



Full wwPDB EM Validation Report ⓘ

Mar 6, 2025 – 06:20 pm GMT

PDB ID : 8P2F
EMDB ID : EMD-17363
Title : Staphylococcus aureus 70S ribosome with elongation factor G locked with fusidic acid cyclopentane in post-translocational state
Authors : Gonzalez-Lopez, A.; Selmer, M.
Deposited on : 2023-05-16
Resolution : 2.44 Å (reported)
Based on initial models : 7NHM, 2XEX, 7SSD, 7K00

This is a Full wwPDB EM Validation 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 ⓘ 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 ⓘ](#)) were used in the production of this report:

EMDB validation analysis : **FAILED**
Mogul : 1.8.4, CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.41

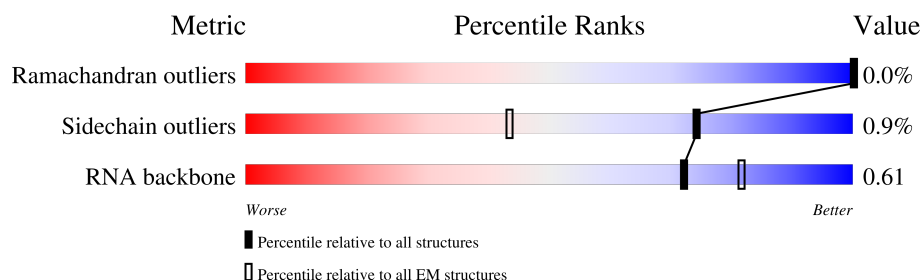
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.44 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.







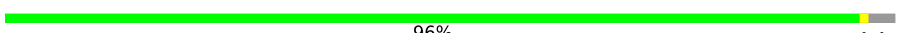
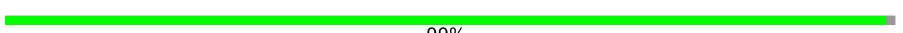
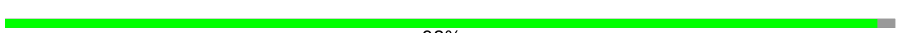








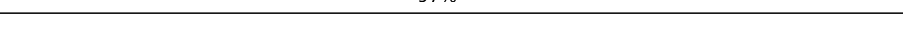
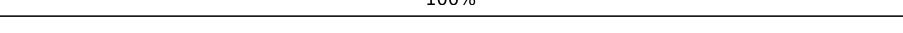
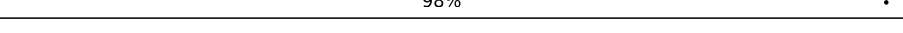
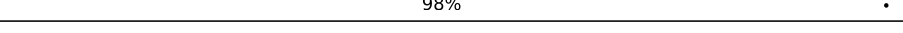
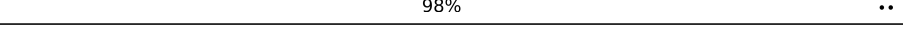
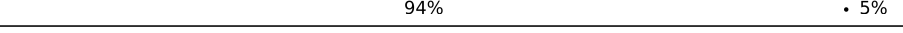
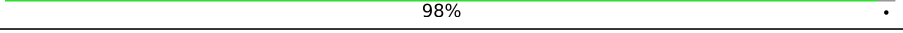
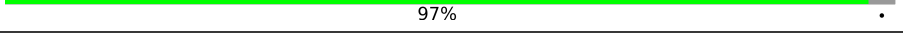


Metric	Whole archive (#Entries)	EM structures (#Entries)
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415
RNA backbone	6643	2191

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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	1	62	
2	2	69	
3	3	59	
4	4	84	
5	5	57	
6	6	49	
7	7	45	
8	8	66	
9	9	37	



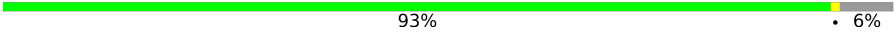
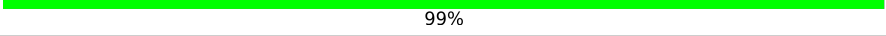
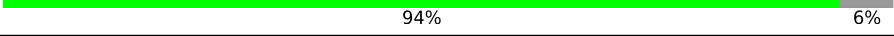
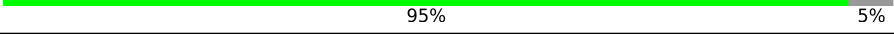
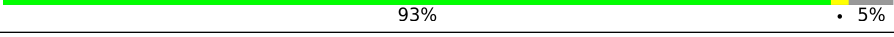
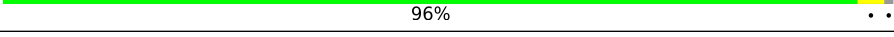
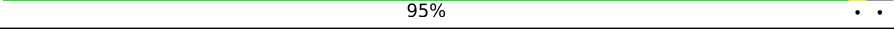
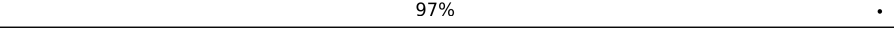
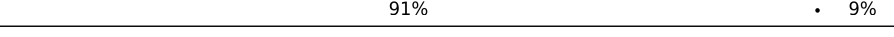
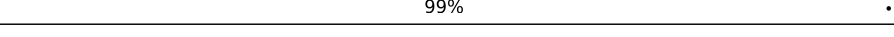

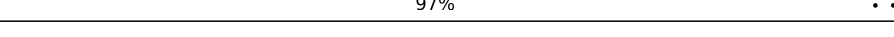
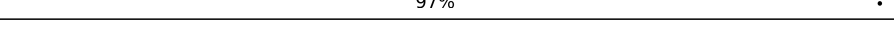
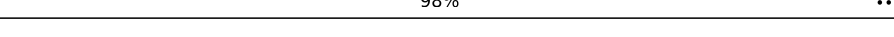
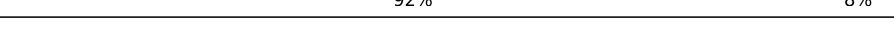

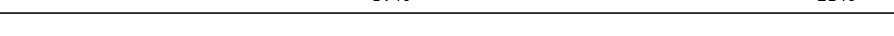

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Mol	Chain	Length	Quality of chain
10	A	2923	 86% 11%
11	B	115	 83% 16%
12	D	77	 77% 23%
12	F	77	 87% 12%
13	E	693	 96%
14	G	277	 99%
15	H	220	 98%
16	I	207	 98%
17	J	179	 98%
18	K	178	 97%
19	M	145	 99%
20	N	122	 100%
21	O	146	 99%
22	P	144	 94% 6%
23	Q	122	 97%
24	R	119	 100%
25	S	116	 98%
26	T	118	 98%
27	U	102	 98%
28	V	117	 94% 5%
29	W	91	 98%
30	X	105	 97%
31	Y	217	 43% 57%
32	Z	94	 89% 11%
33	a	1555	 83% 15%

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Mol	Chain	Length	Quality of chain
34	b	24	 21% 12% 67%
35	c	255	 86% 13%
36	d	217	 93% 6%
37	e	200	 99%
38	f	166	 94% 6%
39	g	98	 95% 5%
40	h	156	 93% 5%
41	i	132	 96% ..
42	j	132	 95% ..
43	k	102	 97% .
44	l	129	 91% . 9%
45	m	137	 99% .
46	n	121	 88% 5% 7%
47	o	61	 97% ..
48	p	89	 97% .
49	q	91	 98% ..
50	r	87	 92% 8%
51	s	80	 78% . 21%
52	t	92	 87% 13%
53	u	83	 95% ..

2 Entry composition

There are 61 unique types of molecules in this entry. The entry contains 149413 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 50S ribosomal protein L28.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	1	61	Total	C	N	O	S	0	0
			481	298	104	78	1		

- Molecule 2 is a protein called 50S ribosomal protein L29.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	2	65	Total	C	N	O	S	0	0
			535	329	100	105	1		

- Molecule 3 is a protein called 50S ribosomal protein L30.

Mol	Chain	Residues	Atoms				AltConf	Trace
3	3	56	Total	C	N	O	0	0
			436	271	82	83		

- Molecule 4 is a protein called 50S ribosomal protein L31 type B.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	4	80	Total	C	N	O	S	0	0
			654	417	111	123	3		

- Molecule 5 is a protein called 50S ribosomal protein L32.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	5	53	Total	C	N	O	S	0	0
			422	256	86	75	5		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
5	?	-	ARG	deletion	UNP Q2FZF1

- Molecule 6 is a protein called 50S ribosomal protein L33 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	6	48	Total	C	N	O	S	0	0
			402	245	79	73	5		

- Molecule 7 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	7	43	Total	C	N	O	S	0	0
			367	225	89	52	1		

- Molecule 8 is a protein called 50S ribosomal protein L35.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	8	64	Total	C	N	O	S	0	0
			521	324	113	82	2		

- Molecule 9 is a protein called 50S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	9	37	Total	C	N	O	S	0	0
			296	186	60	45	5		

- Molecule 10 is a RNA chain called 23S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	A	2844	Total	C	N	O	P	0	0
			60978	27229	11150	19755	2844		

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	48	G	A	conflict	GB CP000253
A	1584	U	A	conflict	GB CP000253
A	2261	G	A	conflict	GB CP000253

- Molecule 11 is a RNA chain called 5S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	B	113	Total	C	N	O	P	0	0
			2408	1076	431	788	113		

- Molecule 12 is a RNA chain called tRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	D	77	Total	C	N	O	P	0	0
			1640	732	297	535	76		
12	F	76	Total	C	N	O	P	0	0
			1623	723	294	530	76		

- Molecule 13 is a protein called Elongation factor G.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	E	670	Total	C	N	O	S	0	0
			5181	3250	869	1033	29		

- Molecule 14 is a protein called 50S ribosomal protein L2.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	G	273	Total	C	N	O	S	0	0
			2085	1297	413	370	5		

- Molecule 15 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	H	216	Total	C	N	O	S	0	0
			1637	1024	301	307	5		

- Molecule 16 is a protein called 50S ribosomal protein L4.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	I	204	Total	C	N	O	S	0	0
			1564	981	286	295	2		

- Molecule 17 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	J	176	Total	C	N	O	S	0	0
			1392	885	238	262	7		

- Molecule 18 is a protein called 50S ribosomal protein L6.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	K	176	Total	C	N	O	S	0	0
			1372	852	251	266	3		

- Molecule 19 is a protein called 50S ribosomal protein L13.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	M	144	Total	C	N	O	S	0	0
			1146	715	210	218	3		

- Molecule 20 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	N	122	Total	C	N	O	S	0	0
			920	572	174	170	4		

- Molecule 21 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	O	145	Total	C	N	O	S	0	0
			1090	674	214	201	1		

- Molecule 22 is a protein called 50S ribosomal protein L16.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	P	136	Total	C	N	O	S	0	0
			1089	698	206	181	4		

- Molecule 23 is a protein called 50S ribosomal protein L17.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	Q	120	Total	C	N	O	S	0	0
			952	584	182	185	1		

- Molecule 24 is a protein called 50S ribosomal protein L18.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	R	119	Total	C	N	O	S	0	0
			922	574	174	173	1		

- Molecule 25 is a protein called 50S ribosomal protein L19.

Mol	Chain	Residues	Atoms				AltConf	Trace
25	S	114	Total	C	N	O	0	0
			922	580	185	157		

- Molecule 26 is a protein called 50S ribosomal protein L20.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	T	116	Total	C	N	O	S	0	0
			943	593	189	157	4		

- Molecule 27 is a protein called 50S ribosomal protein L21.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	U	101	Total	C	N	O	S	0	0
			793	503	141	148	1		

- Molecule 28 is a protein called 50S ribosomal protein L22.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	V	111	Total	C	N	O	S	0	0
			853	532	163	155	3		

- Molecule 29 is a protein called 50S ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	W	89	Total	C	N	O	S	0	0
			725	457	130	134	4		

- Molecule 30 is a protein called 50S ribosomal protein L24.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	X	102	Total	C	N	O	S	0	0
			787	497	144	144	2		

- Molecule 31 is a protein called 50S ribosomal protein L25.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	Y	94	Total	C	N	O	S	0	0
			738	471	131	134	2		

- Molecule 32 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues	Atoms				AltConf	Trace
32	Z	84	Total	C	N	O	0	0
			637	392	124	121		

- Molecule 33 is a RNA chain called 16S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	a	1526	Total	C	N	O	P	0	0
			32707	14608	5975	10598	1526		

- Molecule 34 is a RNA chain called mRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	b	8	Total	C	N	O	P	0	0
			176	79	37	52	8		

- Molecule 35 is a protein called 30S ribosomal protein S2.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	c	221	Total	C	N	O	S	0	0
			1781	1136	310	328	7		

- Molecule 36 is a protein called 30S ribosomal protein S3.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	d	204	Total	C	N	O	S	0	0
			1612	1015	302	293	2		

- Molecule 37 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	e	199	Total	C	N	O	S	0	0
			1617	1020	302	293	2		

- Molecule 38 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	f	156	Total	C	N	O	S	0	0
			1160	730	213	215	2		

- Molecule 39 is a protein called 30S ribosomal protein S6.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	g	93	Total	C	N	O	S	0	0
			773	489	136	146	2		

- Molecule 40 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	h	148	Total	C	N	O	S	0	0
			1180	734	226	216	4		

- Molecule 41 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	i	131	Total	C	N	O	S	0	0
			1032	652	183	193	4		

- Molecule 42 is a protein called 30S ribosomal protein S9.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	j	128	Total	C	N	O	S	0	0
			1016	629	203	183	1		

- Molecule 43 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	k	99	Total	C	N	O	S	0	0
			792	499	145	147	1		

- Molecule 44 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms					AltConf	Trace
44	l	118	Total	C	N	O	S	0	0
			876	542	166	165	3		

- Molecule 45 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace
45	m	135	Total	C	N	O	S	0	0
			1058	658	214	184	2		

- Molecule 46 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	n	113	Total	C	N	O	S	0	0
			902	554	179	168	1		

- Molecule 47 is a protein called 30S ribosomal protein S14 type Z.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	o	60	Total	C	N	O	S	0	0
			501	317	100	79	5		

- Molecule 48 is a protein called 30S ribosomal protein S15.

Mol	Chain	Residues	Atoms					AltConf	Trace
48	p	86	Total	C	N	O	S	0	0
			721	445	148	127	1		

- Molecule 49 is a protein called 30S ribosomal protein S16.

Mol	Chain	Residues	Atoms					AltConf	Trace
49	q	90	Total	C	N	O	S	0	0
			712	448	132	131	1		

- Molecule 50 is a protein called 30S ribosomal protein S17.

Mol	Chain	Residues	Atoms					AltConf	Trace
50	r	80	Total	C	N	O	S	0	0
			662	419	120	122	1		

- Molecule 51 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms					AltConf	Trace
51	s	63	Total	C	N	O	S	0	0
			516	330	96	87	3		

- Molecule 52 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
52	t	80	Total	C	N	O	S	0	0
			651	419	117	113	2		

- Molecule 53 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms					AltConf	Trace
53	u	80	Total	C	N	O	S	0	0
			606	367	119	118	2		

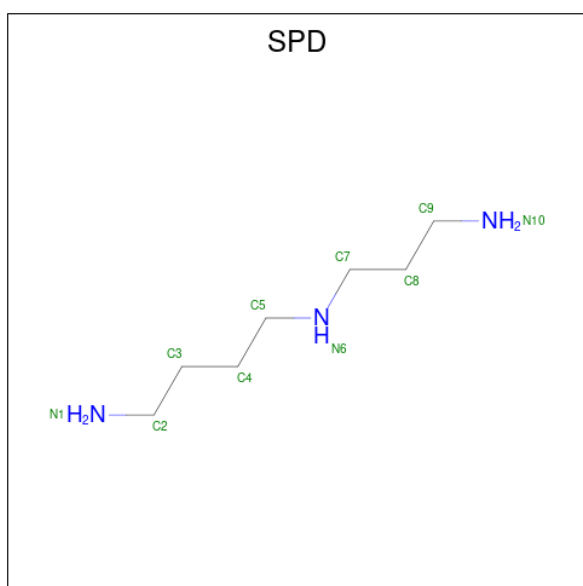
- Molecule 54 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
54	5	1	Total	Zn	0
			1	1	
54	9	1	Total	Zn	0
			1	1	
54	o	1	Total	Zn	0
			1	1	

- Molecule 55 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

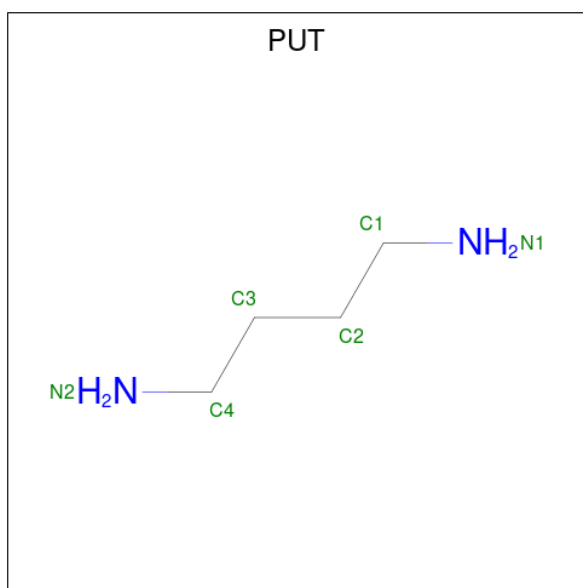
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55	8	1	Total	Mg	0
			1	1	
55	A	131	Total	Mg	0
			131	131	
55	E	1	Total	Mg	0
			1	1	
55	F	2	Total	Mg	0
			2	2	
55	a	10	Total	Mg	0
			10	10	

- Molecule 56 is SPERMIDINE (three-letter code: SPD) (formula: C₇H₁₉N₃).



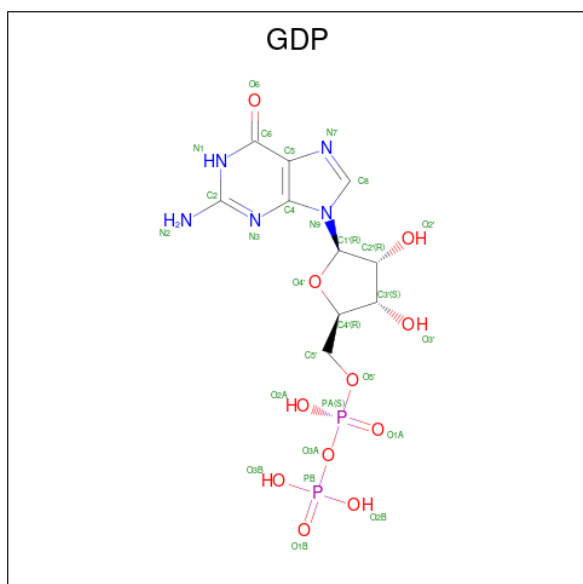
Mol	Chain	Residues	Atoms			AltConf
56	A	1	Total	C	N	0
			10	7	3	

- Molecule 57 is 1,4-DIAMINOBUTANE (three-letter code: PUT) (formula: $C_4H_{12}N_2$).



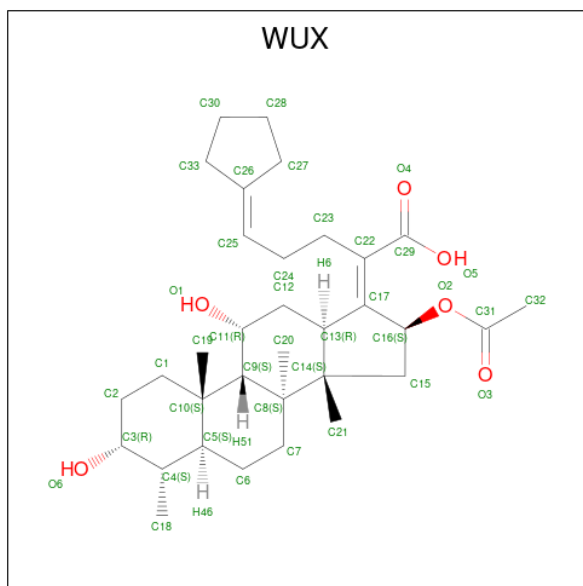
Mol	Chain	Residues	Atoms			AltConf
57	A	1	Total	C	N	0
			6	4	2	

- Molecule 58 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).



Mol	Chain	Residues	Atoms					AltConf
58	E	1	Total	C	N	O	P	0
			28	10	5	11	2	

- Molecule 59 is 2-[(3 {R},4 {S},5 {S},8 {S},9 {S},10 {S},11 {R},13 {S},14 {S},16 {S})-16-acetyloxy-4,8,10,14-tetramethyl-3,11-bis(oxidanyl)-1,2,3,4,5,6,7,9,11,12,13,15,16,17-tetradecahydrocyclopenta[a]phenanthren-17-yl]-5-cyclopentyl-pentanoic acid (three-letter code: WUX) (formula: C₃₃H₅₄O₆) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms		AltConf
59	E	1	Total	C O	0
			39	33 6	

- Molecule 60 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms		AltConf
60	P	1	Total	K	0
			1	1	

- Molecule 61 is water.

Mol	Chain	Residues	Atoms		AltConf
61	1	1	Total	O	0
			1	1	
61	5	7	Total	O	0
			7	7	
61	7	12	Total	O	0
			12	12	
61	8	12	Total	O	0
			12	12	
61	9	1	Total	O	0
			1	1	

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Mol	Chain	Residues	Atoms		AltConf
61	A	1409	Total 1409	O 1409	0
61	B	3	Total 3	O 3	0
61	E	6	Total 6	O 6	0
61	G	43	Total 43	O 43	0
61	H	18	Total 18	O 18	0
61	I	24	Total 24	O 24	0
61	M	5	Total 5	O 5	0
61	N	4	Total 4	O 4	0
61	O	19	Total 19	O 19	0
61	P	8	Total 8	O 8	0
61	Q	3	Total 3	O 3	0
61	S	2	Total 2	O 2	0
61	T	9	Total 9	O 9	0
61	U	5	Total 5	O 5	0
61	V	13	Total 13	O 13	0
61	W	2	Total 2	O 2	0
61	X	1	Total 1	O 1	0
61	Z	6	Total 6	O 6	0
61	a	6	Total 6	O 6	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. 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. 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.

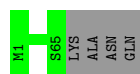
- Molecule 1: 50S ribosomal protein L28

Chain 1:  98% .



- Molecule 2: 50S ribosomal protein L29

Chain 2:  94% 6%




- Molecule 3: 50S ribosomal protein L30

Chain 3:  95% 5%



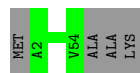
- Molecule 4: 50S ribosomal protein L31 type B

Chain 4:  90% 5% 5%



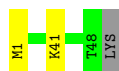
- Molecule 5: 50S ribosomal protein L32

Chain 5:  93% 7%



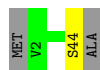
- Molecule 6: 50S ribosomal protein L33 1

Chain 6:  94% . .



- Molecule 7: 50S ribosomal protein L34

Chain 7: 93%



- Molecule 8: 50S ribosomal protein L35

Chain 8: 95%



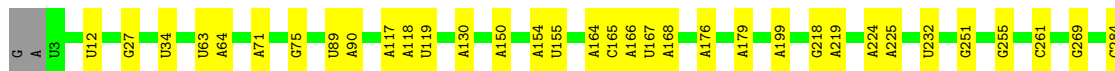
- Molecule 9: 50S ribosomal protein L36

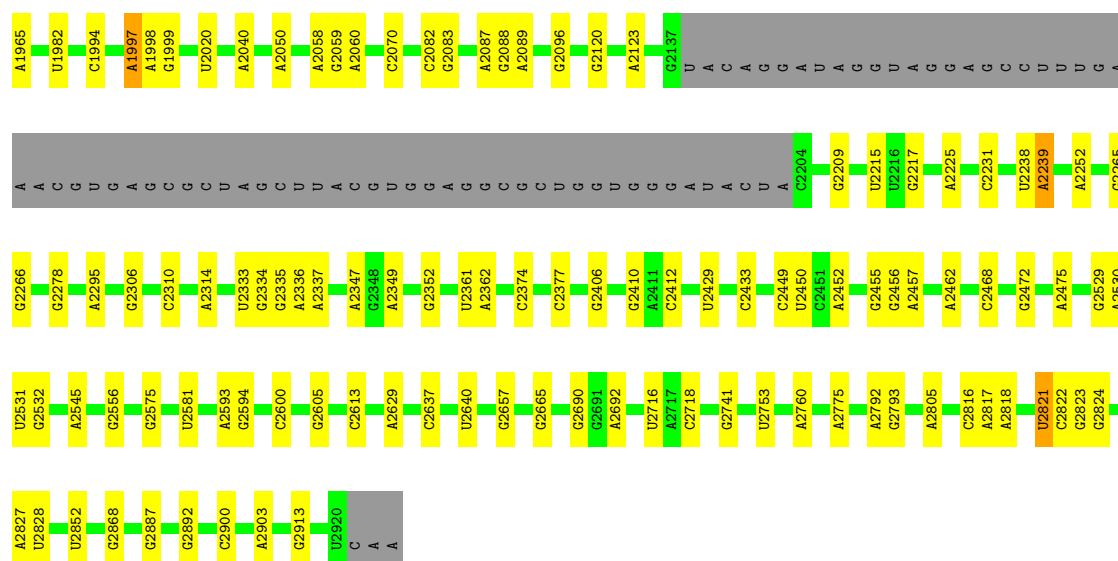
Chain 9: 100%

There are no outlier residues recorded for this chain.

- Molecule 10: 23S ribosomal RNA

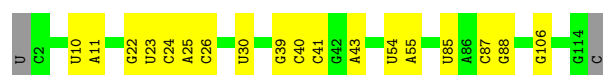
Chain A: 86% 11%





• Molecule 11: 5S ribosomal RNA

Chain B: 83% 16%



• Molecule 12: tRNA

Chain D: 77% 23%



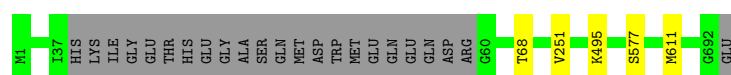
• Molecule 12: tRNA

Chain F: 87% 12%



• Molecule 13: Elongation factor G

Chain E: 96%



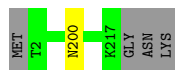
• Molecule 14: 50S ribosomal protein L2

Chain G: 99%



- Molecule 15: 50S ribosomal protein L3

Chain H: 98%



- Molecule 16: 50S ribosomal protein L4

Chain I: 98%



- Molecule 17: 50S ribosomal protein L5

Chain J: 98%



- Molecule 18: 50S ribosomal protein L6

Chain K: 97%



- Molecule 19: 50S ribosomal protein L13

Chain M: 99%



- Molecule 20: 50S ribosomal protein L14

Chain N: 100%

There are no outlier residues recorded for this chain.

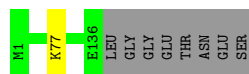
- Molecule 21: 50S ribosomal protein L15

Chain O: 99%



- Molecule 22: 50S ribosomal protein L16

Chain P:  94% • 6%



- Molecule 23: 50S ribosomal protein L17

Chain Q:  97% • •



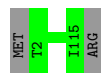
- Molecule 24: 50S ribosomal protein L18

Chain R:  100%

There are no outlier residues recorded for this chain.

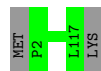
- Molecule 25: 50S ribosomal protein L19

Chain S:  98% •



- Molecule 26: 50S ribosomal protein L20

Chain T:  98% •



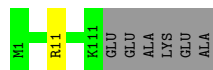
- Molecule 27: 50S ribosomal protein L21

Chain U:  98% • •



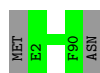
- Molecule 28: 50S ribosomal protein L22

Chain V:  94% • 5%



- Molecule 29: 50S ribosomal protein L23

Chain W:  98% .



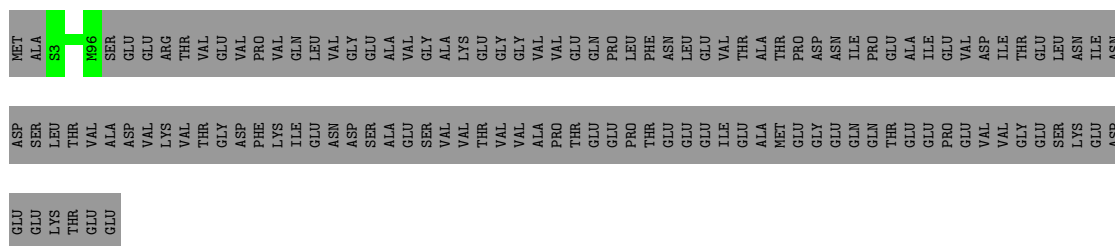
- Molecule 30: 50S ribosomal protein L24

Chain X:  97% .




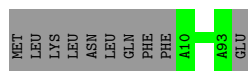
- Molecule 31: 50S ribosomal protein L25

Chain Y:  43% 57%




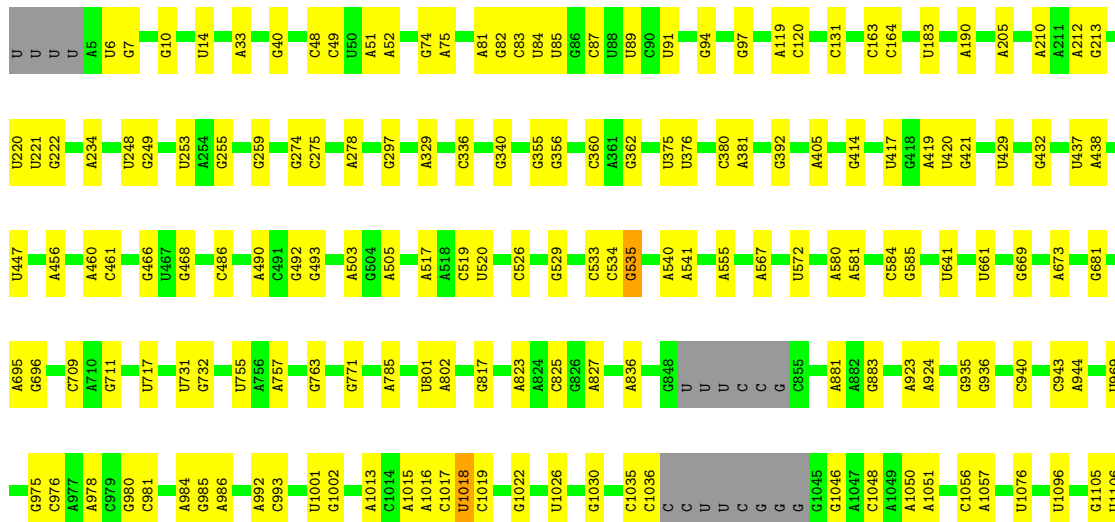
- Molecule 32: 50S ribosomal protein L27

Chain Z:  89% 11%



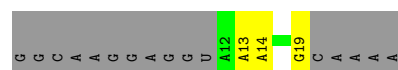
- Molecule 33: 16S ribosomal RNA

Chain a:  83% 15% .

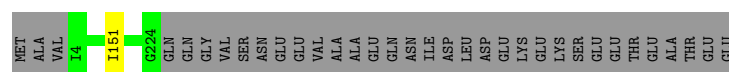
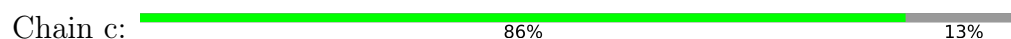




- Molecule 34: mRNA



- Molecule 35: 30S ribosomal protein S2



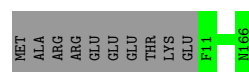
- Molecule 36: 30S ribosomal protein S3



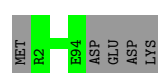
- Molecule 37: 30S ribosomal protein S4



- Molecule 38: 30S ribosomal protein S5



- Molecule 39: 30S ribosomal protein S6



- Molecule 40: 30S ribosomal protein S7

Chain h:  93% • 5%



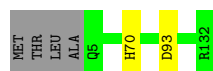
- Molecule 41: 30S ribosomal protein S8

Chain i:  96% • •



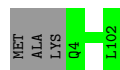
- Molecule 42: 30S ribosomal protein S9

Chain j:  95% • •




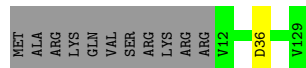
- Molecule 43: 30S ribosomal protein S10

Chain k:  97% •



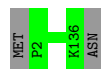
- Molecule 44: 30S ribosomal protein S11

Chain l:  91% • 9%




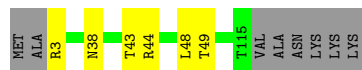
- Molecule 45: 30S ribosomal protein S12

Chain m:  99% •



- Molecule 46: 30S ribosomal protein S13

Chain n:  88% 5% 7%



- Molecule 47: 30S ribosomal protein S14 type Z

Chain o:  97% ..



- Molecule 48: 30S ribosomal protein S15

Chain p:  97% .




- Molecule 49: 30S ribosomal protein S16

Chain q:  98% ..




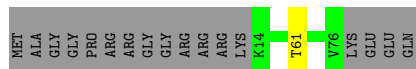
- Molecule 50: 30S ribosomal protein S17

Chain r:  92% 8%




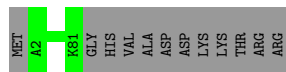
- Molecule 51: 30S ribosomal protein S18

Chain s:  78% 21%



- Molecule 52: 30S ribosomal protein S19

Chain t:  87% 13%



- Molecule 53: 30S ribosomal protein S20

Chain u:  95% ..



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	40800	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	27.77	Depositor
Minimum defocus (nm)	200	Depositor
Maximum defocus (nm)	2400	Depositor
Magnification	165000	Depositor
Image detector	TFS FALCON 4i (4k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: WUX, SPD, H2U, G7M, 4OC, 2MG, MA6, PUT, UR3, OMG, K, MG, 2MA, GDP, ZN, 3TD, 5MC, 5MU

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	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
1	1	0.33	0/487	0.61	0/649
2	2	0.29	0/536	0.57	0/713
3	3	0.33	0/438	0.57	0/590
4	4	0.30	0/671	0.50	0/900
5	5	0.39	0/429	0.63	0/571
6	6	0.35	0/407	0.59	0/545
7	7	0.39	0/371	0.70	0/484
8	8	0.36	0/526	0.68	0/690
9	9	0.37	0/299	0.56	0/393
10	A	0.87	0/68117	0.87	18/106230 (0.0%)
11	B	0.65	0/2692	0.79	0/4193
12	D	0.29	0/1832	0.77	0/2855
12	F	0.49	0/1813	0.79	0/2825
13	E	0.28	0/5271	0.49	0/7128
14	G	0.36	0/2120	0.62	0/2847
15	H	0.40	0/1661	0.58	0/2227
16	I	0.35	0/1587	0.57	0/2143
17	J	0.31	0/1410	0.51	0/1893
18	K	0.32	0/1390	0.55	0/1870
19	M	0.41	0/1168	0.57	0/1573
20	N	0.38	0/927	0.62	0/1243
21	O	0.37	0/1104	0.58	0/1471
22	P	0.41	0/1113	0.61	0/1493
23	Q	0.38	0/956	0.62	0/1277
24	R	0.32	0/931	0.55	0/1244
25	S	0.35	0/934	0.64	0/1249
26	T	0.39	0/955	0.62	0/1265
27	U	0.38	0/803	0.56	0/1073
28	V	0.37	0/861	0.62	0/1159
29	W	0.38	0/733	0.58	0/978
30	X	0.32	0/796	0.50	0/1063

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
31	Y	0.33	0/746	0.54	0/1000
32	Z	0.41	0/643	0.62	0/853
33	a	0.49	0/36440	0.79	3/56820 (0.0%)
34	b	0.64	0/198	0.76	0/307
35	c	0.24	0/1808	0.47	0/2426
36	d	0.24	0/1634	0.51	0/2195
37	e	0.28	0/1647	0.52	0/2211
38	f	0.29	0/1174	0.54	0/1583
39	g	0.28	0/784	0.53	0/1052
40	h	0.25	0/1195	0.54	0/1605
41	i	0.29	0/1044	0.54	0/1401
42	j	0.26	0/1032	0.57	0/1386
43	k	0.24	0/804	0.51	0/1083
44	l	0.26	0/891	0.54	0/1203
45	m	0.31	0/1075	0.58	0/1439
46	n	0.26	0/909	0.59	0/1218
47	o	0.26	0/511	0.56	0/678
48	p	0.27	0/730	0.56	0/975
49	q	0.26	0/723	0.54	0/971
50	r	0.27	0/670	0.52	0/895
51	s	0.27	0/525	0.56	0/704
52	t	0.25	0/668	0.47	0/896
53	u	0.25	0/606	0.47	0/810
All	All	0.65	0/159795	0.77	21/238545 (0.0%)

There are no bond length outliers.

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
10	A	557	G	O4'-C1'-N9	7.04	113.84	108.20
10	A	2868	G	O4'-C1'-N9	6.85	113.68	108.20
10	A	749	G	O4'-C1'-N9	6.61	113.49	108.20
33	a	1018	U	C2-N1-C1'	6.12	125.04	117.70
10	A	1350	U	C2-N1-C1'	5.86	124.73	117.70
10	A	1997	A	O5'-P-OP1	-5.79	100.49	105.70
10	A	166	A	O4'-C1'-N9	5.75	112.80	108.20
10	A	1221	C	O4'-C1'-N1	5.70	112.76	108.20
10	A	2816	C	O4'-C1'-N1	5.67	112.73	108.20
10	A	179	A	C2-N3-C4	-5.66	107.77	110.60
10	A	27	G	O4'-C1'-N9	5.62	112.70	108.20
10	A	150	A	N1-C6-N6	5.61	121.97	118.60
10	A	12	U	C2-N1-C1'	5.59	124.41	117.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
10	A	2821	U	C2-N1-C1'	5.48	124.28	117.70
10	A	1361	G	O4'-C1'-N9	5.42	112.53	108.20
10	A	2239	A	N7-C8-N9	5.37	116.48	113.80
10	A	2665	G	O4'-C1'-N9	5.30	112.44	108.20
33	a	681	G	C4-N9-C1'	5.21	133.27	126.50
33	a	681	G	N3-C4-N9	5.14	129.09	126.00
10	A	1813	A	O4'-C1'-N9	5.10	112.28	108.20
10	A	527	G	O4'-C1'-N9	5.07	112.25	108.20

There are no chirality outliers.

There are no planarity outliers.

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	1	59/62 (95%)	59 (100%)	0	0	100	100
2	2	63/69 (91%)	63 (100%)	0	0	100	100
3	3	54/59 (92%)	52 (96%)	2 (4%)	0	100	100
4	4	78/84 (93%)	76 (97%)	2 (3%)	0	100	100
5	5	51/57 (90%)	49 (96%)	2 (4%)	0	100	100
6	6	46/49 (94%)	45 (98%)	1 (2%)	0	100	100
7	7	41/45 (91%)	41 (100%)	0	0	100	100
8	8	62/66 (94%)	60 (97%)	2 (3%)	0	100	100
9	9	35/37 (95%)	35 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
13	E	666/693 (96%)	649 (97%)	16 (2%)	1 (0%)	44	53
14	G	271/277 (98%)	265 (98%)	6 (2%)	0	100	100
15	H	214/220 (97%)	204 (95%)	10 (5%)	0	100	100
16	I	202/207 (98%)	200 (99%)	2 (1%)	0	100	100
17	J	174/179 (97%)	168 (97%)	6 (3%)	0	100	100
18	K	174/178 (98%)	169 (97%)	5 (3%)	0	100	100
19	M	142/145 (98%)	141 (99%)	1 (1%)	0	100	100
20	N	120/122 (98%)	117 (98%)	3 (2%)	0	100	100
21	O	143/146 (98%)	138 (96%)	5 (4%)	0	100	100
22	P	134/144 (93%)	131 (98%)	3 (2%)	0	100	100
23	Q	118/122 (97%)	116 (98%)	2 (2%)	0	100	100
24	R	117/119 (98%)	114 (97%)	3 (3%)	0	100	100
25	S	112/116 (97%)	110 (98%)	2 (2%)	0	100	100
26	T	114/118 (97%)	114 (100%)	0	0	100	100
27	U	99/102 (97%)	98 (99%)	1 (1%)	0	100	100
28	V	109/117 (93%)	108 (99%)	1 (1%)	0	100	100
29	W	87/91 (96%)	86 (99%)	1 (1%)	0	100	100
30	X	100/105 (95%)	97 (97%)	3 (3%)	0	100	100
31	Y	92/217 (42%)	91 (99%)	1 (1%)	0	100	100
32	Z	82/94 (87%)	79 (96%)	3 (4%)	0	100	100
35	c	219/255 (86%)	210 (96%)	9 (4%)	0	100	100
36	d	202/217 (93%)	197 (98%)	5 (2%)	0	100	100
37	e	197/200 (98%)	194 (98%)	3 (2%)	0	100	100
38	f	154/166 (93%)	149 (97%)	5 (3%)	0	100	100
39	g	91/98 (93%)	85 (93%)	6 (7%)	0	100	100
40	h	144/156 (92%)	141 (98%)	3 (2%)	0	100	100
41	i	129/132 (98%)	124 (96%)	5 (4%)	0	100	100
42	j	126/132 (96%)	124 (98%)	2 (2%)	0	100	100
43	k	97/102 (95%)	94 (97%)	3 (3%)	0	100	100
44	l	116/129 (90%)	108 (93%)	8 (7%)	0	100	100
45	m	133/137 (97%)	128 (96%)	5 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
46	n	111/121 (92%)	107 (96%)	3 (3%)	1 (1%)	14	16
47	o	58/61 (95%)	57 (98%)	1 (2%)	0	100	100
48	p	84/89 (94%)	81 (96%)	3 (4%)	0	100	100
49	q	88/91 (97%)	84 (96%)	4 (4%)	0	100	100
50	r	78/87 (90%)	76 (97%)	2 (3%)	0	100	100
51	s	61/80 (76%)	61 (100%)	0	0	100	100
52	t	78/92 (85%)	76 (97%)	2 (3%)	0	100	100
53	u	78/83 (94%)	77 (99%)	1 (1%)	0	100	100
All	All	6003/6468 (93%)	5848 (97%)	153 (2%)	2 (0%)	100	100

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
46	n	38	ASN
13	E	251	VAL

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain 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	
1	1	51/52 (98%)	51 (100%)	0	100	100
2	2	59/62 (95%)	59 (100%)	0	100	100
3	3	51/53 (96%)	51 (100%)	0	100	100
4	4	71/75 (95%)	67 (94%)	4 (6%)	17	22
5	5	48/50 (96%)	48 (100%)	0	100	100
6	6	46/47 (98%)	44 (96%)	2 (4%)	25	34
7	7	39/40 (98%)	38 (97%)	1 (3%)	41	54
8	8	55/57 (96%)	54 (98%)	1 (2%)	54	67
9	9	35/35 (100%)	35 (100%)	0	100	100
13	E	559/579 (96%)	555 (99%)	4 (1%)	81	89

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
14	G	220/224 (98%)	220 (100%)	0	100	100
15	H	174/177 (98%)	173 (99%)	1 (1%)	84	90
16	I	168/169 (99%)	167 (99%)	1 (1%)	84	90
17	J	155/158 (98%)	155 (100%)	0	100	100
18	K	153/155 (99%)	150 (98%)	3 (2%)	50	63
19	M	123/123 (100%)	122 (99%)	1 (1%)	79	87
20	N	100/100 (100%)	100 (100%)	0	100	100
21	O	111/112 (99%)	110 (99%)	1 (1%)	75	85
22	P	113/119 (95%)	112 (99%)	1 (1%)	75	85
23	Q	101/102 (99%)	99 (98%)	2 (2%)	50	63
24	R	95/95 (100%)	95 (100%)	0	100	100
25	S	100/102 (98%)	100 (100%)	0	100	100
26	T	96/98 (98%)	96 (100%)	0	100	100
27	U	86/86 (100%)	85 (99%)	1 (1%)	67	79
28	V	90/94 (96%)	89 (99%)	1 (1%)	70	80
29	W	80/82 (98%)	80 (100%)	0	100	100
30	X	87/90 (97%)	87 (100%)	0	100	100
31	Y	83/190 (44%)	83 (100%)	0	100	100
32	Z	65/75 (87%)	65 (100%)	0	100	100
35	c	192/221 (87%)	191 (100%)	1 (0%)	86	92
36	d	166/175 (95%)	164 (99%)	2 (1%)	67	79
37	e	174/175 (99%)	173 (99%)	1 (1%)	84	90
38	f	122/131 (93%)	122 (100%)	0	100	100
39	g	81/86 (94%)	81 (100%)	0	100	100
40	h	126/132 (96%)	123 (98%)	3 (2%)	44	57
41	i	112/113 (99%)	108 (96%)	4 (4%)	30	41
42	j	106/109 (97%)	104 (98%)	2 (2%)	52	65
43	k	89/91 (98%)	89 (100%)	0	100	100
44	l	94/104 (90%)	93 (99%)	1 (1%)	70	80
45	m	117/119 (98%)	117 (100%)	0	100	100
46	n	98/104 (94%)	93 (95%)	5 (5%)	20	27

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
47	o	52/53 (98%)	51 (98%)	1 (2%)	52	65
48	p	79/81 (98%)	79 (100%)	0	100	100
49	q	76/77 (99%)	75 (99%)	1 (1%)	65	77
50	r	75/82 (92%)	75 (100%)	0	100	100
51	s	56/68 (82%)	55 (98%)	1 (2%)	54	67
52	t	70/80 (88%)	70 (100%)	0	100	100
53	u	67/69 (97%)	66 (98%)	1 (2%)	60	73
All	All	5166/5471 (94%)	5119 (99%)	47 (1%)	74	85

All (47) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	4	27	SER
4	4	33	GLU
4	4	43	TYR
4	4	76	LYS
6	6	1	MET
6	6	41	LYS
7	7	44	SER
8	8	31	HIS
13	E	68	THR
13	E	495	LYS
13	E	577	SER
13	E	611	MET
15	H	200	ASN
16	I	64	PRO
18	K	25	THR
18	K	57	ASP
18	K	176	THR
19	M	142	GLU
21	O	87	ASP
22	P	77	LYS
23	Q	29	ARG
23	Q	75	ASP
27	U	57	THR
28	V	11	ARG
35	c	151	ILE
36	d	43	ASP
36	d	57	GLU
37	e	3	ARG

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Mol	Chain	Res	Type
40	h	75	VAL
40	h	78	ARG
40	h	84	ASN
41	i	25	LEU
41	i	53	GLU
41	i	54	ASP
41	i	77	LEU
42	j	70	HIS
42	j	93	ASP
44	l	36	ASP
46	n	3	ARG
46	n	43	THR
46	n	44	ARG
46	n	48	LEU
46	n	49	THR
47	o	57	ARG
49	q	14	ARG
51	s	61	THR
53	u	28	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
10	A	2839/2923 (97%)	319 (11%)	14 (0%)
11	B	112/115 (97%)	18 (16%)	0
12	D	76/77 (98%)	18 (23%)	0
12	F	75/77 (97%)	9 (12%)	0
33	a	1520/1555 (97%)	228 (15%)	0
34	b	7/24 (29%)	3 (42%)	0
All	All	4629/4771 (97%)	595 (12%)	14 (0%)

All (595) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
10	A	34	U
10	A	63	U
10	A	64	A
10	A	71	A

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Mol	Chain	Res	Type
10	A	75	G
10	A	89	U
10	A	90	A
10	A	117	A
10	A	118	A
10	A	119	U
10	A	155	U
10	A	164	A
10	A	165	C
10	A	167	U
10	A	168	A
10	A	176	A
10	A	199	A
10	A	218	G
10	A	219	A
10	A	224	A
10	A	225	A
10	A	232	U
10	A	251	G
10	A	255	G
10	A	261	C
10	A	269	G
10	A	284	C
10	A	285	U
10	A	286	U
10	A	289	U
10	A	312	A
10	A	313	U
10	A	314	A
10	A	315	C
10	A	321	U
10	A	324	A
10	A	327	G
10	A	354	A
10	A	373	A
10	A	404	U
10	A	410	G
10	A	411	A
10	A	432	G
10	A	457	G
10	A	458	A
10	A	497	U

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Mol	Chain	Res	Type
10	A	502	C
10	A	527	G
10	A	550	A
10	A	553	A
10	A	575	G
10	A	576	U
10	A	577	A
10	A	578	G
10	A	583	A
10	A	590	U
10	A	592	A
10	A	593	U
10	A	594	G
10	A	606	G
10	A	616	G
10	A	618	A
10	A	630	G
10	A	646	A
10	A	650	U
10	A	682	A
10	A	683	G
10	A	690	U
10	A	699	U
10	A	700	A
10	A	731	U
10	A	762	C
10	A	767	A
10	A	774	G
10	A	775	A
10	A	792	5MU
10	A	810	A
10	A	820	G
10	A	827	A
10	A	829	U
10	A	835	U
10	A	837	G
10	A	850	G
10	A	857	C
10	A	872	U
10	A	873	U
10	A	904	G
10	A	911	A

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Mol	Chain	Res	Type
10	A	919	G
10	A	923	A
10	A	924	G
10	A	925	G
10	A	927	G
10	A	941	A
10	A	943	C
10	A	945	A
10	A	955	A
10	A	970	U
10	A	971	U
10	A	972	A
10	A	985	A
10	A	989	A
10	A	990	G
10	A	1005	G
10	A	1018	A
10	A	1027	A
10	A	1040	A
10	A	1049	C
10	A	1056	U
10	A	1057	A
10	A	1066	G
10	A	1070	A
10	A	1077	U
10	A	1090	A
10	A	1091	G
10	A	1111	A
10	A	1114	A
10	A	1119	C
10	A	1121	A
10	A	1128	A
10	A	1129	A
10	A	1132	A
10	A	1134	U
10	A	1141	U
10	A	1156	G
10	A	1172	A
10	A	1176	U
10	A	1179	C
10	A	1180	G
10	A	1186	A

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Mol	Chain	Res	Type
10	A	1199	A
10	A	1216	U
10	A	1218	G
10	A	1221	C
10	A	1222	A
10	A	1276	G
10	A	1291	A
10	A	1294	G
10	A	1309	G
10	A	1310	A
10	A	1318	G
10	A	1337	A
10	A	1339	U
10	A	1402	A
10	A	1405	G
10	A	1415	A
10	A	1416	U
10	A	1421	A
10	A	1449	A
10	A	1455	U
10	A	1457	U
10	A	1458	A
10	A	1459	A
10	A	1463	A
10	A	1464	U
10	A	1471	A
10	A	1472	C
10	A	1477	U
10	A	1490	G
10	A	1497	A
10	A	1498	U
10	A	1504	U
10	A	1507	A
10	A	1511	C
10	A	1518	G
10	A	1526	G
10	A	1530	A
10	A	1533	A
10	A	1536	C
10	A	1553	A
10	A	1560	A
10	A	1569	G

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Mol	Chain	Res	Type
10	A	1578	A
10	A	1580	A
10	A	1581	U
10	A	1582	U
10	A	1583	G
10	A	1585	G
10	A	1587	C
10	A	1594	U
10	A	1606	C
10	A	1613	G
10	A	1616	A
10	A	1625	U
10	A	1630	A
10	A	1631	G
10	A	1642	C
10	A	1651	C
10	A	1652	A
10	A	1654	A
10	A	1690	A
10	A	1691	G
10	A	1692	C
10	A	1718	G
10	A	1740	G
10	A	1759	G
10	A	1772	G
10	A	1790	G
10	A	1791	G
10	A	1800	A
10	A	1803	G
10	A	1809	C
10	A	1818	A
10	A	1827	C
10	A	1828	U
10	A	1843	U
10	A	1856	A
10	A	1899	U
10	A	1900	G
10	A	1909	C
10	A	1933	G
10	A	1934	G
10	A	1940	A
10	A	1941	C

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Mol	Chain	Res	Type
10	A	1943	A
10	A	1956	G
10	A	1957	G
10	A	1963	A
10	A	1964	A
10	A	1965	A
10	A	1982	U
10	A	1994	C
10	A	1997	A
10	A	1998	A
10	A	1999	G
10	A	2020	U
10	A	2040	A
10	A	2050	A
10	A	2058	A
10	A	2059	G
10	A	2060	A
10	A	2070	C
10	A	2082	C
10	A	2083	G
10	A	2087	A
10	A	2088	G
10	A	2089	A
10	A	2096	G
10	A	2120	G
10	A	2123	A
10	A	2209	G
10	A	2215	U
10	A	2217	G
10	A	2225	A
10	A	2231	C
10	A	2238	U
10	A	2239	A
10	A	2252	A
10	A	2265	G
10	A	2266	G
10	A	2295	A
10	A	2306	G
10	A	2310	C
10	A	2314	A
10	A	2333	U
10	A	2334	G

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Mol	Chain	Res	Type
10	A	2335	G
10	A	2336	A
10	A	2337	A
10	A	2347	A
10	A	2349	A
10	A	2352	G
10	A	2361	U
10	A	2362	A
10	A	2374	C
10	A	2377	C
10	A	2406	G
10	A	2410	G
10	A	2412	C
10	A	2429	U
10	A	2433	C
10	A	2449	C
10	A	2450	U
10	A	2452	A
10	A	2455	G
10	A	2456	G
10	A	2457	A
10	A	2462	A
10	A	2468	C
10	A	2475	A
10	A	2529	G
10	A	2531	U
10	A	2532	G
10	A	2545	A
10	A	2556	G
10	A	2575	G
10	A	2581	U
10	A	2593	A
10	A	2594	G
10	A	2600	C
10	A	2605	G
10	A	2613	C
10	A	2629	A
10	A	2637	C
10	A	2640	U
10	A	2657	G
10	A	2690	G
10	A	2692	A

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Mol	Chain	Res	Type
10	A	2716	U
10	A	2718	C
10	A	2741	G
10	A	2753	U
10	A	2760	A
10	A	2775	A
10	A	2792	A
10	A	2793	G
10	A	2805	A
10	A	2818	A
10	A	2821	U
10	A	2823	G
10	A	2824	G
10	A	2827	A
10	A	2828	U
10	A	2852	U
10	A	2887	G
10	A	2892	G
10	A	2900	C
10	A	2903	A
10	A	2913	G
11	B	10	U
11	B	11	A
11	B	22	G
11	B	23	U
11	B	24	C
11	B	25	A
11	B	26	C
11	B	30	U
11	B	39	G
11	B	40	C
11	B	41	C
11	B	43	A
11	B	54	U
11	B	55	A
11	B	85	U
11	B	87	C
11	B	88	G
11	B	106	G
12	D	4	G
12	D	8	U
12	D	11	A

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Mol	Chain	Res	Type
12	D	16	C
12	D	17(A)	U
12	D	19	G
12	D	20	U
12	D	21	A
12	D	22	G
12	D	33	U
12	D	35	A
12	D	43	A
12	D	46	G
12	D	47	U
12	D	56	C
12	D	58	A
12	D	66	C
12	D	76	A
12	F	9	G
12	F	17(A)	U
12	F	19	G
12	F	21	A
12	F	43	A
12	F	47	U
12	F	48	C
12	F	58	A
12	F	76	A
33	a	6	U
33	a	7	G
33	a	10	G
33	a	14	U
33	a	33	A
33	a	40	G
33	a	48	C
33	a	49	C
33	a	51	A
33	a	52	A
33	a	74	G
33	a	75	A
33	a	81	A
33	a	82	G
33	a	83	C
33	a	84	U
33	a	85	U
33	a	87	C

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Mol	Chain	Res	Type
33	a	89	U
33	a	91	U
33	a	94	G
33	a	97	G
33	a	119	A
33	a	120	C
33	a	131	C
33	a	163	C
33	a	164	C
33	a	183	U
33	a	190	A
33	a	205	A
33	a	210	A
33	a	212	A
33	a	213	G
33	a	220	U
33	a	221	U
33	a	222	G
33	a	234	A
33	a	248	U
33	a	249	G
33	a	253	U
33	a	255	G
33	a	259	G
33	a	274	G
33	a	275	C
33	a	278	A
33	a	297	G
33	a	329	A
33	a	336	C
33	a	340	G
33	a	355	G
33	a	356	G
33	a	360	C
33	a	362	G
33	a	375	U
33	a	376	U
33	a	380	C
33	a	381	A
33	a	392	G
33	a	405	A
33	a	414	G

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Mol	Chain	Res	Type
33	a	417	U
33	a	419	A
33	a	420	U
33	a	421	G
33	a	429	U
33	a	432	G
33	a	437	U
33	a	438	A
33	a	447	U
33	a	456	A
33	a	460	A
33	a	461	C
33	a	466	G
33	a	468	G
33	a	486	C
33	a	490	A
33	a	492	G
33	a	493	G
33	a	503	A
33	a	505	A
33	a	517	A
33	a	519	C
33	a	520	U
33	a	526	C
33	a	529	G
33	a	533	C
33	a	534	C
33	a	535	G7M
33	a	540	A
33	a	541	A
33	a	555	A
33	a	567	A
33	a	572	U
33	a	580	A
33	a	581	A
33	a	584	C
33	a	585	G
33	a	641	U
33	a	661	U
33	a	669	G
33	a	673	A
33	a	695	A

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Mol	Chain	Res	Type
33	a	696	G
33	a	709	C
33	a	711	G
33	a	717	U
33	a	731	U
33	a	732	G
33	a	755	U
33	a	757	A
33	a	763	G
33	a	771	G
33	a	785	A
33	a	801	U
33	a	802	A
33	a	817	G
33	a	823	A
33	a	825	C
33	a	827	A
33	a	836	A
33	a	881	A
33	a	883	G
33	a	923	A
33	a	924	A
33	a	935	G
33	a	936	G
33	a	940	C
33	a	943	C
33	a	944	A
33	a	969	U
33	a	978	A
33	a	980	G
33	a	981	C
33	a	984	A
33	a	985	G
33	a	986	A
33	a	992	A
33	a	993	C
33	a	1001	U
33	a	1002	G
33	a	1013	A
33	a	1015	A
33	a	1016	A
33	a	1017	C

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Mol	Chain	Res	Type
33	a	1018	U
33	a	1019	C
33	a	1022	G
33	a	1026	U
33	a	1030	G
33	a	1035	C
33	a	1036	C
33	a	1046	G
33	a	1048	C
33	a	1050	A
33	a	1051	A
33	a	1056	C
33	a	1057	A
33	a	1076	U
33	a	1096	U
33	a	1105	G
33	a	1106	U
33	a	1111	C
33	a	1112	A
33	a	1113	A
33	a	1114	C
33	a	1134	A
33	a	1141	A
33	a	1143	C
33	a	1145	U
33	a	1149	G
33	a	1152	G
33	a	1156	A
33	a	1167	A
33	a	1168	C
33	a	1169	U
33	a	1174	G
33	a	1175	U
33	a	1176	G
33	a	1177	A
33	a	1178	C
33	a	1179	A
33	a	1194	G
33	a	1197	G
33	a	1206	A
33	a	1207	A
33	a	1223	A

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Mol	Chain	Res	Type
33	a	1229	U
33	a	1237	A
33	a	1248	A
33	a	1266	C
33	a	1267	A
33	a	1289	A
33	a	1290	A
33	a	1296	U
33	a	1297	A
33	a	1302	U
33	a	1303	G
33	a	1309	A
33	a	1310	G
33	a	1312	U
33	a	1328	A
33	a	1329	A
33	a	1330	C
33	a	1346	U
33	a	1348	G
33	a	1363	G
33	a	1374	U
33	a	1389	G
33	a	1398	U
33	a	1399	C
33	a	1404	A
33	a	1407	C
33	a	1408	A
33	a	1416	U
33	a	1452	G
33	a	1456	A
33	a	1460	U
33	a	1463	U
33	a	1464	A
33	a	1503	A
33	a	1504	A
33	a	1505	G
33	a	1513	A
33	a	1517	U
33	a	1528	G
33	a	1540	G
33	a	1541	G
33	a	1543	U

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Mol	Chain	Res	Type
34	b	13	A
34	b	14	A
34	b	19	G

All (14) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
10	A	130	A
10	A	154	A
10	A	312	A
10	A	809	A
10	A	827	A
10	A	1113	A
10	A	1179	C
10	A	1291	A
10	A	2336	A
10	A	2449	C
10	A	2457	A
10	A	2817	A
10	A	2822	C
10	A	2827	A

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

14 non-standard protein/DNA/RNA residues are 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	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
10	OMG	A	2278	12,55,10	18,26,27	1.18	3 (16%)	19,38,41	0.60	0
10	5MU	A	1966	10	19,22,23	0.36	0	28,32,35	0.45	0
33	2MG	a	975	33	18,26,27	0.99	3 (16%)	16,38,41	0.65	0
33	5MC	a	976	33	18,22,23	0.35	0	26,32,35	0.80	1 (3%)
33	4OC	a	1412	55,33	20,23,24	0.36	0	26,32,35	0.50	0
33	MA6	a	1529	33	18,26,27	0.79	0	19,38,41	0.72	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
33	G7M	a	535	33	20,26,27	0.64	0	17,39,42	0.98	2 (11%)
33	UR3	a	1509	33	19,22,23	0.34	0	26,32,35	0.32	0
10	3TD	A	1942	10	19,22,23	0.57	0	21,32,35	0.60	0
10	2MG	A	2472	10	18,26,27	1.19	3 (16%)	16,38,41	0.61	0
10	5MU	A	792	10	19,22,23	0.36	0	28,32,35	0.37	0
10	2MA	A	2530	55,10	19,25,26	1.16	2 (10%)	21,37,40	3.22	5 (23%)
33	MA6	a	1530	33	18,26,27	0.77	0	19,38,41	0.69	0
10	H2U	A	2476	10	18,21,22	0.34	0	21,30,33	0.44	0

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	Res	Link	Chirals	Torsions	Rings
10	OMG	A	2278	12,55,10	-	0/5/27/28	0/3/3/3
10	5MU	A	1966	10	-	0/7/25/26	0/2/2/2
33	2MG	a	975	33	-	0/5/27/28	0/3/3/3
33	5MC	a	976	33	-	0/7/25/26	0/2/2/2
33	4OC	a	1412	55,33	-	0/9/29/30	0/2/2/2
33	MA6	a	1529	33	-	0/7/29/30	0/3/3/3
33	G7M	a	535	33	-	3/3/25/26	0/3/3/3
33	UR3	a	1509	33	-	0/7/25/26	0/2/2/2
10	3TD	A	1942	10	-	0/7/25/26	0/2/2/2
10	2MG	A	2472	10	-	0/5/27/28	0/3/3/3
10	5MU	A	792	10	-	0/7/25/26	0/2/2/2
10	2MA	A	2530	55,10	-	2/3/25/26	0/3/3/3
33	MA6	a	1530	33	-	3/7/29/30	0/3/3/3
10	H2U	A	2476	10	-	0/7/38/39	0/2/2/2

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
10	A	2530	2MA	C6-N6	-2.85	1.23	1.34
10	A	2472	2MG	C8-N7	-2.75	1.30	1.35
10	A	2278	OMG	C5-C6	-2.74	1.41	1.47
10	A	2278	OMG	C8-N7	-2.68	1.30	1.35
10	A	2278	OMG	C5-C4	-2.51	1.36	1.43
33	a	975	2MG	C5-C6	-2.50	1.42	1.47
10	A	2472	2MG	C5-C6	-2.50	1.42	1.47
10	A	2472	2MG	C5-C4	-2.31	1.37	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
10	A	2530	2MA	C8-N7	-2.20	1.30	1.34
33	a	975	2MG	C5-C4	-2.04	1.37	1.43
33	a	975	2MG	C8-N7	-2.03	1.31	1.35

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
10	A	2530	2MA	C5-C6-N1	-12.89	112.54	121.01
10	A	2530	2MA	C2-N1-C6	4.32	124.82	118.08
10	A	2530	2MA	C2-N3-C4	-3.77	112.46	115.52
33	a	535	G7M	O3'-C3'-C4'	2.86	119.33	111.05
10	A	2530	2MA	C5-C6-N6	2.69	124.44	120.35
33	a	976	5MC	O4'-C1'-N1	2.57	114.25	108.36
33	a	535	G7M	O3'-C3'-C2'	2.49	119.89	111.82
10	A	2530	2MA	N6-C6-N1	2.18	123.01	117.07

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
33	a	535	G7M	C3'-C4'-C5'-O5'
33	a	1530	MA6	O4'-C4'-C5'-O5'
33	a	1530	MA6	C3'-C4'-C5'-O5'
33	a	535	G7M	O4'-C4'-C5'-O5'
33	a	535	G7M	C4'-C5'-O5'-P
10	A	2530	2MA	O4'-C4'-C5'-O5'
10	A	2530	2MA	C4'-C5'-O5'-P
33	a	1530	MA6	C4'-C5'-O5'-P

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 153 ligands modelled in this entry, 149 are monoatomic - leaving 4 for Mogul analysis.

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	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
56	SPD	A	3001	-	9,9,9	0.12	0	8,8,8	0.25	0
57	PUT	A	3002	-	5,5,5	0.11	0	4,4,4	0.10	0
59	WUX	E	703	-	42,43,43	0.44	0	47,68,68	0.62	0
58	GDP	E	701	55	24,30,30	0.90	3 (12%)	30,47,47	0.76	1 (3%)

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	Res	Link	Chirals	Torsions	Rings
56	SPD	A	3001	-	-	1/7/7/7	-
57	PUT	A	3002	-	-	1/3/3/3	-
59	WUX	E	703	-	-	4/15/99/99	0/5/5/5
58	GDP	E	701	55	-	4/12/32/32	0/3/3/3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
58	E	701	GDP	C5-C6	-2.17	1.43	1.47
58	E	701	GDP	C5-C4	-2.07	1.37	1.43
58	E	701	GDP	C8-N7	-2.05	1.31	1.35

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
58	E	701	GDP	PA-O3A-PB	2.63	141.84	132.83

There are no chirality outliers.

All (10) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
58	E	701	GDP	C5'-O5'-PA-O3A

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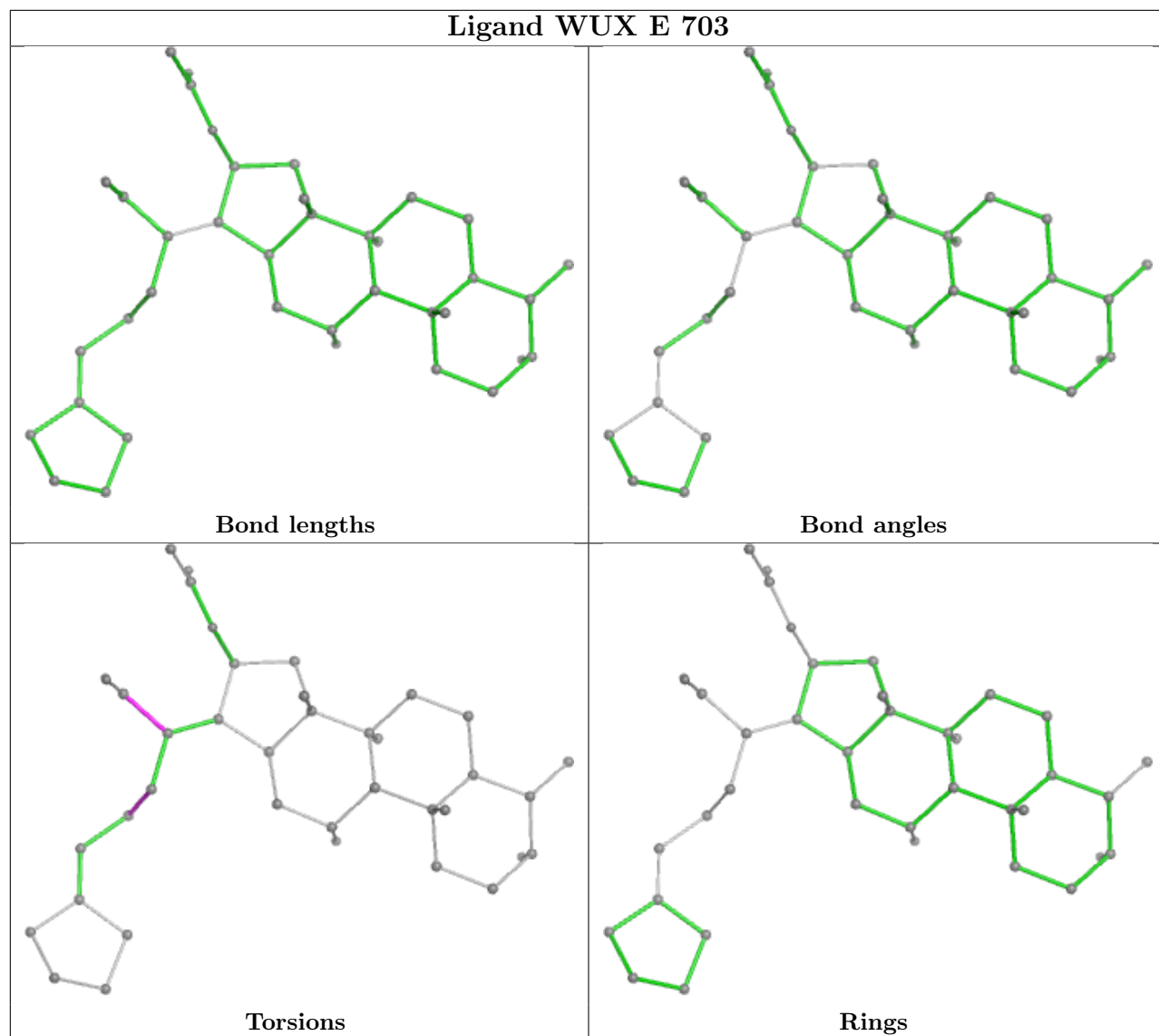
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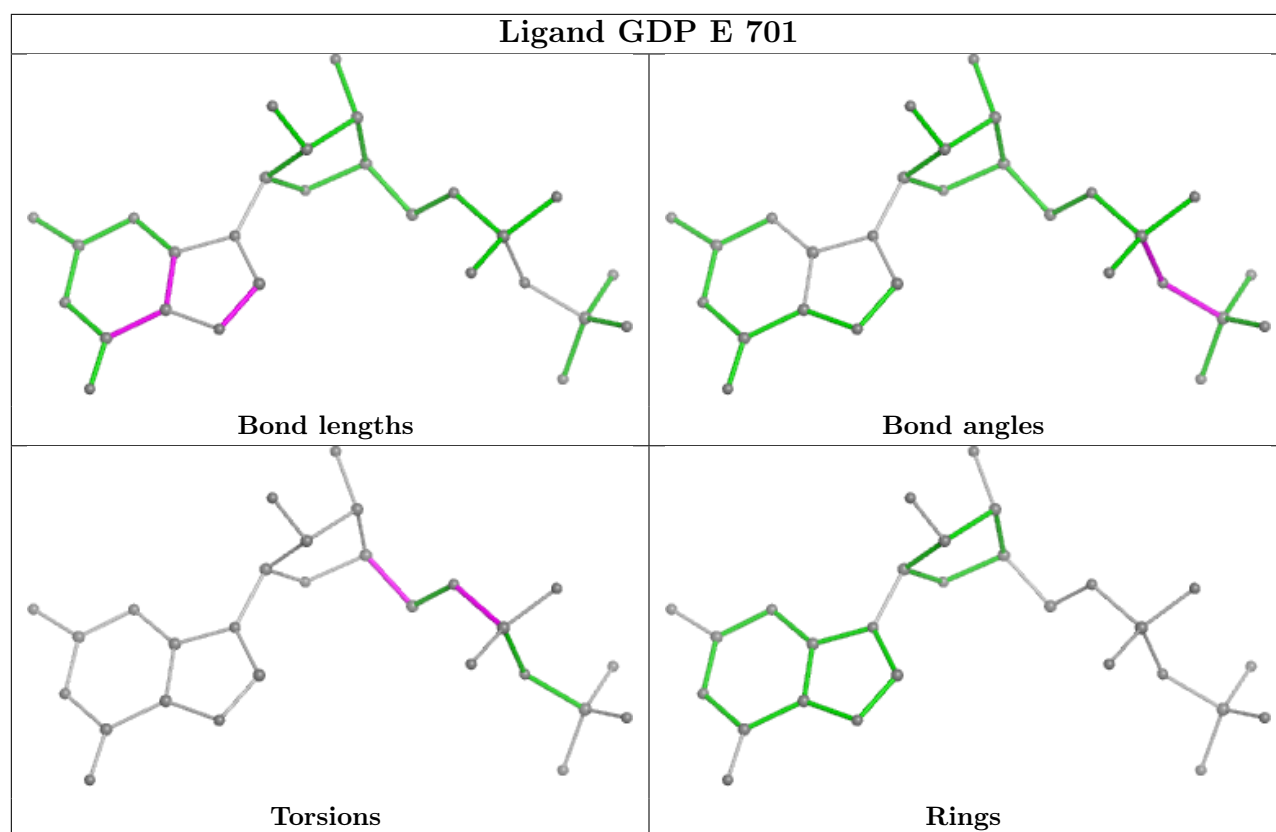
Mol	Chain	Res	Type	Atoms
59	E	703	WUX	C23-C22-C29-O4
59	E	703	WUX	C23-C22-C29-O5
58	E	701	GDP	O4'-C4'-C5'-O5'
59	E	703	WUX	C22-C23-C24-C25
58	E	701	GDP	C3'-C4'-C5'-O5'
57	A	3002	PUT	C1-C2-C3-C4
56	A	3001	SPD	C8-C7-N6-C5
58	E	701	GDP	C5'-O5'-PA-O1A
59	E	703	WUX	C17-C22-C29-O4

There are no ring outliers.

No monomer is involved in short contacts.

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 than 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.