

wwPDB EM Validation Summary Report (i)

Feb 23, 2022 – 09:58 pm GMT

PDB ID	:	7QH6
EMDB ID	:	EMD-13965
Title	:	Cryo-EM structure of the human mtLSU assembly intermediate upon MRM2
		depletion - class 1
Authors	:	Rebelo-Guiomar, P.; Pellegrino, S.; Dent, K.C.; Warren, A.J.; Minczuk, M.
Deposited on	:	2021-12-10
Resolution	:	3.08 Å(reported)
Based on initial model	:	500L

This is a wwPDB EM Validation Summary Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org* A user guide is available at https://www.wwpdb.org/validation/2017/EMValidationReportHelp with specific help available everywhere you see the (i) symbol.

The following versions of software and data (see references (1)) were used in the production of this report:

EMDB validation analysis	:	$0.0.0.{ m dev}97$
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.26

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure: $ELECTRON\ MICROSCOPY$

The reported resolution of this entry is 3.08 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	$egin{array}{c} { m Whole \ archive} \ (\#{ m Entries}) \end{array}$	${f EM} {f structures} \ (\#{f Entries})$
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion < 40%). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain		
1	D	305	• 57%	43%	
2	Е	348	80%	•	18%
3	F	311		5%	20%
4	Н	267	33 % • 64%		
5	K	178	9 7%		
6	L	145	77%	•	21%
7	М	296	93%		• •
8	N	251	79%	•	18%

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Mol	Chain	Length	Quality of chain						
9	Ο	175	• 81%		6% 13%				
10	Р	180	73%	6%	22%				
11	Q	292	73%	•	26%				
12	R	149	92%		• 6%				
13	S	205	71%	5%	24%				
14	Т	206	<u>6%</u> 75%	6%	19%				
15	U	153	5% 88%		• 9%				
16	V	216	20%	•	25%				
17	W	148	72%	•	26%				
18	Х	256	91%		• 5%				
19	Y	250	68%	•	30%				
20	Z	161	• 69%	•	27%				
21	0	188	54% •	43%					
22	1	65	80%		20%				
23	2	92	47% •	51%					
24	3	188	48% •	49%					
25	5	423	84%		• 12%				
26	6	380	• 79%	6	% 15%				
27	7	338	83%		• 15%				
28	9	137	82%		• 15%				
29	a	142	- 55% •	42%					
30	b	215	66%		31%				
31	с	332	81%		• 17%				
32	d	306	6 0%		%				
33	g	166	74%	•	22%				

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Mol	Chain	Length	Quality of chain	
34	h	158	61%	37%
35	i	128	73%	• 24%
36	j	123	67%	• 31%
37	О	102	85%	• 11%
38	р	206	5% 57% ·	38%
39	q	222	5% 56% ·	42%
40	r	196	63% •	34%
41	S	439	80%	• 16%
42	u	234	46% •	53%
43	v	70	96%	· .
44	W	156	38% 49%	49%
45	А	1559	48% 24%	27%
46	В	69	62%	19% 19%

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2 Entry composition (i)

There are 47 unique types of molecules in this entry. The entry contains 83425 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

• Molecule 1 is a protein called 39S ribosomal protein L2, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	D	174	Total 1349	C 834	N 268	0 240	${f S}{7}$	0	0

• Molecule 2 is a protein called 39S ribosomal protein L3, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	Е	284	Total 2249	C 1451	N 382	O 405	S 11	0	0

• Molecule 3 is a protein called 39S ribosomal protein L4, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	F	250	Total 2013	C 1294	N 365	0 348	S 6	0	0

• Molecule 4 is a protein called 39S ribosomal protein L9, mitochondrial.

Mol	Chain	Residues		Ato	\mathbf{ms}	AltConf	Trace	
4	Н	95	Total 784	C 498	N 152	0 134	0	0

• Molecule 5 is a protein called 39S ribosomal protein L13, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	K	177	Total 1451	C 934	N 259	0 251	S 7	0	0

• Molecule 6 is a protein called 39S ribosomal protein L14, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	L	115	Total 889	C 559	N 171	0 154	${f S}{5}$	0	0



• Molecule 7 is a protein called 39S ribosomal protein L15, mitochondrial.

Mol	Chain	Residues		Ate	oms			AltConf	Trace
7	М	287	Total 2305	C 1472	N 425	O 402	S 6	0	0

• Molecule 8 is a protein called 39S ribosomal protein L16, mitochondrial.

Mol	Chain	Residues		At	oms			AltConf	Trace
8	Ν	205	Total 1654	C 1056	N 308	O 280	S 10	0	0

• Molecule 9 is a protein called 39S ribosomal protein L17, mitochondrial.

Mol	Chain	Residues		At	oms	AltConf	Trace		
9	О	152	Total 1245	С 784	N 239	0 215	${f S}{7}$	0	0

• Molecule 10 is a protein called 39S ribosomal protein L18, mitochondrial.

Mol	Chain	Residues		At	oms			AltConf	Trace
10	Р	141	Total 1148	C 719	N 221	O 203	${ m S}{ m 5}$	0	0

• Molecule 11 is a protein called 39S ribosomal protein L19, mitochondrial.

Mol	Chain	Residues		Ate	oms			AltConf	Trace
11	Q	217	Total 1805	C 1159	N 317	O 320	${f S}$ 9	0	0

• Molecule 12 is a protein called 39S ribosomal protein L20, mitochondrial.

Mol	Chain	Residues		At	oms			AltConf	Trace
12	R	140	Total 1153	C 732	N 231	0 186	${S \atop 4}$	0	0

• Molecule 13 is a protein called 39S ribosomal protein L21, mitochondrial.

Mol	Chain	Residues		At	oms			AltConf	Trace
13	S	156	Total 1251	C 806	N 222	0 219	$\frac{S}{4}$	0	0

• Molecule 14 is a protein called 39S ribosomal protein L22, mitochondrial.



Mol	Chain	Residues		At	oms	AltConf	Trace		
14	Т	166	Total 1368	C 875	N 254	O 232	${ m S} 7$	0	0

• Molecule 15 is a protein called 39S ribosomal protein L23, mitochondrial.

Mol	Chain	Residues		At	oms	AltConf	Trace		
15	U	139	Total 1154	С 734	N 220	O 197	${ m S} { m 3}$	0	0

• Molecule 16 is a protein called 39S ribosomal protein L24, mitochondrial.

Mol	Chain	Residues		At	oms			AltConf	Trace
16	V	163	Total 1333	C 848	N 231	0 247	${f S}{7}$	0	0

• Molecule 17 is a protein called 39S ribosomal protein L27, mitochondrial.

Mol	Chain	Residues		At	\mathbf{oms}			AltConf	Trace
17	W	109	Total 859	C 552	N 162	0 142	${ m S} { m 3}$	0	0

• Molecule 18 is a protein called 39S ribosomal protein L28, mitochondrial.

Mol	Chain	Residues		Ate		AltConf	Trace		
18	Х	243	Total 2035	C 1317	N 351	0 362	${ m S}{ m 5}$	0	0

• Molecule 19 is a protein called 39S ribosomal protein L47, mitochondrial.

Mol	Chain	Residues		At	oms			AltConf	Trace
19	Y	176	Total 1517	C 970	N 291	O 252	${S \atop 4}$	0	0

• Molecule 20 is a protein called 39S ribosomal protein L30, mitochondrial.

Mol	Chain	Residues		At	oms			AltConf	Trace
20	Z	117	Total 955	C 610	N 179	O 163	${ m S} { m 3}$	0	0

• Molecule 21 is a protein called 39S ribosomal protein L32, mitochondrial.



Mol	Chain	Residues		At	oms	AltConf	Trace		
21	0	108	Total 880	$\begin{array}{c} \mathrm{C} \\ 545 \end{array}$	N 172	O 157	S 6	0	0

• Molecule 22 is a protein called 39S ribosomal protein L33, mitochondrial.

Mol	Chain	Residues		Ato	\mathbf{ms}	AltConf	Trace		
22	1	52	Total 433	C 278	N 83	O 70	${ m S} { m 2}$	0	0

• Molecule 23 is a protein called 39S ribosomal protein L34, mitochondrial.

Mol	Chain	Residues		Ato	\mathbf{ms}	AltConf	Trace		
23	2	45	Total 367	C 227	N 81	O 58	S 1	0	0

• Molecule 24 is a protein called 39S ribosomal protein L35, mitochondrial.

Mol	Chain	Residues		At	\mathbf{oms}			AltConf	Trace
24	3	95	Total 831	C 539	N 162	0 127	${ m S} { m 3}$	0	0

• Molecule 25 is a protein called 39S ribosomal protein L37, mitochondrial.

Mol	Chain	Residues		At	oms			AltConf	Trace
25	5	373	Total 3037	C 1964	N 526	O 536	S 11	0	0

• Molecule 26 is a protein called 39S ribosomal protein L38, mitochondrial.

Mol	Chain	Residues		At		AltConf	Trace		
26	6	324	Total 2640	C 1694	N 470	O 468	S 8	0	0

• Molecule 27 is a protein called 39S ribosomal protein L39, mitochondrial.

Mol	Chain	Residues		At	oms			AltConf	Trace
27	7	287	Total 2334	C 1495	N 397	0 425	S 17	0	0

• Molecule 28 is a protein called 39S ribosomal protein L41, mitochondrial.



Mol	Chain	Residues		At	oms	AltConf	Trace		
28	9	117	Total 947	C 614	N 163	0 168	${ m S} { m 2}$	0	0

• Molecule 29 is a protein called 39S ribosomal protein L42, mitochondrial.

Mol	Chain	Residues		At	oms	AltConf	Trace		
29	a	82	Total 686	C 434	N 124	0 123	${f S}{5}$	0	0

• Molecule 30 is a protein called 39S ribosomal protein L43, mitochondrial.

Mol	Chain	Residues		At	oms		AltConf	Trace	
30	b	148	Total 1178	C 733	N 229	0 213	${ m S} { m 3}$	0	0

• Molecule 31 is a protein called 39S ribosomal protein L44, mitochondrial.

Mol	Chain	Residues		At	oms			AltConf	Trace
31	с	275	Total 2217	C 1415	N 383	0 410	S 9	0	0

• Molecule 32 is a protein called 39S ribosomal protein L45, mitochondrial.

Mol	Chain	Residues		At	oms			AltConf	Trace
32	d	185	Total 1529	C 989	N 260	0 271	S 9	0	0

• Molecule 33 is a protein called 39S ribosomal protein L49, mitochondrial.

Mol	Chain	Residues		At	oms			AltConf	Trace
33	g	129	Total 1067	C 690	N 185	O 190	${ m S} { m 2}$	0	0

• Molecule 34 is a protein called 39S ribosomal protein L50, mitochondrial.

Mol	Chain	Residues		At	oms	AltConf	Trace		
34	h	100	Total 827	C 524	N 146	0 155	${S \over 2}$	0	0

• Molecule 35 is a protein called 39S ribosomal protein L51, mitochondrial.



Mol	Chain	Residues		At	oms			AltConf	Trace
35	i	97	Total 827	C 532	N 165	O 126	$\frac{S}{4}$	0	0

• Molecule 36 is a protein called 39S ribosomal protein L52, mitochondrial.

Mol	Chain	Residues		At	oms	AltConf	Trace		
36	j	85	Total 684	C 423	N 133	O 126	${S \over 2}$	0	0

• Molecule 37 is a protein called Ribosomal protein 63, mitochondrial.

Mol	Chain	Residues		At	oms	AltConf	Trace		
37	О	91	Total 771	C 487	N 156	0 125	${ m S} { m 3}$	0	0

• Molecule 38 is a protein called Peptidyl-tRNA hydrolase ICT1, mitochondrial.

Mol	Chain	Residues		At	oms	AltConf	Trace		
38	р	127	Total 1058	C 661	N 201	O 192	${S \over 4}$	0	0

• Molecule 39 is a protein called Growth arrest and DNA damage-inducible proteins-interacting protein 1.

Mol	Chain	Residues		At	oms			AltConf	Trace
39	q	128	Total 1076	C 671	N 208	0 192	${ m S}{ m 5}$	0	0

• Molecule 40 is a protein called 39S ribosomal protein S18a, mitochondrial.

Mol	Chain	Residues		At	oms	AltConf	Trace		
40	r	130	Total 1075	C 683	N 210	0 174	S 8	0	0

• Molecule 41 is a protein called 39S ribosomal protein S30, mitochondrial.

Mol	Chain	Residues		At	oms			AltConf	Trace
41	S	370	Total 3036	C 1946	N 542	0 534	S 14	0	0

• Molecule 42 is a protein called Mitochondrial assembly of ribosomal large subunit protein 1.



Mol	Chain	Residues		\mathbf{A}	toms			AltConf	Trace
42	u	111	Total 927	C 595	N 155	O 167	S 10	0	0

• Molecule 43 is a protein called MIEF1 upstream open reading frame protein.

Mol	Chain	Residues	Atoms			AltConf	Trace	
43	v	69	Total 588	C 372	N 116	O 100	0	0

• Molecule 44 is a protein called Acyl carrier protein, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
44	W	79	Total 638	C 410	N 95	0 128	${f S}{5}$	0	0

• Molecule 45 is a RNA chain called 16S ribosomal RNA.

Mol	Chain	Residues		A	toms			AltConf	Trace
45	А	1133	Total 24063	C 10801	N 4361	O 7768	Р 1133	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
А	3107	U	UNK	$\operatorname{conflict}$	GB 1025814679

• Molecule 46 is a RNA chain called mitochondrial tRNAVal.

Mol	Chain	Residues	Atoms				AltConf	Trace	
46	В	56	Total 1191	C 534	N 214	O 387	Р 56	0	0

• Molecule 47 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	AltConf
47	0	1	Total Zn 1 1	0



3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

• Molecule 1: 39S ribosomal protein L2, mitochondrial





Chain H:	33%	•	64%	1
MET ALA ALA ALA PRO PRO VAL VAL TAR ALA GLY GLY ARG	LEU LEU ARG ALA ALA GLY ALA ALA ARG LEU LEU	ARG GLY CLY CLY CLN CLN CLU CLU CLU CLU ARG ARG ARG ARG ARG ARG ARG ARG ARG ARG	ALA ALA PRO PRO ALA CYS CYS CSR ALA ALA ALA ALA ALA ALA ALA ALA ALA AL	L96 L96 D110
F140 E141 E141 E142 E142 E143 GLN GLN GLN GLU GLV GLV GLV	LYS THR GLN ALA GLY GLY ALA ALA	VAL LYS PHE LEU LEU CYS CYS CYS CYS CYS CYS CYS CYS CYS CYS	ASN VAL LYS LYS CLU CLU CLU CLU ASN ARC ARC ARC ARC ARC ARC ARC ARC ARC ARC	LEU GLY VAL VAL VAL
ALA PRO HIS THR LEU LEU CVS GLU GLU PRO GLU	THR THR ARG GLY GLU TYR CYS GLU VAL	THR VAL ASN GLY ASP ASP VAL ANG PRO MET SER VAL	ASN ASN ASN CUU CUU CUU CUN CUN CUN CUN ARC CUN CUN ALA ALA ALA ALA ALA	ALA ALA LYS ALA MET ALA
PRO THR SER PRO GLN ILE				
• Molecule 5: 3	9S ribosomal j	protein L13, mitocho	ondrial	
Chain K:		97%	•	
MET 82 843 143 115 115 115 115 115 115 115	ht 77			
• Molecule 6: 3	9S ribosomal _l	protein L14, mitocho	ndrial	
Chain L:		77%	• 21%	-
MET ALA PHE PHE THR GLY LEU TRP GLY FRO PHE	LIAN CYS VAL SER ARG VAL LEU SER HIS HIS CYS	PHE SER THR THR THR GLY GLY GLY GLY SER SER SER SER V105 V105	R130	
• Molecule 7: 3	9S ribosomal j	protein L15, mitocho	ondrial	
Chain M:		93%		
MET ALA ALA ALA PRO PRO GLY GLY GLY GLY	R17 R44 E56 F74 F74 E85	L118 L118 R134 8160 1187 1222 C257 C257 C257	6 6 7 7	
• Molecule 8: 3	9S ribosomal j	protein L16, mitocho	ondrial	
Chain N:		79%	• 18%	-
MET TRP ARG LEU LEU LEU ARG ALA SER SER SER SER	LEU LEU ARG PRO PRO LEU SER SER ALA ALA	LEU LEU LEU ALA ALA ALA ALA ALA ALA CLY VAL LEU LEU LEU LEU VAL PRO	SER SER PHE ASP ASP VAL SER TLU CAL CAL CAL CAL CAL CAL CAL CAL CAL CAL	D201 N209 M247
V261				
• Molecule 9: 3	9S ribosomal _l	protein L17, mitocho	ondrial	
Chain O:		81%	6% 13%	-

W O R L D W I D E PROTEIN DATA BANK

MET ARC ARC SER SER ALA ALA ALA ALA ALA ALA ALA ALA ALA AL	D99 1101 1101 1101 1101 1105 1115 1115 11	HIS THR ALA GLA THR THR THR THR IL
• Molecule 10: 39S ribosomal	l protein L18, mitochondr	ial
Chain P:	73%	6% 22%
MET ALKA ALKA ALKG ALKG ARKG PHHE PHHE CYS ASIN ASIN ASIN CYS ASIN ASIN ARG CYS ASIN ARG ASIN ARG ASIN ARG ARG ASIN ARG ACTA ACTA ACTA ACTA ACTA ACTA ACTA ACT	ALA ALA LEU SER THR THR THR SER PRO PRO PRO GLU CTA CTA CTA CTA CTA	E47 E57 E57 E57 E57 E56 S106 S106 C136 R120 R120 S155 S155 S155
<mark>7179</mark>		
• Molecule 11: 39S ribosomal	l protein L19, mitochondr	ial
Chain Q:	73%	• 26%
MET ALA ALA CYS CYS CYS CYS ALA ALA ALA ALA ALA ALA ALA	ARA THR LEU LEU PRO PRO PRO PRO PRO PRO ALA ALA ALA ALA ALA ALA ARG CYS ARG CYS ARG CYS ARG CYS ARG CYS ARC ARA PRO PRO PRO PRO PRO PRO PRO PRO PRO PRO	ARG GLN GLN SER THR SER THR FRO SER RLY CLY RL PHE GLV PRO CLY FRO CLY FRO CLY FRO CLY
VAL VAL ILE ASP ASP ARG CLU CLU CLU CLU CLU CLU ARG ARG ARG ARG ARG ARG ARG ARG ARG ARG	K290 ARG SER	
• Molecule 12: 39S ribosomal	protein L20 mitochondr	ial
	protein 120, intechendi	141
Chain R:	92%	• 6%
Chain R:	92%	• 6%
 Chain R: Chain R: Molecule 13: 39S ribosomal 	92% 92% I protein L21, mitochondr	· 6%
 Chain R: Chain R: Molecule 13: 39S ribosomal Chain S: 	92% 92% I protein L21, mitochondr 71%	• 6% ial
Chain R: Molecule 13: 39S ribosomal Chain S:	92% 92% I protein L21, mitochondr 71%	• 6% ial 5% 24%
Chain R: Molecule 13: 39S ribosomal Chain S: Molecule 13: 39S ribosomal Chain S: Molecule 13: 39S ribosomal	92% 92% I protein L21, mitochondr 71%	• 6% ial 5% 24%
 Chain R: Chain R: Molecule 13: 39S ribosomal Chain S: Signature Signature Signatu	92% 92% I protein L21, mitochondr 71% R & & & & & & & & & & & & & & & & & & &	- 6% ial 5% 24%
Chain R: Molecule 13: 39S ribosomal Chain S: Molecule 14: 39S ribosomal Molecule 14: 39S ribosomal Chain T:	92% 92% I protein L21, mitochondr 71% B Z Z & S Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z	- 6% ial 5% 24% E 5 E E E E E E E E E E E E E E E E E E



R163 F166 F166 F166 F166 F191 F191 F191 F191
• Molecule 15: 39S ribosomal protein L23, mitochondrial
Chain U: 88% • 9%
MET A2 N23 D38 H74 B38 B38 B38 B38 CUU CUU CUU CUU CUU CUU CUU CUU CUU CU
• Molecule 16: 39S ribosomal protein L24, mitochondrial
20% Chain V: 75% · 25%
MET ARG ARG ARG ALA ALA ALA ALA ALA ALA ALA CLEU CLEU PRO PRO PRO PRO ARG ARG ARG ARG ARG ARG ARG ARG ARG ARG
Q82 N105 V125 V125 V125 N126 N136 N136 N136 N136 N146 N166 N166 N166 N166 N166 N166 N166 N166
\bullet Molecule 17: 39S ribosomal protein L27, mitochondrial
Chain W: 72% · 26%
MET VAL VAL LEU ALA LEU ALA ALA ALA THR ALA ALA ALA ALA ALA ALA ALA ALA ALA AL
\bullet Molecule 18: 39S ribosomal protein L28, mitochondrial
Chain X: 91% · 5%
MET R36 R36 R36 R36 R36 R37 C1101 L101 L101 R37 R37 R10 R10 R10 R10 R10 R10 R10 R10 R10 R10
\bullet Molecule 19: 39S ribosomal protein L47, mitochondrial
Chain Y: 68% · 30%
MET ALA ALA ALA ALA ALA ALA ALA ALA ALA AL
ARG LYS LYS B97 E96 E96 E96 C33 C236 K223 C238 C238 C238 C238 C238 C238 C238 C
\bullet Molecule 20: 39S ribosomal protein L30, mitochondrial
Chain Z: 69% · 27%
WORLDWIDE PROTEIN DATA BANK

MET ALA ALA ALA LEU LEU VAL VAL VAL VAL TRP PRO PRO	GLY ARG LEU LEU THR THR THR LYS GLY VAL CYS GLU SER LEU LLE CYS CYS	TRP TILE TILE ARG KIS KIS K7 K7 K7	S105 N112 L151 PR0 CLN CLN CLN CLN CLN CLN SER ALA ALA ALA ALA ALA SER
• Molecule 21: 39	S ribosomal protein L3	32, mitochondrial	
Chain 0:	54%	·	43%
MET ALA ALA LEU MET MET LEU VAL VAL VAL VAL SER SER FRO	SER ALA ALA ALA ARG GLY CLEU CLEU ARG GLU CLEU CLEU ARG CLU CLEU	LLIS LEU PRO GLN SER ARG PRO GLY PHE PRO SER PRO SER TRP	GLY ALA ALA ALA ALA VAL GLY PHE THR PHE THR CLU CLU CLU ALA ASN
ASP THR STHR STH SER CLY SER CLY SER SER SER SER SER SER SER SER SER SER	SER ILLE PHE MET MPG N96 N10 C110 C110 C110 C110 C110	1104 1186 GLN ASN	
• Molecule 22: 39	S ribosomal protein L3	33, mitochondrial	
Chain 1:	80%		20%
MET PHE LEU SER VAL VAL PHE PHE ALA LVS SER SER	K14 LS7		
• Molecule 23: 39	S ribosomal protein L3	34, mitochondrial	
Chain 2:	47%	• 519	%
MET ALA VAL LEU LEU GLY CLV LEU LEU LEU CLY THR SER SER	ARG ALA ALA ALA ALA LEU CLEU CLEU CLEU CLN ARG ALA ALA ALA ALA ALA	CLEV CLEV PHE ASP ASP ALA ALA CLEV CLEV PRO FLN GLN GLN	ALA ALA GLY GLY A48 N51 H92 H92
• Molecule 24: 39	S ribosomal protein L3	35, mitochondrial	
Chain 3:	48%	• 49	0%
MET ALA ALA SER SER ALA GLY GLY ALA ALA ALA	SER GLY ILE LEU ARG ARG ARG ALA SER SER TYR SER TYR ARG	CASN CASN VAL LYS ALA ALA SER LEU LEU SER LEU SER CASN THR	ARG PHE FHE TLE FILE FILE FILE FAC FILE FAC FILE FRC FILE FILE LEU
THR THR SER GLU ASN ASN THR THR CYS CYS CYS SER THR SER	VAL LILE LILE ASN ASN ASN ALA ALA ALA PAL PAL PAL PAL FEU VAL LIEU LIEU	VAL VAL ARG SER L194 L13 R113 R125 T162 T163 S164 S164	X108
• Molecule 25: 39	S ribosomal protein L3	37, mitochondrial	
Chain 5:	84%		• 12%
MET LEU LEU ALA ALA ALA ALA ARG ARG ALA ALA ALA	SER SER GLN GLN GLN GLN GLN ARG ARG ARG ARG ARG ARG ARG ARG	TYR TYR GLU GLU GLU GLU VAL TRR TRR TRR TRR TRR SER SER SER SER SER	PR0 P45 E56 E148 E148 E148 E152 T175 D182 S210
L218 N250 F256 H266 D272 D276	L294 L294 L365 L365 L382 L382 L382 L382 L382 L185 L185 L185 L185 L185 L185 L185 L185	A422 Ala	

• Molecule 26: 39S ribosomal protein L38, mitochondrial



Chain 6:	79%	6%	15%
MET ALA ALA ALA TRP PRD TRP ALA ALA ALA ALA ALA ARG CYS CYS CYS CYS CYS CYS CYS CYS ARG CYS ARG ARG ARG ARG ARG ARG ARA ARA ALA ALA ALA ALA ALA ALA ALA ALA	THR SER ALA ALA ALA CICU CICU CICU CICU CICU	LYS THR ASP PRO LYS CLYS CLYS TLE ASP CLEU TLE PRO PRO	LYES VAL SER R99 A115 A115 L125 R126 T125 T125
W139 T166 E192 E192 E192 C113 C113 C113 C113 C113 C113 C113 C11	L268 L268 2280 8281 8281 8282 810 814 ARG PRO PRO PRO CYS	Y291 F298 F298 F329 F329 F329 F322 V323 V323 V323 V323	F344 F346 1376 1376 1376
• Molecule 27: 39S riboson	nal protein L39, mit	ochondrial	
Chain 7:	83%	·	15%
MET ALLA CLU ALLA LLEU LLEU MET CLU ARG ARG ARG ARG ARG ARG LLEU LLEU LLEU LLEU LLEU VLL VLL ALA CLV CGLY CGLY CGLY CGLY CGLY CGLU	CLY CLY LLY LLY LLY TTRP ARG TTRP TTRP TTR TTR TTR TTR TTR TTR TTR T	LEU 173 173 187 187 187 187 187 187 187 187 187 187	MET VAL THR GLU GLU GLU SER LYS ALA THR GLU
GLU CYS STHR STHR THR THR			
• Molecule 28: 39S riboson	nal protein L41, mit	ochondrial	
Chain 9:	82%		15%
MET CLY VAL CLY LEU LEU ALA ALA ALA ALA ALA ALA ALA ALA ALA AL	q62 E69 D106 D106 D106 ASP ASP PR0 ASP PR0 ASP PR0 ASP PR0 ASP PR0 ASP		
• Molecule 29: 39S riboson	nal protein L42, mit	ochondrial	
Chain a:	5%	42%	
MET VAL VAL ALA ALA ALA ALA ALA VAL VAL VAL	PRIC PRIC GLN GLN ASN ALA ALA ALA TYR CYS CYS CYS CYS SER SER	135 142 143 144 144 145 145 145 145 145 145 145 145	PRO ASP PRO PRO VAL ASN ASN ASN CLU CLU CLU ASP ASP
GLA VAL LIBU LIBU LIBU CLBU GLU GLU GLU CLA CLA CLA CLA CLA CLA CLA CLA CLA CLA			
• Molecule 30: 39S riboson	nal protein L43, mit	ochondrial	
Chain b:	66%	• 31%	
MET 12 E50 E50 E50 B122 D122 A19 P10 A14 P10 A14 A1A A1A A1A A1A	ASP THR GLY GLY GLY LEU ARG SER ALA ALA ALA ALA ALA ALA CLN TLEU TLEU	LEU PRO GLY ASP PRO PRO ASP THR VAL VAL VAL	TLE SER SER SER SER THR THR THR THR ALA ALA PRO PRO
MET LEU SER ALA ALA ALA CYS CYS CYS CYS CYS CYS TLEU VAL LEU VAL LEU VAL LEU VAL SER ALA			
• Molecule 31: 39S ribosor	nal protein L44, mit	ochondrial	
Chain c:	81%	·	17%



MET ALA ALA SER GLY CLEU LEU LEU LEU CLN GLN	GLY HIS ARG CYS CYS CYS CYS CYS CYS CYS FIEU VAL FRO FRO FRO FRO FRO FRO FRO FRO FRO FRO
1316 SER SER LYS LYS LYS CLV CLV LEU ALL ALL ALL	LYS THE ALA SER
• Molecule 32:	39S ribosomal protein L45, mitochondrial
Chain d:	60% · 40%
MET ALA ALA PRO FRO FRO GLN GLY SER SER	LEU LEU ARG ARG CLEU CLEU CLEU PHE PTRP PTRP PTRP PTRP PTRP PTRP PTRP PTR
ARG LYS LYS ALA GLY GLY FRO FRO GLU	SER ASP ARS ARS ARS H77 H77 H77 H77 ASP CLU CLU CLU CLU CLU CLU CLU CLU CLU CLU
L252 THR ASN P255 P255 C286 C286 C286 K288	
• Molecule 33:	39S ribosomal protein L49, mitochondrial
Chain g:	74% · 22%
MET ALA ALA ALA ALA PHE PHE ALA ALA LEU	CLY ARG ARG CLY VAL CLY CLEU CLEU CLEU CLEU CLEU CLEU CLEU CLEU
• Molecule 34:	39S ribosomal protein L50, mitochondrial
Chain h:	61% • 37%
MET ALA ALA ALA ARG SER SER SER SER TLE TLE THR	ARG ARG MET THR WAL THR VAL THR CO SER CO CO CO CO CO CO CO CO CO CO CO CO CO
SER L82 L91 1117 S146 Y158	
• Molecule 35:	39S ribosomal protein L51, mitochondrial
Chain i:	73% • 24%
MET ALA GLY GLY LEU LEU LEU SER GLY GLY ALA GLY	ARG TED TRP PRO PRO CCYS SER PHE CCYS SER PHE CCYS CCYS CCYS CCYS CCYS CCYS CCYS CCY
• Molecule 36:	39S ribosomal protein L52, mitochondrial
Chain j:	67% · 31%
MET ALA ALA ALA LEU CLEU VAL LEU PHE THR THR	VAL ARG ARG CHIES CYS SER ALA ALA ALA ALA ALA ALA C24 C24 C24 C24 C24 C24 C24 C24 C24 C24
	PROTEIN DATA BANK

• Molecule 37:	Ribosomal protein 63, mite	ochondrial		
Chain o:	85%		• 11%	
MET PHE LEU THR ALA LEU LEU TRP GLY ARG	112 118 753 753 753 753 753 8102			
• Molecule 38:	Peptidyl-tRNA hydrolase l	CT1, mitochond	lrial	
Chain p:	57%		38%	
MET ALA ALA ALA ALA ARG CYS CYS CYS CYS CYS CYS CYS CYS CYS CYS	SER ARG ALY ALA ALA CLY TRP TRP TRP TRP FRO FRO FRO FRO FRO FRO ALA ALA ALA ALA ALA ALA ALA ALA ALA AL	LYS GLN LYS LYS ASP CLY THR E38 V61 PR0 PR0 ASN	ALA LYS GLN ALA ALA ASP SER BTO SER SER SER CLY PRO	GLY GLN GLN ASN VAL
ASN LYS V95 F103 T107 L130	L135 L135 S139 S139 LTHR THR PRO LVS GLU FRO THR GLU ASP VAL K174 H175	A179	1193 HIS SER ALA VAL LYS THR THR SER ARG ARG VAL	ASP
• Molecule 39:	Growth arrest and DNA d	amage-inducible	proteins-interact	ing protein 1
Chain q:	56%	·	42%	
MET ALA ALA ALA SER VAL ARG GLN ALA SER SER	LEU GLY VAL ALA ALA ALA ALA ALA ALA ALA CLY CLY CLY CLZ CLY CLZ CLY CLA CLA CLA CLA CLA CLA CLA CLA CLA CLA	S74 E140 E141 M142 W143 E144 K145	q147 4148 b149 K150 E151 ARG ARG ARG ARG CLEU	ALA ALA GLU GLU GLU LEU LEU CLEU CLEU CLEU
TYR GLN VAL ASP PRO PRO SER ALA ALA ALA ALA CLN	GLU LEU GLN ASP GLN ASP GLU CLYS GLU CLYS GLU CLV CLV CLV CLV CVS	ARG LYS LYS GLU ALA ALA ALA ALA ALA ALA ALA	ALA VAL ALA ALA GLN ALA ALA ALA SER SER ALA ALA PRO	S ER
• Molecule 40:	39S ribosomal protein S18a	a, mitochondrial		
Chain r:	63%	·	34%	
MET ALA ALA ALA LEU LEU VAL SER GLY CYS	GLY GLY LEU LEU LEU LEU LEU CLY CLY CLY CLY CLY CLY CLY CLA ALA ALA ALA ALA ALA ALA ALA ALA ALA	ALA ARG GLY GLY ARG GLU VAL CLU CLU GLU GLN GLN	GLY CLYS LYS THR THR THR TLE GLU GLU GLV GLY ALA ALA	T56 C70 W75
N76 L87 L87 L87 L87 LEU FRO GLU GLV VAL VAL	PRO LYS SER LYS PRD 0146 H196			
• Molecule 41:	39S ribosomal protein S30,	mitochondrial		
Chain s:	80%		• 16%	
MET ALA ALA ALA ALA ARG CYS CYS CYS TRP ARG PRO PRO LEU	ARG GLY PRO GLY FLEU ARG ARG ARG ARA ALA ALA ALA ALA ALA ALA ALA ALA THR THR THR	THR CYS GLN ASD ALA ALA ALA ALA PRO PRO	S75 S75 R81 R81 P10 P10 P10 P10 P10 P10 P10 P10	PRO GLU PLU GLU GLU
PRO GLU PRO GLU GLU ALA LEU LEU LEU LEU	F176 8182 8182 0201 0201 1223 1223 1223 1223 1223 122	C371 T376 L401 H423 K430 GLU GLU	LYS SER GLN LEU LEU GLU ASN	

• Molecule 42: Mitochondrial assembly of ribosomal large subunit protein 1



Chain u:	46%	•	53%		
MET MET PRIO CLY CLY CLY CLY CLY CLY ALA ARG LEU LEU LEU LEU LEU LEU LEU LEU LEU CLEU C	AKG ALA VAL VAL SER SER VAL VAL CLY SER SER ALA SER SER SER	GLY GLY CLU CLU CLU CLU CLU LEU LEU LEU LEU CLA CLA	ANG PRO VAL GLY ALA ALA ALA CYS CYS	ARG ALA CYS CYS CYS CYS GIN PRO ASN VAL ARG ARG CLY CGLY	
LEU HEU REIS SER GLU PRO PRO GLU GLU GLU GLU GLU GLU GLV SNN	GLU GLY ARG PRO GLU SER ARA ASP ALA ALA ALA ALA ALA THR	GLY PRO K153 K158 K158 M167 D201 GLN TEN	ALA GLN ILE ALA PRO GLU VAL VAL	PRO GLU ASP PHE ILEU LEU GLY GLY ASP ASP	
THR SER SER SER SER SER PRO PRO VAL CALU CYS GLU					
• Molecule 43: MIEF1	upstream open	reading frame pr	rotein		
Chain v:		96%			
MET A2 E7 E7 A8 R14 R14 R18 R18 R21 R21 R21	R3(F61 F61 F61 F61 F61 F60 F68 F68 F68 F68 F68 F68 F68 F68 F68 F68				
• Molecule 44: Acyl ca	arrier protein, m	itochondrial			
Chain w:	3% 49%	·	49%		
MET ALA SER ARG VAL LEU SER ALA SER SER VAL LEU ARG ALA ALA	PHE ALA PRO PRO PRO ARG ARG ARG ALA ALA ALA	ALA ARG PRO LEU SER ALA ALA CYS SER ALA GLY THR	THR THR ARG LEU GLY THR LEU GLN	PRO ALA LEU VAL LEU ALA GLN PRO GLY ARG	
TAL TAR GLN CIS CIS CIS ARC CIN ASP ASP ASP ASP PRO PRO TTS	E.77 G78 G78 Q80 B81 N82 V83 V83 V83 V83	V86 L87 K88 K88 V90 V90 K92 193 193	P95 E96 K97 L98 S99 V100 N101	S102 M105 K106 D107 L108 G109 C109 L110	0115 0116 0117 0124 0124 0124 0124 0127 0127 0127
F128 ← E129 ← P131 ← D132 ← D132 ← D133 ← A135 ← A135 ← L138 ← L138 ←	V145 D146 Y147 1143 A149 A149 D150 K151 K151	VAL TYR GLU			
• Molecule 45: 16S rib	oosomal RNA				
Chain A:	48%	24%	27%	, 0	
G1671 U1679 A1680 C1681 C1681 C1689 C1689 C1689 C1689 C1691 C1691 C1691 C1691	C1098 01700 01703 01703 01704 01704 01704 01704 01708 0 0	A1712 A1713 1716 U1716 U1718 A1718 C1719 C1720 A1724 A1727 H1728	01/20 41731 C1732 C C C A A A1737	G1748 C1749 G1750 A1751 U1752 G1760 A A A A	
C C G1767 G1767 G1770 A1779 U1778 A1779 G1778 G1778 C1788	A1/44 U1799 01800 A1803 A1805 A1805 A1805 U U U	A 41811 C1812 C1812 C1812 A1820 A1820 A1820 A1823 A1821 A1823 A1823	C1427 A1828 A1829 A1832 C1833 C1833 A1836 A1833	A1844 C1849 C1849 A1853 A1855 A1855 A1855 C1856 C1856	
A1869 A1870 A1871 A1871 A1872 A1872 A1872 U1877 U1877 U1877 U1878 C1886 A1883 A1883	C1903 A1912 A1914 A1914 A1914 G1918 C1933 C1933	000 00 00 00 00 00 00 00 00 00 00 00 00		5 D 4 6 6 4 4 4 D 4	
0 0 0 0 0 0 1972 0 1972 0 1972 0 1973 0 1973 0 1987 0 1987 0 1987 0 1987 0 1987	A1994 A1995 C2000 C2001 G2001 G2015 G2015 U2017 U2017 U2017	(20019 (22022 (22025 (22028 (22028 (22028 (22033 (22033 (22033) (22033	U2034 U2035 C2036 U2037 U2038 A2039 U2053	00000 12005 12005 12005 12005 12006 12006 10 10 10 10 10 10 10 10 10 10 10 10 10	





• Molecule 46: mitochondrial tRNAVal







4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	119341	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE	Depositor
	CORRECTION	
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/\text{\AA}^2)$	52.5	Depositor
Minimum defocus (nm)	-1000	Depositor
Maximum defocus (nm)	-2600	Depositor
Magnification	Not provided	
Image detector	FEI FALCON III (4k x 4k)	Depositor
Maximum map value	0.060	Depositor
Minimum map value	-0.020	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.004	Depositor
Recommended contour level	0.01	Depositor
Map size (Å)	381.59998, 381.59998, 381.59998	wwPDB
Map dimensions	360, 360, 360	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.06, 1.06, 1.06	Depositor



5 Model quality (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: ZN

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with |Z| > 5 is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mal	Chain	Bond	lengths	E	Bond angles
	Unam	RMSZ	# Z > 5	RMSZ	# Z > 5
1	D	0.26	0/1371	0.54	0/1848
2	Е	0.33	0/2313	0.50	0/3137
3	F	0.42	0/2071	0.55	0/2817
4	Н	0.35	0/798	0.60	0/1073
5	Κ	0.39	0/1495	0.51	0/2029
6	L	0.27	0/904	0.56	0/1218
7	М	0.39	0/2359	0.58	0/3185
8	Ν	0.31	0/1697	0.52	0/2281
9	0	0.36	0/1269	0.56	0/1708
10	Р	0.30	0/1173	0.55	0/1588
11	Q	0.31	0/1846	0.56	0/2487
12	R	0.42	0/1174	0.56	0/1572
13	S	0.38	0/1276	0.61	1/1729~(0.1%)
14	Т	0.41	0/1402	0.56	0/1886
15	U	0.36	0/1183	0.55	0/1600
16	V	0.28	0/1362	0.48	0/1842
17	W	0.40	0/881	0.56	0/1188
18	Х	0.35	0/2090	0.51	0/2825
19	Y	0.36	0/1552	0.51	0/2079
20	Ζ	0.34	0/979	0.53	0/1321
21	0	0.34	0/895	0.59	0/1201
22	1	0.27	0/438	0.55	0/583
23	2	0.43	0/373	0.61	0/496
24	3	0.47	0/852	0.57	0/1136
25	5	0.29	0/3126	0.51	0/4259
26	6	0.34	0/2726	0.53	0/3715
27	7	0.31	0/2391	0.49	0/3234
28	9	0.35	0/972	0.53	0/1306
29	а	0.38	0/709	0.56	0/963
30	b	0.39	0/1202	0.60	0/1626
31	с	0.34	0/2264	0.51	0/3059
32	d	0.27	0/1573	0.50	0/2134



Mol Chain		Bond lengths		Bond angles	
1VIOI	Unam	RMSZ	# Z > 5	RMSZ	# Z > 5
33	g	0.40	0/1102	0.55	0/1503
34	h	0.31	0/847	0.51	0/1150
35	i	0.47	0/849	0.59	0/1135
36	j	0.37	0/698	0.59	0/940
37	0	0.38	0/792	0.58	0/1064
38	р	0.29	0/1071	0.55	0/1433
39	q	0.33	0/1107	0.52	0/1498
40	r	0.33	0/1110	0.55	0/1504
41	s	0.34	0/3114	0.53	0/4225
42	u	0.26	0/949	0.47	0/1281
43	V	0.26	0/597	0.50	0/796
44	W	0.25	0/647	0.44	0/871
45	А	0.62	0/26912	0.93	27/41848~(0.1%)
46	В	0.22	0/1328	0.83	0/2056
All	All	0.45	0/87839	0.70	28/124429~(0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
13	S	0	1

There are no bond length outliers.

The worst 5 of 28 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms		$Observed(^{o})$	$Ideal(^{o})$
45	А	2484	С	C2-N1-C1'	8.06	127.66	118.80
45	А	2484	C	N1-C2-O2	6.99	123.09	118.90
45	А	1833	С	C6-N1-C2	-6.12	117.85	120.30
45	А	2493	С	N1-C2-O2	6.07	122.54	118.90
45	А	3134	С	C6-N1-C2	-6.02	117.89	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
13	S	101	PHE	Peptide



5.2 Too-close contacts (i)

Due to software issues we are unable to calculate clashes - this section is therefore empty.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	D	172/305~(56%)	158 (92%)	14 (8%)	0	100	100
2	Е	280/348~(80%)	262 (94%)	18 (6%)	0	100	100
3	F	248/311 (80%)	230 (93%)	18 (7%)	0	100	100
4	Н	93/267~(35%)	86 (92%)	7 (8%)	0	100	100
5	K	175/178~(98%)	161 (92%)	14 (8%)	0	100	100
6	L	113/145 (78%)	105 (93%)	8 (7%)	0	100	100
7	М	285/296~(96%)	265 (93%)	20 (7%)	0	100	100
8	N	203/251~(81%)	189 (93%)	14 (7%)	0	100	100
9	Ο	150/175~(86%)	142 (95%)	8 (5%)	0	100	100
10	Р	139/180~(77%)	132 (95%)	7 (5%)	0	100	100
11	Q	215/292 (74%)	198 (92%)	17 (8%)	0	100	100
12	R	138/149~(93%)	128 (93%)	10 (7%)	0	100	100
13	S	154/205~(75%)	144 (94%)	10 (6%)	0	100	100
14	Т	164/206~(80%)	152 (93%)	12 (7%)	0	100	100
15	U	135/153~(88%)	128 (95%)	7 (5%)	0	100	100
16	V	159/216~(74%)	150 (94%)	9 (6%)	0	100	100
17	W	107/148 (72%)	100 (94%)	7 (6%)	0	100	100
18	Х	241/256~(94%)	229 (95%)	12 (5%)	0	100	100
19	Y	$174/250\ (70\%)$	165 (95%)	9 (5%)	0	100	100
20	Z	115/161 (71%)	107 (93%)	8 (7%)	0	100	100
21	0	106/188~(56%)	102 (96%)	4 (4%)	0	100	100

Continued on next page...



Mol	Chain	Analysed	Favoured	Allowed	Outliers	Perce	entiles
22	1	50/65~(77%)	45 (90%)	5 (10%)	0	100	100
23	2	43/92~(47%)	36 (84%)	7 (16%)	0	100	100
24	3	93/188~(50%)	89 (96%)	4 (4%)	0	100	100
25	5	369/423~(87%)	342 (93%)	27 (7%)	0	100	100
26	6	316/380~(83%)	290 (92%)	26 (8%)	0	100	100
27	7	285/338~(84%)	262 (92%)	23 (8%)	0	100	100
28	9	113/137~(82%)	107 (95%)	6 (5%)	0	100	100
29	a	78/142~(55%)	72 (92%)	6 (8%)	0	100	100
30	b	146/215~(68%)	132 (90%)	14 (10%)	0	100	100
31	с	271/332 (82%)	258 (95%)	13 (5%)	0	100	100
32	d	177/306~(58%)	166 (94%)	11 (6%)	0	100	100
33	g	127/166~(76%)	120 (94%)	7 (6%)	0	100	100
34	h	96/158~(61%)	90 (94%)	6 (6%)	0	100	100
35	i	95/128~(74%)	85 (90%)	10 (10%)	0	100	100
36	j	83/123~(68%)	79~(95%)	4 (5%)	0	100	100
37	О	89/102~(87%)	81 (91%)	8 (9%)	0	100	100
38	р	119/206~(58%)	112 (94%)	7 (6%)	0	100	100
39	q	126/222~(57%)	119 (94%)	7 (6%)	0	100	100
40	r	126/196~(64%)	118 (94%)	8 (6%)	0	100	100
41	S	366/439~(83%)	340 (93%)	26 (7%)	0	100	100
42	u	109/234~(47%)	98 (90%)	11 (10%)	0	100	100
43	v	67/70~(96%)	62 (92%)	5 (8%)	0	100	100
44	W	77/156~(49%)	67 (87%)	10 (13%)	0	100	100
All	All	$69\overline{87/9498}$ (74%)	6503 (93%)	484 (7%)	0	100	100

Continued from previous page...

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent side chain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.



Mol	Chain	Analysed	Rotameric	Outliers	Percentile	
1	D	140/245~(57%)	139~(99%)	1 (1%)	84	92
2	Ε	245/290~(84%)	238~(97%)	7 (3%)	42	70
3	F	217/262~(83%)	202~(93%)	15 (7%)	15	44
4	Η	86/228~(38%)	80 (93%)	6 (7%)	15	43
5	К	155/156~(99%)	151 (97%)	4 (3%)	46	72
6	L	98/124~(79%)	94 (96%)	4 (4%)	30	62
7	М	245/249~(98%)	232~(95%)	13 (5%)	22	53
8	Ν	172/211 (82%)	165 (96%)	7 (4%)	30	62
9	О	133/150~(89%)	122 (92%)	11 (8%)	11	37
10	Р	123/155~(79%)	113 (92%)	10 (8%)	11	37
11	Q	199/256~(78%)	195 (98%)	4 (2%)	55	78
12	R	118/126 (94%)	115 (98%)	3 (2%)	47	74
13	S	141/180 (78%)	131 (93%)	10 (7%)	14	43
14	Т	146/176~(83%)	134 (92%)	12 (8%)	11	37
15	U	124/135~(92%)	120 (97%)	4 (3%)	39	68
16	V	146/191~(76%)	144 (99%)	2 (1%)	67	84
17	W	89/119~(75%)	86 (97%)	3 (3%)	37	67
18	Х	219/229~(96%)	209~(95%)	10 (5%)	27	58
19	Y	159/223~(71%)	153 (96%)	6 (4%)	33	64
20	Ζ	108/147~(74%)	102 (94%)	6 (6%)	21	51
21	0	97/164~(59%)	90 (93%)	7 (7%)	14	42
22	1	49/60~(82%)	49 (100%)	0	100	100
23	2	39/72~(54%)	37~(95%)	2(5%)	24	54
24	3	88/166~(53%)	83 (94%)	5 (6%)	20	50
25	5	335/368~(91%)	319~(95%)	16 (5%)	25	57
26	6	265/332~(80%)	242 (91%)	23 (9%)	10	35
27	7	263/303~(87%)	257 (98%)	6 (2%)	50	75
28	9	99/112~(88%)	95~(96%)	4 (4%)	31	63
29	a	78/133~(59%)	74 (95%)	4 (5%)	24	54
30	b	130/186~(70%)	124 (95%)	6 (5%)	27	58
31	с	241/288~(84%)	234 (97%)	7(3%)	42	70
32	d	170/274~(62%)	168 (99%)	2 (1%)	71	87

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Mol	Chain	Analysed	Rotameric	Outliers	Perce	ntiles
33	g	119/148~(80%)	113 (95%)	6 (5%)	24	55
34	h	95/148~(64%)	91~(96%)	4 (4%)	30	61
35	i	86/110 (78%)	83 (96%)	3 (4%)	36	67
36	j	68/97~(70%)	65~(96%)	3 (4%)	28	59
37	О	78/87~(90%)	74 (95%)	4 (5%)	24	54
38	р	117/181~(65%)	108 (92%)	9~(8%)	13	40
39	q	110/178~(62%)	106 (96%)	4 (4%)	35	66
40	r	119/169~(70%)	113~(95%)	6 (5%)	24	55
41	S	326/381~(86%)	308 (94%)	18 (6%)	21	52
42	u	105/200~(52%)	102 (97%)	3(3%)	42	70
43	V	59/60~(98%)	57~(97%)	2(3%)	37	67
44	W	73/136~(54%)	71 (97%)	2(3%)	44	72
All	All	6272/8205~(76%)	5988 (96%)	284 (4%)	31	59

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 $5~{\rm of}~284$ residues with a non-rotameric side chain are listed below:

Mol	Chain	\mathbf{Res}	Type
35	i	80	LEU
37	0	54	MET
41	s	75	SER
14	Т	98	SER
13	S	197	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 8 such sidechains are listed below:

Mol	Chain	Res	Type
38	р	184	ASN
29	а	44	ASN
14	Т	125	GLN
11	Q	158	GLN
19	Y	110	ASN

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
45	А	1113/1559~(71%)	358~(32%)	15 (1%)

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Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
46	В	51/69~(73%)	13~(25%)	0
All	All	1164/1628~(71%)	371 (31%)	15 (1%)

5 of 371 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
45	А	1679	U
45	А	1680	А
45	А	1681	G
45	А	1685	С
45	А	1689	С

5 of 15 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
45	А	2653	С
45	А	3130	А
45	А	2905	А
45	А	3168	С
45	А	3117	С

5.4 Non-standard residues in protein, DNA, RNA chains (i)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.



5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.



6 Map visualisation (i)

This section contains visualisations of the EMDB entry EMD-13965. These allow visual inspection of the internal detail of the map and identification of artifacts.

No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections (i)

6.1.1 Primary map



The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

6.2.1 Primary map



X Index: 180



Y Index: 180



Z Index: 180



The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

6.3.1 Primary map



X Index: 186

Y Index: 191

Z Index: 221

The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal surface views (i)

6.4.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.01. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.



6.5 Mask visualisation (i)

This section was not generated. No masks/segmentation were deposited.



7 Map analysis (i)

This section contains the results of statistical analysis of the map.

7.1 Map-value distribution (i)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.



7.2 Volume estimate (i)



The volume at the recommended contour level is 1470 nm^3 ; this corresponds to an approximate mass of 1328 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.



7.3 Rotationally averaged power spectrum (i)



*Reported resolution corresponds to spatial frequency of 0.325 ${\rm \AA^{-1}}$



8 Fourier-Shell correlation (i)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC (i)



*Reported resolution corresponds to spatial frequency of 0.325 \AA^{-1}



8.2 Resolution estimates (i)

$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	Estimation criterion (FSC cut-off)		
Resolution estimate (A)	0.143	0.5	Half-bit
Reported by author	3.08	-	-
Author-provided FSC curve	3.06	3.79	3.12
Unmasked-calculated*	-	-	_

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.



9 Map-model fit (i)

This section contains information regarding the fit between EMDB map EMD-13965 and PDB model 7QH6. Per-residue inclusion information can be found in section 3 on page 12.

9.1 Map-model overlay (i)



The images above show the 3D surface view of the map at the recommended contour level 0.01 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.



9.2 Atom inclusion (i)



At the recommended contour level, 97% of all backbone atoms, 92% of all non-hydrogen atoms, are inside the map.

