



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 10, 2021 – 04:10 PM JST

PDB ID : 6A3A
Title : MVM NES mutant Nm2 in complex with CRM1-Ran-RanBP1
Authors : Sun, Q.; Li, Y.
Deposited on : 2018-06-15
Resolution : 2.30 Å(reported)

This is a Full wwPDB X-ray Structure 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)
Xtriage (Phenix)	:	1.13
EDS	:	2.20
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.20

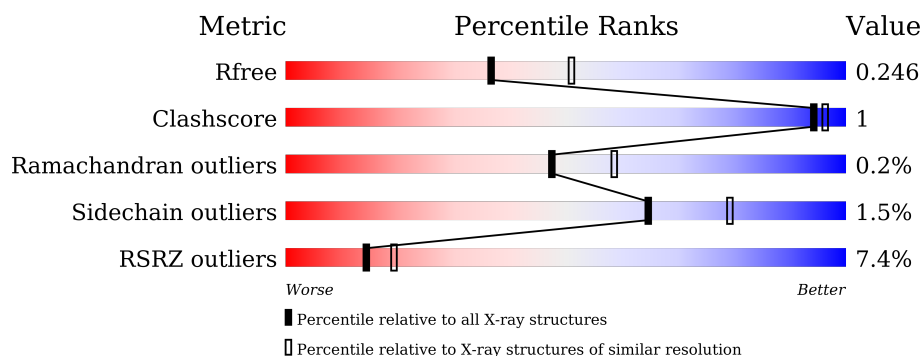
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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))
R_{free}	130704	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

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 of 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 $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	235	<div> <div>8%</div> <div> <div></div> <div>84%</div> <div>5% •</div> <div>11%</div> </div> </div>
2	B	143	<div> <div>13%</div> <div> <div></div> <div>85%</div> <div>5%</div> <div>10%</div> </div> </div>
3	C	1003	<div> <div>6%</div> <div> <div></div> <div>95%</div> <div>5% •</div> </div> </div>
4	D	20	<div> <div>10%</div> <div> <div></div> <div>85%</div> <div>15%</div> </div> </div>

2 Entry composition

There are 10 unique types of molecules in this entry. The entry contains 11216 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 protein called GTP-binding nuclear protein Ran.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	210	Total	C	N	O	S	0	0	0
			1677	1080	288	303	6			

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-18	GLY	-	expression tag	UNP P62826
A	-17	SER	-	expression tag	UNP P62826
A	-16	SER	-	expression tag	UNP P62826
A	-15	HIS	-	expression tag	UNP P62826
A	-14	HIS	-	expression tag	UNP P62826
A	-13	HIS	-	expression tag	UNP P62826
A	-12	HIS	-	expression tag	UNP P62826
A	-11	HIS	-	expression tag	UNP P62826
A	-10	HIS	-	expression tag	UNP P62826
A	-9	SER	-	expression tag	UNP P62826
A	-8	SER	-	expression tag	UNP P62826
A	-7	GLY	-	expression tag	UNP P62826
A	-6	LEU	-	expression tag	UNP P62826
A	-5	VAL	-	expression tag	UNP P62826
A	-4	PRO	-	expression tag	UNP P62826
A	-3	ARG	-	expression tag	UNP P62826
A	-2	GLY	-	expression tag	UNP P62826
A	-1	SER	-	expression tag	UNP P62826
A	0	HIS	-	expression tag	UNP P62826
A	197	ALA	TYR	engineered mutation	UNP P62826

- Molecule 2 is a protein called Ran-specific GTPase-activating protein 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	129	Total	C	N	O	S	0	0	0
			1058	672	184	197	5			

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	59	GLY	-	expression tag	UNP P41920
B	60	GLY	-	expression tag	UNP P41920
B	61	SER	-	expression tag	UNP P41920

- Molecule 3 is a protein called Exportin-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	996	Total	C	N	O	S	0	1	0
			8040	5169	1324	1506	41			

There are 66 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-2	GLY	-	expression tag	UNP P30822
C	-1	GLY	-	expression tag	UNP P30822
C	0	SER	-	expression tag	UNP P30822
C	?	-	VAL	deletion	UNP P30822
C	?	-	GLN	deletion	UNP P30822
C	?	-	ARG	deletion	UNP P30822
C	?	-	LEU	deletion	UNP P30822
C	?	-	PRO	deletion	UNP P30822
C	?	-	ALA	deletion	UNP P30822
C	?	-	THR	deletion	UNP P30822
C	?	-	GLU	deletion	UNP P30822
C	?	-	MET	deletion	UNP P30822
C	?	-	SER	deletion	UNP P30822
C	?	-	PRO	deletion	UNP P30822
C	?	-	LEU	deletion	UNP P30822
C	?	-	ILE	deletion	UNP P30822
C	?	-	GLN	deletion	UNP P30822
C	?	-	LEU	deletion	UNP P30822
C	?	-	SER	deletion	UNP P30822
C	?	-	VAL	deletion	UNP P30822
C	?	-	GLY	deletion	UNP P30822
C	?	-	SER	deletion	UNP P30822
C	?	-	GLN	deletion	UNP P30822
C	?	-	ALA	deletion	UNP P30822
C	?	-	ILE	deletion	UNP P30822
C	?	-	SER	deletion	UNP P30822
C	?	-	THR	deletion	UNP P30822
C	?	-	GLY	deletion	UNP P30822

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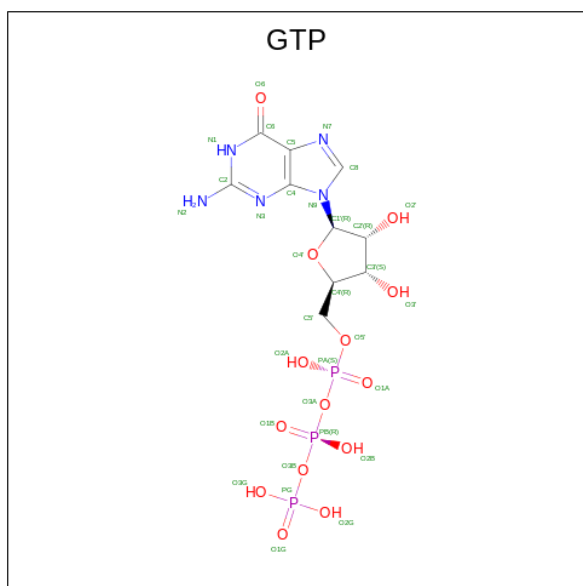
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Chain	Residue	Modelled	Actual	Comment	Reference
C	?	-	SER	deletion	UNP P30822
C	?	-	GLY	deletion	UNP P30822
C	?	-	ALA	deletion	UNP P30822
C	?	-	LEU	deletion	UNP P30822
C	?	-	ASN	deletion	UNP P30822
C	?	-	PRO	deletion	UNP P30822
C	?	-	GLU	deletion	UNP P30822
C	?	-	TYR	deletion	UNP P30822
C	?	-	MET	deletion	UNP P30822
C	?	-	LYS	deletion	UNP P30822
C	?	-	ARG	deletion	UNP P30822
C	?	-	PHE	deletion	UNP P30822
C	?	-	VAL	deletion	UNP P30822
C	?	-	LEU	deletion	UNP P30822
C	?	-	VAL	deletion	UNP P30822
C	?	-	VAL	deletion	UNP P30822
C	?	-	GLU	deletion	UNP P30822
C	?	-	ASN	deletion	UNP P30822
C	?	-	ASP	deletion	UNP P30822
C	?	-	GLU	deletion	UNP P30822
C	?	-	GLY	deletion	UNP P30822
C	?	-	GLU	deletion	UNP P30822
C	?	-	ILE	deletion	UNP P30822
C	?	-	VAL	deletion	UNP P30822
C	?	-	ARG	deletion	UNP P30822
C	?	-	GLU	deletion	UNP P30822
C	?	-	PHE	deletion	UNP P30822
C	?	-	VAL	deletion	UNP P30822
C	?	-	LYS	deletion	UNP P30822
C	?	-	GLU	deletion	UNP P30822
C	?	-	SER	deletion	UNP P30822
C	?	-	ASP	deletion	UNP P30822
C	?	-	THR	deletion	UNP P30822
C	537	GLY	ASP	engineered mutation	UNP P30822
C	539	CYS	THR	engineered mutation	UNP P30822
C	540	GLU	VAL	engineered mutation	UNP P30822
C	541	GLN	LYS	engineered mutation	UNP P30822
C	1022	CYS	TYR	engineered mutation	UNP P30822

- Molecule 4 is a protein called MVM NES mutant Nm2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	17	Total	C	N	O	S	0	0	0
			133	83	21	28	1			

- Molecule 5 is GUANOSINE-5'-TRIPHOSPHATE (three-letter code: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	N	O	P	0	0
			32	10	5	14	3		

- Molecule 6 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

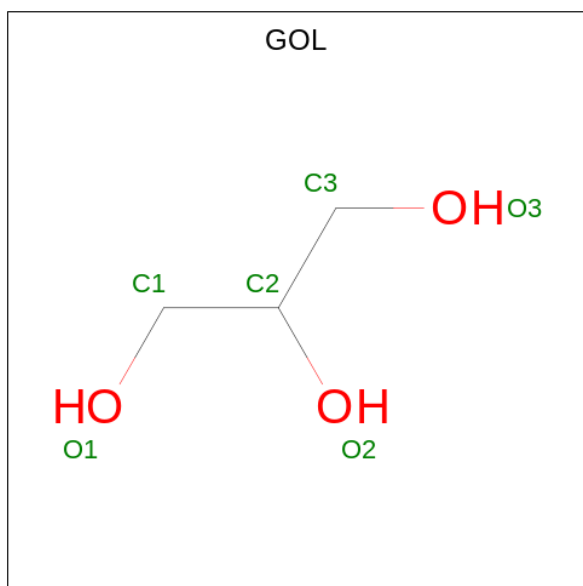
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	Mg	0	0
			1	1		

- Molecule 7 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			4	2	2		

- Molecule 8 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	C	1	Total	C	O	0	0
			6	3	3		

- Molecule 9 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	C	1	Total 1	Na 1	0	0

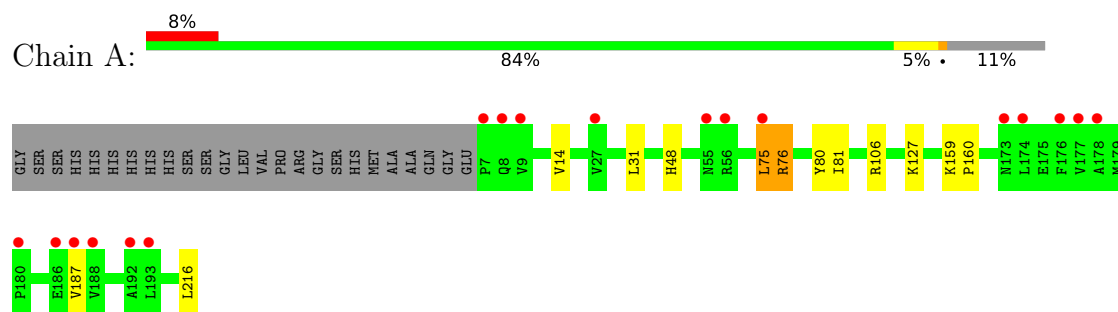
- Molecule 10 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	A	52	Total 52	O 52	0	0
10	B	14	Total 14	O 14	0	0
10	C	197	Total 197	O 197	0	0
10	D	1	Total 1	O 1	0	0

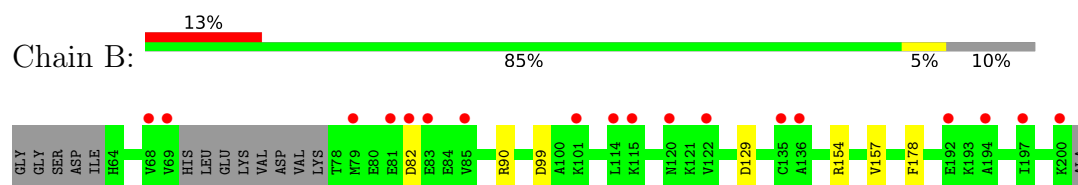
3 Residue-property plots [i](#)

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 electron 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 dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). 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.

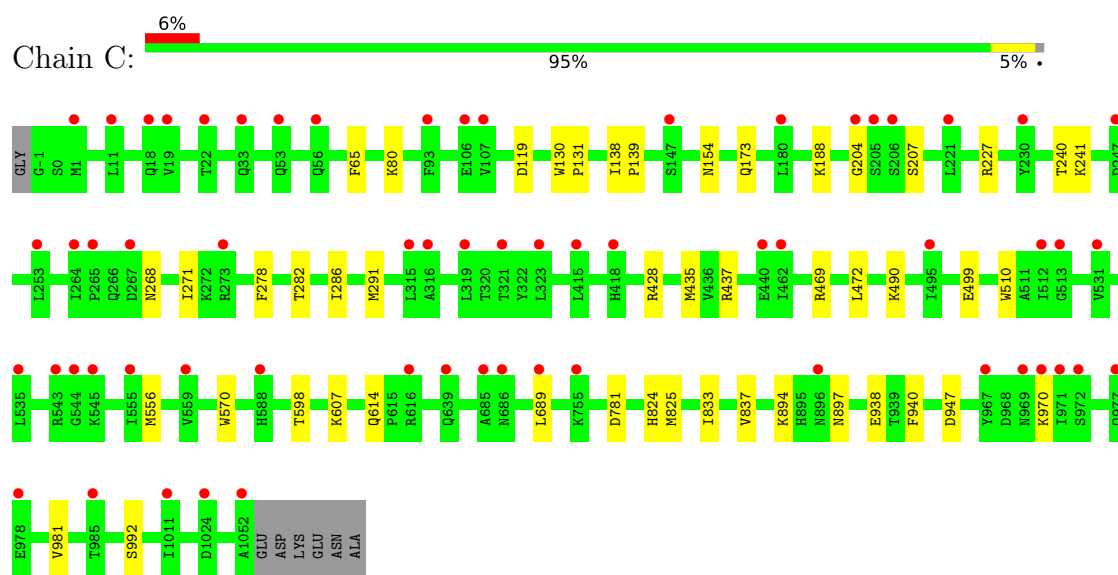
- Molecule 1: GTP-binding nuclear protein Ran



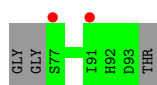
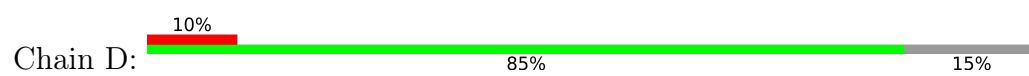
- Molecule 2: Ran-specific GTPase-activating protein 1



- Molecule 3: Exportin-1



- Molecule 4: MVM NES mutant Nm2



4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	106.65Å 106.65Å 304.31Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	33.99 – 2.30 33.96 – 2.30	Depositor EDS
% Data completeness (in resolution range)	99.3 (33.99-2.30) 99.4 (33.96-2.30)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.40 (at 2.29Å)	Xtriage
Refinement program	REFMAC 5.8.0222	Depositor
R, R_{free}	0.209 , 0.246 0.214 , 0.246	Depositor DCC
R_{free} test set	4019 reflections (5.13%)	wwPDB-VP
Wilson B-factor (Å ²)	56.7	Xtriage
Anisotropy	0.210	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 39.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	11216	wwPDB-VP
Average B, all atoms (Å ²)	73.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.07% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: EDO, GOL, MG, NA, GTP

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	A	0.31	0/1718	0.50	0/2329
2	B	0.30	0/1077	0.53	0/1439
3	C	0.35	0/8199	0.47	0/11110
4	D	0.34	0/134	0.50	0/179
All	All	0.34	0/11128	0.48	0/15057

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
3	C	0	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	C	428	ARG	Sidechain
3	C	469	ARG	Sidechain

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1677	0	1681	8	0
2	B	1058	0	1054	3	0
3	C	8040	0	8132	21	0
4	D	133	0	131	0	0
5	A	32	0	12	0	0
6	A	1	0	0	0	0
7	A	4	0	6	0	0
8	C	6	0	8	0	0
9	C	1	0	0	0	0
10	A	52	0	0	0	0
10	B	14	0	0	0	0
10	C	197	0	0	2	0
10	D	1	0	0	0	0
All	All	11216	0	11024	28	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 1.

All (28) 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)
3:C:556:MET:HG3	3:C:598:THR:HG21	1.83	0.60
3:C:268:ASN:HD22	3:C:271:ILE:HD12	1.66	0.59
3:C:119:ASP:OD2	3:C:154:ASN:ND2	2.37	0.57
2:B:90:ARG:NH1	2:B:129:ASP:OD2	2.31	0.56
3:C:490:LYS:NZ	3:C:499:GLU:OE2	2.41	0.53
2:B:154:ARG:NH1	2:B:178:PHE:O	2.41	0.53
1:A:81:ILE:HD11	3:C:65:PHE:CG	2.45	0.51
1:A:81:ILE:HD11	3:C:65:PHE:CD1	2.49	0.47
1:A:216:LEU:HD11	2:B:90:ARG:HG2	1.96	0.47
3:C:282:THR:O	3:C:286:ILE:HG12	2.14	0.47
3:C:894:LYS:NZ	3:C:938:GLU:OE1	2.45	0.47
3:C:824:HIS:CD2	3:C:825:MET:HG3	2.50	0.46
3:C:138:ILE:HB	3:C:139:PRO:HD3	1.98	0.46
3:C:435:MET:HE1	3:C:472:LEU:HD22	1.99	0.45
3:C:897:ASN:ND2	10:C:1205:HOH:O	2.50	0.44
3:C:437:ARG:HB3	3:C:510:TRP:CH2	2.53	0.44
3:C:833:ILE:O	3:C:837:VAL:HG22	2.18	0.44
3:C:240:THR:OG1	3:C:241:LYS:N	2.51	0.44
3:C:435:MET:CE	3:C:472:LEU:HD22	2.48	0.44
3:C:268:ASN:HD22	3:C:271:ILE:CD1	2.29	0.43
1:A:31:LEU:HD11	1:A:48:HIS:HB3	2.01	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:159:LYS:HB2	1:A:160:PRO:HD3	2.01	0.42
1:A:106:ARG:HH12	3:C:173:GLN:NE2	2.18	0.42
1:A:14:VAL:HG11	1:A:80:TYR:HA	2.03	0.41
1:A:75:LEU:O	1:A:76:ARG:C	2.59	0.41
3:C:227:ARG:NH1	10:C:1209:HOH:O	2.54	0.40
3:C:570:TRP:CD2	3:C:614:GLN:HG3	2.56	0.40
3:C:130:TRP:HA	3:C:131:PRO:HA	1.82	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all 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	
1	A	208/235 (88%)	200 (96%)	6 (3%)	2 (1%)	15	17
2	B	125/143 (87%)	116 (93%)	9 (7%)	0	100	100
3	C	995/1003 (99%)	974 (98%)	20 (2%)	1 (0%)	51	64
4	D	15/20 (75%)	15 (100%)	0	0	100	100
All	All	1343/1401 (96%)	1305 (97%)	35 (3%)	3 (0%)	47	58

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	76	ARG
1	A	187	VAL
3	C	204	GLY

5.3.2 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	
1	A	181/200 (90%)	179 (99%)	2 (1%)	73	86
2	B	111/122 (91%)	108 (97%)	3 (3%)	44	61
3	C	909/913 (100%)	896 (99%)	13 (1%)	67	81
4	D	16/17 (94%)	16 (100%)	0	100	100
All	All	1217/1252 (97%)	1199 (98%)	18 (2%)	65	79

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	75	LEU
1	A	127	LYS
2	B	82	ASP
2	B	99	ASP
2	B	157	VAL
3	C	80	LYS
3	C	188	LYS
3	C	207	SER
3	C	278	PHE
3	C	291	MET
3	C	607	LYS
3	C	689	LEU
3	C	781	ASP
3	C	940	PHE
3	C	947	ASP
3	C	970	LYS
3	C	981	VAL
3	C	992	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	62	ASN
1	A	205	GLN
2	B	183	ASN
3	C	56	GLN
3	C	173	GLN

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Mol	Chain	Res	Type
3	C	199	GLN
3	C	203	GLN
3	C	268	ASN
3	C	824	HIS
3	C	1010	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 5 ligands modelled in this entry, 2 are monoatomic - leaving 3 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	$\# Z > 2$
5	GTP	A	301	6	26,34,34	1.14	2 (7%)	33,54,54	1.93	8 (24%)
8	GOL	C	1101	-	5,5,5	0.33	0	5,5,5	0.31	0
7	EDO	A	303	-	3,3,3	0.53	0	2,2,2	0.29	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
5	GTP	A	301	6	-	2/18/38/38	0/3/3/3
8	GOL	C	1101	-	-	2/4/4/4	-
7	EDO	A	303	-	-	1/1/1/1	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	301	GTP	C6-C5	4.12	1.48	1.41
5	A	301	GTP	C5-C4	2.53	1.47	1.40

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	301	GTP	C6-N1-C2	4.30	122.76	115.93
5	A	301	GTP	C2-N3-C4	4.27	120.23	115.36
5	A	301	GTP	C6-C5-C4	-4.26	116.73	120.80
5	A	301	GTP	C5-C6-N1	-4.05	117.90	123.43
5	A	301	GTP	N3-C2-N1	-3.36	122.74	127.22
5	A	301	GTP	PA-O3A-PB	-3.26	121.66	132.83
5	A	301	GTP	C4-C5-N7	-2.50	106.79	109.40
5	A	301	GTP	PB-O3B-PG	-2.30	124.93	132.83

There are no chirality outliers.

All (5) torsion outliers are listed below:

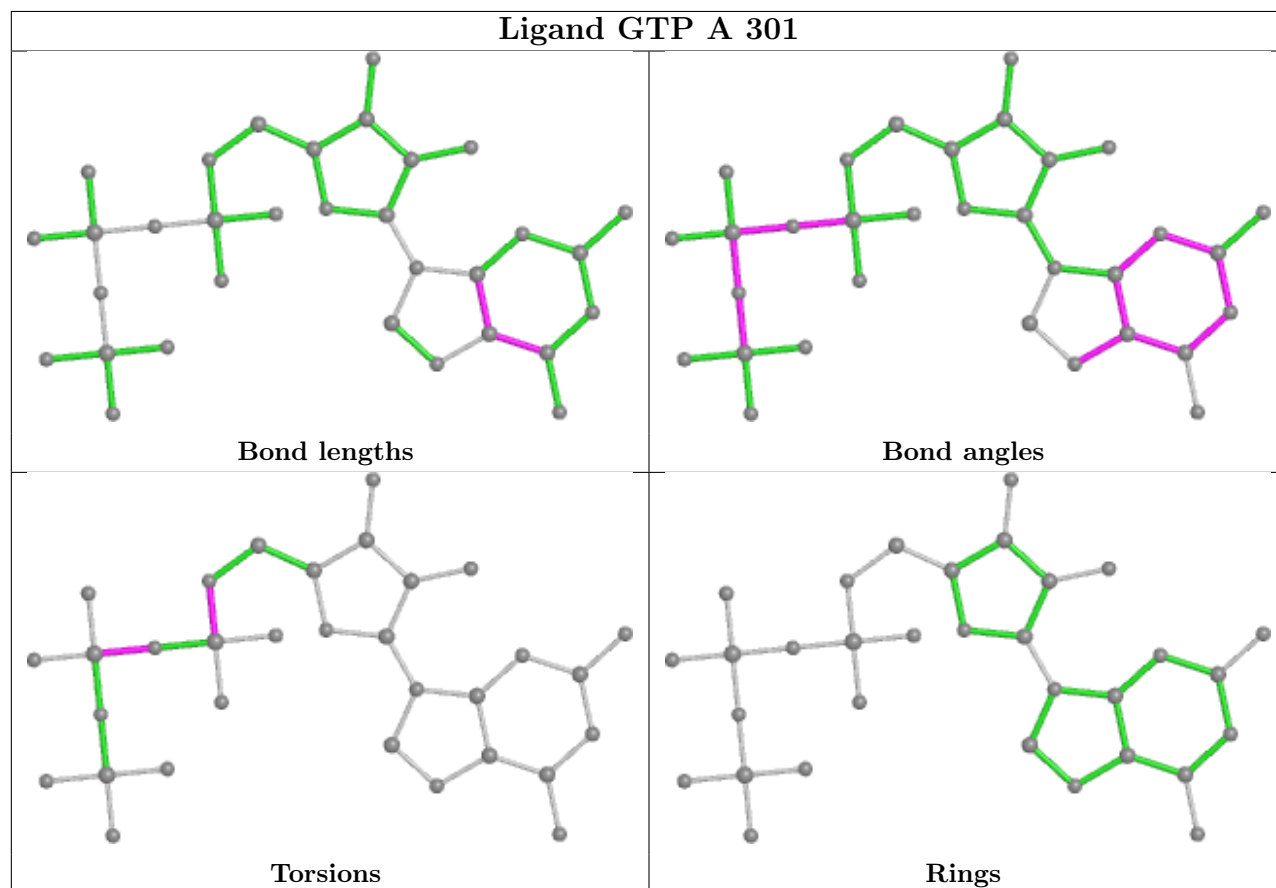
Mol	Chain	Res	Type	Atoms
8	C	1101	GOL	C1-C2-C3-O3
8	C	1101	GOL	O2-C2-C3-O3
5	A	301	GTP	PA-O3A-PB-O1B
7	A	303	EDO	O1-C1-C2-O2
5	A	301	GTP	C5'-O5'-PA-O1A

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.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	210/235 (89%)	0.49	18 (8%) 10 14	47, 69, 130, 153	0
2	B	129/143 (90%)	0.63	18 (13%) 2 4	67, 84, 127, 151	0
3	C	996/1003 (99%)	0.31	62 (6%) 20 26	45, 67, 105, 140	0
4	D	17/20 (85%)	1.00	2 (11%) 4 6	66, 80, 100, 109	0
All	All	1352/1401 (96%)	0.37	100 (7%) 14 19	45, 69, 110, 153	0

All (100) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	C	19	VAL	7.5
1	A	193	LEU	7.1
1	A	8	GLN	6.5
1	A	7	PRO	6.2
3	C	1	MET	6.2
3	C	18	GLN	5.9
2	B	79	MET	5.5
1	A	9	VAL	5.0
3	C	93	PHE	4.9
3	C	689	LEU	4.9
3	C	273	ARG	4.8
4	D	77	SER	4.8
3	C	545	LYS	4.7
2	B	114	LEU	4.5
2	B	120	ASN	4.4
3	C	206	SER	4.0
1	A	188	VAL	4.0
3	C	559	VAL	3.9
2	B	197	ILE	3.9
2	B	122	VAL	3.8
3	C	971	ILE	3.8

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Mol	Chain	Res	Type	RSRZ
3	C	205	SER	3.7
3	C	11	LEU	3.6
3	C	204	GLY	3.6
1	A	177	VAL	3.6
4	D	91	ILE	3.5
1	A	180	PRO	3.5
2	B	82	ASP	3.5
3	C	543	ARG	3.4
3	C	264	ILE	3.4
2	B	68	VAL	3.3
2	B	115	LYS	3.3
3	C	896	ASN	3.1
3	C	970	LYS	3.1
3	C	319	LEU	3.1
3	C	418	HIS	3.1
3	C	977	GLN	3.1
2	B	85	VAL	3.1
1	A	187	VAL	3.0
3	C	512	ILE	3.0
3	C	247	ASP	3.0
2	B	135	CYS	3.0
3	C	535	LEU	2.9
3	C	616	ARG	2.9
3	C	415	LEU	2.9
3	C	555	ILE	2.8
1	A	56	ARG	2.8
3	C	639	GLN	2.7
2	B	136	ALA	2.7
3	C	440	GLU	2.7
3	C	147	SER	2.7
3	C	978	GLU	2.6
3	C	462	ILE	2.6
2	B	200	LYS	2.6
3	C	967	TYR	2.6
3	C	315	LEU	2.6
3	C	267	ASP	2.6
3	C	22	THR	2.5
3	C	33	GLN	2.5
2	B	101	LYS	2.5
2	B	69	VAL	2.5
1	A	192	ALA	2.5
1	A	186	GLU	2.4

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Mol	Chain	Res	Type	RSRZ
2	B	192	GLU	2.4
3	C	221	LEU	2.4
3	C	685	ALA	2.4
3	C	180	LEU	2.4
3	C	53	GLN	2.4
3	C	323	LEU	2.4
3	C	972	SER	2.3
3	C	253	LEU	2.3
3	C	1052	ALA	2.3
3	C	985	THR	2.3
2	B	194	ALA	2.3
1	A	176	PHE	2.3
3	C	588	HIS	2.3
1	A	173	ASN	2.3
3	C	513	GLY	2.3
3	C	265	PRO	2.3
1	A	178	ALA	2.3
3	C	495	ILE	2.3
2	B	83	GLU	2.2
1	A	55	ASN	2.2
3	C	531	VAL	2.2
1	A	27	VAL	2.2
3	C	1011	ILE	2.2
3	C	107	VAL	2.1
3	C	969	ASN	2.1
3	C	230	TYR	2.1
3	C	1024	ASP	2.1
3	C	316	ALA	2.1
2	B	81	GLU	2.1
1	A	75	LEU	2.1
3	C	56	GLN	2.1
3	C	321	THR	2.1
3	C	755	LYS	2.1
3	C	544	GLY	2.0
3	C	106	GLU	2.0
3	C	686	ASN	2.0
1	A	174	LEU	2.0

6.2 Non-standard residues in protein, DNA, RNA chains

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

6.3 Carbohydrates [i](#)

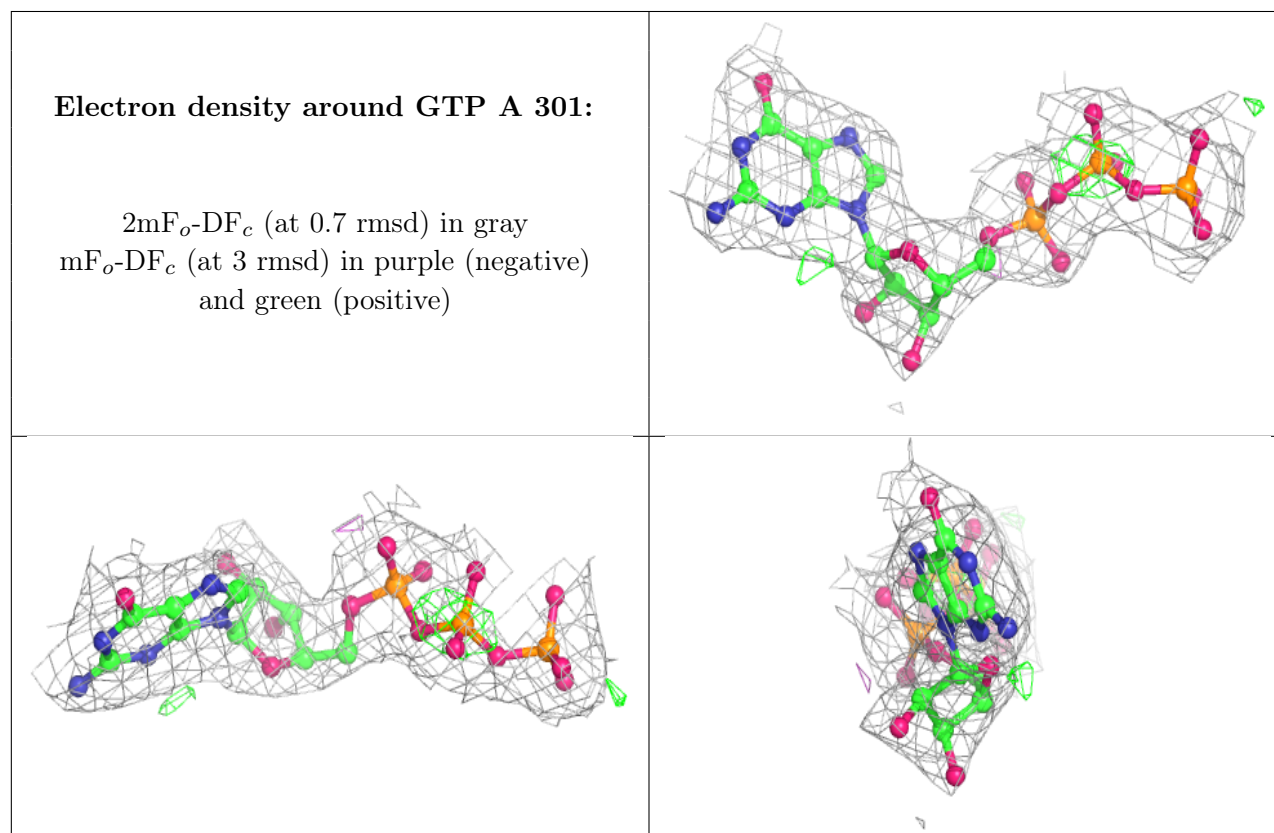
There are no monosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
8	GOL	C	1101	6/6	0.71	0.25	95,96,98,99	0
7	EDO	A	303	4/4	0.82	0.54	88,91,93,93	0
6	MG	A	302	1/1	0.90	0.08	69,69,69,69	0
5	GTP	A	301	32/32	0.97	0.12	57,60,64,65	0
9	NA	C	1102	1/1	0.99	0.10	64,64,64,64	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.



6.5 Other polymers [i](#)

There are no such residues in this entry.