant oligonucleotide peaks are highlighted. Rnase T1 cleaves single-stranded RNA 3' of guanine residues. B) MS spectra of the oligos generated by Rnase T1 digest.

xxx



Appendix D2 RNase A digest and mass spectrometry analysis of *S. thermophilus* unmature crRNA. A) Base peak chromatogram of the RNase A digest of mature crRNA (extracted from Csm3+crRNA. The predominant oligoribonucleotide peaks assigned to the unmature crRNA are highlighted. B) MS spectra of the predominant oligos generated by Rnase A digest of RNA extracted Csm3+crRNA complex



Appendix D3 RNase A digest and mass spectrometry analysis of *S. thermophilus* mature crRNAs. A) MS spectra of the predominant oligos generated by Rnase T1 digest of crRNA extracted Csm2+crRNA complex. B) Cyclic phosphates were observed on two oligos from the same sample when digested with Rnase T1 for shorter time

Appendix D4 Proteins identified following mass spectrometry analysis of Csm complexes.

Csm3+crRNA

Protein	Mass (Da)	Score	Coverage (%)	Peptides
Cas 10	86891	1076	36	LAYYLTR GDYAAIATR VYINQFASDK TVETLVQFEK YFKPTVLNLK YHMANYQSDK HNYKEDLFTK LYVAFGWGSFAAK DSISLFSSDYTFK DIMSELNSPESYR IDLFYGALLHDIGK DFNQFLLANFQTR FITNVYDDKLEQIR EKIDLFYGALLHDIGK GNEKDSISLFSSDYTFK IWDTYTNQADIFNVFGAQTDK SKPNFASATYEPFSKGDYAAIATR IWDTYTNQADIFNVFGAQTDKR HALVGADWFDEIADNQVISDQIR
Csm3	24541	768	46	ITAEANPR FENTIDR TLNELLTAEV ATTVFGNYDVK LLELDYLGGSGSR LKATTVFGNYDVK VAEKPSDDSDILSR DPITNLPIIPGSSLK SYTEVKFENTIDR DAFLSNADELDSLGVR FENTIDRITAEANPR
Csm4	33727	584	33	KQDLYK IFSALVLESLK DGNLYQVATTR HDQIDQSVDVK SSGFAFSHATNENYR FELDIQNIPLELSDR NQPHKDGNLYQVATTR LYIMTFQNAHFGSGTLDSSK
Cas6	28240	197	16	LVFTFK LIFQSLMQK RIDHPAQDLAVK SQGSYVIFPSMR
Csm2	14817	186	21	AQILEALK VQFVYQAGR YMEALVAYFK
Csm5	41013	138	12	LISFLNDNR NHESFYEMGK DAFGNPYIPGSSLK

Csm2+crRNA

Protein	Mass (Da)	Score	Coverage (%)	Peptides
Cas 10	86891	1149	30	LAYYLTR GDYAAIATR VYINQFASDK YFKPTVLNLK YFFNHQDER YHMANYQSDK HNYKEDLFTK LYVAFGWGSFAAK DSISLFSSDYTFK DIMSELNSPESYR IDLFYGALLHDIGK DFNQFLLANFQTR FITNVYDDKLEQIR EKIDLFYGALLHDIGK GNEKDSISLFSSDYTFK IWDTYTNQADIFNVFGAQTDK SKPNFASATYEPFSKGDYAAIATR IWDTYTNQADIFNVFGAQTDKR HALVGADWFDEIADNQVISDQIR
Csm3	24541	801	57	ITAEANPR FENTIDR TLNELLTAEV ATTVFGNYDVK LLELDYLGGSGSR LKATTVFGNYDVK VAEKPSDDSDILSR DPITNLPIIPGSSLK SYTEVKFENTIDR DAFLSNADELDSLGVR FENTIDRITAEANPR NSTFDFELIYEITDENENQVEEDFK*
Csm4	33727	554	33	KQDLYK IFSALVLESLK DGNLYQVATTR HDQIDQSVDVK SSGFAFSHATNENYR FELDIQNIPLELSDR FELDIQNIPLELSDRLTK NQPHKDGNLYQVATTR SSGFGEFELDIQNIPLELSDR
Cas6	28240	171	16	LVFTFK LIFQSLMQK RIDHPAQDLAVK SQGSYVIFPSMR
Csm2	14817	110		AQILEALK VQFVYQAGR
Csm5	41013	965	50	WDYSAK QADGILQR EFIYENK FYFPDMGK TILMNTTPK KFYFPDMGK VSDSKPFDNK LISFLNDNR NHESFYEMGK EYDDLFNAIR WNNENAVNDFGR GKEYDDLFNAIR KGKEYDDLFNAIR IEFEITTTTDEAGR LSLLTLAPIHIGNGEK DAFGNPYIPGSSLK LAEKFEAFLIQTRPNAR