W O R L D W I D E
wwPDB
P R O T E I N   D A T A   B A N K

wwPDB X-ray Structure Validation Summary Report (i)

Jun 17, 2024 – 10:08 AM JST

PDB ID	:	8ZB8
Title	:	Crystal structure of T2R-TTL-DPP21 complex
Authors	:	Wu, C.Y.; Chen, J.J.
Deposited on	:	2024-04-26
Resolution	:	2.94 Å(reported)

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

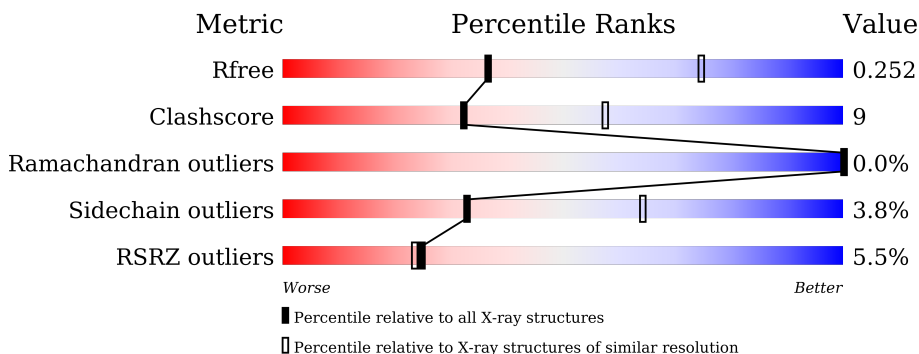|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

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 2.94 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	Percentile Ranks	Value
Rfree		0.252
Clashscore		9
Ramachandran outliers		0.0%
Sidechain outliers		3.8%
RSRZ outliers		5.5%

Worse   *Better*

▌Percentile relative to all X-ray structures

❚ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	130704	2969 (2.98-2.90)
Clashscore	141614	3218 (2.98-2.90)
Ramachandran outliers	138981	3122 (2.98-2.90)
Sidechain outliers	138945	3124 (2.98-2.90)
RSRZ outliers	127900	2902 (2.98-2.90)

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	450	.% / 76% / 20% / · ·
1	C	450	82% / 15% / · ·
2	B	445	2% / 75% / 20% / · ·
2	D	445	4% / 65% / 28% / · 5%
3	E	143	6% / 76% / 8% · 15%
4	F	384	20% / 67% / 18% · 13%

2 Entry composition ⓘ

There are 12 unique types of molecules in this entry. The entry contains 17485 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 Detyrosinated tubulin alpha-1B chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	437	Total 3416	C 2163	N 581	O 650	S 22	0	0	0
1	C	440	Total 3437	C 2175	N 584	O 656	S 22	0	0	0

- Molecule 2 is a protein called Tubulin beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	427	Total 3361	C 2110	N 576	O 649	S 26	0	0	0
2	D	421	Total 3309	C 2080	N 562	O 640	S 27	0	0	0

- Molecule 3 is a protein called Stathmin-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	E	121	Total 1000	C 617	N 181	O 197	S 5	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	3	MET	-	initiating methionine	UNP P63043
E	4	ALA	-	expression tag	UNP P63043

- Molecule 4 is a protein called Tubulin tyrosine ligase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	F	334	Total 2744	C 1761	N 470	O 499	S 14	0	0	0

There are 39 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	?	-	ALA	deletion	UNP A0A8V0Z8P0
F	?	-	GLU	deletion	UNP A0A8V0Z8P0
F	?	-	MET	deletion	UNP A0A8V0Z8P0
F	?	-	GLN	deletion	UNP A0A8V0Z8P0
F	?	-	GLN	deletion	UNP A0A8V0Z8P0
F	?	-	GLN	deletion	UNP A0A8V0Z8P0
F	?	-	LEU	deletion	UNP A0A8V0Z8P0
F	?	-	LEU	deletion	UNP A0A8V0Z8P0
F	?	-	GLU	deletion	UNP A0A8V0Z8P0
F	?	-	GLY	deletion	UNP A0A8V0Z8P0
F	?	-	ASP	deletion	UNP A0A8V0Z8P0
F	?	-	GLN	deletion	UNP A0A8V0Z8P0
F	?	-	THR	deletion	UNP A0A8V0Z8P0
F	?	-	LEU	deletion	UNP A0A8V0Z8P0
F	?	-	VAL	deletion	UNP A0A8V0Z8P0
F	?	-	LEU	deletion	UNP A0A8V0Z8P0
F	?	-	ALA	deletion	UNP A0A8V0Z8P0
F	?	-	SER	deletion	UNP A0A8V0Z8P0
F	?	-	SER	deletion	UNP A0A8V0Z8P0
F	?	-	THR	deletion	UNP A0A8V0Z8P0
F	?	-	HIS	deletion	UNP A0A8V0Z8P0
F	?	-	PRO	deletion	UNP A0A8V0Z8P0
F	?	-	GLU	deletion	UNP A0A8V0Z8P0
F	?	-	SER	deletion	UNP A0A8V0Z8P0
F	?	-	VAL	deletion	UNP A0A8V0Z8P0
F	?	-	ASP	deletion	UNP A0A8V0Z8P0
F	?	-	SER	deletion	UNP A0A8V0Z8P0
F	?	-	ASP	deletion	UNP A0A8V0Z8P0
F	?	-	LYS	deletion	UNP A0A8V0Z8P0
F	?	-	ASN	deletion	UNP A0A8V0Z8P0
F	?	-	HIS	deletion	UNP A0A8V0Z8P0
F	?	-	GLY	deletion	UNP A0A8V0Z8P0
F	?	-	PHE	deletion	UNP A0A8V0Z8P0
F	379	HIS	-	expression tag	UNP A0A8V0Z8P0
F	380	HIS	-	expression tag	UNP A0A8V0Z8P0
F	381	HIS	-	expression tag	UNP A0A8V0Z8P0
F	382	HIS	-	expression tag	UNP A0A8V0Z8P0
F	383	HIS	-	expression tag	UNP A0A8V0Z8P0
F	384	HIS	-	expression tag	UNP A0A8V0Z8P0

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

GTP

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

- Molecule 7 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	1	Total	Ca	1	0
			1	1		
7	C	1	Total	Ca	1	0
			1	1		

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

GOL

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

- Molecule 9 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).

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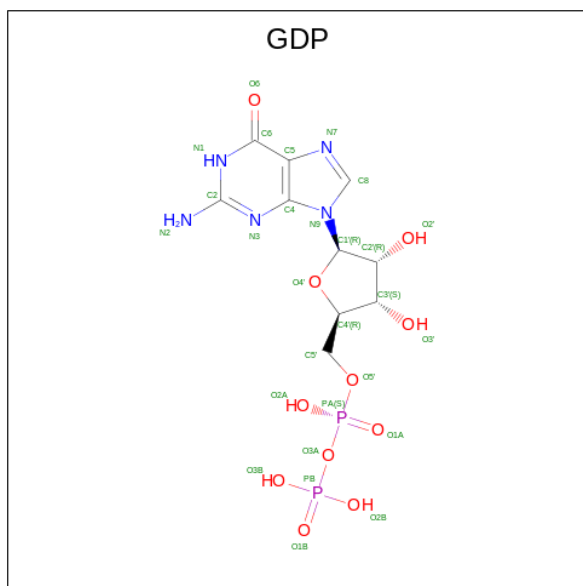
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
9	B	1	Total 28	C 10	N 5	O 11	P 2	0	0
9	D	1	Total 28	C 10	N 5	O 11	P 2	0	0

- Molecule 10 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula: $C_6H_{13}NO_4S$).


MES
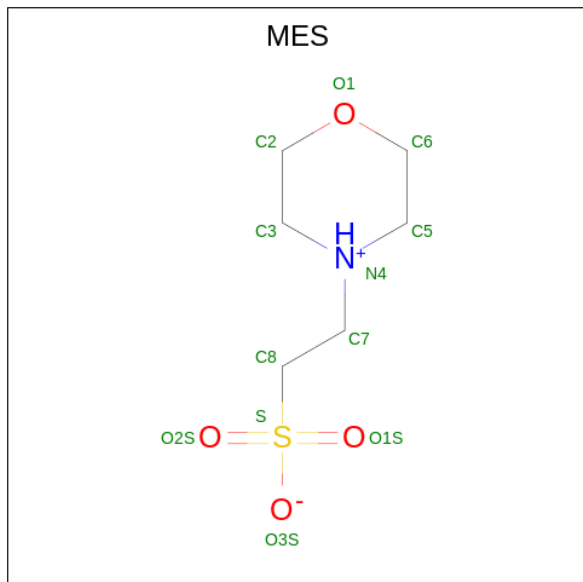
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
10	B	1	12	6	1	4	1	0	0

- Molecule 11 is {N},2-dimethyl- {N}-(1-methylindol-5-yl)thieno[3,2-d]pyrimidin-4-a mine (three-letter code: A1D8I) (formula: $C_{17}H_{16}N_4S$) (labeled as "Ligand of Interest" by depositor).

A1D8I
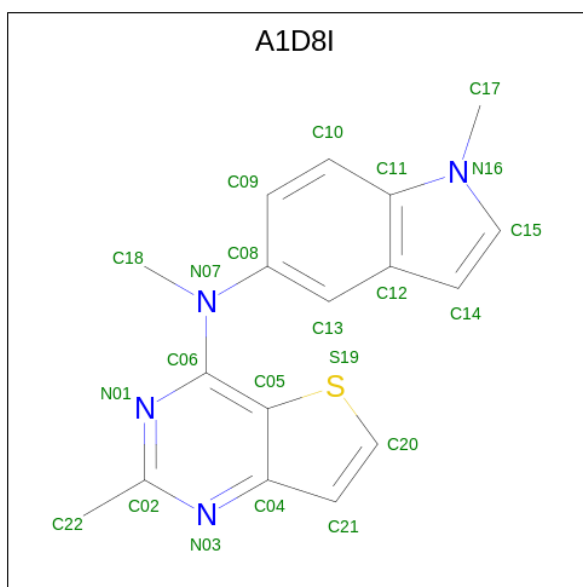
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
11	B	1	Total 22	C 17	N 4	S 1	0	0
11	D	1	Total 22	C 17	N 4	S 1	0	0

- Molecule 12 is PHOSPHOMETHYLPHOSPHONIC ACID ADENYLATE ESTER (three-letter code: ACP) (formula: $C_{11}H_{18}N_5O_{12}P_3$).
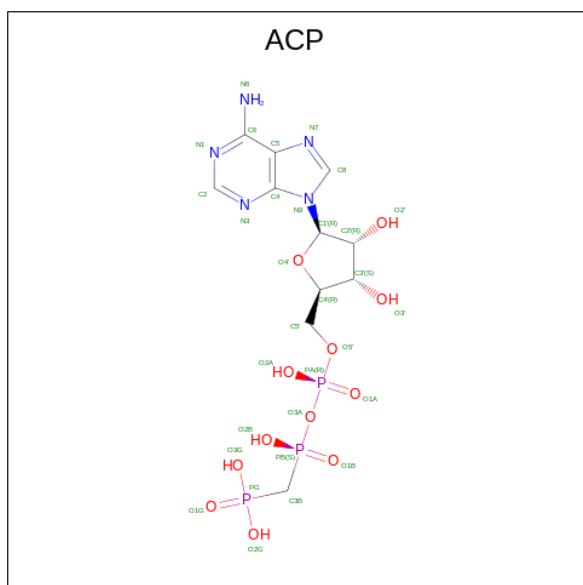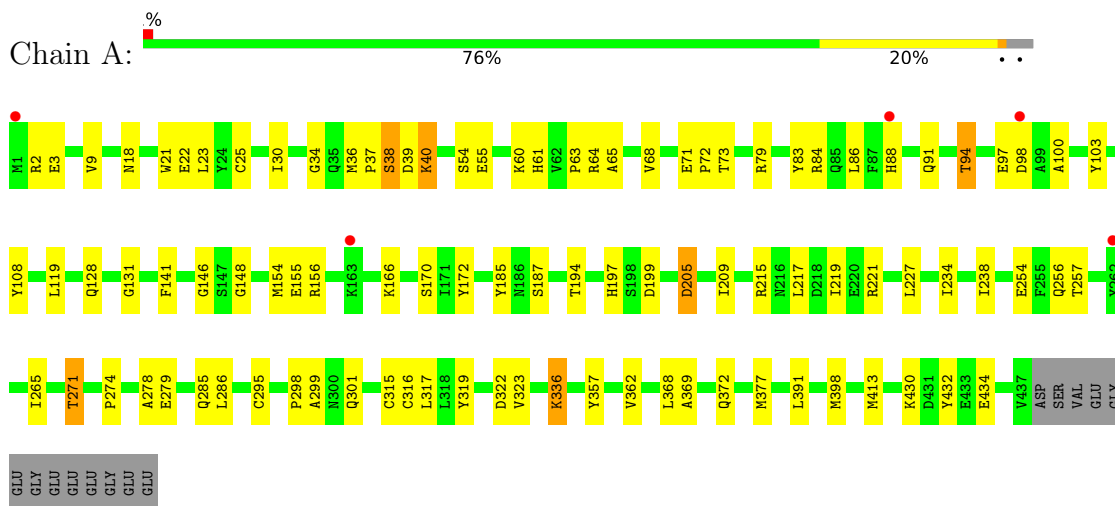

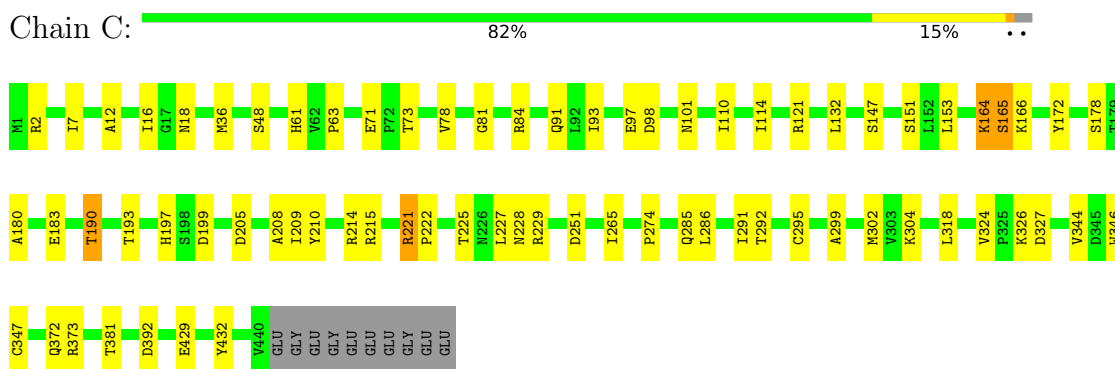| Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
12	F	1	Total 31	C 11	N 5	O 12	P 3	0	0

3 Residue-property plots ⓘ

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.
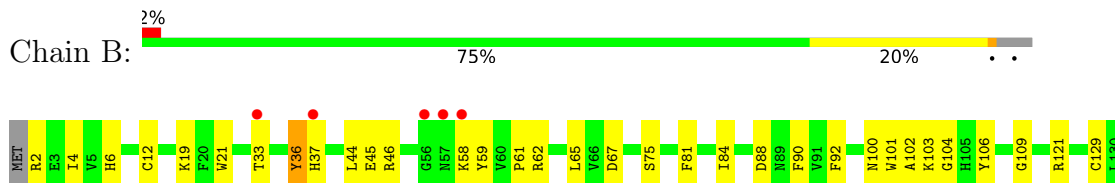
- Molecule 1: Detyrosinated tubulin alpha-1B chain

Chain A:

- Molecule 1: Detyrosinated tubulin alpha-1B chain

Chain C:

- Molecule 2: Tubulin beta chain

Chain B:

Q131 Q134 H137 G140 R156 E157 E158 Y159 R162 I163 M164 N165 V169 N184 L187 E194 D197 I202 Y208 P220 T221 D224 G235 V236 T237 T238 C239 L240 R241 F242 P243 G244 Q245 L246 D249 L250 R251 K252 N256 M267 P268

S278 Q279 R282 T290 Y310 A314 A315 I316 F317 R318 M321 K324 E328 Q329 M330 K336 E343 C354 P358 L361 K362 M363 F367 I368 I374 Q375 R390 R391 K392 M403 D404 E405 M406 E407 Q423 D427 A428 THR ALA ASP GLU GLN

GLY GLU PHE GLU GLU GLU GLY GLU ASP GLU ALA

● Molecule 2: Tubulin beta chain

Chain D:

M1 R2 E3 I4 V5 H6 I7 Q8 A9 G10 Q11 Q15 K19 F20 W21 E22 V23 H28 D31 P32 T33 H37 D41 L42 Q43 L44 V49 Y50 Y51 A54 T55 G56 N57 K58 Y59 V60 P61 R62 A63 I64 L65 V66 D67 L68 E69 T72 M73 D74 R77

P80 F81 I84 F85 V91 F92 G93 Q94 N99 N100 W101 A102 K103 T107 E108 G109 L112 S115 V116 L117 S124 E125 S126 C127 Q131 Q134 L135 T136 H137 S138 L139 G140 G141 S145 G146 M147 L151 I152 S153 K154 I155 R156 I163 M164 N165 S168 V169

M170 T178 V179 V180 E181 P182 Y183 N184 V189 V193 E194 E198 E205 A206 L207 I210 C211 L215 V229 S230 G235 T238 L246 L250 R251 K252 M267 P268 L273 THR SER ARG GLY SER GLN GLN TYR ARG ALA L284 M293 S296 M300

C303 Y310 I316 F317 R318 G319 R320 M321 S322 M323 K324 E325 Q329 K350 P357 P358 R359 M363 F367 I374 Q375 E376 L377 Q384 R390 R391 L395 H396 W397 Y398 T399 G400 E401 G402 M403 D404 E405 M406 M415 V419 D431 GLU GLN GLY GLU

PHE GLU GLU GLU GLY GLU ASP GLU ALA

● Molecule 3: Stathmin-4

Chain E:

MET ALA ASP M6 G17 Q18 S19 K25 P26 P27 S28 PHE ASP GLY VAL PRO GLU PHE ASN ALA SER LEU PRO ARG ARG D44 P45 S46 E49 E58 E59 R60 R61 K62 I83 I87 L123 E132 N136 L139 K140 E141 GLU ALA SER ARG

● Molecule 4: Tubulin tyrosine ligase

Chain F:

M1 Y2 T3 F4 V13 Y14 V17 S18 R19 L20 L21 L22 A23 T24 W27 R31 K32 R73 K74 L87 S88 E89 S90 C91 V99 I100 Y101 P102 T103 ASN LEU LYS THR PRO VAL ALA PRO ALA GLN ASN GLY ILE ARG HIS LEU ILE ASN ASN THR ARG THR D126 E127

R128 E129 V130 F131 A134 Y135 R138 R139 E140 G141 R142 E143 G144 N145 W146 W147 I148 A149 LYS SER SER ALA GLY ALA LYS GLY GLU GLY ILE L161 L162 S163 S164 E165 A166 S167 E168 L169 L170 D171 F172 I173 Q176 Q177 Q178 V179 H180 V181 I182 Q183 K184 Y185 L186 E187 L190 L191

L192 E193 P194 R197 K198 F199 W204 Y211 N212 I213 Y216 R217 E218 T223 S224 S225 Y228 N229 S230 A231 N232 F233 Q234 D235 K236 T237 C238 H239 L240 T241 N242 H243 C244 I245 Q246 K247 GLU TYR SER LYS N252 Y253 G254 R255 Y256 E257 E258 G259 N260 F263 F264 L275

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	105.60Å 158.20Å 180.52Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	52.28 – 2.94 52.28 – 2.94	Depositor EDS
% Data completeness (in resolution range)	99.9 (52.28-2.94) 99.9 (52.28-2.94)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.43 (at 2.96Å)	Xtriage
Refinement program	PHENIX (1.19_4092: ???)	Depositor
R, R_{free}	0.198 , 0.259 0.193 , 0.252	Depositor DCC
R_{free} test set	2000 reflections (3.07%)	wwPDB-VP
Wilson B-factor (Å^2)	65.6	Xtriage
Anisotropy	0.212	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 47.8	EDS
L-test for twinning[2]	$< \lvert L \rvert > = 0.51$, $< L^2 > = 0.35$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	17485	wwPDB-VP
Average B, all atoms (Å^2)	61.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.46% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< \lvert L \rvert >$, $< L^2 >$ 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: MG, GTP, GOL, MES, GDP, A1D8I, CA, ACP

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	0.57	2/3494 (0.1%)	0.74	2/4743 (0.0%)
1	C	0.58	0/3515	0.73	1/4772 (0.0%)
2	B	0.54	1/3436 (0.0%)	0.70	0/4654
2	D	0.49	0/3382	0.68	1/4581 (0.0%)
3	E	0.52	0/1008	0.67	0/1337
4	F	0.47	0/2806	0.67	1/3791 (0.0%)
All	All	0.53	3/17641 (0.0%)	0.70	5/23878 (0.0%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	316	CYS	CB-SG	-6.76	1.70	1.82
2	B	239	CYS	CB-SG	-5.82	1.72	1.81
1	A	315	CYS	CB-SG	-5.28	1.73	1.81

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	246	LEU	CA-CB-CG	7.09	131.61	115.30
1	A	205	ASP	CB-CG-OD1	5.80	123.52	118.30
1	C	318	LEU	CA-CB-CG	5.76	128.54	115.30
1	A	322	ASP	CB-CG-OD2	-5.28	113.55	118.30
4	F	165	GLU	OE1-CD-OE2	-5.17	117.10	123.30

There are no chirality outliers.

There are no planarity outliers.

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	3416	0	3330	59	0
1	C	3437	0	3348	38	0
2	B	3361	0	3238	65	0
2	D	3309	0	3189	86	0
3	E	1000	0	1018	7	0
4	F	2744	0	2709	52	0
5	A	32	0	12	1	0
5	C	32	0	12	1	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
6	C	1	0	0	0	0
7	A	1	0	0	0	0
7	C	1	0	0	0	0
8	A	6	0	8	0	0
9	B	28	0	12	1	0
9	D	28	0	12	5	0
10	B	12	0	12	1	0
11	B	22	0	0	1	0
11	D	22	0	0	0	0
12	F	31	0	14	1	0
All	All	17485	0	16914	301	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 9.

The worst 5 of 301 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:79:ARG:HH22	1:A:94:THR:HG22	1.31	0.94
4:F:87:LEU:O	4:F:88:SER:HB3	1.68	0.91
2:D:101:TRP:HD1	2:D:145:SER:HG	1.26	0.84
4:F:263:PHE:HZ	4:F:341:LYS:HD3	1.42	0.83
2:D:11:GLN:HB3	9:D:501:GDP:O1A	1.76	0.83

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	435/450 (97%)	409 (94%)	26 (6%)	0	100	100
1	C	438/450 (97%)	424 (97%)	14 (3%)	0	100	100
2	B	425/445 (96%)	410 (96%)	15 (4%)	0	100	100
2	D	417/445 (94%)	397 (95%)	20 (5%)	0	100	100
3	E	117/143 (82%)	115 (98%)	1 (1%)	1 (1%)	17	46
4	F	324/384 (84%)	312 (96%)	12 (4%)	0	100	100
All	All	2156/2317 (93%)	2067 (96%)	88 (4%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	E	139	LEU

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 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	368/378 (97%)	354 (96%)	14 (4%)	33	64
1	C	371/378 (98%)	361 (97%)	10 (3%)	44	74
2	B	369/383 (96%)	360 (98%)	9 (2%)	49	77
2	D	364/383 (95%)	340 (93%)	24 (7%)	16	42
3	E	109/127 (86%)	107 (98%)	2 (2%)	59	82
4	F	301/342 (88%)	288 (96%)	13 (4%)	29	60

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	1882/1991 (94%)	1810 (96%)	72 (4%)	33 64

5 of 72 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	E	19	SER
4	F	353	VAL
4	F	1	MET
4	F	230	SER
1	C	164	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 17 such sidechains are listed below:

Mol	Chain	Res	Type
4	F	136	ASN
4	F	260	ASN
1	C	372	GLN
1	C	406	HIS
2	D	11	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 14 ligands modelled in this entry, 5 are monoatomic - leaving 9 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	#$|Z| > 2$
11	A1D8I	D	502	-	22,25,25	1.45	4 (18%)	24,37,37	2.59	9 (37%)
5	GTP	A	501	6	26,34,34	1.12	1 (3%)	32,54,54	1.70	10 (31%)
9	GDP	D	501	-	24,30,30	1.66	5 (20%)	30,47,47	1.76	10 (33%)
10	MES	B	503	-	12,12,12	2.16	1 (8%)	14,16,16	2.89	8 (57%)
11	A1D8I	B	504	-	22,25,25	1.30	3 (13%)	24,37,37	1.99	3 (12%)
8	GOL	A	504	-	5,5,5	1.07	0	5,5,5	1.05	0
9	GDP	B	501	6	24,30,30	1.06	2 (8%)	30,47,47	1.38	4 (13%)
12	ACP	F	401	-	27,33,33	1.22	1 (3%)	32,52,52	1.07	2 (6%)
5	GTP	C	501	6	26,34,34	1.10	1 (3%)	32,54,54	1.83	9 (28%)

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
11	A1D8I	D	502	-	-	1/7/8/8	0/4/4/4
5	GTP	A	501	6	-	5/18/38/38	0/3/3/3
9	GDP	D	501	-	-	7/12/32/32	0/3/3/3
10	MES	B	503	-	-	1/6/14/14	0/1/1/1
11	A1D8I	B	504	-	-	0/7/8/8	0/4/4/4
8	GOL	A	504	-	-	3/4/4/4	-
9	GDP	B	501	6	-	3/12/32/32	0/3/3/3
12	ACP	F	401	-	-	9/15/38/38	0/3/3/3
5	GTP	C	501	6	-	7/18/38/38	0/3/3/3

The worst 5 of 18 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
10	B	503	MES	C8-S	-7.06	1.67	1.77
12	F	401	ACP	PB-O3A	5.67	1.64	1.58
9	D	501	GDP	C6-N1	-4.03	1.31	1.37
9	D	501	GDP	C2'-C1'	-3.93	1.47	1.53
5	A	501	GTP	C5-C6	-3.82	1.39	1.47

The worst 5 of 55 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
11	D	502	A1D8I	C21-C04-C05	8.15	116.57	110.62
11	B	504	A1D8I	C21-C04-C05	6.16	115.11	110.62
10	B	503	MES	O2S-S-C8	6.04	114.19	106.92
11	B	504	A1D8I	N01-C06-N07	5.42	121.77	116.09
10	B	503	MES	C5-N4-C3	5.29	120.74	108.83

There are no chirality outliers.

5 of 36 torsion outliers are listed below:

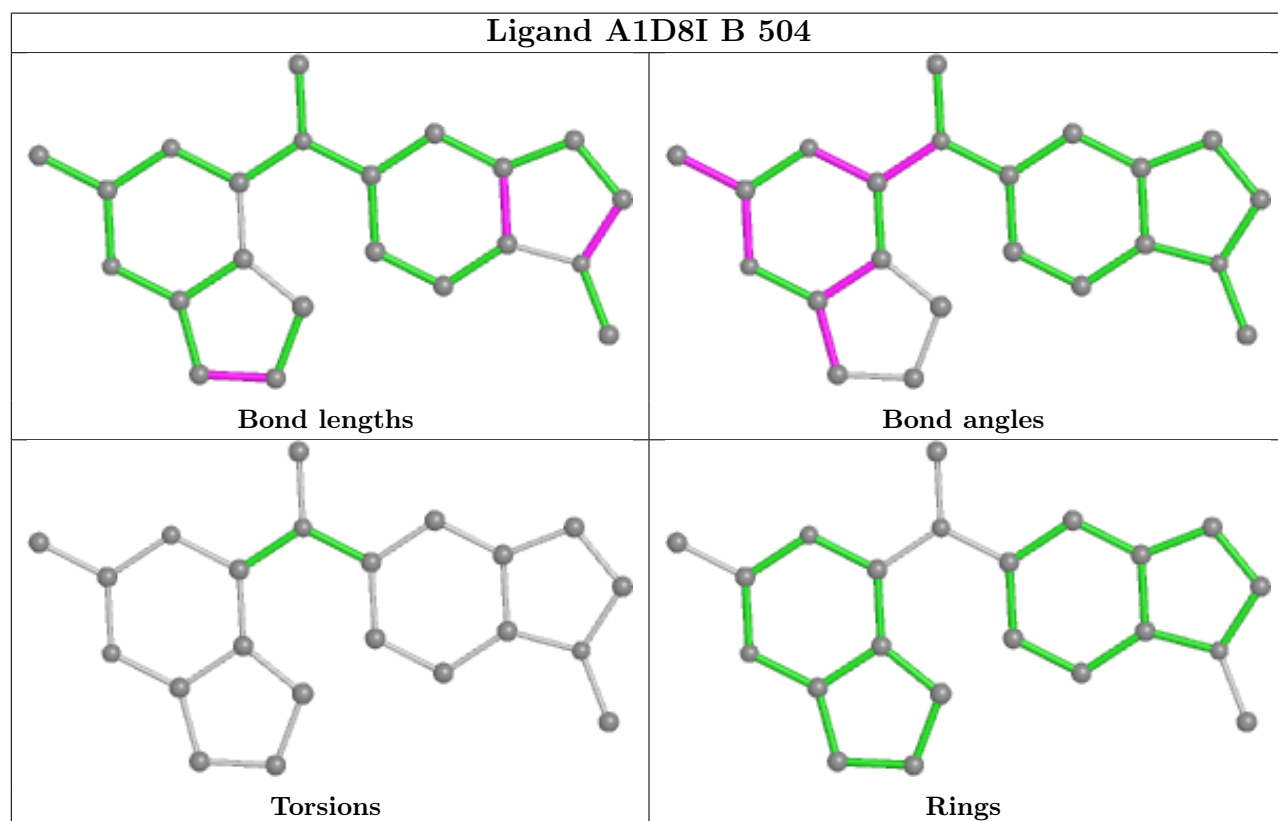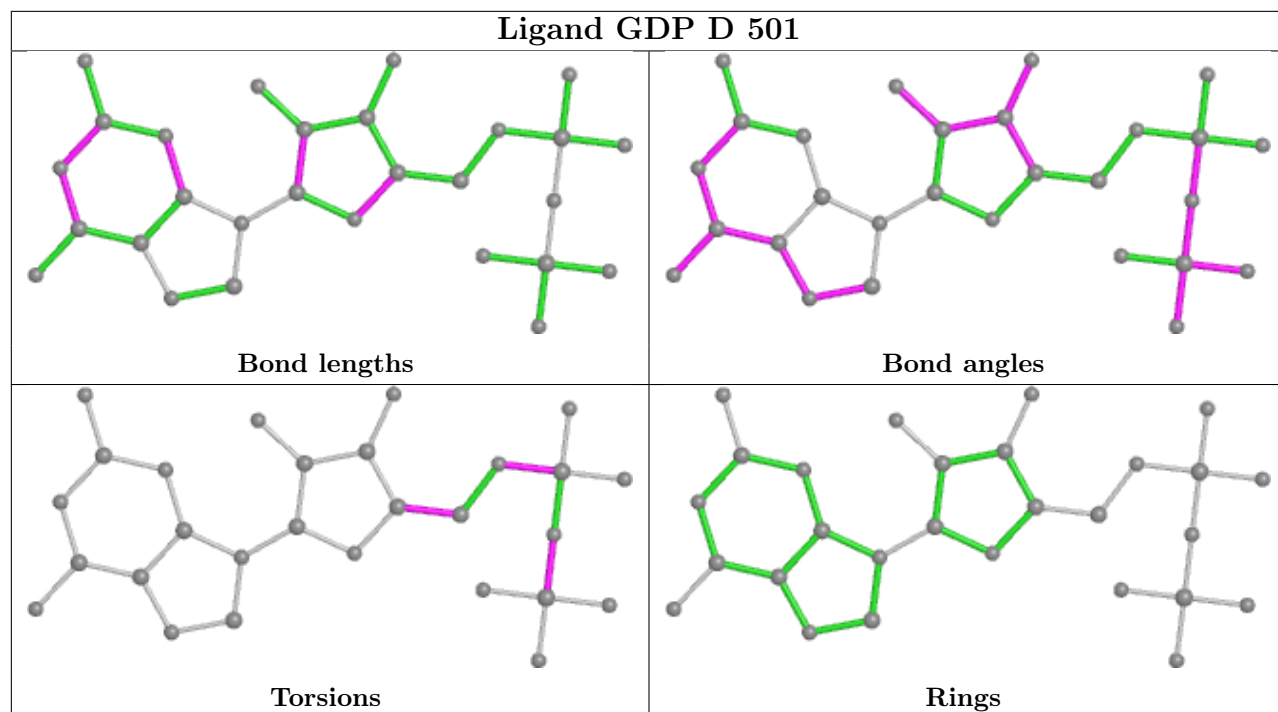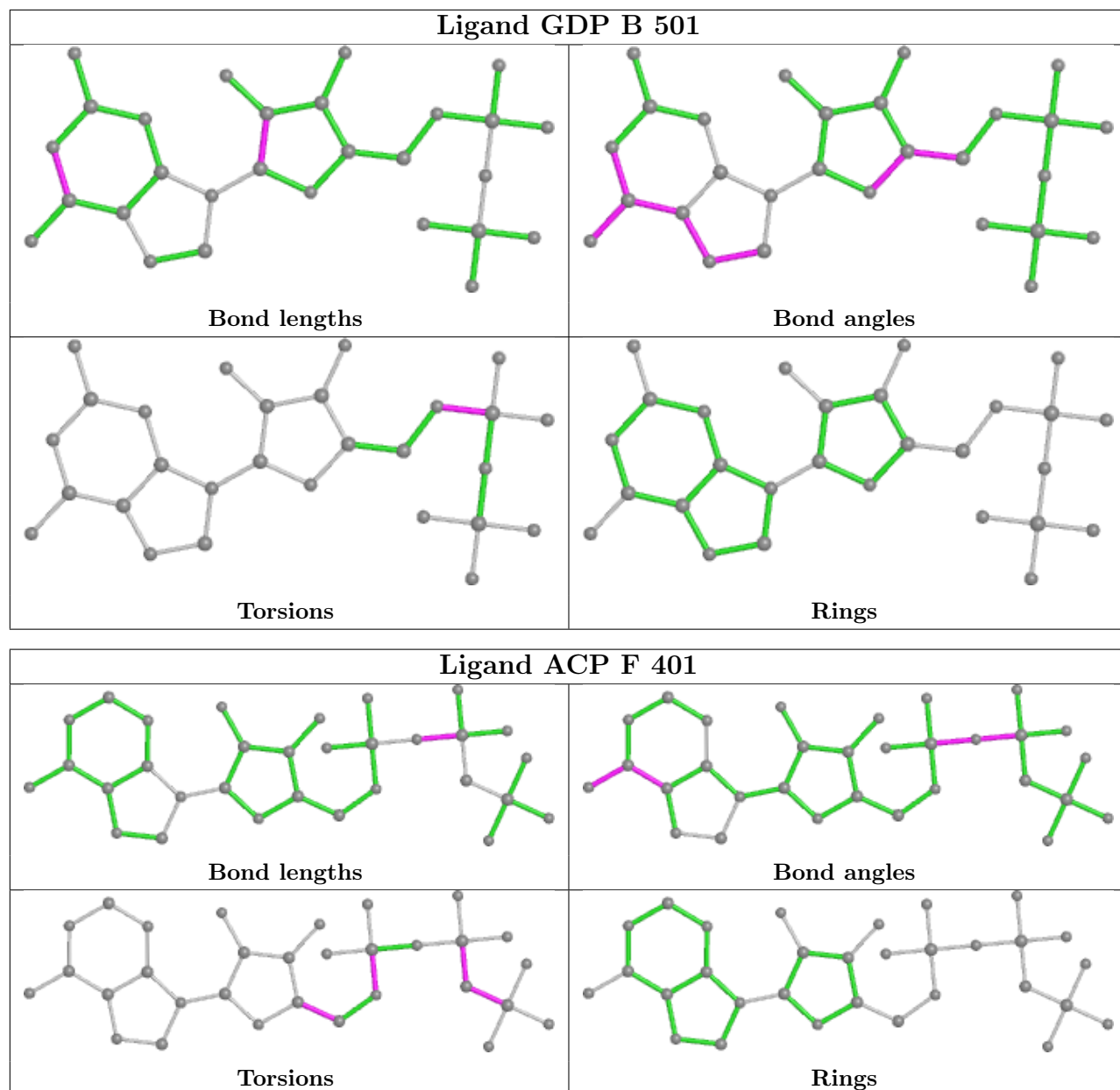| Mol	Chain	Res	Type	Atoms
5	A	501	GTP	PB-O3B-PG-O2G
5	A	501	GTP	C5'-O5'-PA-O1A
5	A	501	GTP	C5'-O5'-PA-O2A
8	A	504	GOL	O1-C1-C2-O2
8	A	504	GOL	O1-C1-C2-C3

There are no ring outliers.

7 monomers are involved in 11 short contacts:

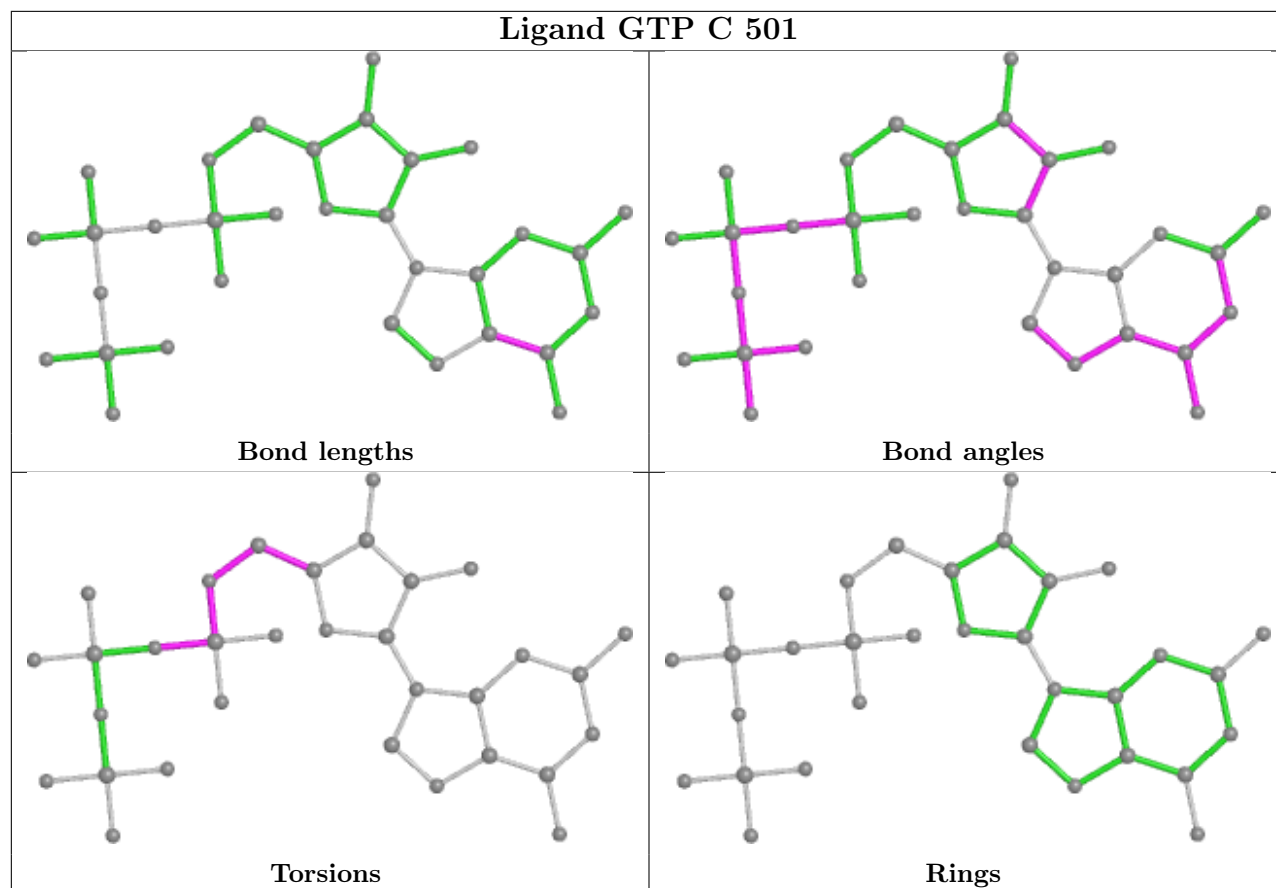| Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	501	GTP	1	0
9	D	501	GDP	5	0
10	B	503	MES	1	0
11	B	504	A1D8I	1	0
9	B	501	GDP	1	0
12	F	401	ACP	1	0
5	C	501	GTP	1	0

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 A1D8I D 502

Bond lengths

Bond angles

Torsions

Rings

Ligand GTP A 501

Bond lengths

Bond angles

Torsions

Rings

Ligand GDP D 501

Bond lengths

Bond angles

Torsions

Rings

Ligand A1D8I B 504

Bond lengths

Bond angles

Torsions

Rings

Ligand GDP B 501

Bond lengths

Bond angles

Torsions

Rings

Ligand ACP F 401

Bond lengths

Bond angles

Torsions

Rings

Ligand GTP C 501

Bond lengths

Bond angles

Torsions

Rings
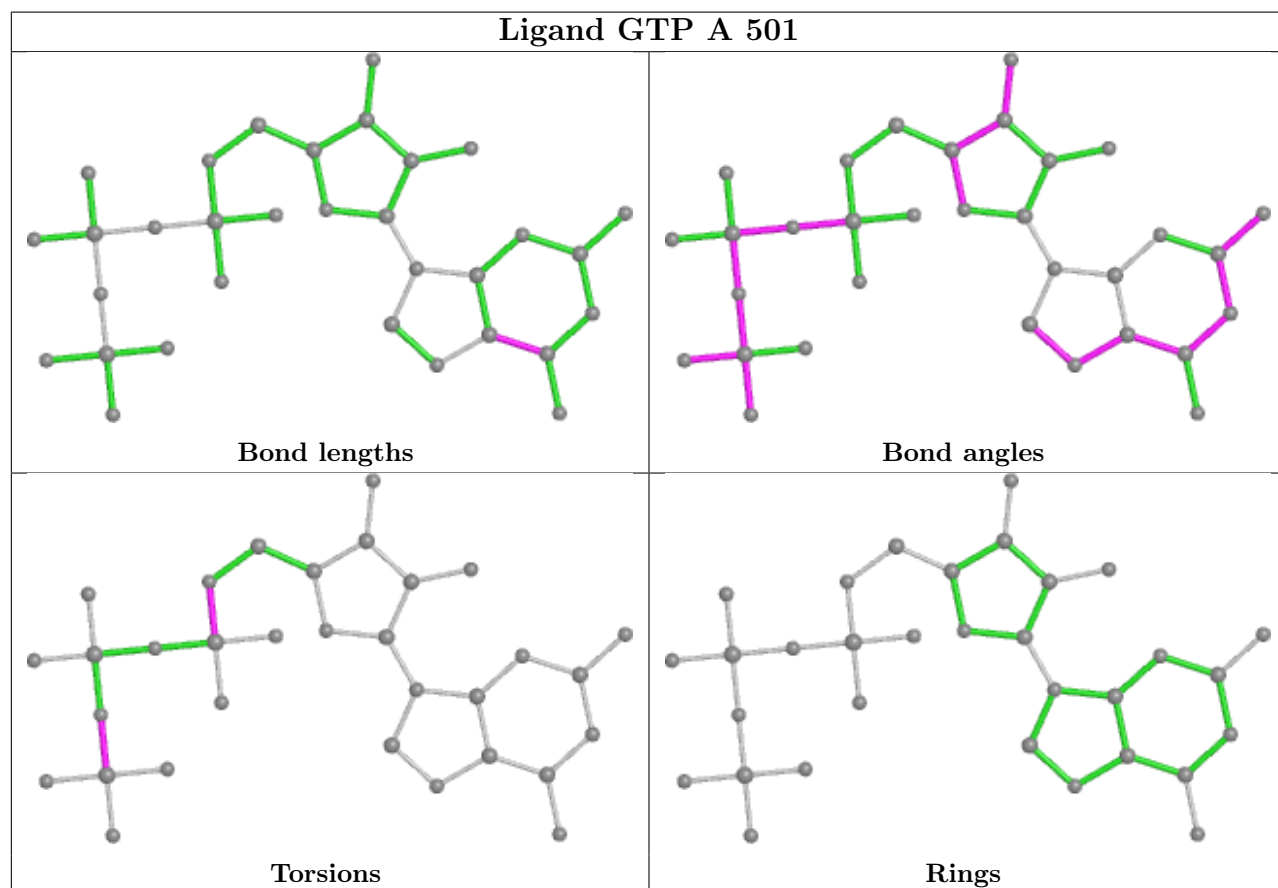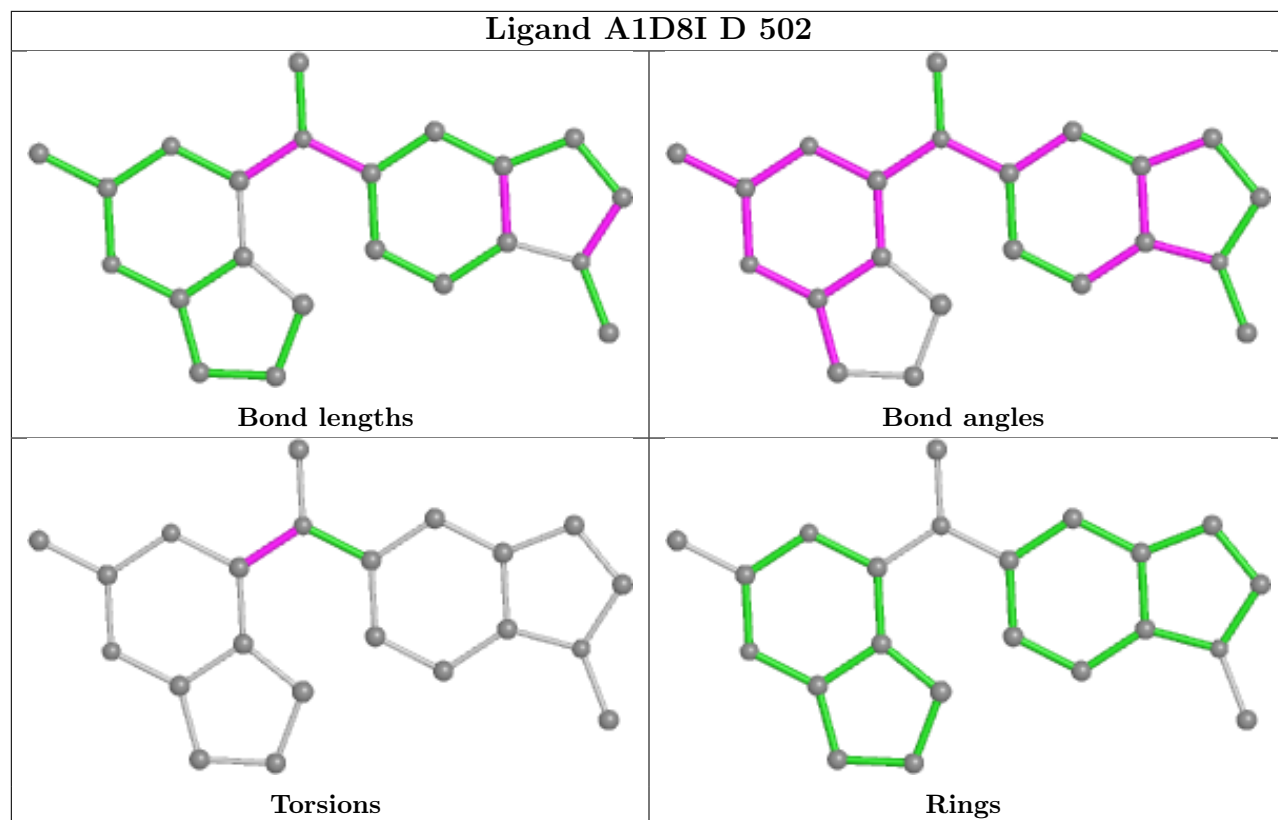
5.7   Other polymers ⓘ

There are no such residues in this entry.

5.8   Polymer linkage issues ⓘ

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	437/450 (97%)	0.05	5 (1%)	80	82	37, 53, 77, 93	0
1	C	440/450 (97%)	-0.19	0	100	100	26, 44, 67, 81	0
2	B	427/445 (95%)	0.01	10 (2%)	60	61	32, 52, 84, 126	0
2	D	421/445 (94%)	0.26	20 (4%)	30	30	38, 71, 100, 121	0
3	E	121/143 (84%)	0.28	9 (7%)	14	12	44, 66, 98, 113	0
4	F	334/384 (86%)	1.10	75 (22%)	0	0	43, 75, 129, 147	0
All	All	2180/2317 (94%)	0.21	119 (5%)	25	23	26, 58, 100, 147	0

The worst 5 of 119 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	F	169	LEU	6.9
4	F	173	ILE	6.2
4	F	103	THR	6.1
4	F	233	PHE	5.8
4	F	232	ASN	5.6

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 ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

LIGAND-RSR INFOmissingINFO

6.5 Other polymers ⓘ

There are no such residues in this entry.