

wwPDB EM Validation Summary Report (i)

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PDB ID	:	7QH4
EMDB ID	:	EMD-13961
Title	:	Structure of the B. subtilis disome - collided 70S ribosome
Authors	:	Kratzat, H.; Buschauer, R.; Berninghausen, O.; Beckmann, R.
Deposited on	:	2021-12-10
Resolution	:	5.45 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 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)	:	2.27

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 5.45 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	$egin{array}{c} { m Whole \ archive} \ (\#{ m Entries}) \end{array}$	${f EM\ structures}\ (\#{ m Entries})$
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 c	hain	
1	А	2928	56%	31%	12% •
2	В	119	53%	32%	8% • 6%
3	С	277	27%		·
4	D	208	15%		·
5	Е	207	45%		••
6	F	179	97%		••
7	G	179	8%		•••
8	Н	166	68%	6%	26%



 $Continued \ from \ previous \ page...$ Chain Length Quality of chain Mol 40% 9 Ι 141 • 6% 93% 8% ••• 10 J 14597% 28% 11 Κ 122. 98% 20% 12L 14699% . 28% 13М 14496% • 14Ν 120.. 98% 13% Ο 1512095% 5% 15% Р . 1611599% 5% Q 1711998% \mathbf{R} 1810297% 14% \mathbf{S} 191135% • 91% 11% Т . 209598% 13% 21U 103. . 94% 19% 22V 9487% 13% 29% Υ 2362 • 6% 90% 11% Ζ 2466 • 98% 8% • • 2559 \mathbf{a} 97% 15% 5926b 90% 8% • 18% • 2749 \mathbf{c} 98% 32% 28d 44 100% 27% 2966 е 95% • • 11% f 30 37 97% • W 155531 65% 26% 8% • 13% 32Х 2469% 89% • 20% 33 218g 96%



Mol	Chain	Length	Quality of chain	
34	h	200	46%	
35	i	166	24%	•••
36	j	95	9%	•
37	k	156	97%	••
38	1	132	5% 	
39	m	130	6% 96%	•
40	n	102	96%	•
41	0	131	89%	• 10%
42	р	138	30%	5%•
43	q	121	90%	8% •
44	r	61	93%	5% •
45	s	89	97%	••
46	t	90	97%	
47	u	87	<u>8%</u> 99%	
48	v	79	8%	• 10%
49	W	92	10%	• 9%
50	x	88	10%	
51	1	77	14% 70% 23%	5% •
51	у	77	<u>40%</u> <u>68%</u> 27%	••

Continued from previous page...



2 Entry composition (i)

There are 51 unique types of molecules in this entry. The entry contains 136043 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 RNA chain called 23S rRNA.

Mol	Chain	Residues			AltConf	Trace			
1	А	2923	Total 62767	C 28002	N 11589	O 20253	Р 2923	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
А	1558	С	G	conflict	GB 1864548803

• Molecule 2 is a RNA chain called 5S rRNA.

Mol	Chain	Residues		At	AltConf	Trace			
2	В	112	Total 2395	C 1068	N 435	O 780	Р 112	0	0

• Molecule 3 is a protein called 50S ribosomal protein L2.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	С	275	Total 2111	C 1312	N 416	0 377	S 6	0	0

• Molecule 4 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	207	Total 1575	C 988	N 290	O 292	${ m S}{ m 5}$	0	0

• Molecule 5 is a protein called 50S ribosomal protein L4.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	Е	205	Total 1561	C 980	N 289	O 290	${S \over 2}$	0	0

• Molecule 6 is a protein called 50S ribosomal protein L5.



Mol	Chain	Residues	Atoms					AltConf	Trace
6	F	178	Total 1404	C 893	N 245	O 259	${f S}$ 7	0	0

• Molecule 7 is a protein called Ribosomal protein L6.

Mol	Chain	Residues		At	oms			AltConf	Trace
7	G	175	Total 1342	C 835	N 248	0 257	${S \over 2}$	0	0

• Molecule 8 is a protein called 50S ribosomal protein L10.

Mol	Chain	Residues		At	oms			AltConf	Trace
8	Н	123	Total 955	C 602	N 163	0 189	S 1	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
H	154	THR	ALA	conflict	UNP A0A063X7V1

• Molecule 9 is a protein called 50S ribosomal protein L11.

Mol	Chain	Residues		At	oms			AltConf	Trace
9	Ι	133	Total 981	C 617	N 173	0 185	S 6	0	0

• Molecule 10 is a protein called 50S ribosomal protein L13.

Mol	Chain	Residues		At	oms	AltConf	Trace		
10	J	142	Total 1123	C 710	N 206	O 202	${S \atop 5}$	0	0

• Molecule 11 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues		At	oms			AltConf	Trace
11	K	122	Total 920	C 571	N 173	0 172	${S \atop 4}$	0	0

• Molecule 12 is a protein called 50S ribosomal protein L15.



Mol	Chain	Residues		At	oms			AltConf	Trace
12	L	146	Total 1081	C 671	N 207	0 201	${ m S} { m 2}$	0	0

• Molecule 13 is a protein called 50S ribosomal protein L16.

Mol	Chain	Residues		At	oms			AltConf	Trace
13	М	138	Total 1097	C 703	N 208	0 181	${f S}{5}$	0	0

• Molecule 14 is a protein called 50S ribosomal protein L17.

Mol	Chain	Residues		At	oms			AltConf	Trace
14	Ν	119	Total 953	C 583	N 186	0 180	S 4	0	0

• Molecule 15 is a protein called 50S ribosomal protein L18.

Mol	Chain	Residues		At	oms			AltConf	Trace
15	Ο	120	Total 912	C 564	N 176	0 171	S 1	0	0

• Molecule 16 is a protein called 50S ribosomal protein L19.

Mol	Chain	Residues		Ato	\mathbf{ms}	AltConf	Trace	
16	Р	114	Total 936	C 595	N 184	O 157	0	0

• Molecule 17 is a protein called 50S ribosomal protein L20.

Mol	Chain	Residues		At	AltConf	Trace			
17	Q	117	Total 940	C 591	N 189	0 156	$\frac{S}{4}$	0	0

• Molecule 18 is a protein called 50S ribosomal protein L21.

Mol	Chain	Residues		Ato	ms	AltConf	Trace	
18	R	101	Total 786	C 501	N 139	O 146	0	0

• Molecule 19 is a protein called 50S ribosomal protein L22.



Mol	Chain	Residues		At	oms			AltConf	Trace
19	S	109	Total 842	C 525	N 164	O 150	${ m S} { m 3}$	0	0

• Molecule 20 is a protein called 50S ribosomal protein L23.

Mol	Chain	Residues		At	oms			AltConf	Trace
20	Т	93	Total 752	C 472	N 137	O 139	${f S}$ 4	0	0

• Molecule 21 is a protein called 50S ribosomal protein L24.

Mol	Chain	Residues		At	oms			AltConf	Trace
21	U	100	Total 754	С 473	N 141	0 137	${ m S} { m 3}$	0	0

• Molecule 22 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues		Ato	ms	AltConf	Trace	
22	V	82	Total 630	C 390	N 123	0 117	0	0

• Molecule 23 is a protein called 50S ribosomal protein L28.

Mol	Chain	Residues		Atc	\mathbf{ms}	AltConf	Trace		
23	Y	58	Total 444	C 275	N 92	O 75	$\begin{array}{c} \mathrm{S} \\ \mathrm{2} \end{array}$	0	0

• Molecule 24 is a protein called 50S ribosomal protein L29.

Mol	Chain	Residues		Ate	oms	AltConf	Trace		
24	Z	65	Total	С	Ν	0	\mathbf{S}	0	0
			530	328	102	98	2		

• Molecule 25 is a protein called 50S ribosomal protein L30.

Mol	Chain	Residues		Atc	\mathbf{ms}			AltConf	Trace
25	a	58	Total 455	C 281	N 89	0 84	${f S}$ 1	0	0

• Molecule 26 is a protein called 50S ribosomal protein L32.



Mol	Chain	Residues		Atc	\mathbf{ms}	AltConf	Trace		
26	b	54	Total 426	C 262	N 86	0 71	${ m S} 7$	0	0

• Molecule 27 is a protein called 50S ribosomal protein L33.

Mol	Chain	Residues		Atc	\mathbf{ms}	AltConf	Trace		
27	с	48	Total 401	C 244	N 80	0 73	${ m S}_4$	0	0

• Molecule 28 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues		Atc	\mathbf{ms}	AltConf	Trace		
28	d	44	Total 367	C 222	N 89	0 54	${S \over 2}$	0	0

• Molecule 29 is a protein called 50S ribosomal protein L35.

Mol	Chain	Residues		Ate	oms			AltConf	Trace
29	е	64	Total 512	C 321	N 107	O 82	${ m S} { m 2}$	0	0

• Molecule 30 is a protein called 50S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	f	36	Total 288	C 181	N 59	0 44	S 4	0	0

• Molecule 31 is a RNA chain called 16S rRNA.

Mol	Chain	Residues		1	AltConf	Trace			
31	W	1544	Total 33115	C 14768	N 6067	O 10736	Р 1544	0	0

• Molecule 32 is a protein called 30S ribosomal protein S2.

Mol	Chain	Residues	Atoms				AltConf	Trace
32	Х	224	Total 896	C 448	N 224	O 224	0	0

• Molecule 33 is a protein called 30S ribosomal protein S3.



Mol	Chain	Residues	Atoms				AltConf	Trace
33	g	210	Total	C 420	N 210	0	0	0
	-		840	420	210	210		

• Molecule 34 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms				AltConf	Trace
34	h	199	Total 797	C 398	N 199	O 200	0	0

• Molecule 35 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms				AltConf	Trace
35	i	165	Total 661	C 330	N 165	O 166	0	0

• Molecule 36 is a protein called 30S ribosomal protein S6.

Mol	Chain	Residues	Atoms				AltConf	Trace
36	j	95	Total 381	C 190	N 95	O 96	0	0

• Molecule 37 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms				AltConf	Trace
37	k	153	Total 613	C 306	N 153	O 154	0	0

• Molecule 38 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms				AltConf	Trace
38	1	131	Total 525	C 262	N 131	O 132	0	0

• Molecule 39 is a protein called 30S ribosomal protein S9.

Mol	Chain	Residues	Atoms				AltConf	Trace
39	m	130	Total 521	C 260	N 130	O 131	0	0

• Molecule 40 is a protein called 30S ribosomal protein S10.



Mol	Chain	Residues	Atoms				AltConf	Trace
40	n	102	Total 409	C 204	N 102	O 103	0	0

• Molecule 41 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms				AltConf	Trace
41	О	118	Total 472	C 236	N 118	0 118	0	0

• Molecule 42 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues		Ato	\mathbf{ms}		AltConf	Trace
42	р	137	Total 549	С 274	N 137	O 138	0	0

• Molecule 43 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues		Ato	ms		AltConf	Trace
43	q	119	Total 476	C 238	N 119	O 119	0	0

• Molecule 44 is a protein called 30S ribosomal protein S14 type Z.

Mol	Chain	Residues		Aton	ns		AltConf	Trace
44	r	60	Total 241	C 120	N 60	O 61	0	0

• Molecule 45 is a protein called 30S ribosomal protein S15.

Mol	Chain	Residues		Aton	ıs	AltConf	Trace		
45	G	<u> </u>	Total	С	Ν	0	0	0	
40	5	00	353	176	88	89	0	0	

• Molecule 46 is a protein called 30S ribosomal protein S16.

Mol	Chain	Residues		Aton	ıs	AltConf	Trace	
46	t	89	Total 357	C 178	N 89	O 90	0	0

• Molecule 47 is a protein called 30S ribosomal protein S17.



Mol	Chain	Residues		Aton	ıs	AltConf	Trace	
47	u	86	Total 345	C 172	N 86	O 87	0	0

• Molecule 48 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues		Aton	ıs	AltConf	Trace		
48	v	71	Total 285	C 142	N 71	O 72	0	0	

• Molecule 49 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues		Aton	ns	AltConf	Trace		
49	W	84	Total 336	C 168	N 84	0 84	0	0	

• Molecule 50 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues		Aton	ıs	AltConf	Trace		
50	х	86	Total 345	C 172	N 86	0 87	0	0	

• Molecule 51 is a RNA chain called tRNA.

Mol	Chain	Residues		\mathbf{A}	AltConf	Trace			
51	17	77	Total	С	Ν	0	Р	0	0
51	У	11	1643	731	290	545	77	0	0
51	1	77	Total	С	Ν	0	Р	0	0
	L	11	1643	731	290	545	77	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: 23S rRNA



A9 04	A908 G909	6911 C912	A913 C914 U915	G916 A917	A922	<mark>C923</mark> U924	A925	G928 G929	C830	C931 C932	0934 0934	A935 C936	C937	U942	A943 C944	A947	A948	A952	A956 A957	A958 A958		A964 A965	A970	A971 U972	G973 A974	C975	0160 1977 1978	C981	A987
A991	4993 4993	666V	A1003 U1004 A1005	A1006 G1007	A1008	A1014	A1019 A1020	A1021	A1025 A1026	A1027 C1028	A1029	G1030 C1031	A1034	G1035 A1036	C1037	A1042	A1046	A1047	A1054 A1055	A1056 G1057	U1058 A1059	U1060 A1061	C1062 G1063	ATORE	A1067	61068	G1071 A1072	A1073 A1074 A1075	GYOTA
A1078 U1079	A1084	A1092 G1093 A1094	<mark>C1095</mark> A1096 A1097	A1100	G1101 G1102	A1103 U1104	U1 107	G1108	U1111 11112	A1113 G1114	A1115	A1116 G1117	C1118 A1119	G1120 C1121	C1122	C1124 C1124	A1126	U1127 U1128	U1129 A1130	A1131 A1132	G1133 A1134	G1135 U1136	G1137 C1138	G1139	A1140	A1142 U1143	A1144 G1145	C1148	C1150
U1151 G1152	A1157 G1158	A1161	A1172 A1173 A1174	A1175 U1176	G1177 U1178	A1179 C1180	C1181 G1182	A1188	A1189 A1190	A 1194			A1201 A1202	G1209	A1210	U1218	C1219 G1220	A1221 A1222	C1223 A1224	A1230	A1233	G1234	G1236	A1243	A1244 G1245	G1246 G1247	C1248 U1249	G1250 U1251	<mark>G1252</mark> A1253
A1254	A1 258 G1 259 A1 260	A1265 A1266 A1266	<mark>G1267</mark> G1268 A1269	A1277	G1278	A1284 G1285	A1286 A1287	G1288 U1289	G1290 A1291	G1292 A1293	A1294	01295 G1296	A1302	A1305	G1306	A1308	A1312	A1313 A1314	G1315 A1316	G1319	A1323	G1324 A1325	A1326 U1327	A1 335	COOTW	A1339 A1340	U1341	C1344 U1345	A1340 A1347
	01352 A1357	A1360 A1361	<mark>G1362</mark> G1363 C1364	A1375	G1376	U1380 A1381	G1382 U1383	C1384	A1388	A1392 A1393		AI398	A1404 A1405	A1406	A1412	A1417		A1421 C1422	A1423 A1424	C1425 A1426	A1432	U1433 A1434	U1435	C1437	C1438 U1439	G1440 U1441	A1442	A1445	C1450
A1453 C1454 C1454	01400 41456	01403 61460 A1461	A1464 A1465	A1473	C1474	A1477	A1480	A1483 U1484	A1485	A1490 A1491		C1495 G1496	G1497 U1498	A1499	A1504	A1506	U1507	U1513	A1516 A1517	<mark>G1518</mark> C1519	A1520 G1521	U1522 U1522	A1524	C1527	U1528 G1529	G1530 61530	41532 A1532 A1533	A1534 U1535	A1536
C1539 A1540	A1541 A1542 U1543	A1553 U1554	A1555 A1556 G1557	C1558	G1561 A1562	A1569	G1572	C1573 G1574	A1575	G1578 A1579	A1580	A1581 U1582	A1583	A1585	A1588	A1592	A1593 G1594	U1595 U1596	G1600	A1601		A1606 C1607	A1608	A1614 A1615	G1616 A1617	A1618 A1619		U1626 A1627	G1630
A1631 G1632	A1636 G1637 A1628	A1639 61640 61640	U1647 A1648	G1651	C1652 A1653	A1654 A1655	C1656 C1657	G1658 A1659	C1660 A1661	C1662 A1663		A166 /	A1672 G1673	G1674 A1675	G1676	G1678	A1680	A1685	A1686 G1687	G1688	A1691 U1692	C1693 G1694	A1695 G1696	A1697	A1699		U1707 U1708	A1709 A1710	61712 61712
A1713 A1714	G1719 C1720	A1722 A1722 A1723	A1724 A1727	C1728	A1734 A1735	C1739	A1743	G1744 A1745	A1746	G1752	C1755	01/56 G1757	U1758 U1759	A1760	A1767	G1769	C1771	A1774	G1775 A1776	G1777 A1778	G1779 C1780	C1781 G1782	C1783 A1784	G1785	G1787	A1/88 A1789	U1790 A1791	G1792 G1793	C1796
A1797	A1002 A1809 A1810	G1811 C1811 A1812	A1813 A1814 A1815	A1816 C1817	A1818 C1819	A1820	C1829 G1830	A1831 A1832	G1833 C1834	A1838	A1839	A1844	A1845	A1848 111849	A1850	A1858	C1862	A1876	A1877	A1882 A1883	G1884 A1885	41222		G1896	C1897	A1900 A1901	G1902	A1905 A1906	G1910
C1911 G1912	A1913 A1914 U1915	01910 61917 A1918	A1919 A1925	A1928	A1929 A1930	G1935	A1941	A1942	U1944	A1945 U1946	A1947 A1948	C1954	U1955 A1956	A1957	G1958 G1959	U1960 A1961	A1965	A1966	U1968		71011	A1981 A1982	G1983 U1984	A1989		ZEETO	A1995 C1996	61997 A1998 A1900	A2000 G2001
A2006		C2012	A2018 C2019 U2020	U2024	C2025 A2026	A2027	A2030 G2031	A2032 G2033	A2034	A2042 A2043	A2044	A2047	U2048 A2049	A 205.2		A2069 A2060	42062 A2062	A2066	A2071	C2072	A2078 C2079	A2080	A2083 C2084	G2085	A2087	A2088 A2089	G2090 A2091	C2092	G2099
A2100	U2105 A2106	A2111 U2115	G2116 A2117 112118	02110 A2119 U2120	U2121 G2122	A2123 A2124	U2125 G2126		U2131		02140 A2141	C2142 A2143	G2144 G2145	A2146	02147 A2148	G2149 G2150	U2151	A2155 G2156	C2157	U2160 G2161	G2162	C2166	10170	C2174	C2175 A2176	G2177	A2187	C2190	G2195 U2196
															W O	R L			E										





LYS

• Molecule 4: 50S ribosomal protein L3



VAL ALA GLU GLU GLU GLU GLU GLV ALA

• Molecule 9: 50S ribosomal protein L11



 \bullet Molecule 14: 50S ribosomal protein L17

Chain N:

98%





Chain U:	94%	• •
MET H2 F28 K30 K30 G53 F52 F53 F73 K74	KB4	
• Molecule 22: 50S ribose	omal protein L27	
Chain V:	87%	13%
MET LEU ARG LEU ASP LEU GILA GILA ASP CLA GILA GILA GILA GILA GILA	S17 T18 K19 N20 G21 R22 R22 R25 K27 K27 K27 K27 K27 K27 K27 K27 K27 K27	
• Molecule 23: 50S ribos	omal protein L28	
Chain Y:	90%	• 6%
MET ALA R3 K4 C5 V6 V5 V6 T3 C5 K10 K11 K11 S19 S19 S19	8255 826 827 128 140 144 154 860 860 ARG	
• Molecule 24: 50S ribose	omal protein L29	
Chain Z:	98%	
M1 R7 T111 A12 E15 K19 A64 NG5 NG5		
• Molecule 25: 50S ribos	omal protein L30	
Chain a:	97%	•••
MET A.2 E17 D18 019 R24 K20 K29 C29 C29 C59		
• Molecule 26: 50S ribos	omal protein L32	
Chain b:	90%	• 8%
MET A2 V3 P4 F2 R5 R5 R5 R5 P2 F20 F20 F20 C2 R5 M27 M25 M45	NB5 SER ASN	
• Molecule 27: 50S ribos	omal protein L33	
Chain c:	98%	.
M1 R2 V3 V3 V3 F6 F1 E11 E11 F2 P2 P28 P28 P28 P28 P28 P28 P28 P28 P28		
	PROTEIN DATA BANK	

• Molecule 28: 50S ribosomal protein L34

Chain d:	32%	100%		
M1 K2 K14 K14 R19 R19 R20 R21 S23	R34 R35 K40 V41 L42 S43			
• Molecule 29: 50	S ribosomal protei	in L35		
Chain e:	1%	95%		• •
MET P2 K3 K5 K12 K12 K12 K15 K15	S25 S30 H31 L44 S47 V50	165 155 155 155 155 165 165 165 175		
• Molecule 30: 50	S ribosomal protei	in L36		
Chain f:		97%		·
MET K2 K3 E12 C21 C21 C37				
• Molecule 31: 16	S rRNA			
Chain W:	65%		26%	8% •
А И U И С С С С С С С С С С С С С С С С С С	A18 A28 A31 A34 A35 A35 A35 C4 C49 C50	451 453 453 455 457 457 461 461 461 467	A72 C73 A74 A76 A76 A81 A81 C83 C83 C83 U84 U85 €85	C87 U88 U98 A99 A107
6113 A117 A117 A117 A118 C119 C119 C119 C126 A128 A128	C130 A139 A140 G141 C143 C143 C143 A148 A148 A148 A150 A151 A151	6158 4160 4161 4161 6162 6162 6163 4171 4171 4173	410 1182 1182 1183 1189 1189 1189 1196 1196 1196	A202 A203 A204 A206 A206 A206 A208 A208 A208 A208
A211 A225 A225 A228 A228 A232 C233 A236 A236 A236 A236 A236	A240 C250 A251 A251 A254 A254 C256 A254 C256 A256 C256	A266 A271 A271 C274 C274 C278 A281 A281	A287 C288 C288 A296 A296 C297 C297 A301 A301 A301 C307 C307	A308 A314 A321 A321 C322 A323 A323
A333 6333 6333 6333 6333 6333 6333 6333	A355 A355 C355 A357 A355 A356 A356 A356 A356 A356 A356 A356	A367 A371 A372 A372 U375 U375 A381 A381 A381 A385 A385	A389 A391 A397 A397 A401 A405 A405 A405 A405	A415 A419 U420 G421 A422 A423 V429
C430 6431 6431 6431 6433 6436 6436 6438 A438 A438 A440 A440 A440	A452 A455 A455 A455 A455 A453 A453 A453 A453	A474 A475 A477 A477 A485 A485 U488 U488 G490 A491	6494 1495 1495 1500 1504 1503 1503 1503 1503	A512 A518 A519 C520 U521 A522 A522 C527
6528 4529 4532 6533 6533 6533 6542 8541 8541 8541	A555 A555 A556 A568 A569 A572 A581 A582 A583	6585 6585 6585 6585 6585 4592 A604 A605 A611 A611	A61/ A618 A630 A638 A638 A638 C641 U642 C643 C643	A649 A651 A651 A658 A658 A659 D662 C963
A664 A666 A670 A671 A673 A677 A677 A677 A677	A694 A690 A690 A703 A703 A703 A703 A711 A712 C712	A713 6714 A715 A721 A724 A725 C728 A726 C728 C729 C729	6730 6731 0731 7732 7736 6739 6740 6741 743 743 743 7743	A757 A758 A762 C763 G764 A768





• Molecule 34: 30S ribosomal protein S4











• Molecule 46: 30S ribosomal protein S16

Chain t: 97% . . • Molecule 47: 30S ribosomal protein S17 Chain u: 99% • Molecule 48: 30S ribosomal protein S18 8% Chain v: 86% 10% MET ALA GLY GLY ARG ARG GLY GLY GLY R9 R9 R9 • Molecule 49: 30S ribosomal protein S19 10% Chain w: 89% 9% LYS LYS THF ARG ARG ME7 AL/ ARC • Molecule 50: 30S ribosomal protein S20 10% Chain x: •• 97% \bullet Molecule 51: tRNA 40% Chain y: 68% 27% . C56 G57 A58 G59 U60 U60 C61 C62 C62 G2 G6 G6 G5 U8 274 275 476

• Molecule 51: tRNA







4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	12739	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 $(e^-/\text{\AA}^2)$	40	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	4000	Depositor
Magnification	Not provided	
Image detector	FEI FALCON II $(4k \ge 4k)$	Depositor
Maximum map value	1.496	Depositor
Minimum map value	-0.769	Depositor
Average map value	-0.001	Depositor
Map value standard deviation	0.082	Depositor
Recommended contour level	0.22	Depositor
Map size (Å)	650.4, 650.4, 650.4	wwPDB
Map dimensions	600, 600, 600	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.084, 1.084, 1.084	Depositor



5 Model quality (i)

5.1 Standard geometry (i)

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).

Mol Chain		I	Bond lengths		Bond angles
	Unam	RMSZ	# Z > 5	RMSZ	# Z > 5
1	А	1.37	1882/70307~(2.7%)	2.92	7351/109687~(6.7%)
2	В	1.30	67/2678~(2.5%)	2.78	247/4174~(5.9%)
3	С	0.27	0/2148	0.48	0/2881
4	D	0.28	0/1597	0.47	0/2140
5	Ε	0.27	0/1580	0.50	0/2132
6	F	0.29	0/1423	0.51	0/1910
7	G	0.24	0/1360	0.43	0/1832
8	Н	0.26	0/963	0.49	0/1298
9	Ι	0.26	0/995	0.48	0/1346
10	J	0.26	0/1146	0.49	0/1542
11	Κ	0.28	0/927	0.47	0/1245
12	L	0.23	0/1093	0.44	0/1457
13	М	0.21	0/1120	0.38	0/1496
14	Ν	0.26	0/960	0.50	0/1284
15	0	0.30	0/921	0.54	1/1236~(0.1%)
16	Р	0.24	0/949	0.44	0/1269
17	Q	0.27	0/952	0.45	0/1266
18	R	0.28	0/797	0.53	0/1070
19	S	0.34	0/851	0.59	0/1146
20	Т	0.30	0/759	0.47	0/1011
21	U	0.27	0/764	0.52	0/1022
22	V	0.30	0/638	0.50	0/847
23	Y	0.30	0/448	0.58	0/596
24	Ζ	0.24	0/531	0.48	0/707
25	a	0.24	0/457	0.44	0/613
26	b	0.23	0/433	0.48	0/574
27	с	0.26	0/406	0.44	0/540
28	d	0.21	0/370	0.44	0/483
29	е	0.24	0/519	0.48	0/680
30	f	0.20	0/291	0.37	0/383
31	W	1.36	975/37074~(2.6%)	2.90	3795/57834~(6.6%)
32	Х	0.32	0/895	0.40	0/1117
33	g	0.30	0/839	0.38	0/1047
34	h	0.26	0/796	0.42	0/992



Mol	Chain	I	Bond lengths		Bond angles
	Unam	RMSZ	# Z > 5	RMSZ	# Z > 5
35	i	0.26	0/660	0.46	0/822
36	j	0.32	0/380	0.41	0/472
37	k	0.26	0/612	0.39	0/762
38	l	0.24	0/524	0.43	0/652
39	m	0.27	0/520	0.51	0/647
40	n	0.28	0/408	0.39	0/507
41	0	0.22	0/471	0.42	0/587
42	р	0.24	0/548	0.50	0/682
43	q	0.31	0/475	0.52	0/592
44	r	0.21	0/240	0.49	0/297
45	\mathbf{S}	0.27	0/352	0.42	0/437
46	\mathbf{t}	0.27	0/356	0.41	0/442
47	u	0.27	0/344	0.43	0/427
48	V	0.31	0/284	0.44	0/352
49	W	0.33	0/335	0.46	0/417
50	Х	0.27	0/344	0.41	0/427
51	1	1.03	29/1834~(1.6%)	2.18	105/2858~(3.7%)
51	У	1.00	26/1834~(1.4%)	2.08	94/2858~(3.3%)
All	All	1.20	2979/148508~(2.0%)	2.59	11593/223095~(5.2%)

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
1	А	0	81
2	В	0	2
5	Е	0	1
19	S	0	2
31	W	0	35
51	1	0	2
51	у	0	2
All	All	0	125

The worst 5 of 2979 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	$\mathrm{Ideal}(\mathrm{\AA})$
31	W	508	A	C8-N7	8.64	1.37	1.31
1	А	1188	А	C8-N7	8.30	1.37	1.31
31	W	1372	А	C8-N7	8.24	1.37	1.31
1	А	526	А	C8-N7	8.18	1.37	1.31



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Mol	Chain	Res	Type	Atoms	Ζ	Observed(Å)	$\mathrm{Ideal}(\mathrm{\AA})$
31	W	631	А	C8-N7	8.17	1.37	1.31

The worst 5 of 11593 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	$Observed(^{o})$	$Ideal(^{o})$
1	А	1134	A	C2-N3-C4	20.46	120.83	110.60
1	А	1691	А	C2-N3-C4	20.44	120.82	110.60
31	W	1308	A	C2-N3-C4	20.37	120.78	110.60
1	А	226	А	C2-N3-C4	20.30	120.75	110.60
31	W	993	А	C2-N3-C4	20.23	120.72	110.60

There are no chirality outliers.

5 of 125 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	А	126	А	Sidechain
1	А	168	А	Sidechain
1	А	52	А	Sidechain
1	А	64	А	Sidechain
1	А	67	А	Sidechain

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	Pe	erce	entile	es
3	С	273/277~(99%)	264 (97%)	8 (3%)	1 (0%)		34	72	
4	D	205/208~(99%)	189 (92%)	11 (5%)	5 (2%)		6	33	



Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
5	Ε	203/207~(98%)	184 (91%)	16 (8%)	3~(2%)	10 45
6	F	176/179~(98%)	154 (88%)	18 (10%)	4(2%)	6 34
7	G	173/179~(97%)	164 (95%)	8 (5%)	1 (1%)	25 65
8	Н	121/166~(73%)	97~(80%)	14 (12%)	10 (8%)	1 12
9	Ι	131/141~(93%)	122~(93%)	7 (5%)	2(2%)	10 45
10	J	140/145~(97%)	130 (93%)	9~(6%)	1 (1%)	22 62
11	Κ	120/122~(98%)	112 (93%)	6~(5%)	2(2%)	9 41
12	L	144/146~(99%)	132 (92%)	10 (7%)	2 (1%)	11 45
13	М	136/144~(94%)	129 (95%)	7 (5%)	0	100 100
14	Ν	117/120~(98%)	109 (93%)	7 (6%)	1 (1%)	17 56
15	Ο	118/120~(98%)	106 (90%)	7 (6%)	5 (4%)	3 22
16	Р	112/115~(97%)	100 (89%)	12 (11%)	0	100 100
17	Q	115/119~(97%)	112 (97%)	3 (3%)	0	100 100
18	R	99/102~(97%)	82 (83%)	15 (15%)	2(2%)	7 37
19	S	107/113~(95%)	96 (90%)	8 (8%)	3(3%)	5 30
20	Т	91/95~(96%)	86 (94%)	5 (6%)	0	100 100
21	U	98/103~(95%)	87~(89%)	8 (8%)	3~(3%)	4 27
22	V	80/94~(85%)	77~(96%)	3(4%)	0	100 100
23	Υ	56/62~(90%)	53~(95%)	1 (2%)	2~(4%)	3 25
24	Z	63/66~(96%)	60~(95%)	3~(5%)	0	100 100
25	a	56/59~(95%)	54 (96%)	1 (2%)	1 (2%)	8 40
26	b	52/59~(88%)	47 (90%)	4 (8%)	1 (2%)	8 38
27	с	46/49~(94%)	44 (96%)	2(4%)	0	100 100
28	d	42/44~(96%)	41 (98%)	1 (2%)	0	100 100
29	е	62/66~(94%)	56 (90%)	5 (8%)	1 (2%)	9 43
30	f	34/37~(92%)	33~(97%)	1 (3%)	0	100 100
32	Х	$222/\overline{246}\ (90\%)$	204 (92%)	13 (6%)	5(2%)	6 34
33	g	208/218~(95%)	$193 \ (93\%)$	14 (7%)	1 (0%)	29 69
34	h	197/200 (98%)	191 (97%)	4 (2%)	2(1%)	15 54
35	i	163/166~(98%)	150 (92%)	9 (6%)	4 (2%)	5 32
36	j	93/95~(98%)	88 (95%)	3(3%)	2(2%)	6 35



Mol	Chain	Analysed	Favoured	Allowed	Outliers	Pe	erce	entiles
37	k	151/156~(97%)	144 (95%)	6 (4%)	1 (1%)	4	22	62
38	1	129/132~(98%)	123 (95%)	5 (4%)	1 (1%)		19	59
39	m	128/130 (98%)	113 (88%)	10 (8%)	5 (4%)		3	23
40	n	100/102~(98%)	88 (88%)	8 (8%)	4 (4%)		3	23
41	О	116/131 (88%)	106 (91%)	9 (8%)	1 (1%)		17	56
42	р	135/138~(98%)	118 (87%)	10 (7%)	7 (5%)		2	19
43	q	$117/121 \ (97\%)$	94 (80%)	13 (11%)	10 (8%)		1	11
44	r	58/61~(95%)	51 (88%)	4 (7%)	3~(5%)		2	19
45	S	86/89~(97%)	82 (95%)	2 (2%)	2 (2%)		6	34
46	t	87/90~(97%)	82 (94%)	3 (3%)	2(2%)		6	34
47	u	84/87~(97%)	78~(93%)	6 (7%)	0	10	00	100
48	v	69/79~(87%)	64 (93%)	2(3%)	3~(4%)		2	22
49	W	82/92~(89%)	75~(92%)	5 (6%)	2(2%)		6	33
50	X	84/88~(96%)	77 (92%)	6 (7%)	1 (1%)		13	49
All	All	5479/5758~(95%)	5041 (92%)	332 (6%)	106 (2%)		11	38

Continued from previous page...

5 of 106 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
8	Н	93	ALA
9	Ι	19	ASN
15	0	26	ALA
21	U	87	ASP
35	i	4	ILE

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	Percentiles
3	С	223/225~(99%)	223 (100%)	0	100 100
4	D	168/169~(99%)	168 (100%)	0	100 100



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Commuted	jiom	previous	puye

Mol	Chain	Analysed	Rotameric	Outliers	Percent	iles
5	Ε	169/170~(99%)	168~(99%)	1 (1%)	86 9)1
6	F	153/154~(99%)	153 (100%)	0	100 1	.00
7	G	148/151~(98%)	148 (100%)	0	100 1	.00
8	Н	105/139~(76%)	105 (100%)	0	100 1	.00
9	Ι	103/110 (94%)	103 (100%)	0	100 1	.00
10	J	120/123~(98%)	120 (100%)	0	100 1	.00
11	Κ	101/101~(100%)	101 (100%)	0	100 1	.00
12	L	110/110 (100%)	110 (100%)	0	100 1	.00
13	М	111/116 (96%)	111 (100%)	0	100 1	.00
14	Ν	99/100~(99%)	99 (100%)	0	100 1	.00
15	О	93/93~(100%)	93 (100%)	0	100 1	.00
16	Р	99/100~(99%)	99 (100%)	0	100 1	.00
17	Q	96/98~(98%)	96 (100%)	0	100 1	.00
18	R	83/84~(99%)	83 (100%)	0	100 1	.00
19	S	90/93~(97%)	89~(99%)	1 (1%)	73 8	34
20	Т	84/85~(99%)	84 (100%)	0	100 1	.00
21	U	84/87~(97%)	84 (100%)	0	100 1	.00
22	V	64/74~(86%)	64 (100%)	0	100 1	.00
23	Y	47/50~(94%)	47 (100%)	0	100 1	.00
24	Ζ	56/57~(98%)	56 (100%)	0	100 1	.00
25	a	52/53~(98%)	52 (100%)	0	100 1	.00
26	b	48/53~(91%)	48 (100%)	0	100 1	.00
27	с	46/47~(98%)	46 (100%)	0	100 1	.00
28	d	39/39~(100%)	39 (100%)	0	100 1	.00
29	е	54/56~(96%)	54 (100%)	0	100 1	.00
30	f	34/35~(97%)	34 (100%)	0	100 1	.00
All	All	2679/2772~(97%)	2677 (100%)	2 (0%)	93 9)7

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
5	Е	66	ARG
19	S	90	MET



Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 38 such sidechains are listed below:

Mol	Chain	Res	Type
22	V	37	GLN
29	е	31	HIS
23	Y	23	ASN
26	b	40	HIS
30	f	36	GLN

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	А	2922/2928~(99%)	817 (27%)	83 (2%)
2	В	111/119~(93%)	32~(28%)	4(3%)
31	W	1543/1555~(99%)	235~(15%)	17 (1%)
51	1	76/77~(98%)	15 (19%)	1 (1%)
51	У	76/77~(98%)	18 (23%)	0
All	All	4728/4756~(99%)	1117~(23%)	105 (2%)

5 of 1117 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	А	8	U
1	А	9	U
1	А	10	А
1	А	13	А
1	А	27	G

5 of 105 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	А	1965	А
1	А	2468	А
31	W	1154	С
1	А	2155	А
1	А	2278	U

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)

There are no ligands in this entry.

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-13961. 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: 300



Y Index: 300



Z Index: 300



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: 299

Y Index: 273

Z Index: 236

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 0.22. 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 4985 $\rm nm^3;$ this corresponds to an approximate mass of 4503 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 0.183 ${\rm \AA}^{-1}$



8 Fourier-Shell correlation (i)

This section was not generated. No FSC curve or half-maps provided.



9 Map-model fit (i)

This section contains information regarding the fit between EMDB map EMD-13961 and PDB model 7QH4. Per-residue inclusion information can be found in section 3 on page 13.

9.1 Map-model overlay (i)



The images above show the 3D surface view of the map at the recommended contour level 0.22 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, 88% of all backbone atoms, 88% of all non-hydrogen atoms, are inside the map.

