

SUPPLEMENTARY TABLES

SUPPLEMENTARY TABLE 1 | Mitochondrial introns in known *S. pombe* strains. The 9 introns are distinct in sequence, categorised into group I or II based on their predicted secondary structure, and might encode proteins (1, 2). Since *cox1-l1b* and *cox1-l1b'* are situated at the same position within *cox1*, a single *S. pombe* mitogenome could only harbour either of these and at most 8 introns. The 3 introns present in *S. pombe* 972h⁻ (the reference strain) are shaded.

Intron	Group	Protein-coding
<i>cytb-l1</i>	II	+
<i>cox1-l1a</i>	II	+
<i>cox1-l1b</i>	I	+
<i>cox1-l1b'</i>	I	?
<i>cox1-l2a</i>	I	-
<i>cox1-l2b</i>	I	+
<i>cox1-l3</i>	I	-
<i>cox1-l4</i>	II	+
<i>cox2-l1</i>	II	+

SUPPLEMENTARY TABLE 2 | Aminoacyl-tRNA ligases in *S. pombe* mitochondria and cytoplasm. Except for Grs1 and Vrs1/2 (shaded), whose functions have been published, the majority of factors were solely predicted from sequence homology (3–5).

Associated amino acid	Intracellular localisation		
	Mitochondrial	Dual	Cytoplasmic
Alanine		Ala1	
Arginine		Mrs1	
Asparagine	Slm5		Nrs1
Aspartate	Dar2		Drs1
Cysteine		Crsl ^a	
Glutamate ^b	Mse1		Gus1
Glutamine	Mse1 + Gta1/2/3		Qrs1
Glycine		Grs1	
Histidine		Hrs1	
Isoleucine	Ism1		Irs1
Leucine	SPAC4G8.09		Lrs1
Lysine	Msk1		Krs1
Methionine	Msm1		Rar1
Phenylalanine	Msf1		Frs1 + Frs2 ^c
Proline	SPBC24C6.03		Prs1
Serine	Dia4		Srs1
Threonine	SPAC24C9.09		Trs1
Tryptophan	Msw1		Wrs1
Tyrosine	SPCC576.06c		Yrs1
Valine	Vrs2		Vrs1

^a Crs1 (SPAC29E6.06c) is recorded in PomBase as a cytoplasmic cysteinyl-tRNA ligase (3). However, the protein might also function in the mitochondria, because (i) no mitochondrial cysteine-tRNA ligase has been identified in *S. pombe*, and (ii) a single *S. cerevisiae* *crs1* gene produces both a nuclear and a mitochondrial cysteinyl-tRNA ligase *via* alternative translation initiation (3, 6).

^b Sexual differentiation could be induced by supplementing *S. pombe* with glutamic acid, or overexpressing either *mse1* or *gus1* (7).

^c In *S. cerevisiae*, Frs1 and Frs2 are subunits of the cytoplasmic phenylalanyl-tRNA ligase complex (8).

SUPPLEMENTARY TABLE 3 | Confirmed and putative *S. pombe* mitoribosomal proteins. So far, only Mrp51/Mug178 (bS1m isoforms), Urfa (uS3m, mitochondrial-encoded), Bot1 (mS45) and the Aco2-bl21 tandem fusion protein have been studied (shaded). The remaining proteins were inferred from sequence homology (3, 9, 10).

A. Proteins from the small subunit of bacterial cytoplasmic and eukaryotic mitochondrial ribosome.

<i>S. pombe</i>		<i>E. coli</i>	<i>S. cerevisiae</i>		<i>H. sapiens</i>	Universal ID
Name	Systematic ID		ORF	Name		
	≥33	21	34		30	

***E. coli* proteins and possible mitochondrial homologues**

Mrp51	SPAC23A1.18c	S1	YPL118w	Mrp51	MRPS28	bS1m
Mug178	SPBC2G2.07c					
Mrp4	SPAC24C9.10c	S2	YHL004w	Mrp4	MRPS2	uS2m
Urfa	SPMIT.08	S3	Q0140	Var1	MRPS24	uS3m
Nam9	SPBC13G1.01c	S4	YNL137c	Nam9	-	uS4m
Mrp5	SPAC4G9.17c	S5	YBR251w	Mrps5	MRPS5	uS5m
Mrp17	SPAC343.08c	S6	YKL003c	Mrp17	MRPS6	bS6m
Rsm7	SPAC16E8.10c	S7	YJR113c	Rsm7	MRPS7	uS7m
Mrps8	SPCC736.10c	S8	YMR158w	Mrps8	-	uS8m
Mrps9	SPAC29A4.03c	S9	YBR146w	Mrps9	MRPS9	uS9m
Rsm10	SPBC211.01	S10	YDR041w	Rsm10	MRPS10	uS10m
Mrps18	SPAC1B3.18c	S11	YNL306w	Mrps18	MRPS11	uS11m
Mrps12	SPAC4F8.06	S12	YNR036c	Mrps12	MRPS12	uS12m
Sws2	SPCC1795.07	S13	YNL081c	Sws2	-	uS13m
Mrp2	SPAC23H3.07c	S14	YPR166c	Mrp2	MRPS14	uS14m
Mrps28	SPBC11B10.04c	S15	YDR337c	Mrps28	MRPS15	uS15m
Mrps16	SPBC354.06	S16	YPL013c	Mrps16	MRPS16	bS16m
Mrps17	SPBC409.14c	S17	YMR188c	Mrps17	MRPS17	uS17m
Rsm18	SPCC18B5.04	S18	YER050c	Rsm18	MRPS18 ^a	bS18m
Rsm19	SPAC1751.02c	S19	YNR037c	Rsm19	-	uS19m
	-	S20	-	-	-	-
Mrp21	SPBC839.09c	S21	YBL090w	Mrp21	MRPS21	bS21m

Proteins conserved in humans and both yeasts, and absent from E. coli

Rsm25	SPBC16A3.04	-	YIL093c	Rsm25	MRPS23	mS23
-	SPBC19F8.05 ^b	-	YOR158w	Pet123	MRPS26	mS26
Rsm23	SPBC29A3.15c	-	YGL129c	Rsm23	MRPS29	mS29
Rsm27	SPBC30D10.12c	-	YGR215w	Rsm27	MRPS33	mS33
Rsm24	SPAC2F7.15	-	YDR175c	Rsm24	MRPS35	mS35
Mrp10	SPAC24C9.13c	-	YDL045w-A	Mrp10	MRPS37	mS37
Cox24	SPAC1782.04	-	YLR204W	Cox24	MRPS38	mS38

Proteins conserved in both yeasts, and absent from E. coli and humans

Fyv4	SPBC4B4.11	-	YHR059W	Fyv4		mS41
-	SPBC16A3.14 ^c	-	YJR101w	Rsm26	-	mS42
-	SPBC3H7.04 ^c	-	YDR347w	Mrp1	-	mS43
Bot1	SPBC14C8.16c	-	YGR165w	Mrps35	-	mS45

Snr1	SPBC2D10.09	-	YDR036c	Ehd3		mS47
Proteins specific to <i>S. cerevisiae</i>						
-	-	-	YGR084c	Mrp13	-	mS44
-	-	-	YDR494w	Rsm28 ^d	-	mS46
Proteins specific to humans						
-	-	-	-	-	MRPS22	mS22
-	-	-	-	-	MRPS25 ^e	mS25
-	-	-	-	-	MRPS27	mS27
-	-	-	-	-	MRPS31	mS31
-	-	-	-	-	MRPS34	mS34
-	-	-	-	-	MRPS39	mS39
-	-	-	-	-	MRPS18B ^a	mS40

^aThere are 3 homologues of *E. coli* bS18 in the human mitoribosome: MRPS18A (mL66, see table below), MRPS18B (mS40) and MRPS18C (bS18m) (11).

^bWe propose *S. pombe* SPBC19F8.05 to be an mS26 family member, based on sequence homology and co-enrichment with Mrh5 (Supplementary Data of (10)).

^c*S. pombe* SPBC16A3.14 and SPBC3H7.04 each bears sequence homology to both *S. cerevisiae* Rsm26 (mS42) and Mrp1 (mS43) (3).

^d*S. cerevisiae* Rsm28 (mS46) occupies a position equivalent to MRPS31 (mS31) in human mt-SSU (12).

^eHuman MRPS25 (mS25) and *S. cerevisiae* Mrp49 (mL61, see table below) share sequence homology (3, 13), albeit belonging to different mitoribosomal subunits (11, 12).

Proteins previously included as part of the mitoribosome are *S. cerevisiae* Ppe1 (YHR075c, homologous to *S. pombe* SPBP4H10.17c), *S. cerevisiae* Rsm22 (YKL155c, homologous to the N-terminus of *S. pombe* SPAC1420.04c and SPAC19B12.13 tandem fusion proteins) and *H. sapiens* MRPS36.

B. Proteins from the large subunit of bacterial cytoplasmic and eukaryotic mitochondrial ribosome.

<i>S. pombe</i>		<i>E. coli</i>	<i>S. cerevisiae</i>		<i>H. sapiens</i>	Universal ID
Name	Systematic ID		ORF	Name		
	≥46	33	46		52	

E. coli proteins and possible mitochondrial homologues

Mrpl1	SPAC1610.02c	L1	YDR116c	Mrpl1	MRPL1	uL1m
Rml2	SPCC16C4.15	L2	YEL050c	Rml2	MRPL2	uL2m
Mrpl9	SPAC644.17c	L3	YGR220c	Mrpl9	MRPL3	uL3m
Yml6	SPBC2D10.08c	L4	YML025c	Yml6	MRPL4	uL4m
Mrpl7	SPBC2F12.02c	L5	YDR237w	Mrpl7	-	uL5m
Mrpl6	SPAC12G12.08	L6	YHR147c	Mrpl6	-	uL6m
Mrpl12	SPCC4B3.09c	L7/L12	YGL068w	-	MRPL7	bL12m
-	SPCC777.17c	L9	YNR022c	Mrpl50	MRPL9	bL9m
Mrp11	SPAC31A2.03	L10	YDL202w	Mrpl11	MRPL10	uL10m
Mrpl19	SPAC1486.07c	L11	YNL185c	Mrpl19	MRPL11	uL11m
Mrpl23	SPBC16G5.04	L13	YOR150w	Mrpl23	MRPL13	uL13m
Mrpl38	SPBC887.07	L14	YKL170w	Mrpl38	MRPL14	uL14m
Mrpl10	SPBC9B6.06	L15	YNL284c	Mrpl10	MRPL15	uL15m
Mrpl16	SPBC1105.03c	L16	YBL038w	Mrpl16	MRPL16	uL16m

Mrpl8	SPBC1271.13	L17	YYJL063c	Mrpl8	MRPL17	uL17m
-	-	L18	-	-	MRPL18	uL18m
Img1	SPAC343.02	L19	YCR046c	Img1	MRPL19	bL19m
-	-	L20	-	-	MRPL20	bL20m
Aco2	SPBP4H10.15	L21	YJL096w	Mrpl49	MRPL21	bL21m
Mrpl22	SPCC1739.02c	L22	YNL177c	Mrpl22	MRPL22	uL22m
Mrp20	SPAC31A2.08	L23	YDR405w	Mrp20	MRPL23	uL23m
Mrpl40	SPAC4F8.02c	L24	YPL173w	Mrpl40	MRPL24	uL24m
-	-	L25	-	-	-	
Mrp7	SPAP19A11.05c	L27	YNL005c	Mrp7	MRPL27	bL27m
Mrpl24	SPBC14C8.10	L28	YMR193w	Mrpl24	MRPL28	bL28m
Mrpl4	SPCC4G3.06c	L29	YLR439w	Mrpl4	MRPL47	uL29m
Mrpl33	SPCC1919.08c	L30	YMR286w	Mrpl33	MRPL30	uL30m
Tam9	SPBC1711.18	L31	YBR122c	Mrpl36	-	bL31m
Mrpl32	SPBC1604.13c	L32	YCR003w	Mrpl32	MRPL32	bL32m
Mrpl39	SPBC4F6.08c	L33	YML009c	Mrpl39	MRPL33	bL33m
Mrx14	SPBC21C3.04c	L34	YDR115w	Mrx14	MRPL34	bL34m
New15	SPBC8D2.23	L35	YNL122c	Mrp35	MRPL35	bL35m
Rtc6	SPBC83.06c	L36	YPL183w-A	Rtc6	MRPL36	bL36m

Proteins conserved in humans and both yeasts, and absent from E. coli

Mrpl35	SPBC2F12.10	-	YDR322w	Mrpl35	MRPL38	mL38
Mrpl28	SPAC4F8.05c	-	YDR462w	Mrpl28	MRPL40	mL40
Mrpl27	SPAC3A12.19	-	YBR282w	Mrpl27	MRPL41	mL41
Mrpl51	SPBC19C2.12	-	YPR100w	Mrpl51	MRPL43	mL43
Mrpl3	SPBC3B9.14c	-	YMR024w	Mrpl3	MRPL44	mL44
Mrpl17	SPCC126.05c	-	YNL252c	Mrpl17	MRPL46	mL46
Img2	SPAC3H8.03	-	YCR071c	Img2	MRPL49	mL49
-	SPCC24B10.04 ^a	-	YKR006c	Mrpl13	MRPL50	mL50
Mrpl44	SPBC56F2.14	-	YMR225c	Mrpl44	MRPL53	mL53
Mrpl37	SPCC645.09	-	YBR268w	Mrpl37	MRP-L54	mL54

Proteins conserved in both yeasts, and absent from E. coli and humans

Mrpl15	SPBC1539.01c	-	YLR312w-A	Mrpl15	-	mL57
Mrpl20	SPCC1393.11	-	YKR085c	Mrpl20	-	mL58
Mrpl25	SPAC1952.14c	-	YGR076c	Mrpl25	-	mL59
Mrpl31	SPCC16A11.11	-	YKL138c	Mrpl31	-	mL60
Mrp49	SPCC1442.19	-	YKL167c	Mrp49 ^b	-	mL61
Mhr1	SPBC18H10.17c	-	YDR296w	Mhr1	-	mL67

Proteins specific to humans

-	-	-	-	-	MRPL37	mL37
-	-	-	-	-	MRPL39	mL39
-	-	-	-	-	MRPL42	mL42
-	-	-	-	-	MRPL45	mL45
-	-	-	-	-	MRPL48	mL48
-	-	-	-	-	MRPL51	mL51
-	-	-	-	-	MRPL52	mL52

-	-	-	-	-	MRPL55	mL55
-	-	-	-	-	MRPL58 (ICT1)	mL62
-	-	-	-	-	MRPL57	mL63
-	-	-	-	-	MRPL59	mL64
-	-	-	-	-	MRPS30 ^c	mL65
-	-	-	-	-	MRPS18A ^d	mL66

^aWe propose *S. pombe* SPCC24B10.04 to be an mL50 family member, based on sequence homology and co-enrichment with Mrh5 (Supplementary Data of (10)).

^bHuman MRPS25 (mS25, see table above) and *S. cerevisiae* Mrp49 (mL61) share sequence homology (3, 13), albeit belonging to different mitoribosomal subunits (11, 12).

^c*H. sapiens* MRPS30 was previously assigned to the mS30 family, albeit actually corresponding to mL65.

^dThere are 3 homologues of *E. coli* bS18 in the human mitoribosome: MRPS18A (mL66), MRPS18B (mS40, see table above) and MRPS18C (bS18m, see table above) (11).

Previously, *H. sapiens* MRPL56 (LACTB) was included as part of the mt-LSU.

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