

# wwPDB EM Validation Summary Report (i)

#### Nov 13, 2022 – 10:05 AM EST

PDB ID	:	6WRU
EMDB ID	:	EMD-21888
Title	:	Structure of the 50S subunit of the ribosome from Methicillin Resistant Staphy-
		lococcus aureus in complex with an isomer of the tedizolid
Authors	:	Belousoff, M.J.
Deposited on	:	2020-04-30
Resolution	:	3.10  Å(reported)

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 types of validation reports are described at http://www.wwpdb.org/validation/2017/FAQs#types.

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

EMDB validation analysis	:	0.0.1. dev 43
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4.02b-467
buster-report	:	1.1.7(2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.9
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.31.2

# 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 3.10 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	$egin{array}{c} { m Whole \ archive} \ (\#{ m Entries}) \end{array}$	${f EM} {f structures} \ (\#{f Entries})$
Clashscore	158937	4297
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  $\geq=3, 2, 1$  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  $\leq=5\%$  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	А	116	67%	28%	••
2	В	277	69%	30%	
3	С	118	73%	23%	••
4	D	105	72%	23%	5%
5	Е	117	70%	24%	• 5%
6	F	91	60%	35%	•
7	G	105	43% 42%		15%

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Mol	Chain	Length	Quality of chain	
8	Н	107	52% 45% 42%	13%
9	J	62	71%	24% 5%
10	Κ	72	51% 29%	19%
11	L	217	77%	22% ·
12	М	58	72%	22% · ·
13	Ν	57	72%	16% 12%
14	Ο	49	59%	37% •
15	Р	50	72%	16% 12%
16	Q	65	66%	32% •
17	R	37	76%	24%
18	S	207	66%	27% 7%
19	U	175	66%	33% ••
20	V	145	70%	28% ••
21	W	122	63%	35% ••
22	Х	146	71%	27% •
23	Y	144	72%	23% 6%
24	Z	122	72%	21% 7%
25	a	119	97%	
26	1	2923	42% 33%	15% • 9%
27	2	115	38% 41%	17% •••
28	Ι	85	74%	16% • 8%

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# 2 Entry composition (i)

There are 29 unique types of molecules in this entry. The entry contains 81707 atoms, of which 14 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 50S ribosomal protein L19.

Mol	Chain	Residues		Ato	ms	AltConf	Trace	
1	А	113	Total 915	C 576	N 184	O 155	0	0

• Molecule 2 is a protein called 50S ribosomal protein L2.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	В	275	Total 2103	C 1309	N 417	0 372	${f S}{5}$	0	0

• Molecule 3 is a protein called 50S ribosomal protein L20.

Mol	Chain	Residues		At	oms	AltConf	Trace		
3	С	116	Total 943	C 593	N 189	0 157	$\frac{S}{4}$	0	0

• Molecule 4 is a protein called 50S ribosomal protein L21.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	100	Total 785	C 499	N 139	0 146	S 1	0	0

• Molecule 5 is a protein called 50S ribosomal protein L22.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	Ε	111	Total 853	C 532	N 163	0 155	${ m S} { m 3}$	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
Ε	110	ALA	GLY	variant	UNP A0A077UKF9

• Molecule 6 is a protein called 50S ribosomal protein L23.



Mol	Chain	Residues		At	oms	AltConf	Trace		
6	F	87	Total 711	C 447	N 128	0 132	$\frac{S}{4}$	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	87	ASP	ILE	variant	UNP W8TUB4

• Molecule 7 is a protein called 50S ribosomal protein L24.

Mol	Chain	Residues		At	oms			AltConf	Trace
7	G	89	Total 689	C 437	N 126	0 125	S 1	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	54	SER	GLY	variant	UNP W8TRD5

• Molecule 8 is a protein called uL25.

Mol	Chain	Residues		At	oms			AltConf	Trace
8	Н	93	Total 727	C 465	N 129	0 132	S 1	0	0

• Molecule 9 is a protein called 50S ribosomal protein L28.

Mol	Chain	Residues		Ato	$\mathbf{ms}$			AltConf	Trace
Q	T	50	Total	С	Ν	Ο	$\mathbf{S}$	0	0
3	J		463	287	99	76	1	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
J	62	ALA	-	insertion	UNP A0A077URJ8

• Molecule 10 is a protein called 50S ribosomal protein L29.

Mol	Chain	Residues		Aton	ıs		AltConf	Trace
10	K	58	Total 481	C 296	N 92	O 93	0	0



• Molecule 11 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues		Ate	oms			AltConf	Trace
11	L	215	Total 1628	C 1018	N 299	O 306	$\frac{S}{5}$	0	0

• Molecule 12 is a protein called 50S ribosomal protein L30.

Mol	Chain	Residues		Aton	ıs		AltConf	Trace
12	М	56	Total 432	C 269	N 82	0 81	0	0

• Molecule 13 is a protein called 50S ribosomal protein L32.

Mol	Chain	Residues		Ato	$\mathbf{ms}$			AltConf	Trace
13	Ν	50	Total 397	C 241	N 83	O 68	${ m S}{ m 5}$	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
N	54	ALA	VAL	variant	UNP A0A077UWR7

• Molecule 14 is a protein called 50S ribosomal protein L33.

Mol	Chain	Residues		Ato	$\mathbf{ms}$			AltConf	Trace
14	0	47	Total	С	Ν	0	$\mathbf{S}$	0	0
11		11	390	233	79	73	5	0	0

• Molecule 15 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues		Ato	$\mathbf{ms}$		AltConf	Trace	
15	Р	44	Total 372	C 228	N 90	O 53	S 1	0	0

• Molecule 16 is a protein called 50S ribosomal protein L35.

Mol	Chain	Residues		Ate	oms			AltConf	Trace
16	Q	64	Total 521	C 324	N 113	O 82	${ m S} { m 2}$	0	0

• Molecule 17 is a protein called 50S ribosomal protein L36.



Mol	Chain	Residues		Ato	$\mathbf{ms}$			AltConf	Trace
17	R	37	Total 296	C 186	N 60	0 45	${ m S}{ m 5}$	0	0

• Molecule 18 is a protein called 50S ribosomal protein L4.

Mol	Chain	Residues		At	oms			AltConf	Trace
18	S	192	Total 1472	C 924	N 271	0 275	${S \over 2}$	0	0

• Molecule 19 is a protein called 50S ribosomal protein L6.

Mol	Chain	Residues		At	oms			AltConf	Trace
19	U	174	Total 1360	C 845	N 249	O 263	${ m S} { m 3}$	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
U	18	SER	THR	variant	UNP W8U3X2

• Molecule 20 is a protein called 50S ribosomal protein L13.

Mol	Chain	Residues		At	oms	AltConf	Trace		
20	V	143	Total 1138	C 710	N 209	0 217	${ m S} { m 2}$	0	0

• Molecule 21 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues		At	oms	AltConf	Trace		
21	W	121	Total 911	C 566	N 173	0 168	$\begin{array}{c} \mathrm{S} \\ 4 \end{array}$	0	0

• Molecule 22 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues		Ato	ms	AltConf	Trace	
22	Х	144	Total 1082	C 669	N 213	O 200	0	0

• Molecule 23 is a protein called 50S ribosomal protein L16.



Mol	Chain	Residues		At	oms			AltConf	Trace
23	Y	136	Total 1089	C 698	N 206	0 181	$\frac{S}{4}$	0	0

• Molecule 24 is a protein called 50S ribosomal protein L17.

Mol	Chain	Residues		At	oms	AltConf	Trace		
24	Z	114	Total 899	$\begin{array}{c} \mathrm{C} \\ 554 \end{array}$	N 175	O 169	S 1	0	0

• Molecule 25 is a protein called 50S ribosomal protein L18.

Mol	Chain	Residues		Ato	$\mathbf{ms}$	AltConf	Trace	
25	a	116	Total 899	C 560	N 171	0 168	0	0

• Molecule 26 is a RNA chain called 23S rRNA.

Mol	Chain	Residues			Atoms			AltConf	Trace
26	1	2665	Total 57132	C 25513	N 10463	O 18496	Р 2660	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
1	1866	А	G	$\operatorname{conflict}$	GB 1760383645

• Molecule 27 is a RNA chain called 5S rRNA.

Mol	Chain	Residues		A	AltConf	Trace			
27	2	112	Total 2381	C 1066	N 427	O 777	Р 111	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
2	80	С	G	variant	GB 1750990749
2	109	С	G	variant	GB 1750990749
2	111	А	С	variant	GB 1750990749
2	112	G	А	variant	GB 1750990749

• Molecule 28 is a protein called 50S ribosomal protein L27.



Mol	Chain	Residues		Ato	ms	AltConf	Trace	
28	Ι	78	Total 597	C 367	N 116	0 114	0	0

• Molecule 29 is Tedizolid isomer (three-letter code: U7Y) (formula:  $C_{17}H_{15}FN_6O_3$ ) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues		Atoms											
20	1	1	Total	С	F	Η	Ν	0	0						
29			41	17	1	14	6	3							



# 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.

- Chain A: 67% 28% ARG • Molecule 2: 50S ribosomal protein L2 Chain B: 69% 30% • Molecule 3: 50S ribosomal protein L20 Chain C: 73% 23% • Molecule 4: 50S ribosomal protein L21 Chain D: 72% 5% 23%
- Molecule 1: 50S ribosomal protein L19



• Molecule 5: 50S ri	bosomal protein L	22					
Chain E:	70%		24%	• 5%			
M1 K4 110 110 112 112 112 121 121	133 K37 842 843 843 843 843 843 843 843 848 848 848	HEG HEG N61 N61 N63 N64 HEG N66 N66 N66 N66 N66 N66 N66 N66 N66 N6	H102 V106 D109	A110 K111 GLU GLU ALA ALA LYS GLU	ALA		
• Molecule 6: 50S ri	ibosomal protein L	.23					
Chain F:	60%	3	5%	·			
MET GLU ALA ALA CI CI CI CI CI CI CI CI CI CI CI CI CI	817 817 817 817 817 818 822 928 928 928 838 838 838 838	K39 M41 A41 A41 A41 A41 A41 A42 A42 A42 A51 A51 A51 A51 A53 N54 M64 M64	T72 R76	T81 L82 L89 F90 ASN			
• Molecule 7: 50S ri	ibosomal protein L	.24					
Chain G:	43%	42%		15%			
MET 112 143 144 112 112 112 112 112 112 112 112 112	126 127 127 131 133 133 133 133 133 133 133 136 133 136 136	M41 K42 K43 F44 CLN CLN CLN CLN CLN CLN CLN CLN CLN CLN	L57 L57 E58 T59 E60 A61 A62	163 H64 V65 S66 N67 V68 Q69	L70 L71 D72		
P73 E77 E77 E77 F78 F78 F78 F78 F78 F78 F78 F78 F78 F	EB9 E100 T1101 LYS SER ASN ASN						
• Molecule 8: uL25	520/						
Chain H:	45%	42%		13%			
MET A2 L4 L4 S5 S6 R9 R9 R9 R13 R13 R13 R13 R13 R13 R13 R13 R13 R13	816 117 118 121 122 122 823 824 825 824 825 825 825 825 825 825 825 825 825 825	P28 V31 136 V31 V35 V38 V38 V41 V43 V43 V43 V43 V43 V43	E45 V46 E47 F48 I49	K50 V51 I52 R53 E54 V55	G56 R57 N58 G59 V60	I61 E62 L63 G64 V65	G66
S67 K68 1789 K71 V72 V73 V73 V73 V74 A75 V74 V77	F 79 D80 D81 D80 D80 D80 D80 D80 F 91 F 91	L92 A93 A93 A59 A59 A51 A51 A51 A51 LEU LLEU LLEU LLEU LLYS TYR PHE	ASN				
• Molecule 9: 50S ri	ibosomal protein L	.28	_				
Chain J:	71%		24%	5%			
MET 62 63 63 63 7 112 112 112 112 113 113 113 113 113 113	R37 138 139 144 146 146 146 146 146 160	ARG					
• Molecule 10: 50S	ribosomal protein	L29					
Chain K:	51%	29%	19	9%			
MET LYS LYS LYS LYS LYS ALA T1 T1 T1 T1 T1 T1 T1 T1 T1 T1 T1 T1 T1	q17 118 221 125 125 126 126 730 730 137 538	R42 145 145 146 146 146 146 147 851 851 851 851 851 851 851 851 851 851	SER LYS ALA ASN GLN				
• Molecule 11: 50S	ribosomal protein	L3					



Chain L:	77%	22%	•
MET 15 16 16 67 88 88 81 716 716 716 716 716	E42 N47 V51 V51 C52 F53 F53 F55 K64 N56 N66 N66 N66 N70 N70 N70 N70 N70 N70 N70 N70 N70 N66 N66 N66 N66 N70 N70 N70 N70 N70 N71 N70 N71 N70 N71 N70 N71 N70 N71 N70 N71 N70 N70 N70 N70 N70 N70 N70 N70 N70 N70	D108 T109 F110 V111 V115 T119 T119 T119	K122 K123 R138 G144 M156 A157
A172 M173 G174 1178 1179 1190 E191 1196 1195 1195	L196 C203 C207 C207 C207 C207 C207 C201 C201 C201 C201 C201 C201 C201 C201 C201 C201 C203 C201		
• Molecule 12: 505	S ribosomal protein L30		
Chain M:	72%	22%	•••
A2 45 811 113 113 113 113 113 113 833 833	V36 844 147 147 147 147 147 147 147 147 147 1		
• Molecule 13: 508	S ribosomal protein L32		
Chain N:	72%	16%	12%
MET A2 K15 K15 R16 R16 V24 V24 V24 V24 V24	H 33 H 40 G 51 ALA ALA ALA LYS LYS		
• Molecule 14: 508	S ribosomal protein L33		
Chain O:	59%	37%	·
M1 N2 16 110 114 118 118	K21 N22 N25 K34 K34 K33 K33 K33 K33 K33 K33 K33 K33		
• Molecule 15: 509	S ribosomal protein L34		
Chain P:	72%	16%	12%
MET GLU VAL VAL PHE CYS K3 K12 K12 K12 K12 K12 K12 K12 K12 K12 K12	V 16 125 K30 A45		
• Molecule 16: 508	S ribosomal protein L35		
Chain Q:	66%	32%	·
MET P2 K5 A10 A10 C9 C9 C9 C9 C14 X13 X13 X13 X13 X13 X13 X13 X13 X13 X13	R24 A27 7 28 7 28 64 44 853 853 853 853 853 853 855 853 855 855		
• Molecule 17: 508	S ribosomal protein L36		
Chain R:	76%	24%	
M1 K2 86 117 117 117 126 126 126	K31 137		



• Molecule 18: 50S ribosomal protein L4



• Molecule 23: 50S ribosomal protein L16 Chain Y: 72% 23% 6% GLY GLY T43 S44 R45 GLU THR ASN GLU SER • Molecule 24: 50S ribosomal protein L17 Chain Z: 72% 21% 7% I71 LEU ASN GLU GLU GLU THR THR MET 62 L24 126 126 827 827 827 827 827 R4 K5 L6 • Molecule 25: 50S ribosomal protein L18 Chain a: 97% . . MET ILE SER K4 • Molecule 26: 23S rRNA Chain 1: 42% 33% 15% 9% A28 U29 G30 C31 C32 C20 A21



G578	6/en	A583	C587	G588	U589 U590	A591	A592 II593	G594		0597 0598	A599	009N	, CO C	GO04 UG05	G606		G613	0614 4615	G616	A617	A618	0619 G620	A621	A622	C623	A629	G630 116.24	0031 0632	A633	4646	G647	G648 11649	<b>U650</b>	A651	4052 G653	C654	A655	0650 U657	A658	A659	A660 11661	G662	<mark>U663</mark> G664
G665	4000 G667	C668	A672	G673	<mark>C6/4</mark> G675		A678 C679	C680	G681	A682 C683	U684	C685	U686	4688 A688	A689	<b>U690</b>	A691	6693 06633	G694	C695	0696	U698	0699	A700	G701	A703	U704		U712	G719	A720	A721	C723	C724	A730	U731	C732	0738	U739	-	A744 G745	G746	U747 U748
G749	A751	G752	U754 U754	C755	A756 G757		A760 A761	C762	A763	C764 11765	5	A768	0.000	6773	G774	A775	02.20	61/8	C781		U787	A/ 88	U791	U7 92	G7 93 A7 94	A795	A796		<b>A801</b>	6802	G805	A806	<b>G</b> 808	A809	A819	G820	C821	G823	A824	G825	A826 4827	A828	U829 U830
C831	0832 A833	A834	<mark>0835</mark> C836	G837	A838 A839		G846 A847	U848	A849	G850	G854	<b>U855</b>	U856		<mark>C859</mark>		C870	18/1 11872	U873		G877		C883	-	6888 11889	<b>G890</b>	A891	0032 (1893	A894	0895 11896	A897	U898 II800	0065	G901	G903	G904	U905	6065	C910	A911	020V	C921	G
5 0	5 5	5 0	ບບ	0	ם ני	C I	ם ט	0.0	5	5	n	A	0 0	0 5	Ā	А	U 1040	0948 0949	A950	G951		ABD	A962	A963	0964 С965	<b>C966</b>	C967	A969	0670	1972	A973	U974	0976	A977	6982	<mark>G983</mark>	G984 A085	600H	A989	0665	A991 A992		<mark>U999</mark> G1000
001	003	004	900	013	014	018	034	025	026	027	029		040	044	045		.051	055	056	.057	058	8 QO	.063	.064	.065 066	067	068	010	071	073	074	077	078	079	083	.084	085 086	087	088				
A A1	U A1	A A1	9 9 9	A U1		U A1	ר עו עו	G A1	C1	U II C1	A C1	IJ,	A A1	G A1	C A1	А	0 0	0 C	A UI	U A1	01	A U	U U	U	A A1	A U1	0 9	G A1	U A1	D D	G G1	U A	A G1	U v	G G	c U1	л с		0 10	C N	A G A	U A	D C C D
A	00115	A1 159	C1 160	<mark>G1166</mark>	C1167 C1168	G1 169	A1170 A1171	A1172	A1173	111 176	A1177	C1178	C1179	U1 185	A1186	A1187	A1188	C1 189 A1 190	U1191		A1195	C1 196 C1 197		G1201	C1 202 111 203		G1207	01209	U1210	G1211 11212	<mark>C1213</mark>	C1214	U1216	U1217	G1218 G1219	A1220	C1221	A1 223	U1224	G1225	G1226 111.227	A1 228	<mark>G1 229</mark> G1 230
231	707	238	241	242	245 245	246	051 051	252	253	254	257	258		503	272	273	274 275	276	277	278	1	286 286	287	288	289	291	292	294 294	295	300		303 304	305	306 207	308	<u>309</u>	310	312	313		320	323	32 <u>4</u> 325
A1	19	Б	A1:	A1	G1	CI	41	A1	G1	5	G1	A1	2	IV	11	G1	61	G1	5 13	G1	ľ	A1 G1	10	G1	A1 G1	A1	A1	5 5	CI	5		A1.	ID	A1	5	G1:	A1	A1	61		19	A1:	
	01330		G1336 A1337	U1338	01339	U1343	A1344 A1345	G1346	G1347	U1348	U1350	C1351	C1352	A1353 G1354	A1355	G1356	G1357	A1358 A1359	G1360	G1361		C1364 G1365	U1366		61375	U1378	A1379		U1389	A1390 A1391		G1401 A1402	C1403	A1404	61400	G1414	A1415		A1421	A1422	C1423 A1424	G1425	G1426 U1427
U1428	41429 A1430	U1431	A1432 U1433	U1434	A1443	C1444	A1 447	U1448	Å	A 11	0 0	IJ	n :		n	А	A1459	G1462	A1463	U1464		G1469 G1470	A1471	C1472	C1476	U1477	A1478	G1480 G1480	A1481	01482 A1483	G1484	G1485 C1486	G1487	A1488	A1489 G1490	C1491	G1492	CETIO	A1497	U1498	01499 G1500	G1501	A1502 U1503
U1504	C1506	A1507	C1508 G1509	U1510	C1511 U1512	A1513	A1514 C1515	C1516	A1517	G1518 111519	A1520	A 1521	G1522	01523 C	n	IJ	A S	11 פי	Å	U	n ·	A D		υ.	A	 A1530	U1540	G1544	U1545	A1546 C1547	U	00	n	n •	A A	IJ	G1556	U1558	G1559	A1560	G1561 C1562	U1563	G1564 U1565
31566 31566	11568	11569 1170	11571	1572	41573 31574	A1575	41576 31577	A1578	3 <mark>1579</mark>	11580 11581	11582	1583	11584	11586	01587	J1588	11589 1580	1590 1591	1592	1593 1593	J1594	01595 11596	11597	J1598	1599 1600	11601	1606	11606		1612 1613	A1614	1615 1616	1617	11618	1624	J1625	A1626	17015	Ĩ	-			
	38	39	40 0	45 45	46 47 0	1		52 I	53			80		54 1	65 65	66 L				74 0	75	۵/ ۲7	78	1 62	200 100 100	82	83	85	86		91 1	92 03		1 96		1 66	- C	2	. 1 60	10	11 1 1	13	14 15 1
D •	A G16	616	016	G16	016 A16		G16 C16	A16	A16	A16 C16		A16		G16	U16t	A16	G16			U16	G16	A16 G16	A16	A16	016	C16	U16	A16t	G16	A16	G16	C16		C16	A16	A16	17 11	TO	A17	G17.	G17 A17	A17	C17 U17:
C1716	G1718	C1719	A1720 A1721	A1722	A1723 U1724	G1725	A1726		C1730	111737	C1738	G1739	G1740	61741 A1742		A1745	G1746	G1749	U1750	G1751	C1752	U1756	U1757	A1758	G1759 G1760	G1761	U1762	0 A	A	<u>ა</u> ღ	с <mark>1768</mark>	C1769	G1772	A1773	A1//4	G1780	C1781	G1783		U1788	A1789 G1790	G1791	C1792 C1793





Chain 2:

17%

. .



#### 

• Molecule 28: 50S ribosomal protein L27

Chain I:	74%	16%	• 8%
ALA SER LYS LYS GLY VAL 816 K19	R22 822 822 822 822 822 822 828 833 844 844 844 844 844 844 844 844 84		



# 4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	77500	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE	Depositor
	CORRECTION	
Microscope	FEI TALOS ARCTICA	Depositor
Voltage (kV)	200	Depositor
Electron dose $(e^-/\text{\AA}^2)$	47	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	FEI FALCON III (4k x 4k)	Depositor
Maximum map value	11.419	Depositor
Minimum map value	-7.604	Depositor
Average map value	0.013	Depositor
Map value standard deviation	0.292	Depositor
Recommended contour level	0.02	Depositor
Map size (Å)	419.04, 419.04, 419.04	wwPDB
Map dimensions	432, 432, 432	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.97,  0.97,  0.97	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:  $\rm U7Y$ 

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	А	0.47	0/927	0.59	0/1239
2	В	0.48	0/2138	0.55	0/2869
3	С	0.56	0/955	0.58	0/1265
4	D	0.45	0/795	0.55	0/1062
5	Е	0.44	0/861	0.58	0/1159
6	F	0.45	0/719	0.57	0/959
7	G	0.36	0/695	0.48	0/926
8	Н	0.28	0/735	0.45	0/986
9	J	0.42	0/469	0.52	0/625
10	Κ	0.47	0/482	0.58	0/642
11	L	0.53	0/1652	0.64	0/2216
12	М	0.58	0/434	0.64	0/585
13	N	0.50	0/404	0.53	0/537
14	0	0.39	0/393	0.54	0/523
15	Р	0.53	0/376	0.56	0/491
16	Q	0.50	0/526	0.55	0/690
17	R	0.43	0/299	0.54	0/393
18	S	0.47	0/1494	0.58	0/2018
19	U	0.37	0/1378	0.53	0/1853
20	V	0.50	0/1160	0.54	0/1563
21	W	0.48	0/918	0.58	0/1232
22	Х	0.45	0/1096	0.56	0/1461
23	Y	0.47	0/1113	0.52	0/1493
24	Ζ	0.46	0/902	0.55	0/1202
25	a	0.37	0/908	0.50	0/1215
26	1	0.84	0/63978	1.00	90/99764~(0.1%)
27	2	0.57	0/2662	0.95	1/4146~(0.0%)
28	Ι	0.53	0/603	0.60	0/801
All	All	0.75	0/89072	0.92	91/133915~(0.1%)

There are no bond length outliers.



Mol	Chain	Res	Type	Atoms	Z	$Observed(^{o})$	$Ideal(^{o})$
26	1	2902	А	N9-C1'-C2'	-8.91	102.20	112.00
26	1	2539	С	N1-C1'-C2'	-8.10	103.09	112.00
26	1	1522	G	C4'-C3'-O3'	7.63	128.25	113.00
26	1	675	G	N9-C1'-C2'	-7.37	103.89	112.00
26	1	167	U	N1-C1'-C2'	-7.19	104.09	112.00

The worst 5 of 91 bond angle outliers are listed below:

There are no chirality outliers.

There are no planarity outliers.

# 5.2 Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	А	915	0	987	30	0
2	В	2103	0	2218	74	0
3	С	943	0	1014	24	0
4	D	785	0	825	21	0
5	Е	853	0	912	21	0
6	F	711	0	743	23	0
7	G	689	0	748	36	0
8	Н	727	0	777	46	0
9	J	463	0	501	11	0
10	K	481	0	508	15	0
11	L	1628	0	1667	38	0
12	М	432	0	472	11	0
13	N	397	0	407	7	0
14	0	390	0	396	19	0
15	Р	372	0	420	6	0
16	Q	521	0	586	14	0
17	R	296	0	340	5	0
18	S	1472	0	1520	48	0
19	U	1360	0	1390	54	0
20	V	1138	0	1130	30	0
21	W	911	0	970	38	0
22	Х	1082	0	1119	29	0
23	Y	1089	0	1155	25	0

Continued on next page...



Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
24	Ζ	899	0	954	22	0
25	a	899	0	940	0	0
26	1	57132	0	28744	938	0
27	2	2381	0	1209	41	0
28	Ι	597	0	607	12	0
29	1	27	14	0	1	0
All	All	81693	14	53259	1522	0

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The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 12.

The worst 5 of 1522 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
26:1:275:A:H62	26:1:296:G:N2	1.53	1.05
10:K:17:GLN:O	10:K:21:SER:HB2	1.59	1.03
26:1:699:U:H4'	26:1:700:A:H5'	1.43	1.00
2:B:95:VAL:HG22	2:B:101:LYS:HG2	1.44	0.98
4:D:65:GLN:HG3	4:D:93:THR:HG22	1.46	0.95

There are no symmetry-related clashes.

# 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	Perce	ntiles
1	А	111/116~(96%)	101 (91%)	10 (9%)	0	100	100
2	В	273/277~(99%)	247 (90%)	26 (10%)	0	100	100
3	С	114/118~(97%)	112 (98%)	2(2%)	0	100	100
4	D	98/105~(93%)	87~(89%)	11 (11%)	0	100	100
5	E	109/117~(93%)	103 (94%)	6 (6%)	0	100	100

Continued on next page...



Mol	Chain	Analysed	Favoured	Allowed	Outliers	Perce	entiles
6	F	85/91~(93%)	73~(86%)	12 (14%)	0	100	100
7	G	85/105 (81%)	79~(93%)	6 (7%)	0	100	100
8	Н	91/107~(85%)	88 (97%)	3 (3%)	0	100	100
9	J	57/62~(92%)	52 (91%)	5(9%)	0	100	100
10	K	56/72~(78%)	52 (93%)	4 (7%)	0	100	100
11	L	213/217~(98%)	199 (93%)	14 (7%)	0	100	100
12	М	54/58~(93%)	50 (93%)	4 (7%)	0	100	100
13	Ν	48/57~(84%)	41 (85%)	7 (15%)	0	100	100
14	Ο	45/49~(92%)	42 (93%)	3 (7%)	0	100	100
15	Р	42/50~(84%)	41 (98%)	1 (2%)	0	100	100
16	Q	62/65~(95%)	57 (92%)	5 (8%)	0	100	100
17	R	35/37~(95%)	32 (91%)	3 (9%)	0	100	100
18	S	190/207~(92%)	177 (93%)	13 (7%)	0	100	100
19	U	172/175~(98%)	152 (88%)	20 (12%)	0	100	100
20	V	141/145~(97%)	134 (95%)	7 (5%)	0	100	100
21	W	119/122~(98%)	107 (90%)	12 (10%)	0	100	100
22	Х	142/146~(97%)	124 (87%)	18 (13%)	0	100	100
23	Y	134/144~(93%)	130 (97%)	4 (3%)	0	100	100
24	Z	110/122~(90%)	104 (94%)	6 (6%)	0	100	100
25	a	114/119~(96%)	98 (86%)	16 (14%)	0	100	100
28	Ι	76/85~(89%)	69 (91%)	7 (9%)	0	100	100
All	All	2776/2968~(94%)	2551 (92%)	225 (8%)	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	Perce	ntiles
1	А	99/102~(97%)	96~(97%)	3~(3%)	41	71
2	В	222/224~(99%)	221 (100%)	1 (0%)	88	94
3	С	96/98~(98%)	92~(96%)	4 (4%)	30	62
4	D	85/89~(96%)	85 (100%)	0	100	100
5	Ε	90/94~(96%)	87~(97%)	3~(3%)	38	69
6	F	79/82~(96%)	77~(98%)	2(2%)	47	75
7	G	76/91~(84%)	75~(99%)	1 (1%)	69	87
8	Η	81/95~(85%)	81 (100%)	0	100	100
9	J	49/51~(96%)	49 (100%)	0	100	100
10	К	53/65~(82%)	52 (98%)	1 (2%)	57	81
11	L	173/175~(99%)	168~(97%)	5(3%)	42	72
12	М	50/52~(96%)	49 (98%)	1 (2%)	55	80
13	Ν	45/49~(92%)	45 (100%)	0	100	100
14	Ο	45/47~(96%)	45 (100%)	0	100	100
15	Р	39/45~(87%)	39 (100%)	0	100	100
16	Q	55/56~(98%)	55 (100%)	0	100	100
17	R	35/35~(100%)	35~(100%)	0	100	100
18	$\mathbf{S}$	158/170~(93%)	155~(98%)	3(2%)	57	81
19	U	152/153~(99%)	150 (99%)	2 (1%)	69	87
20	V	122/123~(99%)	120 (98%)	2 (2%)	62	84
21	W	99/100~(99%)	98~(99%)	1 (1%)	76	90
22	Х	110/112 (98%)	108 (98%)	2 (2%)	59	82
23	Υ	113/119~(95%)	113 (100%)	0	100	100
24	Ζ	94/102~(92%)	94 (100%)	0	100	100
25	a	92/95~(97%)	91 (99%)	1 (1%)	73	89
28	Ι	$\overline{61/66}\ (92\%)$	60 (98%)	1 (2%)	62	84
All	All	2373/2490~(95%)	2340 (99%)	33 (1%)	68	86

5 of 33 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
21	W	73	ASP
22	Х	29	LYS
28	Ι	22	ARG

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Mol	Chain	Res	Type
6	F	68	TYR
6	F	65	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 45 such sidechains are listed below:

Mol	Chain	Res	Type
18	S	46	GLN
19	U	77	GLN
18	S	119	GLN
18	S	179	GLN
20	V	48	HIS

#### 5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
26	1	2654/2923~(90%)	749 (28%)	236~(8%)
27	2	111/115~(96%)	36~(32%)	17~(15%)
All	All	2765/3038~(91%)	785 (28%)	253~(9%)

5 of 785 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
26	1	11	U
26	1	18	С
26	1	20	С
26	1	27	G
26	1	28	А

5 of 253 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
26	1	1491	С
26	1	2639	С
26	1	1712	А
26	1	2637	С
27	2	8	А



## 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)

1 ligand is modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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| > 2 is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Tuno	Chain	Res Link		Bos Link Bond lengths			Bond angles		
	Type	Ullalli	nes		Counts	RMSZ	# Z >2	Counts	RMSZ	# Z >2
29	U7Y	1	3001	-	28,30,30	<mark>5.58</mark>	19 (67%)	38,43,43	2.48	15 (39%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	$\mathbf{Res}$	Link	Chirals	Torsions	Rings
29	U7Y	1	3001	-	-	7/14/26/26	0/4/4/4

The worst 5 of 19 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
29	1	3001	U7Y	N4-N3	13.53	1.55	1.34
29	1	3001	U7Y	C13-N6	12.23	1.48	1.36
29	1	3001	U7Y	C12-C7	8.82	1.52	1.37
29	1	3001	U7Y	C9-C8	8.00	1.52	1.40
29	1	3001	U7Y	C6-C5	7.44	1.52	1.39

The worst 5 of 15 bond angle outliers are listed below:



Mol	Chain	Res	Type	Atoms	Ζ	$\mathbf{Observed}(^{o})$	$Ideal(^{o})$
29	1	3001	U7Y	C14-N6-C13	-6.90	107.28	111.28
29	1	3001	U7Y	C17-N1-C1	-6.50	121.60	129.38
29	1	3001	U7Y	O2-C13-N6	-5.18	106.26	109.83
29	1	3001	U7Y	O2-C13-O1	3.92	126.71	122.37
29	1	3001	U7Y	C14-N6-C11	3.59	127.53	121.45

There are no chirality outliers.

5 of 7 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
29	1	3001	U7Y	N1-C1-C2-C3
29	1	3001	U7Y	N1-C1-C2-N5
29	1	3001	U7Y	N4-C1-C2-C3
29	1	3001	U7Y	N4-C1-C2-N5
29	1	3001	U7Y	C14-C15-C16-O3

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
29	1	3001	U7Y	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





# 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-21888. These allow visual inspection of the internal detail of the map and identification of artifacts.

Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

# 6.1 Orthogonal projections (i)

#### 6.1.1 Primary map



6.1.2 Raw map



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



# 6.2 Central slices (i)

### 6.2.1 Primary map



X Index: 216



Y Index: 216



Z Index: 216

#### 6.2.2 Raw map



X Index: 216

Y Index: 216



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



## 6.3 Largest variance slices (i)

### 6.3.1 Primary map









Z Index: 242

### 6.3.2 Raw map



X Index: 205

Y Index: 199



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 0.02. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

#### 6.4.2 Raw map



These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

### 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 51111  $\rm nm^3;$  this corresponds to an approximate mass of 46170 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 0.323  $\mathrm{\AA^{-1}}$ 



# 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 0.323  $\mathrm{\AA^{-1}}$ 



## 8.2 Resolution estimates (i)

$\begin{bmatrix} Bosolution ostimato (Å) \end{bmatrix}$	Estim	Estimation criterion (FSC cut-off)			
Resolution estimate (A)	0.143	0.5	Half-bit		
Reported by author	3.10	-	-		
Author-provided FSC curve	3.07	3.51	3.10		
Unmasked-calculated*	3.78	5.98	3.89		

\*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.78 differs from the reported value 3.1 by more than 10 %



# 9 Map-model fit (i)

This section contains information regarding the fit between EMDB map EMD-21888 and PDB model 6WRU. Per-residue inclusion information can be found in section 3 on page 10.

# 9.1 Map-model overlay (i)



The images above show the 3D surface view of the map at the recommended contour level 0.02 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 Q-score mapped to coordinate model (i)



The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

#### 9.3 Atom inclusion mapped to coordinate model (i)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.02).



## 9.4 Atom inclusion (i)



At the recommended contour level, 99% of all backbone atoms, 99% of all non-hydrogen atoms, are inside the map.



1.0

0.0 <0.0

# 9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.02) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.9861	0.5670
1	0.9922	0.5730
2	0.9903	0.4860
А	0.9943	0.5800
В	0.9888	0.5890
С	0.9912	0.5910
D	0.9974	0.5820
Ε	0.9940	0.5940
F	0.9841	0.5540
G	0.9941	0.5620
Н	0.3796	0.1680
Ι	0.9879	0.5810
J	0.9911	0.5570
К	0.9871	0.5310
L	0.9819	0.5700
М	0.9835	0.5730
Ν	0.9948	0.5930
О	0.9788	0.5610
Р	0.9886	0.6100
Q	0.9980	0.6180
R	1.0000	0.5920
S	0.9868	0.5690
U	0.9850	0.4980
V	0.9928	0.5920
W	0.9876	0.5730
Х	0.9896	0.5760
Y	0.9953	0.5910
Ζ	0.9919	0.5870
a	0.9886	0.5220

