



# Full wwPDB X-ray Structure Validation Report ⓘ

Nov 26, 2024 – 10:05 AM EST

PDB ID : 8W1J  
Title : Crystal Structure of a fatty acid decarboxylase from *Corynebacterium lipophiloflavum* in complex with palmitic acid  
Authors : Generoso, W.C.; Miyamoto, R.Y.; Murakami, M.T.; Zanzhori, L.M.  
Deposited on : 2024-02-16  
Resolution : 1.80 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](mailto: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>.

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

MolProbity : 4.02b-467  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtriage (Phenix) : 1.21  
EDS : 3.0  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.004 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.40

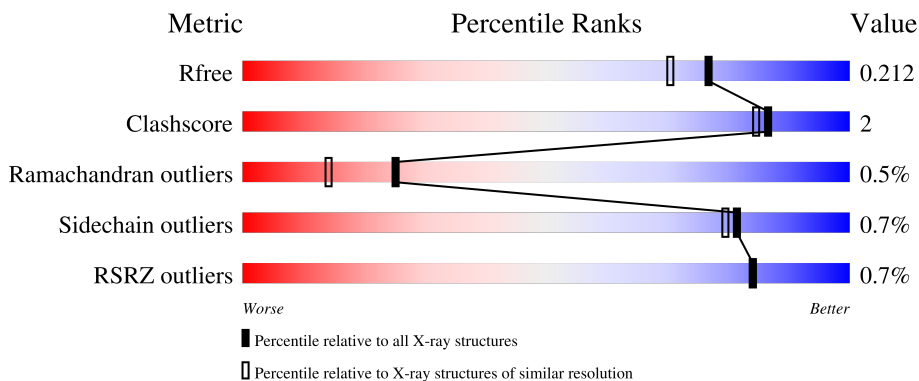
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.80 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))
$R_{free}$	164625	7108 (1.80-1.80)
Clashscore	180529	8162 (1.80-1.80)
Ramachandran outliers	177936	8077 (1.80-1.80)
Sidechain outliers	177891	8076 (1.80-1.80)
RSRZ outliers	164620	7108 (1.80-1.80)

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  $\geq 3$ , 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	450	
1	B	450	
1	C	450	

## 2 Entry composition i

There are 8 unique types of molecules in this entry. The entry contains 11032 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 Fatty acid decarboxylase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	420	3268	2045	578	630	15	0	4	0
1	B	418	3224	2022	569	619	14	0	0	0
1	C	421	3266	2045	576	630	15	0	3	0

There are 63 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-20	MET	-	expression tag	UNP C0XPZ5
A	-19	GLY	-	expression tag	UNP C0XPZ5
A	-18	SER	-	expression tag	UNP C0XPZ5
A	-17	SER	-	expression tag	UNP C0XPZ5
A	-16	HIS	-	expression tag	UNP C0XPZ5
A	-15	HIS	-	expression tag	UNP C0XPZ5
A	-14	HIS	-	expression tag	UNP C0XPZ5
A	-13	HIS	-	expression tag	UNP C0XPZ5
A	-12	HIS	-	expression tag	UNP C0XPZ5
A	-11	HIS	-	expression tag	UNP C0XPZ5
A	-10	SER	-	expression tag	UNP C0XPZ5
A	-9	SER	-	expression tag	UNP C0XPZ5
A	-8	GLY	-	expression tag	UNP C0XPZ5
A	-7	LEU	-	expression tag	UNP C0XPZ5
A	-6	VAL	-	expression tag	UNP C0XPZ5
A	-5	PRO	-	expression tag	UNP C0XPZ5
A	-4	ARG	-	expression tag	UNP C0XPZ5
A	-3	GLY	-	expression tag	UNP C0XPZ5
A	-2	SER	-	expression tag	UNP C0XPZ5
A	-1	HIS	-	expression tag	UNP C0XPZ5
A	0	MET	-	expression tag	UNP C0XPZ5
B	-20	MET	-	expression tag	UNP C0XPZ5
B	-19	GLY	-	expression tag	UNP C0XPZ5

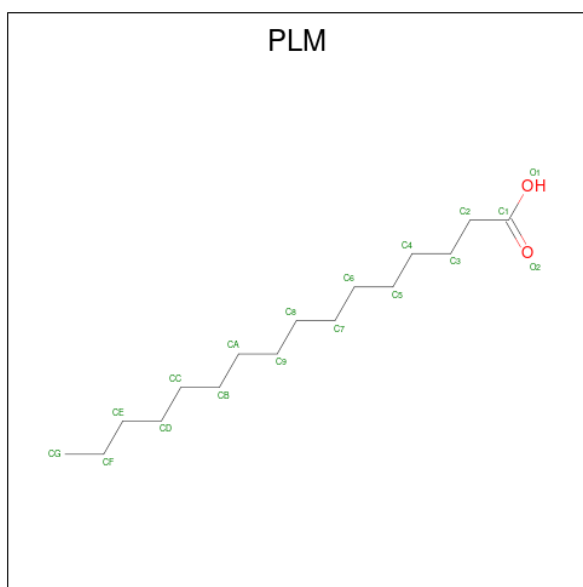
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Chain	Residue	Modelled	Actual	Comment	Reference
B	-18	SER	-	expression tag	UNP C0XPZ5
B	-17	SER	-	expression tag	UNP C0XPZ5
B	-16	HIS	-	expression tag	UNP C0XPZ5
B	-15	HIS	-	expression tag	UNP C0XPZ5
B	-14	HIS	-	expression tag	UNP C0XPZ5
B	-13	HIS	-	expression tag	UNP C0XPZ5
B	-12	HIS	-	expression tag	UNP C0XPZ5
B	-11	HIS	-	expression tag	UNP C0XPZ5
B	-10	SER	-	expression tag	UNP C0XPZ5
B	-9	SER	-	expression tag	UNP C0XPZ5
B	-8	GLY	-	expression tag	UNP C0XPZ5
B	-7	LEU	-	expression tag	UNP C0XPZ5
B	-6	VAL	-	expression tag	UNP C0XPZ5
B	-5	PRO	-	expression tag	UNP C0XPZ5
B	-4	ARG	-	expression tag	UNP C0XPZ5
B	-3	GLY	-	expression tag	UNP C0XPZ5
B	-2	SER	-	expression tag	UNP C0XPZ5
B	-1	HIS	-	expression tag	UNP C0XPZ5
B	0	MET	-	expression tag	UNP C0XPZ5
C	-20	MET	-	expression tag	UNP C0XPZ5
C	-19	GLY	-	expression tag	UNP C0XPZ5
C	-18	SER	-	expression tag	UNP C0XPZ5
C	-17	SER	-	expression tag	UNP C0XPZ5
C	-16	HIS	-	expression tag	UNP C0XPZ5
C	-15	HIS	-	expression tag	UNP C0XPZ5
C	-14	HIS	-	expression tag	UNP C0XPZ5
C	-13	HIS	-	expression tag	UNP C0XPZ5
C	-12	HIS	-	expression tag	UNP C0XPZ5
C	-11	HIS	-	expression tag	UNP C0XPZ5
C	-10	SER	-	expression tag	UNP C0XPZ5
C	-9	SER	-	expression tag	UNP C0XPZ5
C	-8	GLY	-	expression tag	UNP C0XPZ5
C	-7	LEU	-	expression tag	UNP C0XPZ5
C	-6	VAL	-	expression tag	UNP C0XPZ5
C	-5	PRO	-	expression tag	UNP C0XPZ5
C	-4	ARG	-	expression tag	UNP C0XPZ5
C	-3	GLY	-	expression tag	UNP C0XPZ5
C	-2	SER	-	expression tag	UNP C0XPZ5
C	-1	HIS	-	expression tag	UNP C0XPZ5
C	0	MET	-	expression tag	UNP C0XPZ5

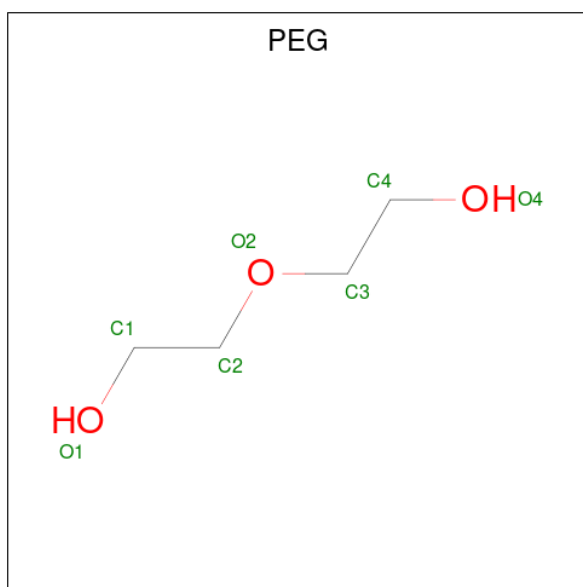
- Molecule 2 is CHLORIDE ION (three-letter code: CL) (formula: Cl).





Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			18	16	2		
4	B	1	Total	C	O	0	0
			18	16	2		
4	C	1	Total	C	O	0	0
			18	16	2		

- Molecule 5 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: C<sub>4</sub>H<sub>10</sub>O<sub>3</sub>).



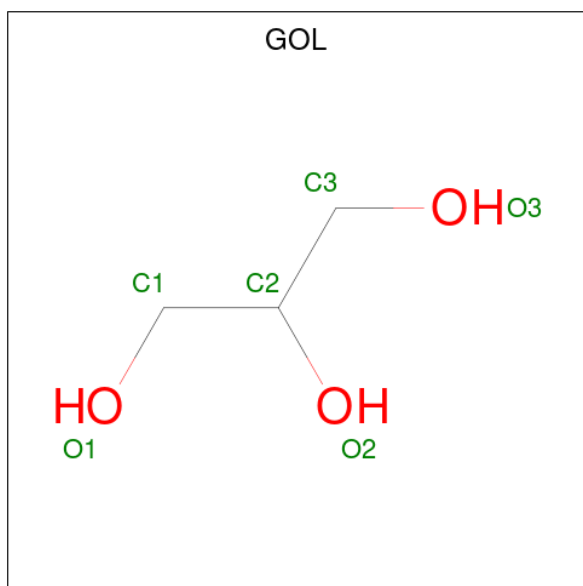
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			7	4	3		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	C	1	Total	C	O	0	0
			7	4	3		

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula:  $C_3H_8O_3$ ).



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

- Molecule 7 is TRIETHYLENE GLYCOL (three-letter code: PGE) (formula:  $C_6H_{14}O_4$ ).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	1	Total C O 10 6 4	0	0

- Molecule 8 is water.


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	391	Total O 391 391	0	0
8	B	291	Total O 291 291	0	0
8	C	354	Total O 354 354	0	0

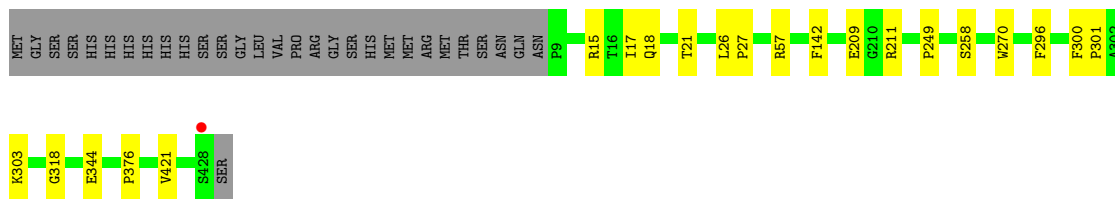


### 3 Residue-property plots [i](#)


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.

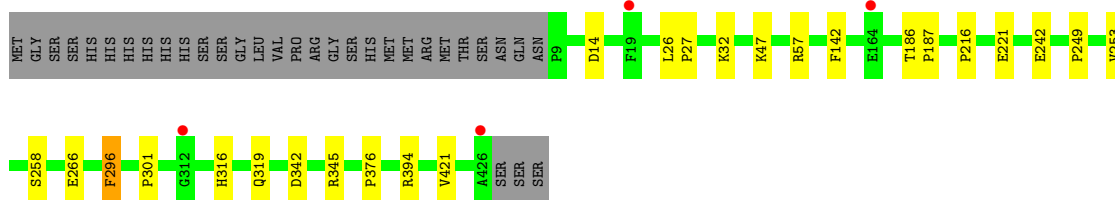
- Molecule 1: Fatty acid decarboxylase

Chain A:  89% 5% 7%




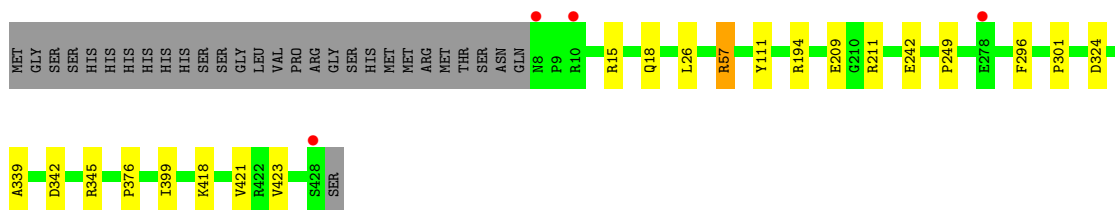
- Molecule 1: Fatty acid decarboxylase

Chain B:  % 87% 5% 7%



- Molecule 1: Fatty acid decarboxylase

Chain C:  % 89% 6% 5%



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	157.93Å 171.02Å 122.31Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.74 – 1.80 49.74 – 1.80	Depositor EDS
% Data completeness (in resolution range)	100.0 (49.74-1.80) 99.9 (49.74-1.80)	Depositor EDS
$R_{merge}$	0.13	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.25 (at 1.79Å)	Xtrriage
Refinement program	PHENIX (1.20.1_4487: ???)	Depositor
R, $R_{free}$	0.176 , 0.213 0.176 , 0.212	Depositor DCC
$R_{free}$ test set	7619 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	29.0	Xtrriage
Anisotropy	0.007	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 33.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	11032	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	32.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.96% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: HEM, PEG, GOL, CL, PGE, PLM

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	0.53	0/3335	0.66	0/4527
1	B	0.45	0/3291	0.63	0/4468
1	C	0.49	0/3333	0.65	0/4527
All	All	0.49	0/9959	0.64	0/13522

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 [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	3268	0	3180	10	0
1	B	3224	0	3144	16	0
1	C	3266	0	3177	12	0
2	A	1	0	0	0	0
3	A	43	0	30	2	0
3	B	43	0	30	4	0
3	C	43	0	30	2	0
4	A	18	0	31	1	0
4	B	18	0	31	0	0
4	C	18	0	31	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	7	0	10	0	0
5	C	7	0	10	1	0
6	A	6	0	8	0	0
6	B	12	0	16	0	0
6	C	12	0	16	1	0
7	A	10	0	14	0	0
8	A	391	0	0	0	0
8	B	291	0	0	1	0
8	C	354	0	0	2	0
All	All	11032	0	9758	39	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 2.

All (39) 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:B:14:ASP:HA	1:B:47:LYS:HB2	1.88	0.55
1:B:32:LYS:HE2	8:C:904:HOH:O	2.09	0.51
1:C:209:GLU:OE1	1:C:211:ARG:NH2	2.41	0.51
1:A:270:TRP:HZ2	1:A:344[B]:GLU:HG2	1.75	0.51
1:C:342:ASP:O	1:C:345:ARG:HG2	2.12	0.49
1:C:376:PRO:HD2	3:C:501:HEM:C1D	2.49	0.48
1:A:300:PHE:HE1	4:A:503:PLM:H61	1.78	0.48
4:C:502:PLM:H81	4:C:502:PLM:H42	1.95	0.48
5:C:503:PEG:H12	8:C:627:HOH:O	2.14	0.47
1:B:186:THR:HG23	1:B:187:PRO:HD3	1.96	0.47
1:A:15:ARG:HD2	1:A:18:GLN:OE1	2.15	0.46
1:B:253:VAL:HA	3:B:501:HEM:HBB1	1.98	0.46
1:C:249:PRO:HB2	3:C:501:HEM:C2C	2.51	0.46
1:C:399:ILE:HA	1:C:423[A]:VAL:HG12	1.97	0.46
1:A:376:PRO:HD2	3:A:502:HEM:C1D	2.51	0.46
1:B:394:ARG:NE	8:B:606:HOH:O	2.48	0.46
1:A:249:PRO:HB2	3:A:502:HEM:C2C	2.51	0.46
1:A:26:LEU:HB3	1:A:27:PRO:HD3	1.98	0.45
1:B:342:ASP:O	1:B:345:ARG:HG2	2.17	0.45
1:C:242:GLU:HA	1:C:242:GLU:OE1	2.17	0.45
1:B:249:PRO:HB2	3:B:501:HEM:C2C	2.53	0.44
1:B:316:HIS:O	1:B:319:GLN:HG2	2.17	0.44
1:A:17:ILE:O	1:A:21:THR:HG23	2.18	0.44
1:B:142:PHE:HB2	1:B:258:SER:OG	2.17	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:186:THR:CG2	1:B:187:PRO:HD3	2.48	0.43
1:B:376:PRO:HD2	3:B:501:HEM:C1D	2.53	0.43
1:A:209:GLU:OE1	1:A:211:ARG:NH2	2.48	0.43
1:B:242:GLU:HA	1:B:242:GLU:OE1	2.19	0.42
1:B:26:LEU:HB3	1:B:27:PRO:HD3	2.01	0.42
1:A:142:PHE:HB2	1:A:258:SER:OG	2.19	0.42
1:C:26:LEU:C	1:C:26:LEU:HD13	2.40	0.42
1:B:296:PHE:CE2	3:B:501:HEM:HBB2	2.55	0.41
1:B:216:PRO:HA	1:B:221:GLU:OE1	2.19	0.41
1:B:266:GLU:HG2	1:C:339:ALA:O	2.20	0.41
1:C:57:ARG:HB3	1:C:324:ASP:HB3	2.02	0.41
1:C:15:ARG:HD2	1:C:18:GLN:OE1	2.20	0.41
1:C:111:TYR:OH	6:C:505:GOL:H2	2.20	0.40
1:C:418:LYS:HD3	1:C:418:LYS:HA	1.91	0.40
1:A:303:LYS:HE3	1:A:318:GLY:O	2.21	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	422/450 (94%)	413 (98%)	7 (2%)	2 (0%)	25 14
1	B	416/450 (92%)	409 (98%)	5 (1%)	2 (0%)	25 14
1	C	422/450 (94%)	413 (98%)	7 (2%)	2 (0%)	25 14
All	All	1260/1350 (93%)	1235 (98%)	19 (2%)	6 (0%)	25 14

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	421	VAL
1	B	421	VAL

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Mol	Chain	Res	Type
1	C	421	VAL
1	C	301	PRO
1	B	301	PRO
1	A	301	PRO

### 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	336/359 (94%)	334 (99%)	2 (1%)	84	82
1	B	330/359 (92%)	328 (99%)	2 (1%)	84	82
1	C	336/359 (94%)	333 (99%)	3 (1%)	75	72
All	All	1002/1077 (93%)	995 (99%)	7 (1%)	81	79

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	57	ARG
1	A	296	PHE
1	B	57	ARG
1	B	296	PHE
1	C	57	ARG
1	C	194	ARG
1	C	296	PHE

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

### 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 oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 15 ligands modelled in this entry, 1 is monoatomic - leaving 14 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
6	GOL	C	505	-	5,5,5	1.11	0	5,5,5	0.99	0
4	PLM	B	502	-	17,17,17	1.55	1 (5%)	17,17,17	0.67	0
6	GOL	B	503	-	5,5,5	1.23	0	5,5,5	1.03	0
6	GOL	B	504	-	5,5,5	0.98	0	5,5,5	0.98	0
4	PLM	A	503	-	17,17,17	1.89	1 (5%)	17,17,17	0.64	0
5	PEG	C	503	-	6,6,6	0.24	0	5,5,5	0.16	0
3	HEM	A	502	1,8	42,50,50	1.41	6 (14%)	46,82,82	1.78	11 (23%)
3	HEM	C	501	1,8	42,50,50	1.39	7 (16%)	46,82,82	1.74	10 (21%)
4	PLM	C	502	-	17,17,17	1.74	1 (5%)	17,17,17	0.77	1 (5%)
6	GOL	C	504	-	5,5,5	1.06	0	5,5,5	1.05	0
7	PGE	A	506	-	9,9,9	0.39	0	8,8,8	0.38	0
6	GOL	A	505	-	5,5,5	1.07	0	5,5,5	1.20	1 (20%)
5	PEG	A	504	-	6,6,6	0.20	0	5,5,5	0.05	0
3	HEM	B	501	1,8	42,50,50	1.61	7 (16%)	46,82,82	1.58	8 (17%)

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
6	GOL	C	505	-	-	3/4/4/4	-
4	PLM	B	502	-	-	8/15/15/15	-
6	GOL	B	503	-	-	0/4/4/4	-
6	GOL	B	504	-	-	2/4/4/4	-
4	PLM	A	503	-	-	6/15/15/15	-
5	PEG	C	503	-	-	3/4/4/4	-
3	HEM	A	502	1,8	-	2/12/54/54	-
3	HEM	C	501	1,8	-	3/12/54/54	-
4	PLM	C	502	-	-	8/15/15/15	-
6	GOL	C	504	-	-	0/4/4/4	-
7	PGE	A	506	-	-	4/7/7/7	-
6	GOL	A	505	-	-	2/4/4/4	-
5	PEG	A	504	-	-	1/4/4/4	-
3	HEM	B	501	1,8	-	0/12/54/54	-

All (23) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	502	PLM	C2-C1	6.78	1.66	1.50
4	A	503	PLM	C2-C1	6.72	1.66	1.50
4	B	502	PLM	C2-C1	5.69	1.63	1.50
3	A	502	HEM	C1B-NB	-3.96	1.33	1.40
3	C	501	HEM	C1B-NB	-3.90	1.33	1.40
3	B	501	HEM	C3C-CAC	3.82	1.56	1.47
3	B	501	HEM	C3C-C2C	-3.63	1.35	1.40
3	A	502	HEM	C4D-ND	-3.40	1.34	1.40
3	C	501	HEM	C4D-ND	-3.38	1.34	1.40
3	A	502	HEM	C4B-NB	-2.75	1.33	1.38
3	B	501	HEM	CAB-C3B	2.69	1.54	1.47
3	B	501	HEM	C3C-C4C	2.67	1.45	1.41
3	C	501	HEM	C1D-ND	-2.62	1.33	1.38
3	A	502	HEM	C1D-ND	-2.56	1.33	1.38
3	C	501	HEM	C4B-NB	-2.55	1.33	1.38
3	B	501	HEM	C1B-NB	-2.38	1.36	1.40
3	C	501	HEM	FE-NB	2.33	2.11	1.98
3	A	502	HEM	FE-NB	2.30	2.10	1.98
3	A	502	HEM	O2D-CGD	-2.14	1.23	1.30
3	C	501	HEM	CHB-C1B	2.10	1.39	1.34
3	B	501	HEM	FE-NB	2.07	2.09	1.98
3	C	501	HEM	O2D-CGD	-2.04	1.24	1.30
3	B	501	HEM	CMB-C2B	2.03	1.54	1.50



All (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	501	HEM	CHC-C4B-NB	4.45	129.22	124.44
3	A	502	HEM	CHC-C4B-NB	4.38	129.15	124.44
3	A	502	HEM	C1B-NB-C4B	3.96	109.89	105.21
3	B	501	HEM	C4D-ND-C1D	3.82	109.73	105.21
3	B	501	HEM	C1B-NB-C4B	3.74	109.63	105.21
3	A	502	HEM	CHD-C1D-ND	3.71	128.42	124.44
3	C	501	HEM	C1B-NB-C4B	3.66	109.54	105.21
3	C	501	HEM	CHD-C1D-ND	3.58	128.28	124.44
3	A	502	HEM	CHB-C1B-NB	3.58	128.81	124.37
3	A	502	HEM	CHA-C4D-ND	3.46	128.66	124.37
3	C	501	HEM	CHB-C1B-NB	3.45	128.65	124.37
3	C	501	HEM	CHA-C4D-ND	3.38	128.56	124.37
3	A	502	HEM	C3B-C4B-NB	-3.36	107.06	109.47
3	B	501	HEM	C4C-CHD-C1D	3.28	126.88	122.56
3	B	501	HEM	CMC-C2C-C3C	2.86	130.40	124.68
3	C	501	HEM	C3B-C4B-NB	-2.80	107.46	109.47
3	B	501	HEM	C3D-C4D-ND	-2.65	107.27	110.17
3	B	501	HEM	C4A-C3A-C2A	2.64	108.83	107.00
3	A	502	HEM	CHD-C1D-C2D	-2.50	121.09	125.03
3	A	502	HEM	CHA-C4D-C3D	-2.42	120.76	125.23
3	C	501	HEM	CHA-C4D-C3D	-2.40	120.79	125.23
3	B	501	HEM	C3B-C4B-NB	-2.40	107.75	109.47
3	A	502	HEM	CMC-C2C-C3C	2.37	129.42	124.68
3	C	501	HEM	CMC-C2C-C3C	2.36	129.40	124.68
3	C	501	HEM	CHD-C1D-C2D	-2.31	121.38	125.03
6	A	505	GOL	C3-C2-C1	-2.26	103.51	111.80
3	B	501	HEM	C2D-C1D-ND	-2.21	107.35	109.90
4	C	502	PLM	O2-C1-C2	-2.18	116.17	123.09
3	C	501	HEM	O2A-CGA-CBA	2.05	120.49	114.00
3	A	502	HEM	O2A-CGA-CBA	2.04	120.44	114.00
3	A	502	HEM	CHB-C1B-C2B	-2.01	121.26	126.94

There are no chirality outliers.

All (42) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	502	HEM	C2B-C3B-CAB-CBB
3	C	501	HEM	C2B-C3B-CAB-CBB
3	C	501	HEM	C4B-C3B-CAB-CBB
6	A	505	GOL	C1-C2-C3-O3
6	B	504	GOL	O1-C1-C2-C3

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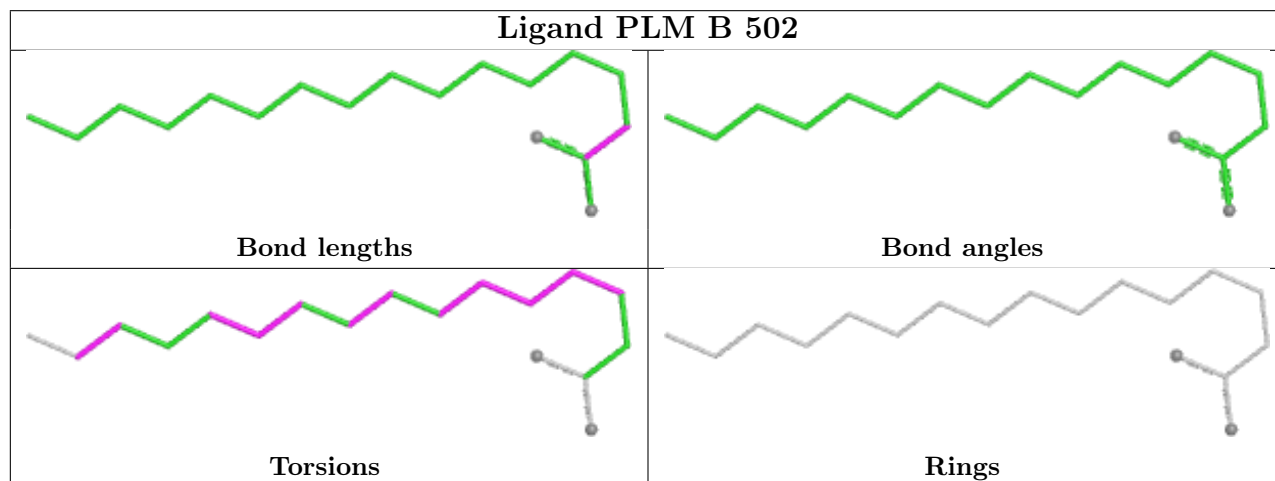
Mol	Chain	Res	Type	Atoms
4	C	502	PLM	C1-C2-C3-C4
4	B	502	PLM	C3-C4-C5-C6
4	A	503	PLM	CC-CD-CE-CF
4	C	502	PLM	C7-C8-C9-CA
4	B	502	PLM	C7-C8-C9-CA
6	C	505	GOL	C1-C2-C3-O3
7	A	506	PGE	O3-C5-C6-O4
6	B	504	GOL	O1-C1-C2-O2
4	C	502	PLM	C3-C4-C5-C6
4	A	503	PLM	C3-C4-C5-C6
4	A	503	PLM	C4-C5-C6-C7
5	C	503	PEG	O2-C3-C4-O4
3	A	502	HEM	C4B-C3B-CAB-CBB
6	A	505	GOL	O2-C2-C3-O3
6	C	505	GOL	O2-C2-C3-O3
4	B	502	PLM	CA-CB-CC-CD
4	B	502	PLM	C4-C5-C6-C7
4	C	502	PLM	C5-C6-C7-C8
5	C	503	PEG	O1-C1-C2-O2
4	C	502	PLM	C2-C3-C4-C5
4	B	502	PLM	C9-CA-CB-CC
7	A	506	PGE	C4-C3-O2-C2
5	A	504	PEG	C1-C2-O2-C3
4	B	502	PLM	CD-CE-CF-CG
7	A	506	PGE	C3-C4-O3-C5
4	C	502	PLM	O2-C1-C2-C3
7	A	506	PGE	C6-C5-O3-C4
4	C	502	PLM	O1-C1-C2-C3
6	C	505	GOL	O1-C1-C2-O2
5	C	503	PEG	C4-C3-O2-C2
4	B	502	PLM	C5-C6-C7-C8
4	C	502	PLM	C9-CA-CB-CC
4	A	503	PLM	C1-C2-C3-C4
4	A	503	PLM	C6-C7-C8-C9
4	A	503	PLM	O1-C1-C2-C3
3	C	501	HEM	CAA-CBA-CGA-O2A
4	B	502	PLM	C2-C3-C4-C5

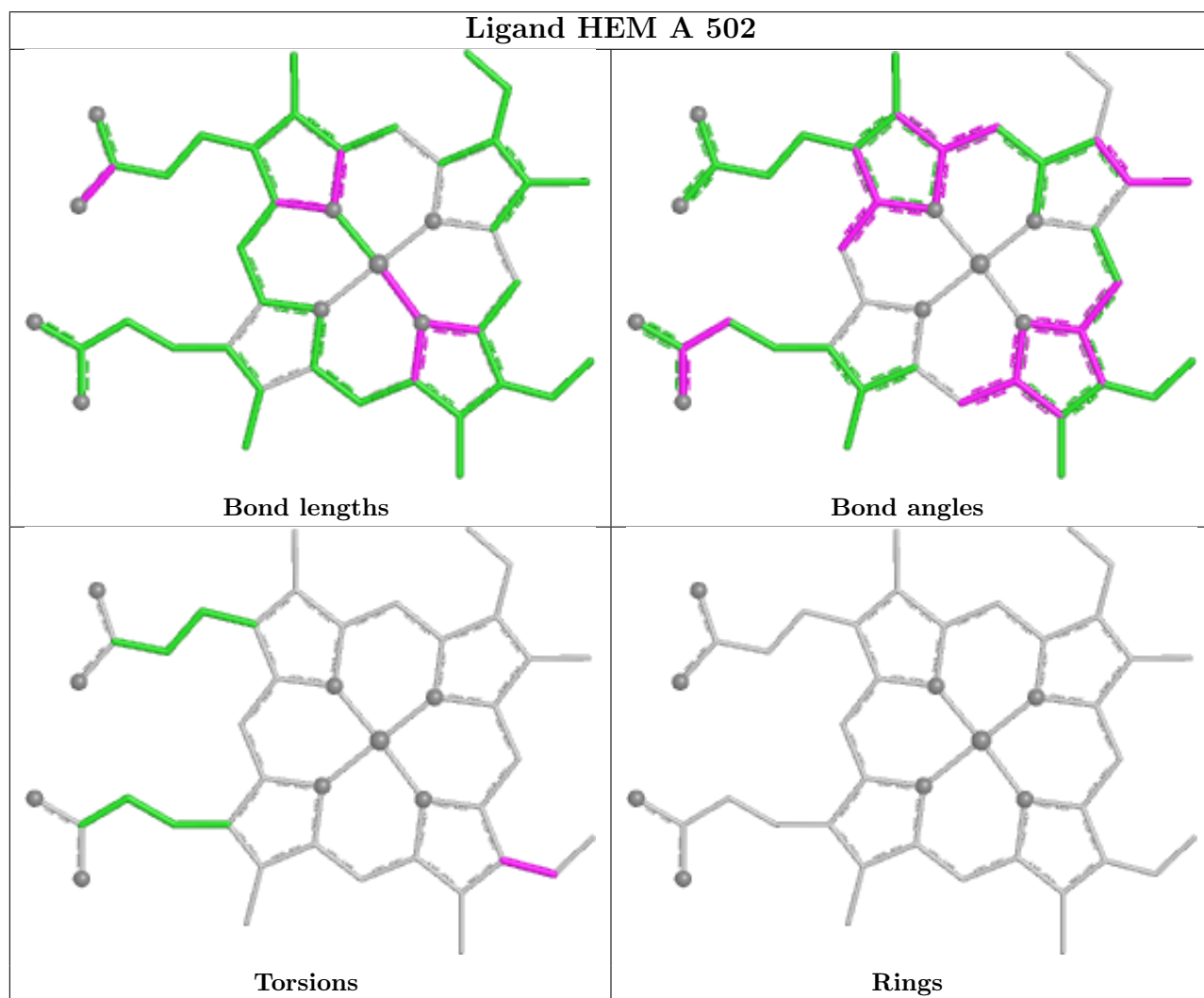
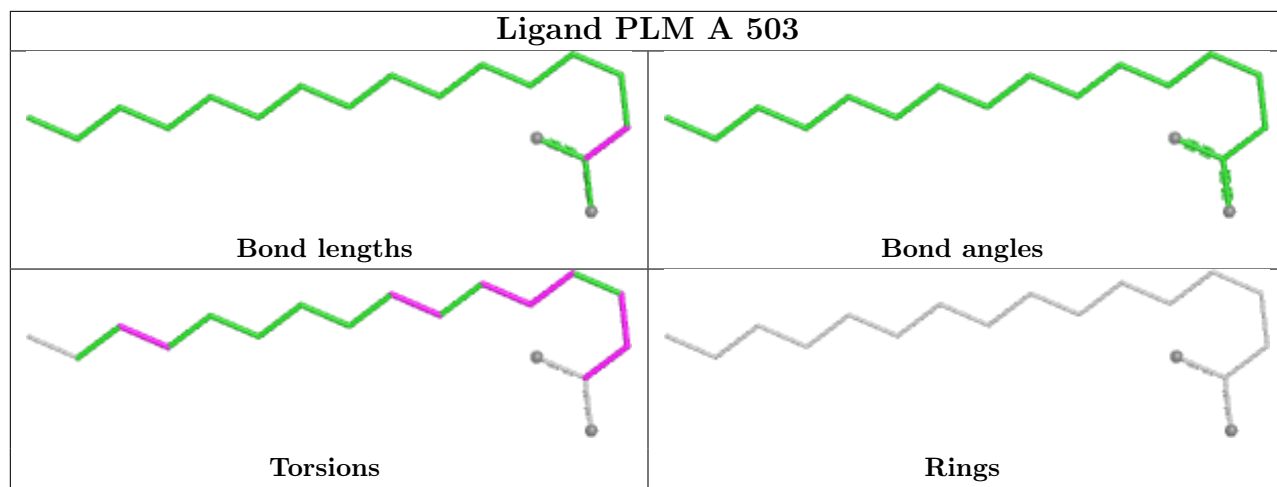
There are no ring outliers.

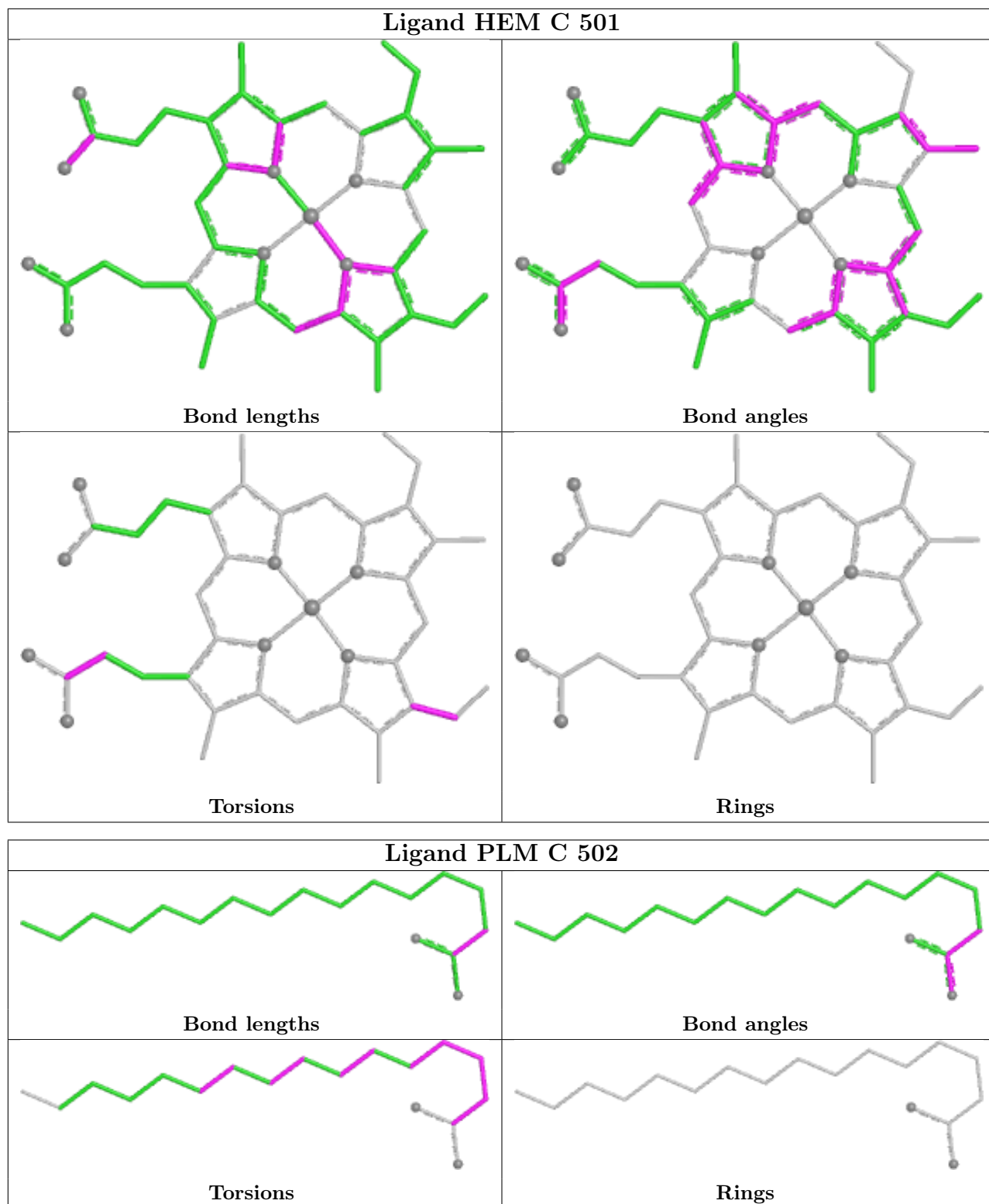
7 monomers are involved in 12 short contacts:

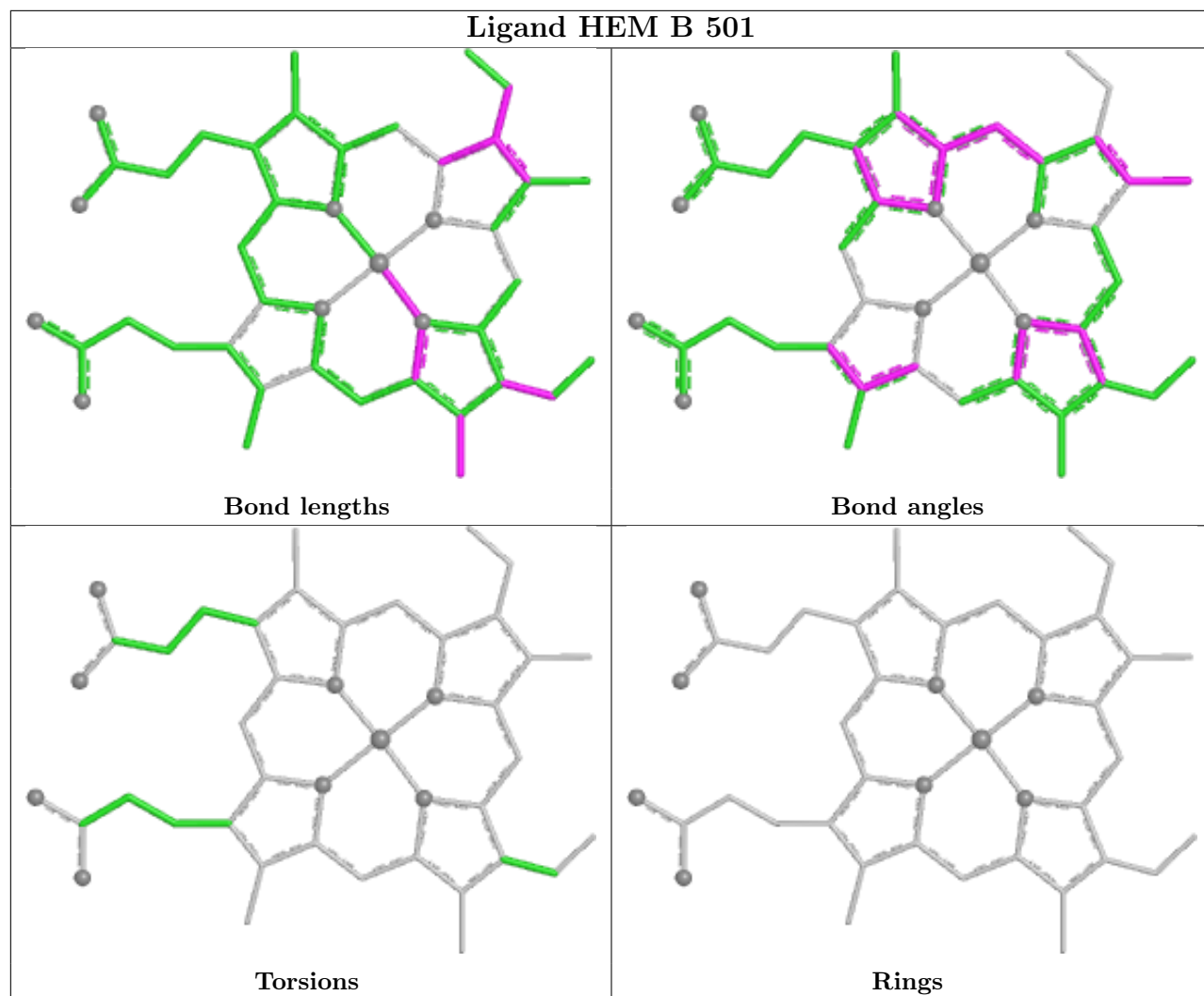
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	C	505	GOL	1	0
4	A	503	PLM	1	0
5	C	503	PEG	1	0
3	A	502	HEM	2	0
3	C	501	HEM	2	0
4	C	502	PLM	1	0
3	B	501	HEM	4	0

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 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 [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	420/450 (93%)	-0.44	1 (0%) 92   91	13, 25, 42, 59	4 (0%)
1	B	418/450 (92%)	-0.07	4 (0%) 79   78	22, 32, 53, 71	0
1	C	421/450 (93%)	-0.27	4 (0%) 79   78	12, 29, 47, 65	3 (0%)
All	All	1259/1350 (93%)	-0.26	9 (0%) 84   84	12, 29, 49, 71	7 (0%)

All (9) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	426	ALA	3.8
1	A	428	SER	3.4
1	B	19	PHE	2.7
1	C	428	SER	2.6
1	B	312	GLY	2.6
1	C	8	ASN	2.4
1	C	278	GLU	2.2
1	B	164	GLU	2.2
1	C	10	ARG	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

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<sup>th</sup> 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.

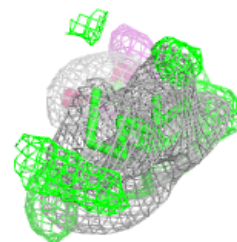
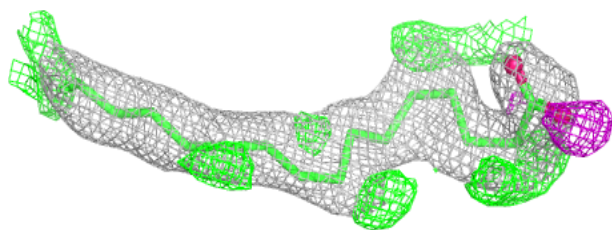
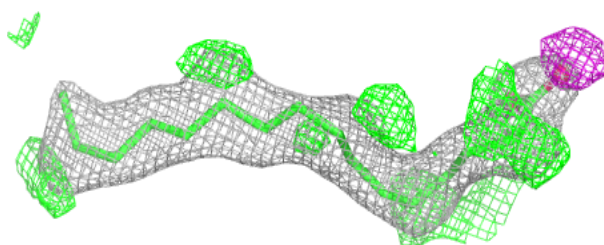
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
7	PGE	A	506	10/10	0.69	0.20	40,54,64,67	0
5	PEG	A	504	7/7	0.72	0.19	55,60,71,73	0
5	PEG	C	503	7/7	0.74	0.18	48,51,62,64	0
6	GOL	C	504	6/6	0.77	0.17	53,61,65,68	0
4	PLM	B	502	18/18	0.80	0.19	32,42,47,49	0
4	PLM	A	503	18/18	0.83	0.16	24,37,44,44	0
6	GOL	B	504	6/6	0.85	0.13	42,48,58,64	0
6	GOL	C	505	6/6	0.86	0.13	41,55,58,60	0
4	PLM	C	502	18/18	0.86	0.14	26,36,45,45	0
6	GOL	B	503	6/6	0.94	0.10	31,41,53,54	0
6	GOL	A	505	6/6	0.95	0.07	28,31,40,46	0
3	HEM	C	501	43/43	0.97	0.07	18,23,27,28	0
2	CL	A	501	1/1	0.97	0.06	36,36,36,36	0
3	HEM	A	502	43/43	0.98	0.06	16,21,25,29	0
3	HEM	B	501	43/43	0.99	0.05	20,27,31,31	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.

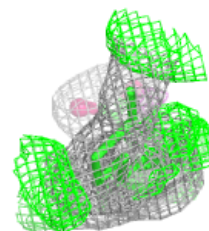
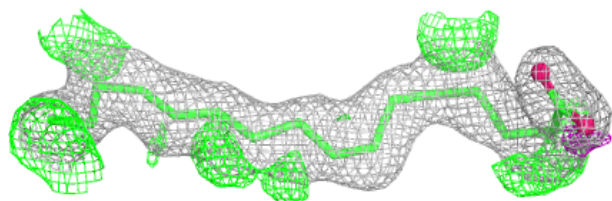
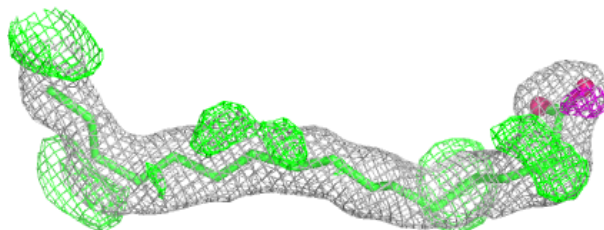


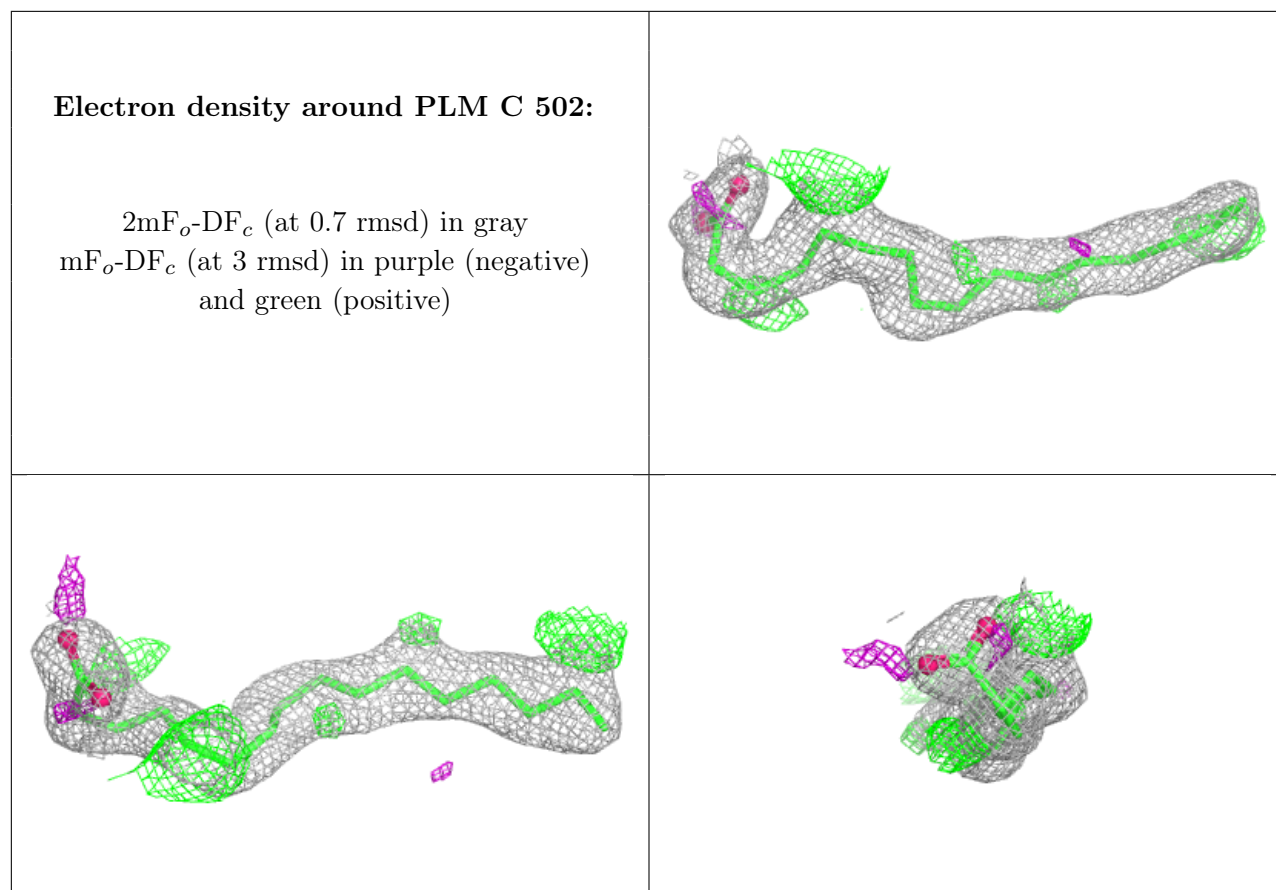
**Electron density around PLM B 502:**

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

**Electron density around PLM A 503:**

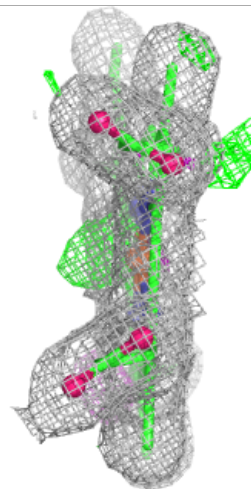
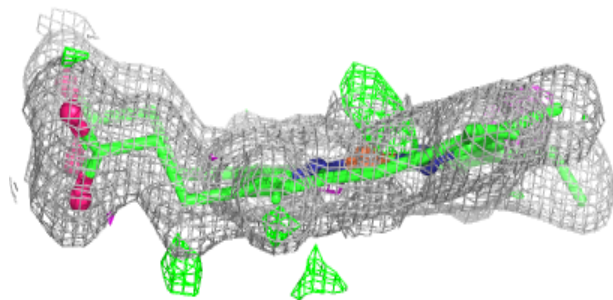
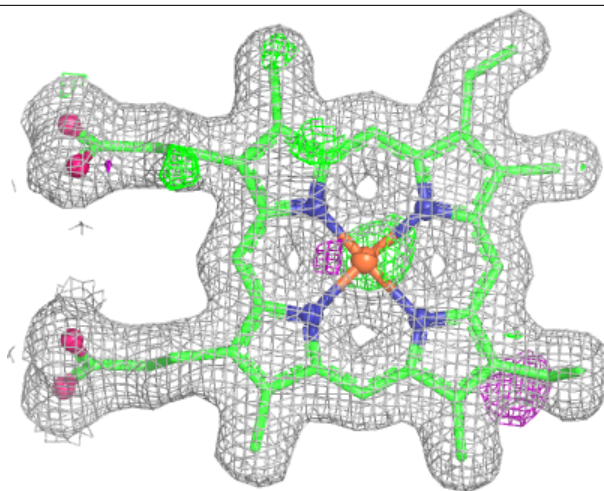
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 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





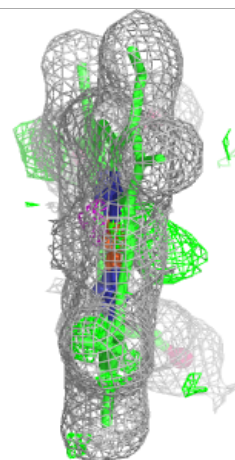
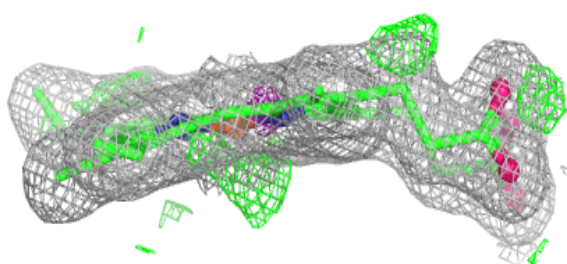
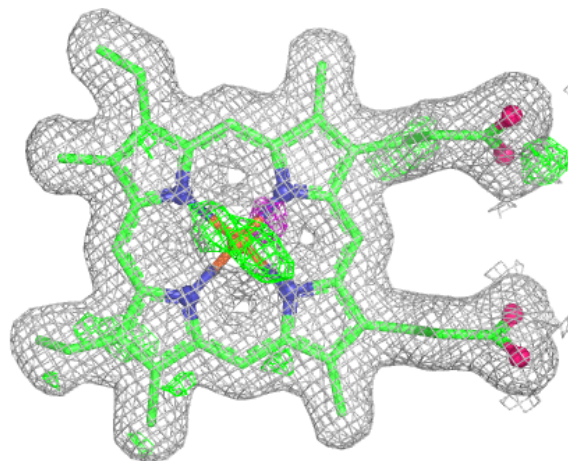
**Electron density around HEM C 501:**

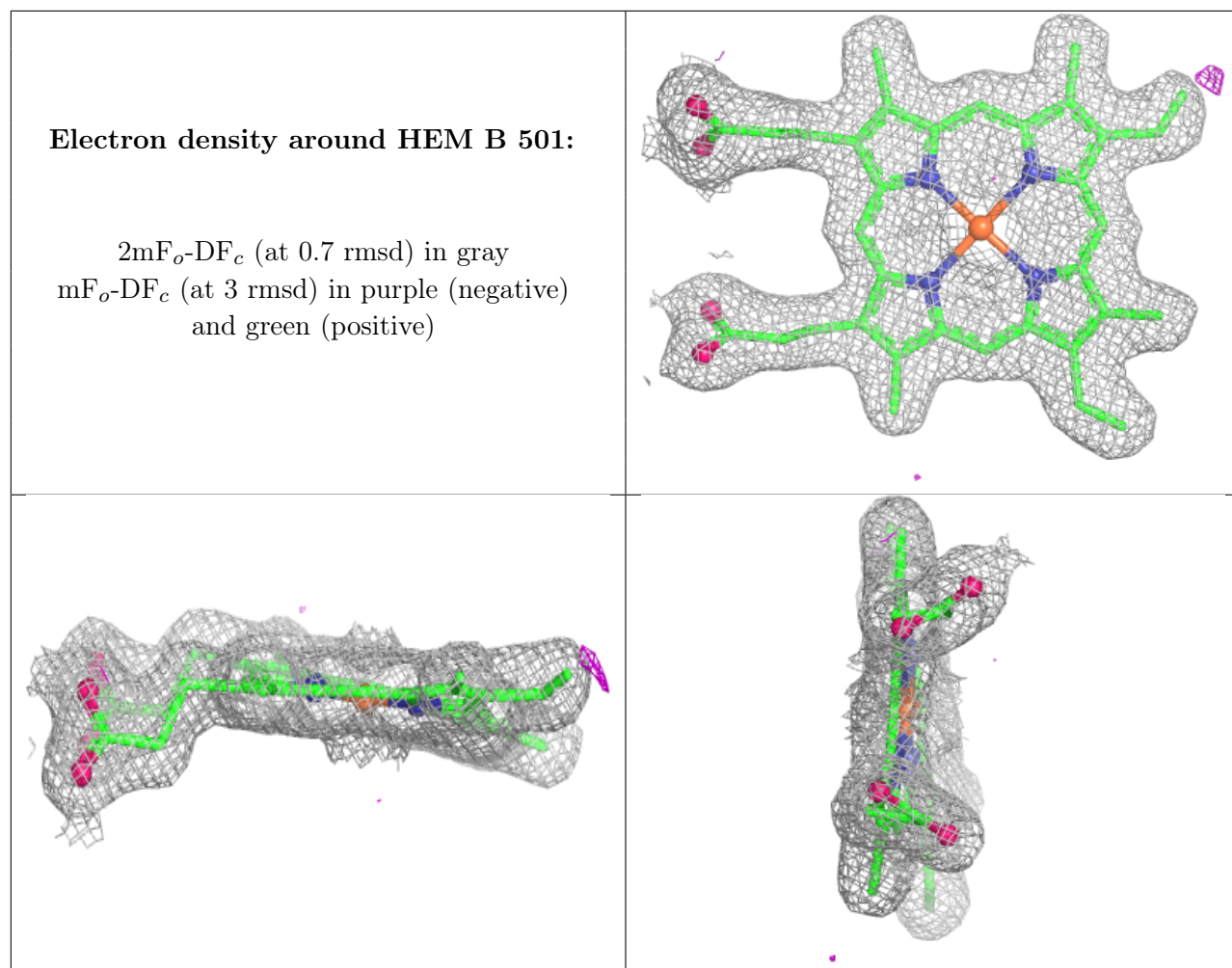
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around HEM A 502:**

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





## 6.5 Other polymers [i](#)

There are no such residues in this entry.