



Full wwPDB Geometry-Only Validation Report ⓘ

May 25, 2020 – 05:39 am BST

PDB ID : 1RMV
Title : RIBGRASS MOSAIC VIRUS, FIBER DIFFRACTION
Authors : Wang, H.; Stubbs, G.
Deposited on : 1997-02-11
Resolution : 2.90 Å(reported)

This is a Full wwPDB Geometry-Only 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/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
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) : 2.11

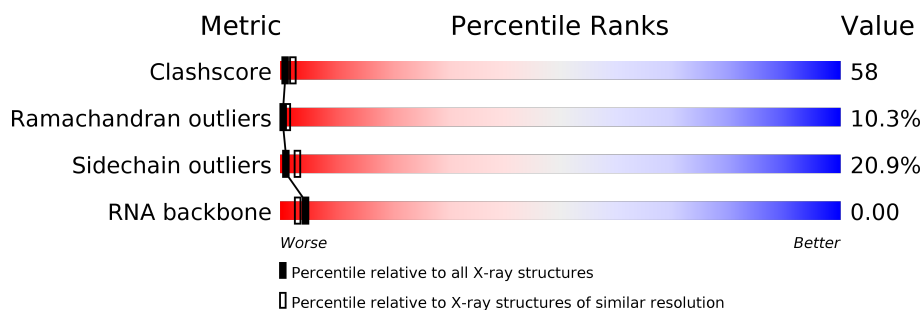
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

FIBER DIFFRACTION

The reported resolution of this entry is 2.90 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)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RNA backbone	3102	1007 (3.16-2.64)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower 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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	B	3	 33% 67%
2	A	157	 20% 63% 17%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 1304 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, 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 RIBGRASS MOSAIC VIRUS RNA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	B	3	Total	C	N	O	P	0	0	0
			67	30	15	19	3			

- Molecule 2 is a protein called RIBGRASS MOSAIC VIRUS COAT PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	A	157	Total	C	N	O	S	0	0	0
			1237	772	216	245	4			

3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

Note EDS was not executed.

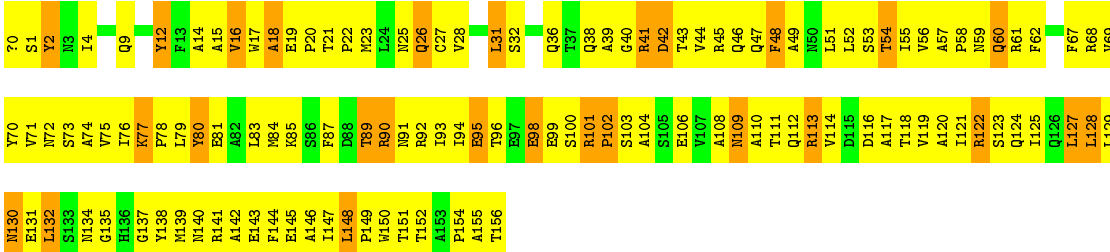
• Molecule 1: RIBGRASS MOSAIC VIRUS RNA

Chain B:  33% 67%



• Molecule 2: RIBGRASS MOSAIC VIRUS COAT PROTEIN

Chain A:  20% 63% 17%



4 Model quality

4.1 Standard geometry

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

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	B	2.78	7/75 (9.3%)	4.30	14/115 (12.2%)
2	A	0.42	0/1260	0.71	1/1718 (0.1%)
All	All	0.77	7/1335 (0.5%)	1.28	15/1833 (0.8%)

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	B	0	1

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	165	G	P-O5'	7.72	1.67	1.59
1	B	165	G	O3'-P	7.01	1.69	1.61
1	B	167	A	P-O5'	6.49	1.66	1.59
1	B	165	G	C4'-C3'	6.38	1.60	1.53
1	B	166	A	O3'-P	5.63	1.68	1.61
1	B	165	G	C3'-O3'	5.61	1.50	1.42
1	B	166	A	C3'-O3'	5.08	1.49	1.42

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	166	A	P-O3'-C3'	15.72	138.57	119.70
1	B	165	G	C3'-C2'-C1'	15.63	114.00	101.50
1	B	167	A	O4'-C1'-N9	14.28	119.62	108.20
1	B	165	G	P-O3'-C3'	13.80	136.26	119.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	165	G	N9-C1'-C2'	-11.76	98.71	114.00
1	B	165	G	O4'-C1'-C2'	-11.64	94.16	105.80
1	B	165	G	C4'-C3'-C2'	-10.24	92.36	102.60
1	B	167	A	C5'-C4'-O4'	8.44	119.23	109.10
1	B	167	A	N9-C1'-C2'	-8.36	102.80	112.00
1	B	165	G	O4'-C1'-N9	8.29	114.83	108.20
1	B	165	G	P-O5'-C5'	8.12	133.89	120.90
1	B	167	A	O4'-C4'-C3'	-7.82	96.18	104.00
1	B	166	A	C2'-C3'-O3'	7.15	125.24	109.50
2	A	132	LEU	CA-CB-CG	5.60	128.18	115.30
1	B	167	A	C2'-C3'-O3'	5.07	121.81	113.70

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	165	G	Sidechain

4.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	67	0	34	11	0
2	A	1237	0	1196	146	0
All	All	1304	0	1230	147	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 58.

All (147) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:12:TYR:HB3	2:A:70:TYR:HE1	1.32	0.95
2:A:75:VAL:HG21	2:A:131:GLU:HB3	1.49	0.95
2:A:130:ASN:H	2:A:130:ASN:HD22	1.09	0.94

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:41:ARG:HD3	2:A:87:PHE:HB2	1.49	0.92
2:A:45:ARG:HA	2:A:84:MET:SD	2.18	0.83
2:A:21:THR:HB	2:A:22:PRO:HD3	1.60	0.83
2:A:12:TYR:HB3	2:A:70:TYR:CE1	2.17	0.79
2:A:119:VAL:HB	2:A:122:ARG:NH2	1.99	0.77
2:A:2:TYR:HB3	2:A:59:ASN:HA	1.65	0.76
2:A:55:ILE:HG13	2:A:56:VAL:N	2.02	0.75
2:A:76:ILE:O	2:A:80:TYR:HB3	1.87	0.73
2:A:57:ALA:HB3	2:A:60:GLN:HE22	1.54	0.73
2:A:57:ALA:HB3	2:A:60:GLN:NE2	2.04	0.73
2:A:116:ASP:O	2:A:119:VAL:HG22	1.89	0.72
2:A:77:LYS:HA	2:A:80:TYR:HD2	1.55	0.72
2:A:42:ASP:O	2:A:45:ARG:HG2	1.88	0.72
2:A:101:ARG:HE	2:A:102:PRO:HD2	1.56	0.69
2:A:55:ILE:HG13	2:A:56:VAL:H	1.58	0.69
2:A:90:ARG:HG3	2:A:92:ARG:HG3	1.74	0.69
2:A:49:ALA:HA	2:A:52:LEU:HD12	1.73	0.69
2:A:40:GLY:O	2:A:44:VAL:HG23	1.92	0.69
2:A:96:THR:HB	2:A:100:SER:HA	1.75	0.69
2:A:70:TYR:HD2	2:A:73:SER:HB3	1.57	0.68
2:A:101:ARG:HA	2:A:101:ARG:NE	2.06	0.68
2:A:45:ARG:HB3	2:A:87:PHE:HE1	1.57	0.68
2:A:121:ILE:HD11	2:A:125:ILE:HD13	1.76	0.67
2:A:1:SER:H	2:A:152:THR:H	1.41	0.67
2:A:57:ALA:HB1	2:A:58:PRO:HD2	1.74	0.67
2:A:72:ASN:HA	2:A:77:LYS:HB2	1.77	0.67
1:B:166:A:C6	2:A:123:SER:HB3	2.30	0.66
2:A:77:LYS:HB3	2:A:78:PRO:HD3	1.78	0.66
2:A:130:ASN:HD22	2:A:130:ASN:N	1.86	0.66
2:A:1:SER:HB3	2:A:152:THR:HB	1.79	0.65
2:A:38:GLN:O	2:A:42:ASP:HB2	1.96	0.65
2:A:48:PHE:O	2:A:52:LEU:HG	1.96	0.64
2:A:130:ASN:H	2:A:130:ASN:ND2	1.89	0.64
2:A:61:ARG:HB3	2:A:150:TRP:HZ3	1.63	0.64
2:A:25:ASN:O	2:A:28:VAL:HG22	1.99	0.63
2:A:139:MET:HG3	2:A:143:GLU:HB3	1.80	0.63
2:A:83:LEU:HD21	2:A:121:ILE:HD12	1.81	0.62
2:A:73:SER:OG	2:A:137:GLY:HA2	2.00	0.62
2:A:83:LEU:HD23	2:A:124:GLN:HB3	1.80	0.62
2:A:2:TYR:HB3	2:A:59:ASN:CA	2.29	0.62
1:B:165:G:H2'	2:A:119:VAL:HG11	1.81	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:62:PHE:CZ	2:A:140:ASN:HA	2.35	0.61
2:A:4:ILE:HD13	2:A:149:PRO:HG2	1.82	0.61
2:A:23:MET:HE1	2:A:71:VAL:HG13	1.83	0.60
2:A:94:ILE:O	2:A:96:THR:HG22	2.02	0.59
2:A:20:PRO:HA	2:A:138:TYR:OH	2.03	0.59
2:A:0:ACE:H3	2:A:154:PRO:HA	1.84	0.59
2:A:20:PRO:HD3	2:A:138:TYR:HE1	1.68	0.59
2:A:61:ARG:HB3	2:A:150:TRP:CZ3	2.37	0.59
2:A:76:ILE:HG23	2:A:77:LYS:H	1.68	0.59
2:A:28:VAL:HA	2:A:31:LEU:HD22	1.84	0.58
2:A:31:LEU:HD23	2:A:32:SER:N	2.17	0.58
2:A:98:GLU:HG3	2:A:99:GLU:N	2.19	0.58
2:A:15:ALA:HA	2:A:52:LEU:O	2.04	0.58
2:A:43:THR:O	2:A:47:GLN:HG3	2.03	0.57
2:A:16:VAL:O	2:A:70:TYR:HA	2.05	0.56
2:A:69:VAL:HB	2:A:138:TYR:CE1	2.40	0.56
2:A:31:LEU:HB2	2:A:125:ILE:HG21	1.87	0.56
2:A:70:TYR:CD2	2:A:73:SER:HB3	2.40	0.56
2:A:19:GLU:HB3	2:A:22:PRO:HD2	1.88	0.55
1:B:165:G:C2'	2:A:119:VAL:HG11	2.36	0.55
1:B:166:A:H4'	2:A:119:VAL:HG21	1.87	0.55
2:A:18:ALA:HB3	2:A:69:VAL:HG13	1.87	0.55
2:A:103:SER:HB3	2:A:106:GLU:HG3	1.88	0.54
2:A:55:ILE:HD13	2:A:68:ARG:HG2	1.88	0.54
2:A:56:VAL:HG21	2:A:144:PHE:CZ	2.43	0.53
2:A:45:ARG:HB3	2:A:87:PHE:CE1	2.41	0.53
2:A:127:LEU:HA	2:A:130:ASN:HD21	1.73	0.53
2:A:16:VAL:HG23	2:A:17:TRP:CD1	2.44	0.53
2:A:121:ILE:CD1	2:A:125:ILE:HD13	2.38	0.52
1:B:166:A:OP1	1:B:166:A:H4'	2.10	0.52
2:A:19:GLU:N	2:A:69:VAL:HG12	2.24	0.52
2:A:104:ALA:O	2:A:108:ALA:HB2	2.10	0.52
2:A:87:PHE:CE2	2:A:121:ILE:HD13	2.45	0.52
2:A:112:GLN:HB2	2:A:113:ARG:NH2	2.25	0.51
1:B:165:G:H2'	2:A:119:VAL:CG1	2.41	0.51
2:A:101:ARG:HB3	2:A:104:ALA:HB2	1.92	0.51
2:A:20:PRO:HD3	2:A:138:TYR:CE1	2.46	0.51
2:A:93:ILE:HG12	2:A:95:GLU:HG3	1.92	0.51
2:A:139:MET:HG2	2:A:140:ASN:N	2.26	0.50
2:A:2:TYR:O	2:A:59:ASN:HA	2.11	0.50
2:A:75:VAL:HG11	2:A:131:GLU:OE2	2.11	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:165:G:C3'	2:A:119:VAL:HG11	2.41	0.50
2:A:19:GLU:CG	2:A:20:PRO:HD2	2.42	0.49
2:A:77:LYS:HA	2:A:80:TYR:CD2	2.41	0.49
2:A:18:ALA:HB3	2:A:69:VAL:CG1	2.42	0.49
2:A:56:VAL:HG21	2:A:144:PHE:CE2	2.48	0.49
2:A:68:ARG:N	2:A:68:ARG:HD2	2.28	0.49
2:A:90:ARG:HD2	2:A:114:VAL:HG22	1.95	0.49
2:A:39:ALA:O	2:A:43:THR:HG22	2.14	0.48
2:A:16:VAL:HB	2:A:72:ASN:OD1	2.13	0.48
2:A:72:ASN:CA	2:A:77:LYS:HB2	2.44	0.48
2:A:128:LEU:HD22	2:A:132:LEU:HD12	1.96	0.48
2:A:17:TRP:CG	2:A:55:ILE:HG12	2.48	0.47
2:A:79:LEU:O	2:A:83:LEU:HB2	2.14	0.47
2:A:109:ASN:H	2:A:109:ASN:ND2	2.12	0.47
2:A:140:ASN:OD1	2:A:142:ALA:HB3	2.14	0.47
2:A:1:SER:O	2:A:150:TRP:CG	2.68	0.47
2:A:45:ARG:HA	2:A:84:MET:CE	2.45	0.47
2:A:119:VAL:HG12	2:A:122:ARG:NH1	2.30	0.47
2:A:58:PRO:HG2	2:A:59:ASN:HD22	1.79	0.46
2:A:101:ARG:O	2:A:104:ALA:HB2	2.15	0.46
2:A:122:ARG:HG2	2:A:123:SER:N	2.30	0.46
2:A:101:ARG:HE	2:A:101:ARG:HA	1.78	0.46
2:A:122:ARG:O	2:A:125:ILE:HG22	2.16	0.46
2:A:23:MET:HE3	2:A:71:VAL:HG22	1.98	0.46
2:A:19:GLU:HG2	2:A:20:PRO:CD	2.45	0.46
1:B:166:A:OP1	2:A:119:VAL:HG21	2.15	0.46
2:A:93:ILE:O	2:A:93:ILE:HG23	2.16	0.46
2:A:84:MET:HE2	2:A:87:PHE:HZ	1.82	0.45
2:A:130:ASN:ND2	2:A:130:ASN:N	2.54	0.44
2:A:2:TYR:CB	2:A:59:ASN:HA	2.40	0.44
1:B:166:A:C8	2:A:122:ARG:NH2	2.85	0.44
2:A:1:SER:O	2:A:150:TRP:HA	2.17	0.44
1:B:165:G:H3'	2:A:119:VAL:HG11	1.99	0.44
2:A:14:ALA:HA	2:A:54:THR:HG22	2.00	0.44
2:A:109:ASN:O	2:A:110:ALA:HB2	2.18	0.43
2:A:1:SER:O	2:A:150:TRP:CA	2.66	0.43
2:A:56:VAL:O	2:A:56:VAL:HG23	2.18	0.43
2:A:18:ALA:C	2:A:69:VAL:HG12	2.39	0.43
2:A:76:ILE:O	2:A:80:TYR:N	2.49	0.43
1:B:166:A:C6	2:A:123:SER:CB	3.01	0.43
2:A:103:SER:HB3	2:A:106:GLU:CG	2.48	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:83:LEU:CD2	2:A:121:ILE:HD12	2.48	0.43
2:A:26:GLN:HG3	2:A:27:CYS:N	2.32	0.43
2:A:148:LEU:N	2:A:148:LEU:HD22	2.33	0.43
2:A:2:TYR:CD1	2:A:150:TRP:HE3	2.37	0.43
2:A:114:VAL:O	2:A:118:THR:HG23	2.19	0.42
2:A:117:ALA:O	2:A:120:ALA:HB3	2.18	0.42
2:A:62:PHE:CE2	2:A:140:ASN:HA	2.55	0.42
2:A:57:ALA:HB1	2:A:58:PRO:CD	2.45	0.42
2:A:101:ARG:HA	2:A:102:PRO:HD2	1.74	0.42
2:A:109:ASN:H	2:A:109:ASN:HD22	1.67	0.42
2:A:81:GLU:O	2:A:85:LYS:HB2	2.20	0.41
2:A:71:VAL:O	2:A:71:VAL:HG12	2.20	0.41
2:A:109:ASN:N	2:A:109:ASN:HD22	2.18	0.41
2:A:89:THR:HG23	2:A:90:ARG:N	2.34	0.41
2:A:2:TYR:HB2	2:A:59:ASN:O	2.21	0.41
2:A:124:GLN:O	2:A:128:LEU:HB2	2.20	0.41
2:A:128:LEU:O	2:A:129:LEU:C	2.58	0.41
2:A:87:PHE:CD2	2:A:121:ILE:HD13	2.56	0.41
2:A:76:ILE:HG23	2:A:77:LYS:N	2.32	0.41
2:A:131:GLU:OE1	2:A:131:GLU:HA	2.21	0.41
2:A:21:THR:HB	2:A:22:PRO:CD	2.41	0.41

There are no symmetry-related clashes.

4.3 Torsion angles [i](#)

4.3.1 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 X-ray entries followed by that with respect to entries of similar resolution.

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
2	A	155/157 (99%)	102 (66%)	37 (24%)	16 (10%)	0 1

All (16) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	A	74	ALA
2	A	134	ASN
2	A	89	THR
2	A	98	GLU
2	A	122	ARG
2	A	146	ALA
2	A	147	ILE
2	A	18	ALA
2	A	102	PRO
2	A	111	THR
2	A	53	SER
2	A	90	ARG
2	A	16	VAL
2	A	95	GLU
2	A	155	ALA
2	A	135	GLY

4.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

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
2	A	134/134 (100%)	106 (79%)	28 (21%)	1 3

All (28) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	A	2	TYR
2	A	9	GLN
2	A	12	TYR
2	A	26	GLN
2	A	31	LEU
2	A	36	GLN
2	A	41	ARG
2	A	42	ASP
2	A	46	GLN
2	A	48	PHE
2	A	51	LEU

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Mol	Chain	Res	Type
2	A	54	THR
2	A	60	GLN
2	A	67	PHE
2	A	77	LYS
2	A	80	TYR
2	A	91	ASN
2	A	101	ARG
2	A	109	ASN
2	A	113	ARG
2	A	127	LEU
2	A	128	LEU
2	A	130	ASN
2	A	141	ARG
2	A	145	GLU
2	A	148	LEU
2	A	151	THR
2	A	156	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
2	A	59	ASN
2	A	60	GLN
2	A	91	ASN
2	A	109	ASN
2	A	130	ASN

4.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	B	3/3 (100%)	2 (66%)	2 (66%)

All (2) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	B	166	A
1	B	167	A

All (2) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	B	165	G
1	B	166	A

4.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

4.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

4.6 Ligand geometry [i](#)

There are no ligands in this entry.

4.7 Other polymers [i](#)

There are no such residues in this entry.

4.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.