Full wwPDB X-ray Structure Validation Report ⓘ

Sep 20, 2023 – 07:09 pm BST

PDB ID	:	7YYY
Title	:	Molecular snapshots of drug release from tubulin: 1 microsecond after photoactivation
Authors	:	Wranik, M.; Weinert, T.; Standfuss, J.
Deposited on	:	2022-02-18
Resolution	:	2.20 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 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:

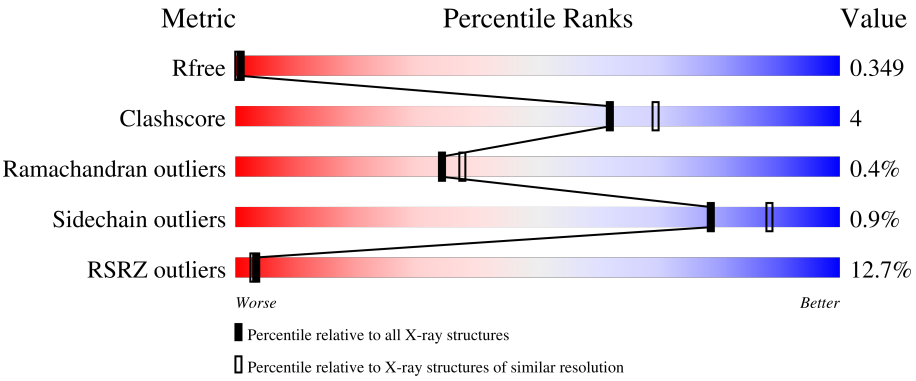
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35.1

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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	4898 (2.20-2.20)
Clashscore	141614	5594 (2.20-2.20)
Ramachandran outliers	138981	5503 (2.20-2.20)
Sidechain outliers	138945	5504 (2.20-2.20)
RSRZ outliers	127900	4800 (2.20-2.20)

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 <=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	451	7% 87% 10%
2	B	445	20% 81% 15%
3	F	169	5% 83% 8% 8%

2 Entry composition (i)

There are 9 unique types of molecules in this entry. The entry contains 8217 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 Tubulin alpha-1B chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	437	3416	2164	579	649	24	4	3	0

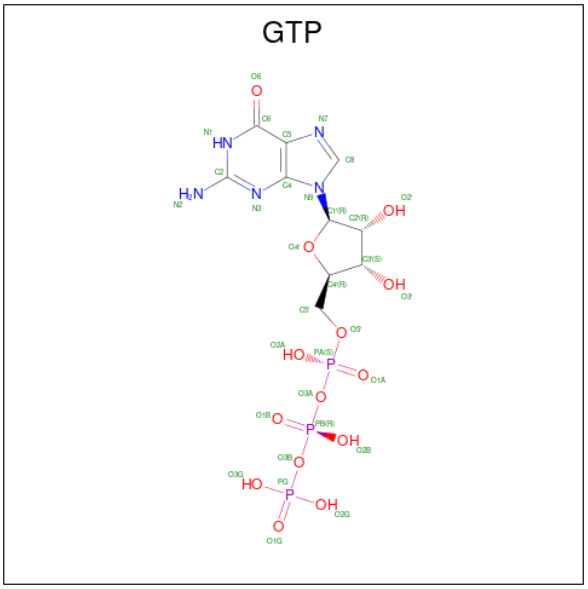
- Molecule 2 is a protein called Tubulin beta-2B chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	426	3339	2097	569	646	27	0	1	0

- Molecule 3 is a protein called Designed Ankyrin Repeat Protein (DARPIN) D1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	F	155	1154	727	198	226	3	0	0	0

- Molecule 4 is GUANOSINE-5'-TRIPHOSPHATE (three-letter code: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$).



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

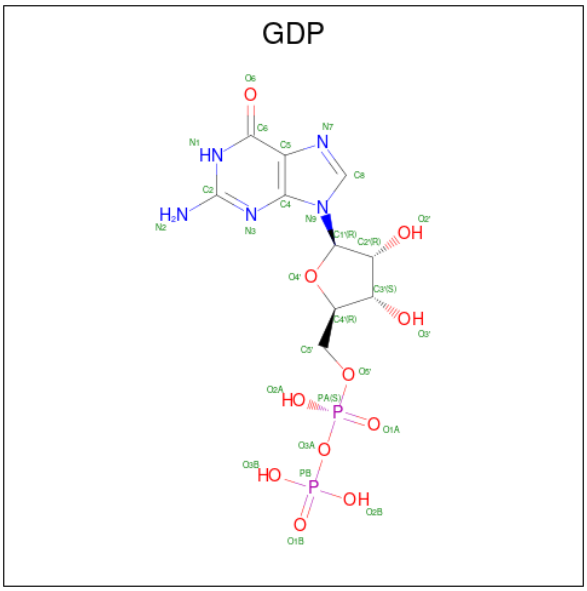
- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

- Molecule 6 is CALCIUM ION (three-letter code: CA) (formula: Ca).

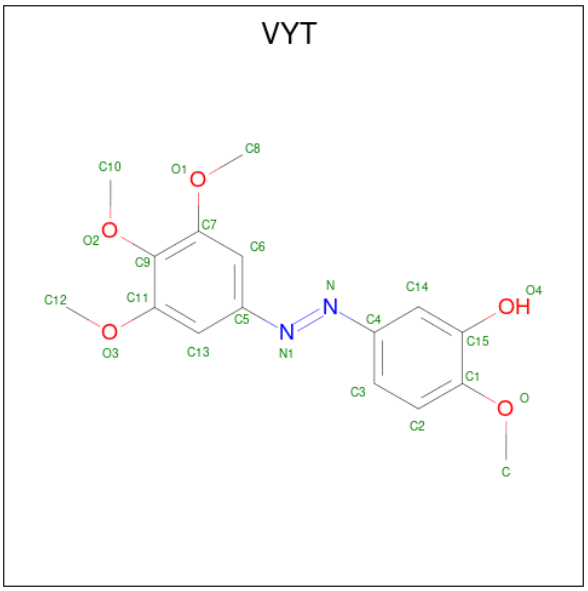
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	Ca	0	0
			1	1		

- Molecule 7 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
7	B	1	Total	C	N	O	P	0	0
			28	10	5	11	2		

- Molecule 8 is Azo-Combretastatin A4 (trans) (three-letter code: VYT) (formula: $C_{16}H_{18}N_2O_5$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	B	1	Total C N O 23 16 2 5	0	0

- Molecule 9 is water.

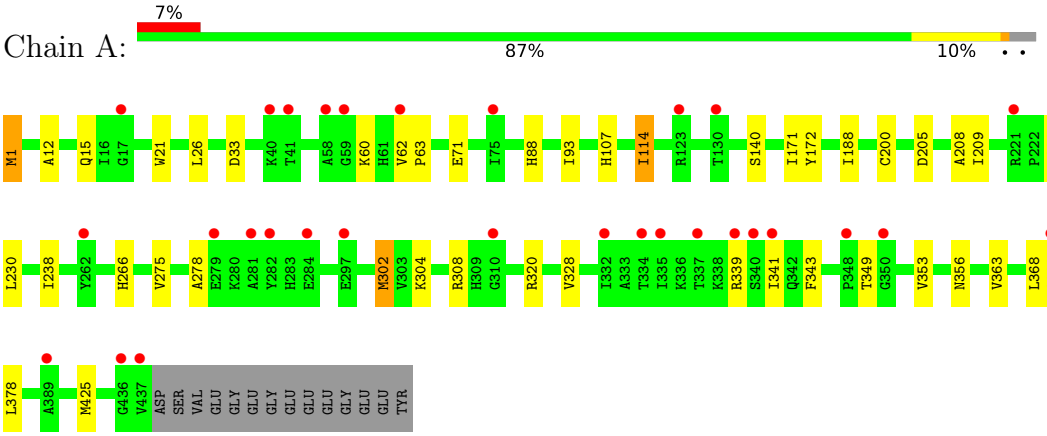
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	A	104	Total O 104 104	0	0
9	B	75	Total O 75 75	0	0
9	F	44	Total O 44 44	0	0

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.

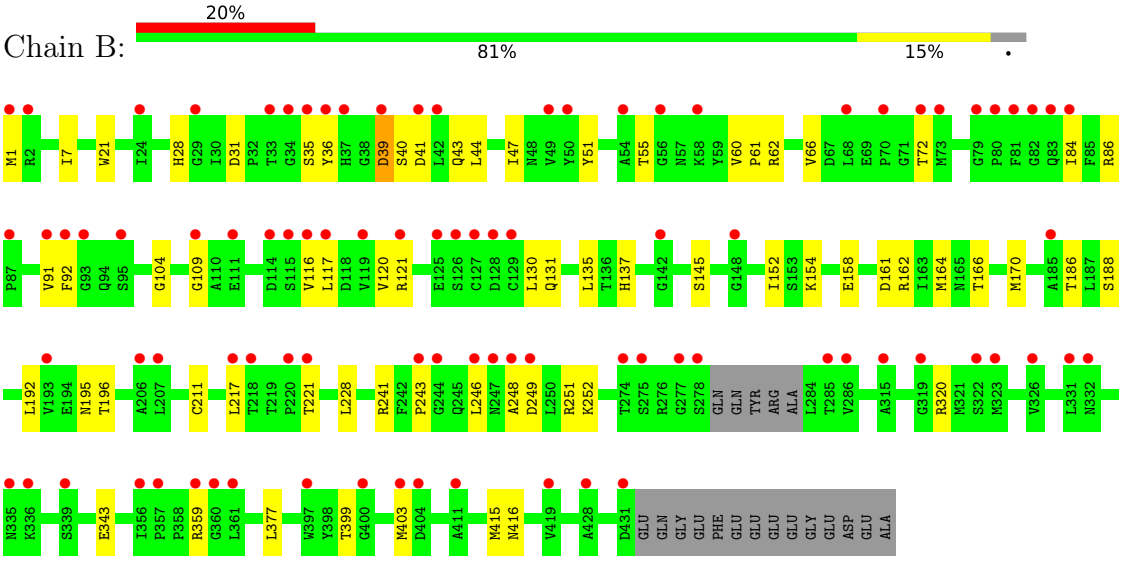
• Molecule 1: Tubulin alpha-1B chain

Chain A:



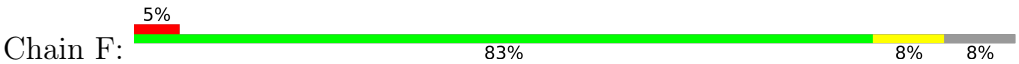
• Molecule 2: Tubulin beta-2B chain

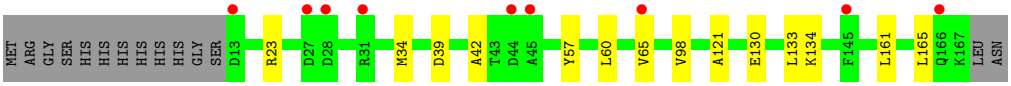
Chain B:



• Molecule 3: Designed Ankyrin Repeat Protein (DARPIN) D1

Chain F:




MET
ARG
GLY
SER
HIS
HIS
HIS
HIS
HIS
GLY
SER
D13
R23
D27
D28
R31
M34
D39
A42
T43
D44
A45
Y57
L60
V65
V98
A121
E130
L133
K134
F145
L161
L165
Q166
K167
LEU
ASN

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	74.53Å 92.58Å 83.99Å 90.00° 96.71° 90.00°	Depositor
Resolution (Å)	9.49 – 2.20 9.49 – 2.20	Depositor EDS
% Data completeness (in resolution range)	91.9 (9.49-2.20) 91.9 (9.49-2.20)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	0.66 (at 2.21Å)	Xtriage
Refinement program	PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.305 , 0.349 0.305 , 0.349	Depositor DCC
R_{free} test set	1817 reflections (3.48%)	wwPDB-VP
Wilson B-factor (Å^2)	33.2	Xtriage
Anisotropy	0.128	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 80.7	EDS
L-test for twinning[2]	$< \|L\| > = 0.54$, $< L^2 > = 0.38$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.89	EDS
Total number of atoms	8217	wwPDB-VP
Average B, all atoms (Å^2)	40.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.12% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: CA, GTP, GDP, MG, VYT

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	0.24	0/3503	0.46	0/4758
2	B	0.24	0/3415	0.45	0/4625
3	F	0.23	0/1170	0.40	0/1590
All	All	0.24	0/8088	0.45	0/10973

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 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	A	3416	0	3325	27	0
2	B	3339	0	3213	35	0
3	F	1154	0	1156	7	0
4	A	32	0	12	1	0
5	A	1	0	0	0	0
6	A	1	0	0	0	0
7	B	28	0	12	0	0
8	B	23	0	0	0	0
9	A	104	0	0	5	0
9	B	75	0	0	4	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
9	F	44	0	0	0	0
All	All	8217	0	7718	69	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 4.

All (69) 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)
1:A:308:ARG:HH11	1:A:339:ARG:HH22	1.42	0.68
2:B:145:SER:HG	2:B:188:SER:HG	1.37	0.68
1:A:172:TYR:HB3	1:A:205:ASP:HA	1.74	0.67
2:B:121:ARG:NH2	2:B:158:GLU:OE1	2.33	0.62
2:B:31:ASP:OD1	2:B:35:SER:N	2.34	0.60
2:B:195:ASN:ND2	9:B:607:HOH:O	2.34	0.59
2:B:130:LEU:O	2:B:162:ARG:NH1	2.33	0.59
1:A:308:ARG:NH2	9:A:609:HOH:O	2.36	0.58
2:B:51:TYR:O	2:B:62:ARG:NH2	2.37	0.58
3:F:121:ALA:HB1	3:F:161:LEU:HD21	1.84	0.58
2:B:117:LEU:HD11	2:B:154:LYS:HB3	1.85	0.58
1:A:209:ILE:HG23	1:A:230:LEU:HD23	1.86	0.57
2:B:211:CYS:HB3	2:B:217:LEU:HD12	1.87	0.56
2:B:416:ASN:ND2	9:B:612:HOH:O	2.38	0.56
3:F:133:LEU:HD11	3:F:165:LEU:HD23	1.88	0.56
2:B:61:PRO:HD3	2:B:84:ILE:HG13	1.88	0.55
2:B:161:ASP:O	2:B:251:ARG:NH2	2.41	0.53
1:A:15:GLN:NE2	4:A:501:GTP:O6	2.41	0.53
1:A:140:SER:HA	1:A:171:ILE:HB	1.91	0.53
3:F:39:ASP:HB3	3:F:42:ALA:HB2	1.92	0.52
1:A:302[B]:MET:SD	9:A:700:HOH:O	2.59	0.52
1:A:1:MET:N	9:A:616:HOH:O	2.42	0.50
1:A:33:ASP:O	1:A:60:LYS:NZ	2.42	0.50
1:A:373:ARG:NH2	9:A:620:HOH:O	2.44	0.50
1:A:26:LEU:HD12	1:A:363:VAL:HG12	1.94	0.49
2:B:44:LEU:HA	2:B:47:ILE:HB	1.94	0.48
1:A:343:PHE:HB2	1:A:349:THR:HG23	1.94	0.48
1:A:62:VAL:HG11	1:A:88:HIS:CD2	2.49	0.48
2:B:152:ILE:HG23	2:B:164:MET:HG2	1.96	0.48
2:B:399:THR:HA	2:B:403:MET:O	2.13	0.48
1:A:328:VAL:HG11	1:A:353:VAL:HG11	1.96	0.48
1:A:188:ILE:HG23	1:A:425:MET:HG3	1.96	0.48

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:135:LEU:HB3	2:B:166:THR:HG22	1.96	0.47
2:B:72:THR:HB	2:B:92:PHE:HE2	1.79	0.47
1:A:21:TRP:CZ3	1:A:63:PRO:HB3	2.49	0.47
1:A:275:VAL:HG13	1:A:368:LEU:HD21	1.96	0.47
2:B:192:LEU:O	2:B:196:THR:OG1	2.27	0.46
2:B:104:GLY:O	2:B:109:GLY:HA3	2.16	0.46
2:B:66:VAL:HA	2:B:91:VAL:O	2.17	0.45
2:B:186:THR:HG23	2:B:415:MET:HE1	1.98	0.45
3:F:130:GLU:O	3:F:134:LYS:HG3	2.17	0.44
2:B:28:HIS:CE1	2:B:241:ARG:HB3	2.52	0.44
2:B:7:ILE:O	2:B:135:LEU:HA	2.17	0.44
2:B:116:VAL:O	2:B:120:VAL:HG23	2.18	0.43
2:B:343:GLU:OE1	2:B:343:GLU:N	2.46	0.43
2:B:249:ASP:HB3	2:B:252:LYS:HB2	2.00	0.43
1:A:93:ILE:HG22	1:A:114:ILE:HD11	2.00	0.43
1:A:208:ALA:HA	1:A:304:LYS:HE3	2.01	0.42
2:B:36:TYR:OH	2:B:40:SER:O	2.38	0.42
1:A:238:ILE:HG12	1:A:378:LEU:HD21	2.02	0.42
1:A:12:ALA:HB3	1:A:140:SER:HB3	2.00	0.42
1:A:320:ARG:HA	1:A:356:ASN:O	2.19	0.42
2:B:228:LEU:O	9:B:601:HOH:O	2.22	0.42
2:B:359:ARG:NH1	9:B:615:HOH:O	2.44	0.42
2:B:21:TRP:CZ3	2:B:61:PRO:HB3	2.54	0.42
2:B:41:ASP:C	2:B:43:GLN:H	2.23	0.42
3:F:60:LEU:HD11	3:F:98:VAL:HG21	2.02	0.41
1:A:278:ALA:HA	1:A:369:ALA:HB2	2.01	0.41
1:A:339:ARG:HB2	1:A:341:ILE:HG12	2.02	0.41
2:B:170:MET:HG3	2:B:377:LEU:HD11	2.01	0.41
2:B:28:HIS:NE2	2:B:241:ARG:HB3	2.36	0.41
1:A:107:HIS:O	9:A:601:HOH:O	2.22	0.41
2:B:39:ASP:OD1	2:B:39:ASP:N	2.53	0.41
2:B:60:VAL:HG11	2:B:86:ARG:HG3	2.03	0.41
3:F:23:ARG:NH1	3:F:57:TYR:OH	2.54	0.41
3:F:34:MET:HE1	3:F:65:VAL:HG12	2.02	0.40
2:B:1:MET:HA	2:B:131:GLN:HB3	2.03	0.40
1:A:200:CYS:HA	1:A:266:HIS:HB2	2.02	0.40
1:A:223:THR:O	1:A:227:LEU:HG	2.22	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	438/451 (97%)	425 (97%)	12 (3%)	1 (0%)	47 55
2	B	423/445 (95%)	406 (96%)	14 (3%)	3 (1%)	22 22
3	F	153/169 (90%)	149 (97%)	4 (3%)	0	100 100
All	All	1014/1065 (95%)	980 (97%)	30 (3%)	4 (0%)	34 37

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	243	PRO
2	B	55	THR
2	B	248	ALA
1	A	114	ILE

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	368/379 (97%)	364 (99%)	4 (1%)	73 85
2	B	366/383 (96%)	361 (99%)	5 (1%)	67 80
3	F	120/132 (91%)	120 (100%)	0	100 100
All	All	854/894 (96%)	845 (99%)	9 (1%)	78 85

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	MET
1	A	71	GLU
1	A	302[A]	MET
1	A	302[B]	MET
2	B	39	ASP
2	B	137	HIS
2	B	221	THR
2	B	246	LEU
2	B	320	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	342	GLN
2	B	8	GLN
2	B	37	HIS
2	B	134	GLN
2	B	245	GLN
3	F	166	GLN

5.3.3 RNA

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates

There are no monosaccharides in this entry.

5.6 Ligand geometry

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	$\#\|Z\| > 2$
4	GTP	A	501	5	26,34,34	1.12	2 (7%)	32,54,54	1.54	7 (21%)
7	GDP	B	501	-	24,30,30	0.94	1 (4%)	30,47,47	1.28	4 (13%)
8	VYT	B	502	-	24,24,24	0.46	0	32,32,32	0.91	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
4	GTP	A	501	5	-	8/18/38/38	0/3/3/3
7	GDP	B	501	-	-	3/12/32/32	0/3/3/3
8	VYT	B	502	-	-	0/13/13/13	0/2/2/2

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	501	GTP	C5-C6	-3.98	1.39	1.47
7	B	501	GDP	C6-N1	-2.32	1.34	1.37
4	A	501	GTP	C2-N3	2.22	1.38	1.33

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	501	GTP	PB-O3B-PG	-3.30	121.50	132.83
4	A	501	GTP	PA-O3A-PB	-3.29	121.52	132.83
7	B	501	GDP	PA-O3A-PB	-3.15	122.02	132.83
4	A	501	GTP	C5-C6-N1	3.15	119.51	113.95
4	A	501	GTP	C8-N7-C5	3.05	108.80	102.99
7	B	501	GDP	C3'-C2'-C1'	3.01	105.50	100.98
4	A	501	GTP	C2-N1-C6	-2.79	119.96	125.10
4	A	501	GTP	C3'-C2'-C1'	2.51	104.76	100.98
7	B	501	GDP	C8-N7-C5	2.32	107.41	102.99
7	B	501	GDP	C5-C6-N1	2.24	117.90	113.95
4	A	501	GTP	O6-C6-C5	-2.14	120.20	124.37

There are no chirality outliers.

All (11) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	501	GTP	PB-O3B-PG-O2G
4	A	501	GTP	C5'-O5'-PA-O1A
4	A	501	GTP	C5'-O5'-PA-O2A
7	B	501	GDP	C5'-O5'-PA-O1A
7	B	501	GDP	C5'-O5'-PA-O2A
4	A	501	GTP	C5'-O5'-PA-O3A
4	A	501	GTP	C3'-C4'-C5'-O5'
4	A	501	GTP	PB-O3A-PA-O1A
4	A	501	GTP	O4'-C4'-C5'-O5'
4	A	501	GTP	C4'-C5'-O5'-PA
7	B	501	GDP	C5'-O5'-PA-O3A

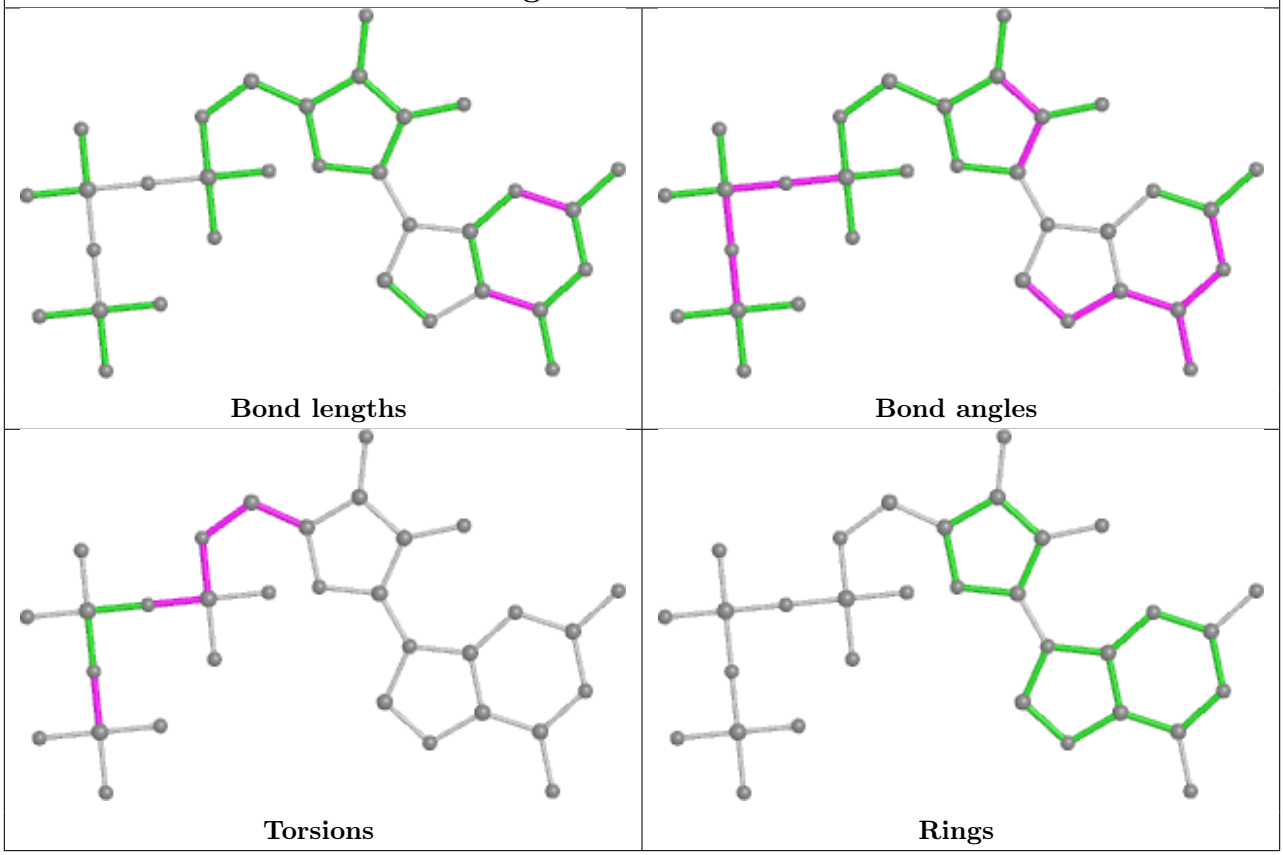
There are no ring outliers.

1 monomer is involved in 1 short contact:

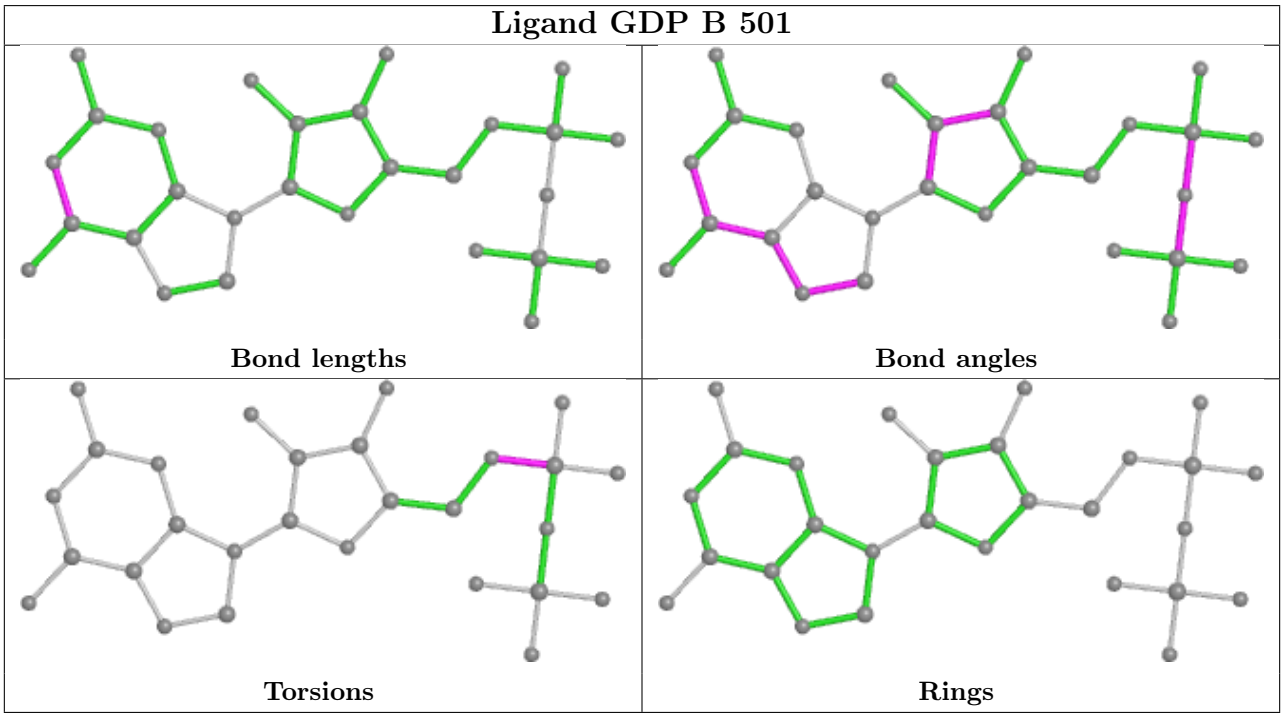
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	501	GTP	1	0

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

Ligand GTP A 501



Ligand GDP B 501



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, 95^{th} 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	437/451 (96%)	0.72	30 (6%) 16 15	20, 34, 54, 74	0
2	B	426/445 (95%)	1.26	90 (21%) 1 0	24, 45, 71, 83	0
3	F	155/169 (91%)	0.73	9 (5%) 23 22	25, 36, 52, 65	0
All	All	1018/1065 (95%)	0.95	129 (12%) 3 3	20, 38, 65, 83	0

All (129) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	437	VAL	10.3
2	B	244	GLY	6.3
2	B	73	MET	6.0
2	B	275	SER	5.5
2	B	115	SER	5.4
2	B	326	VAL	5.4
1	A	41	THR	5.1
2	B	248	ALA	5.0
2	B	54	ALA	4.9
2	B	80	PRO	4.9
2	B	218	THR	4.6
2	B	39	ASP	4.6
2	B	95	SER	4.6
2	B	126	SER	4.5
2	B	93	GLY	4.4
2	B	217	LEU	4.3
2	B	246	LEU	4.3
1	A	389	ALA	4.3
2	B	111	GLU	4.3
2	B	79	GLY	4.2
2	B	36	TYR	4.0
2	B	114	ASP	4.0
2	B	128	ASP	3.9

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
2	B	322	SER	3.8
3	F	13	ASP	3.8
2	B	431	ASP	3.6
2	B	127	CYS	3.6
2	B	404	ASP	3.6
2	B	35	SER	3.5
2	B	34	GLY	3.5
1	A	436	GLY	3.5
2	B	24	ILE	3.5
2	B	243	PRO	3.5
1	A	348	PRO	3.5
1	A	339	ARG	3.5
3	F	31	ARG	3.4
2	B	129	CYS	3.4
1	A	337	THR	3.4
1	A	62	VAL	3.3
1	A	221	ARG	3.3
2	B	247	ASN	3.2
1	A	281	ALA	3.2
2	B	400	GLY	3.1
3	F	166	GLN	3.1
1	A	334	THR	3.1
2	B	56	GLY	3.0
1	A	58	ALA	3.0
2	B	109	GLY	3.0
2	B	361	LEU	3.0
2	B	58	LYS	2.9
1	A	335	ILE	2.9
2	B	403	MET	2.9
1	A	350	GLY	2.9
2	B	82	GLY	2.8
2	B	206	ALA	2.8
2	B	220	PRO	2.8
2	B	360	GLY	2.8
2	B	419	VAL	2.8
2	B	249	ASP	2.8
1	A	340	SER	2.8
2	B	331	LEU	2.7
2	B	332	ASN	2.7
2	B	193	VAL	2.7
3	F	65	VAL	2.7
3	F	145	PHE	2.7

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	279	GLU	2.7
2	B	397	TRP	2.6
3	F	45	ALA	2.6
2	B	70	PRO	2.6
1	A	123	ARG	2.6
2	B	81	PHE	2.6
2	B	116	VAL	2.6
2	B	286	VAL	2.6
2	B	411	ALA	2.6
2	B	207	LEU	2.6
2	B	2	ARG	2.6
3	F	44	ASP	2.6
2	B	87	PRO	2.6
2	B	142	GLY	2.6
2	B	92	PHE	2.5
2	B	37	HIS	2.5
1	A	369	ALA	2.5
1	A	75	ILE	2.5
2	B	121	ARG	2.5
2	B	91	VAL	2.4
2	B	285	THR	2.4
2	B	68	LEU	2.4
2	B	117	LEU	2.4
2	B	277	GLY	2.4
3	F	27	ASP	2.4
2	B	428	ALA	2.4
2	B	148	GLY	2.3
1	A	284	GLU	2.3
2	B	315	ALA	2.3
1	A	262	TYR	2.3
2	B	336	LYS	2.3
3	F	28	ASP	2.3
1	A	59	GLY	2.3
1	A	341	ILE	2.3
2	B	119	VAL	2.3
2	B	274	THR	2.3
1	A	282	TYR	2.3
2	B	359	ARG	2.3
2	B	323	MET	2.2
2	B	339	SER	2.2
2	B	319	GLY	2.2
2	B	49	VAL	2.2

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
2	B	356	ILE	2.2
2	B	83	GLN	2.2
2	B	84	ILE	2.2
2	B	357	PRO	2.2
2	B	50	TYR	2.1
1	A	297	GLU	2.1
2	B	42	LEU	2.1
2	B	72	THR	2.1
2	B	335	ASN	2.1
2	B	41	ASP	2.1
2	B	33	THR	2.1
2	B	29	GLY	2.1
2	B	278	SER	2.1
1	A	332	ILE	2.1
1	A	40	LYS	2.1
2	B	1	MET	2.1
1	A	310	GLY	2.1
1	A	130	THR	2.1
2	B	221	THR	2.1
2	B	125	GLU	2.0
1	A	17	GLY	2.0
2	B	185	ALA	2.0

6.2 Non-standard residues in protein, DNA, RNA chains (i)

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, 95^{th} 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(Å^2)	Q<0.9
8	VYT	B	502	23/23	0.77	0.21	29,41,53,56	0

Continued on next page...

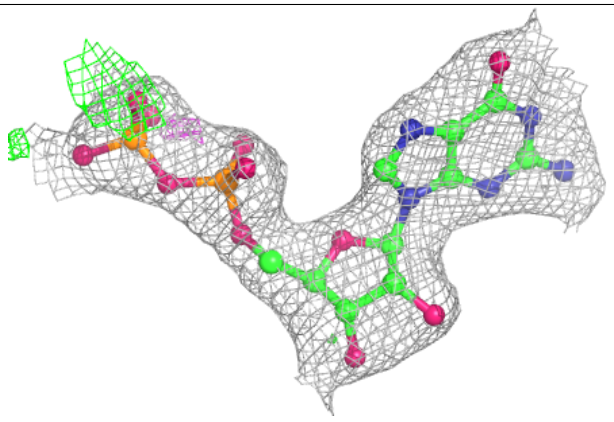
Continued from previous page...

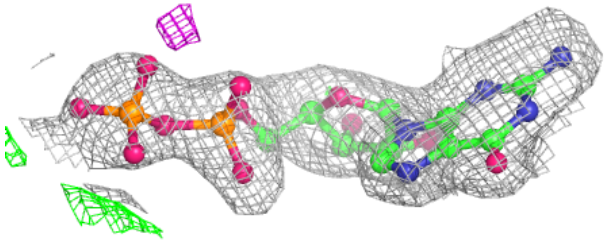
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
7	GDP	B	501	28/28	0.91	0.15	34,39,45,47	0
4	GTP	A	501	32/32	0.91	0.15	19,24,28,31	0
6	CA	A	503	1/1	0.94	0.10	42,42,42,42	0
5	MG	A	502	1/1	0.98	0.17	2,2,2,2	0

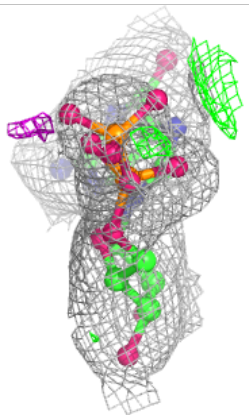
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around GDP B 501:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

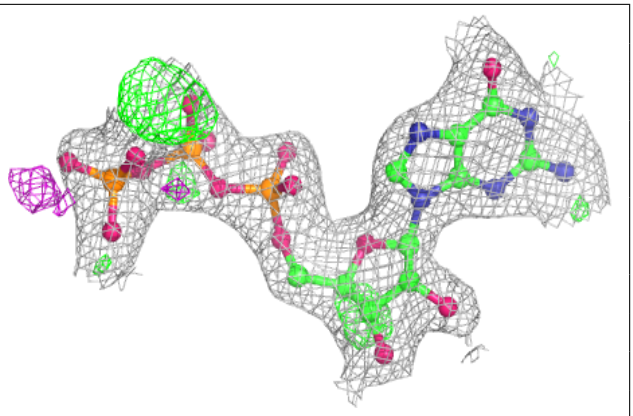


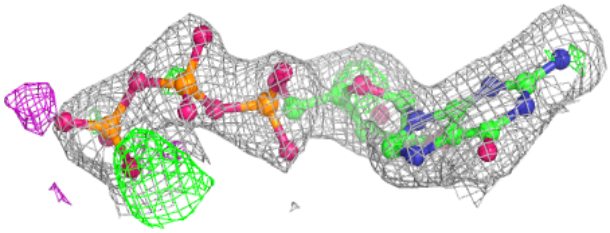


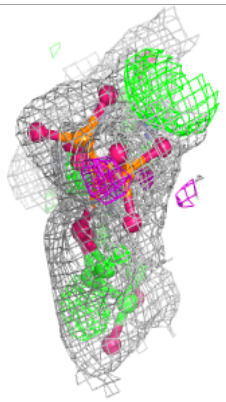


Electron density around GTP A 501:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)







6.5 Other polymers

There are no such residues in this entry.