



Full wwPDB EM Validation Report ⓘ

Mar 2, 2026 – 02:39 AM JST

PDB ID : 9UU3 / pdb_00009uu3
EMDB ID : EMD-64504
Title : Cryo-EM structure of the maize CER6-GL2 complex bound with CoA
Authors : Liu, Y.; Zhang, P.
Deposited on : 2025-05-05
Resolution : 3.01 Å (reported)

This is a Full wwPDB EM 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/EMValidationReportHelp>

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:

EMDB validation analysis : **FAILED**
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4-5-2 with Phenix2.0
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics : **NOT EXECUTED**
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.48.1

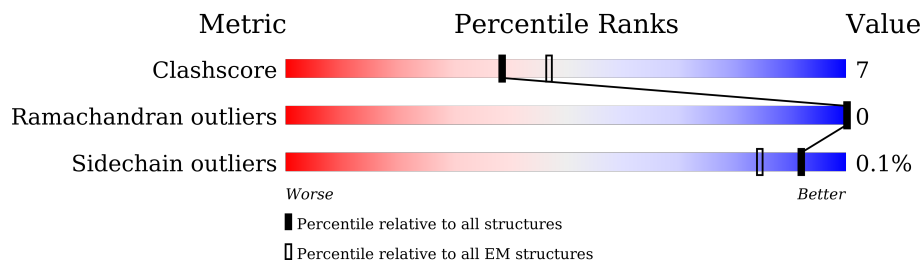
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.01 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)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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

Mol	Chain	Length	Quality of chain
1	A	434	
1	D	434	
2	B	500	
2	C	500	

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 13084 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 Protein ECERIFERUM 26-like.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	411	Total 3107	C 1963	N 547	O 583	S 14	0	0
1	D	411	Total 3107	C 1963	N 547	O 583	S 14	0	0

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-7	ASP	-	expression tag	UNP A0A804MAL4
A	-6	TYR	-	expression tag	UNP A0A804MAL4
A	-5	LYS	-	expression tag	UNP A0A804MAL4
A	-4	ASP	-	expression tag	UNP A0A804MAL4
A	-3	ASP	-	expression tag	UNP A0A804MAL4
A	-2	ASP	-	expression tag	UNP A0A804MAL4
A	-1	ASP	-	expression tag	UNP A0A804MAL4
A	0	LYS	-	expression tag	UNP A0A804MAL4
D	-7	ASP	-	expression tag	UNP A0A804MAL4
D	-6	TYR	-	expression tag	UNP A0A804MAL4
D	-5	LYS	-	expression tag	UNP A0A804MAL4
D	-4	ASP	-	expression tag	UNP A0A804MAL4
D	-3	ASP	-	expression tag	UNP A0A804MAL4
D	-2	ASP	-	expression tag	UNP A0A804MAL4
D	-1	ASP	-	expression tag	UNP A0A804MAL4
D	0	LYS	-	expression tag	UNP A0A804MAL4

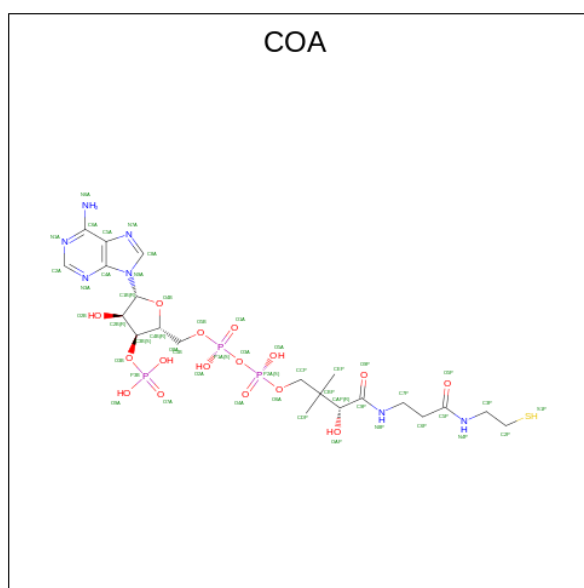
- Molecule 2 is a protein called 3-ketoacyl-CoA synthase.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	C	427	Total 3387	C 2152	N 611	O 601	S 23	0	0
2	B	427	Total 3387	C 2152	N 611	O 601	S 23	0	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-5	HIS	-	expression tag	UNP B4G0N2
C	-4	HIS	-	expression tag	UNP B4G0N2
C	-3	HIS	-	expression tag	UNP B4G0N2
C	-2	HIS	-	expression tag	UNP B4G0N2
C	-1	HIS	-	expression tag	UNP B4G0N2
C	0	HIS	-	expression tag	UNP B4G0N2
B	-5	HIS	-	expression tag	UNP B4G0N2
B	-4	HIS	-	expression tag	UNP B4G0N2
B	-3	HIS	-	expression tag	UNP B4G0N2
B	-2	HIS	-	expression tag	UNP B4G0N2
B	-1	HIS	-	expression tag	UNP B4G0N2
B	0	HIS	-	expression tag	UNP B4G0N2

- Molecule 3 is COENZYME A (CCD ID: COA) (formula: $C_{21}H_{36}N_7O_{16}P_3S$) (labeled as "Ligand of Interest" by depositor).




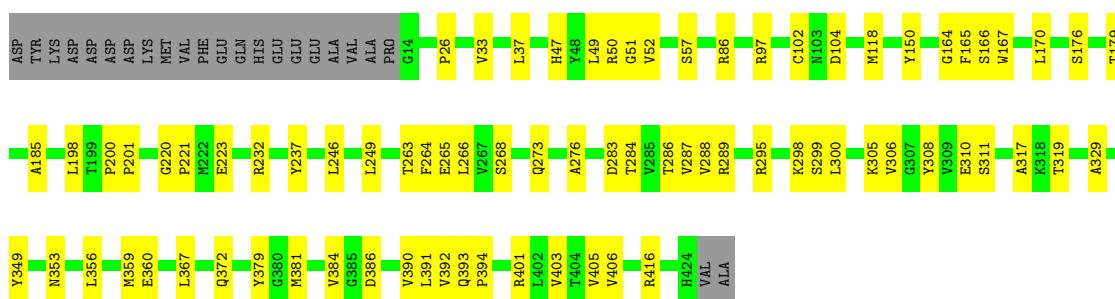
Mol	Chain	Residues	Atoms					AltConf	
			Total	C	N	O	P		S
3	C	1	Total	C	N	O	P	S	0
			48	21	7	16	3	1	
3	B	1	Total	C	N	O	P	S	0
			48	21	7	16	3	1	

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. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

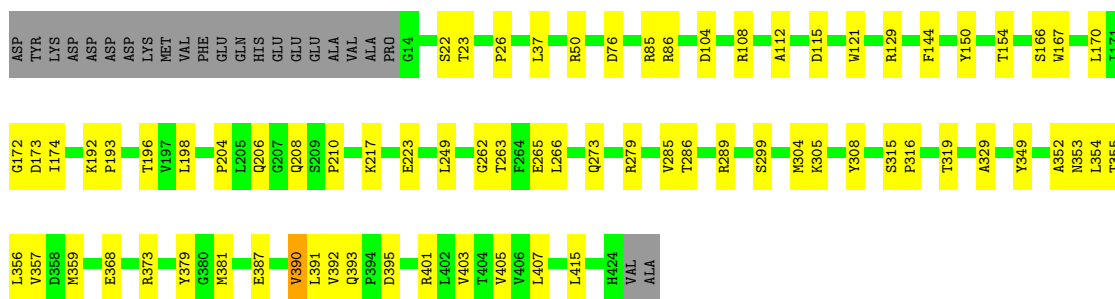
- Molecule 1: Protein ECERIFERUM 26-like

Chain A:  76% 18% 5%




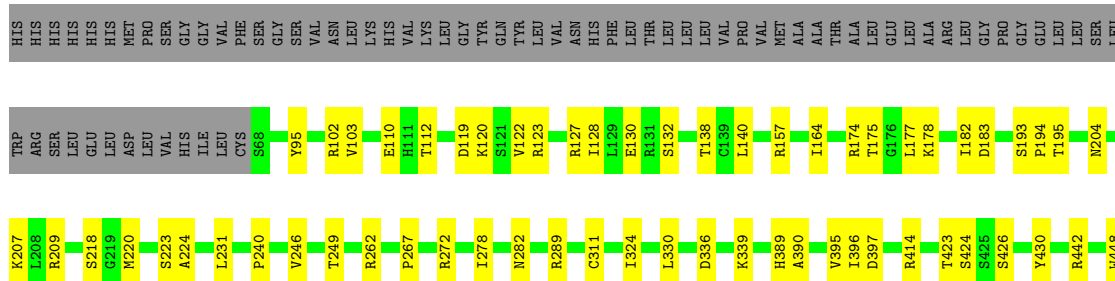
- Molecule 1: Protein ECERIFERUM 26-like

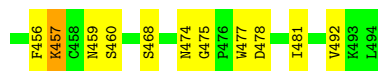
Chain D:  78% 17% 5%



- Molecule 2: 3-ketoacyl-CoA synthase

Chain C:  71% 14% 15%





• Molecule 2: 3-ketoacyl-CoA synthase

Chain B: 75% 10% 15%



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	47973	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2200	Depositor
Magnification	Not provided	
Image detector	TFS FALCON 4i (4k x 4k)	Depositor

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: COA

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	0.21	0/3173	0.49	0/4315
1	D	0.24	1/3173 (0.0%)	0.50	0/4315
2	B	0.24	0/3465	0.47	0/4689
2	C	0.29	1/3465 (0.0%)	0.47	0/4689
All	All	0.25	2/13276 (0.0%)	0.48	0/18008

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	457	LYS	C-N	5.64	1.40	1.33
1	D	174	ILE	C-N	-5.46	1.25	1.33

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	3107	0	3082	47	0
1	D	3107	0	3082	43	0
2	B	3387	0	3424	38	0
2	C	3387	0	3424	54	0
3	B	48	0	32	13	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	C	48	0	32	12	0
All	All	13084	0	13076	186	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 7.

All (186) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:120:LYS:HD3	2:C:262:ARG:HH21	1.05	1.12
2:C:120:LYS:HD3	2:C:262:ARG:NH2	1.71	1.06
2:C:120:LYS:CD	2:C:262:ARG:HH21	1.84	0.89
3:C:501:COA:H132	3:C:501:COA:O4A	1.77	0.85
2:C:389:HIS:HE2	3:C:501:COA:HS1	1.25	0.84
2:C:389:HIS:NE2	3:C:501:COA:S1P	2.51	0.84
3:B:501:COA:H8A	3:B:501:COA:O2A	1.80	0.81
2:C:120:LYS:HD3	2:C:262:ARG:CZ	2.18	0.73
3:C:501:COA:O9P	3:C:501:COA:H121	1.89	0.73
2:C:130:GLU:HG3	2:C:492:VAL:H	1.57	0.70
2:C:311:CYS:HG	2:C:456:PHE:HE2	1.41	0.69
2:C:120:LYS:HD3	2:C:262:ARG:HE	1.59	0.67
2:C:120:LYS:HD3	2:C:262:ARG:NE	2.10	0.67
1:D:150:TYR:HB2	1:D:166:SER:HB3	1.77	0.66
3:C:501:COA:H143	3:C:501:COA:P2A	2.37	0.65
1:D:381:MET:HG2	1:D:391:LEU:HD11	1.80	0.64
1:D:265:GLU:HG2	1:D:329:ALA:HB2	1.79	0.64
3:C:501:COA:H143	3:C:501:COA:O5A	1.98	0.63
1:D:76:ASP:HB3	1:D:196:THR:HG21	1.82	0.62
2:C:120:LYS:CD	2:C:262:ARG:HE	2.12	0.61
2:C:231:LEU:HD11	2:B:231:LEU:HD11	1.83	0.61
1:A:289:ARG:HB2	1:A:305:LYS:HB2	1.82	0.60
2:B:331:MET:HE1	3:B:501:COA:HN8	1.66	0.60
1:D:390:VAL:HG12	1:D:405:VAL:HG23	1.83	0.60
2:B:177:LEU:HD21	2:B:182:ILE:HD11	1.83	0.60
2:B:331:MET:CE	3:B:501:COA:HN8	2.14	0.59
2:B:220:MET:HB2	2:B:224:ALA:HB2	1.85	0.59
2:B:230:ASP:HB2	2:B:297:VAL:HG11	1.85	0.58
2:C:218:SER:HB3	2:B:218:SER:HB2	1.85	0.58
1:D:50:ARG:NH1	1:D:166:SER:OG	2.36	0.58
2:C:112:THR:HG22	2:C:122:VAL:HG12	1.86	0.57
3:C:501:COA:H132	3:C:501:COA:P2A	2.44	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:112:ALA:HB3	1:D:154:THR:HG22	1.88	0.56
1:A:379:TYR:H	1:A:393:GLN:HE22	1.53	0.56
2:C:127:ARG:NH2	3:C:501:COA:O9A	2.39	0.56
1:A:359:MET:HE2	1:A:391:LEU:HB3	1.87	0.55
1:A:150:TYR:HB2	1:A:166:SER:HB3	1.86	0.55
1:A:359:MET:HE1	1:A:379:TYR:HB2	1.88	0.55
1:D:173:ASP:HB2	1:D:304:MET:HE2	1.87	0.55
1:A:287:VAL:HG12	1:A:356:LEU:HB2	1.89	0.55
2:B:246:VAL:HB	2:B:278:ILE:HB	1.87	0.55
2:C:246:VAL:HB	2:C:278:ILE:HB	1.88	0.55
1:D:359:MET:HE2	1:D:393:GLN:HB3	1.89	0.55
2:C:423:THR:OG1	2:C:424:SER:N	2.40	0.55
2:C:102:ARG:NH1	1:D:26:PRO:O	2.40	0.54
2:B:124:PHE:CZ	3:B:501:COA:H1B	2.42	0.54
2:C:223:SER:OG	2:C:459:ASN:ND2	2.40	0.54
2:B:331:MET:HE1	3:B:501:COA:N8P	2.23	0.54
2:B:331:MET:CE	3:B:501:COA:N8P	2.71	0.54
1:A:295:ARG:HH21	1:A:298:LYS:HG2	1.73	0.53
2:C:204:ASN:O	2:C:207:LYS:NZ	2.41	0.53
2:C:128:ILE:O	2:C:132:SER:HB2	2.09	0.53
1:D:273:GLN:NE2	1:D:319:THR:O	2.41	0.53
1:A:86:ARG:NH2	1:A:223:GLU:O	2.43	0.52
2:B:330:LEU:HD23	3:B:501:COA:H72	1.90	0.52
2:B:128:ILE:O	2:B:132:SER:HB2	2.10	0.52
1:A:284:THR:HG22	1:A:310:GLU:HG2	1.92	0.52
3:B:501:COA:O9P	3:B:501:COA:H133	2.09	0.52
1:A:392:VAL:HG12	1:A:403:VAL:HG22	1.92	0.52
2:C:220:MET:HB2	2:C:224:ALA:HB2	1.92	0.52
2:B:183:ASP:OD2	2:B:209:ARG:NH2	2.43	0.52
1:A:286:THR:HA	1:A:308:TYR:HA	1.92	0.52
2:C:267:PRO:HG2	2:C:324:ILE:HB	1.92	0.52
1:A:185:ALA:HB2	1:A:367:LEU:HD13	1.92	0.51
1:A:57:SER:H	1:A:372:GLN:HE22	1.56	0.51
2:C:110:GLU:OE1	1:D:108:ARG:NH2	2.38	0.51
1:D:349:TYR:HA	1:D:355:THR:HG21	1.93	0.51
2:B:267:PRO:HG2	2:B:324:ILE:HB	1.91	0.51
2:B:157:ARG:HH21	2:B:194:PRO:HB2	1.75	0.51
2:B:336:ASP:HA	2:B:339:LYS:HG2	1.93	0.51
1:A:50:ARG:NH1	1:A:166:SER:OG	2.44	0.50
2:C:157:ARG:HH21	2:C:194:PRO:HB2	1.77	0.50
1:D:167:TRP:NE1	1:D:172:GLY:O	2.30	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:477:TRP:HB3	2:C:481:ILE:HD13	1.92	0.50
1:A:37:LEU:O	1:A:97:ARG:NH2	2.43	0.50
1:D:26:PRO:HD2	1:D:104:ASP:HB3	1.94	0.50
1:D:198:LEU:HA	1:D:299:SER:HB3	1.93	0.50
2:B:477:TRP:HB3	2:B:481:ILE:HD13	1.93	0.50
2:C:119:ASP:O	2:C:123:ARG:NH1	2.45	0.49
1:A:263:THR:OG1	1:A:401:ARG:NH1	2.44	0.49
1:D:392:VAL:HG12	1:D:403:VAL:HG22	1.95	0.49
2:B:95:TYR:O	2:B:430:TYR:OH	2.29	0.49
1:A:237:TYR:OH	1:A:416:ARG:NH1	2.40	0.49
2:C:164:ILE:HG12	2:C:249:THR:HG21	1.94	0.49
1:A:52:VAL:HA	1:A:164:GLY:HA2	1.95	0.49
1:D:368:GLU:OE1	1:D:373:ARG:NH2	2.46	0.49
1:D:208:GLN:HG2	1:D:210:PRO:HD3	1.95	0.48
1:A:286:THR:HG23	1:A:353:ASN:HB2	1.93	0.48
1:D:86:ARG:NH2	1:D:223:GLU:O	2.40	0.48
1:D:286:THR:HG22	1:D:353:ASN:HB2	1.94	0.48
2:C:311:CYS:SG	2:C:456:PHE:HE2	2.35	0.48
1:D:289:ARG:HB2	1:D:305:LYS:HB2	1.94	0.48
1:D:356:LEU:HA	1:D:390:VAL:HG22	1.96	0.48
2:C:220:MET:CE	2:C:457:LYS:HE2	2.44	0.48
1:D:121:TRP:O	1:D:129:ARG:NH1	2.39	0.48
1:D:286:THR:HA	1:D:308:TYR:HA	1.95	0.48
2:B:394:ALA:HB3	3:B:501:COA:OAP	2.14	0.48
2:C:174:ARG:NH2	2:C:474:ASN:O	2.47	0.47
3:C:501:COA:H71	3:C:501:COA:OAP	2.14	0.47
1:D:192:LYS:HD3	1:D:193:PRO:HD2	1.96	0.47
2:B:85:ARG:NH1	2:B:237:GLN:O	2.47	0.47
1:A:198:LEU:HA	1:A:299:SER:HB2	1.96	0.47
1:D:37:LEU:HD13	1:D:170:LEU:HD11	1.96	0.47
1:A:26:PRO:HD2	1:A:104:ASP:HB3	1.96	0.47
2:B:439:GLY:O	2:B:442:ARG:NH2	2.44	0.47
2:C:240:PRO:HA	2:C:282:ASN:HD21	1.80	0.47
2:C:183:ASP:OD1	2:C:209:ARG:NH2	2.48	0.46
2:C:177:LEU:HD21	2:C:182:ILE:HD11	1.98	0.46
2:C:442:ARG:NH1	2:C:468:SER:OG	2.48	0.46
1:A:288:VAL:HG12	1:A:306:VAL:HG22	1.98	0.46
2:C:475:GLY:N	2:C:478:ASP:OD2	2.49	0.46
2:C:95:TYR:O	2:C:430:TYR:OH	2.30	0.46
2:C:330:LEU:HD21	3:C:501:COA:H61	1.97	0.46
2:C:103:VAL:HG21	2:C:140:LEU:HD12	1.97	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:390:ALA:HA	2:C:396:ILE:HD11	1.97	0.45
2:C:193:SER:O	2:C:193:SER:OG	2.32	0.45
1:A:246:LEU:HA	1:A:249:LEU:HD12	1.99	0.45
2:C:448:TRP:NE1	2:C:460:SER:OG	2.42	0.45
2:C:128:ILE:O	2:C:132:SER:CB	2.64	0.45
1:D:357:VAL:HB	1:D:391:LEU:HD23	1.98	0.45
2:B:286:GLU:OE1	2:B:289:ARG:NH2	2.50	0.45
1:D:217:LYS:HB2	1:D:352:ALA:HB2	1.99	0.44
2:C:395:VAL:HG21	3:C:501:COA:H62	1.99	0.44
1:A:283:ASP:OD2	1:A:311:SER:OG	2.35	0.44
1:A:33:VAL:HB	1:A:102:CYS:HB2	1.98	0.44
2:C:138:THR:HB	2:C:272:ARG:HG3	2.00	0.44
1:D:285:VAL:HG22	1:D:354:LEU:HB3	1.99	0.44
1:A:390:VAL:HG12	1:A:405:VAL:HG23	2.00	0.44
2:B:119:ASP:O	2:B:123:ARG:NH1	2.50	0.43
2:B:493:LYS:HA	2:B:493:LYS:HD3	1.88	0.43
1:D:22:SER:OG	1:D:23:THR:N	2.50	0.43
1:A:381:MET:HE3	1:A:381:MET:HB3	1.84	0.43
1:A:179:THR:OG1	1:A:298:LYS:NZ	2.47	0.43
1:A:49:LEU:HB2	1:A:167:TRP:HB3	1.99	0.43
2:C:195:THR:HB	2:B:314:GLU:HB2	2.00	0.43
1:D:204:PRO:O	1:D:206:GLN:NE2	2.51	0.43
1:A:176:SER:HB2	1:A:300:LEU:HD23	2.00	0.43
1:A:200:PRO:HA	1:A:201:PRO:HD3	1.88	0.43
1:D:395:ASP:OD1	1:D:395:ASP:N	2.48	0.43
1:A:104:ASP:HB2	2:B:104:PRO:HG2	1.99	0.43
1:A:249:LEU:HD22	1:A:266:LEU:HB3	2.01	0.43
2:C:120:LYS:CG	2:C:262:ARG:HH21	2.29	0.43
2:C:397:ASP:HB3	2:C:414:ARG:HH22	1.83	0.43
1:A:37:LEU:HD13	1:A:170:LEU:HD11	2.01	0.43
1:D:315:SER:O	1:D:319:THR:OG1	2.36	0.43
2:C:220:MET:HE2	2:C:457:LYS:HE2	2.00	0.42
2:C:175:THR:O	2:C:289:ARG:NH1	2.52	0.42
2:C:209:ARG:HE	2:C:209:ARG:HB2	1.59	0.42
2:C:424:SER:HB2	2:C:426:SER:H	1.85	0.42
1:D:115:ASP:OD1	1:D:115:ASP:N	2.42	0.42
1:D:85:ARG:NH1	1:D:144:PHE:O	2.50	0.42
2:B:391:GLY:CA	3:B:501:COA:H31	2.50	0.42
1:A:273:GLN:NE2	1:A:319:THR:O	2.52	0.42
1:D:262:GLY:HA2	1:D:266:LEU:HD13	2.01	0.42
1:A:384:VAL:HG21	1:A:406:VAL:HG11	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:273:GLN:NE2	1:D:316:PRO:O	2.51	0.42
2:B:393:ARG:NH2	2:B:489:PRO:O	2.50	0.42
1:A:360:GLU:HA	1:A:394:PRO:HD3	2.02	0.42
2:B:330:LEU:CD2	3:B:501:COA:H72	2.50	0.42
3:B:501:COA:O9P	3:B:501:COA:H121	2.20	0.42
1:D:249:LEU:HB2	1:D:266:LEU:HD23	2.02	0.41
2:B:399:LEU:HD12	2:B:399:LEU:HA	1.87	0.41
1:A:51:GLY:O	1:A:165:PHE:N	2.39	0.41
2:B:138:THR:HB	2:B:272:ARG:HG3	2.01	0.41
2:B:125:GLN:NE2	2:B:265:LEU:HB3	2.36	0.41
1:A:232:ARG:NH1	1:A:386:ASP:O	2.54	0.41
1:A:264:PHE:HD1	1:A:392:VAL:HG21	1.86	0.41
1:A:359:MET:HE3	1:A:393:GLN:HB3	2.02	0.41
1:A:47:HIS:CE1	1:A:349:TYR:H	2.39	0.41
1:D:407:LEU:HD11	1:D:415:LEU:HD13	2.02	0.41
2:B:361:ARG:HA	2:B:361:ARG:HD3	1.82	0.41
2:B:394:ALA:CB	3:B:501:COA:OAP	2.68	0.41
2:B:193:SER:O	2:B:193:SER:OG	2.32	0.41
1:A:220:GLY:HA2	1:A:221:PRO:HD3	1.92	0.41
2:B:127:ARG:HB3	2:B:131:ARG:HH12	1.86	0.41
1:A:118:MET:HE2	1:A:118:MET:HB3	1.85	0.41
3:C:501:COA:O2B	3:C:501:COA:P3B	2.78	0.41
1:D:263:THR:HB	1:D:401:ARG:HH12	1.86	0.40
1:A:268:SER:HB2	1:A:356:LEU:HD13	2.02	0.40
2:C:178:LYS:HE3	2:C:178:LYS:HB2	1.91	0.40
2:B:129:LEU:HD12	2:B:129:LEU:HA	1.97	0.40
1:A:265:GLU:HG2	1:A:329:ALA:HB2	2.03	0.40
1:A:276:ALA:HB1	1:A:317:ALA:HA	2.03	0.40
2:C:336:ASP:HA	2:C:339:LYS:HG2	2.04	0.40
1:D:279:ARG:NH2	1:D:387:GLU:O	2.43	0.40
1:D:379:TYR:H	1:D:393:GLN:HE22	1.69	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 PDB entries followed by that with respect to all EM entries.

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	409/434 (94%)	370 (90%)	39 (10%)	0	100	100
1	D	409/434 (94%)	374 (91%)	35 (9%)	0	100	100
2	B	425/500 (85%)	404 (95%)	21 (5%)	0	100	100
2	C	425/500 (85%)	404 (95%)	21 (5%)	0	100	100
All	All	1668/1868 (89%)	1552 (93%)	116 (7%)	0	100	100

There are no Ramachandran outliers to report.

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 PDB entries followed by that with respect to all EM entries.

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	320/340 (94%)	320 (100%)	0	100	100
1	D	320/340 (94%)	319 (100%)	1 (0%)	91	96
2	B	372/435 (86%)	372 (100%)	0	100	100
2	C	372/435 (86%)	372 (100%)	0	100	100
All	All	1384/1550 (89%)	1383 (100%)	1 (0%)	92	97

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	390	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	132	GLN
1	A	250	HIS
1	A	273	GLN
1	A	393	GLN

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Mol	Chain	Res	Type
2	C	211	ASN
2	C	296	HIS
2	C	369	ASN
2	C	418	HIS
2	C	449	GLN
2	C	459	ASN
2	C	482	HIS
1	D	19	HIS
1	D	206	GLN
1	D	251	GLN
1	D	273	GLN
1	D	343	GLN
2	B	145	HIS
2	B	188	ASN
2	B	204	ASN
2	B	459	ASN

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](#)

2 ligands are modelled in this entry.

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
3	COA	C	501	-	41,50,50	0.73	1 (2%)	52,75,75	0.84	0
3	COA	B	501	-	41,50,50	0.70	1 (2%)	52,75,75	0.98	2 (3%)

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
3	COA	C	501	-	-	21/44/64/64	0/3/3/3
3	COA	B	501	-	-	21/44/64/64	0/3/3/3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	501	COA	C8A-N7A	-2.05	1.31	1.34
3	B	501	COA	C8A-N7A	-2.00	1.31	1.34

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	501	COA	C7P-C6P-C5P	-3.73	106.15	112.36
3	B	501	COA	OAP-CAP-CBP	-2.04	105.45	110.25

There are no chirality outliers.

All (42) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	501	COA	P2A-O3A-P1A-O5B
3	C	501	COA	CCP-O6A-P2A-O3A
3	C	501	COA	CBP-CCP-O6A-P2A
3	C	501	COA	CAP-CBP-CCP-O6A
3	C	501	COA	OAP-CAP-CBP-CCP
3	C	501	COA	C9P-CAP-CBP-CCP
3	C	501	COA	OAP-CAP-CBP-CDP
3	C	501	COA	C9P-CAP-CBP-CDP
3	C	501	COA	OAP-CAP-CBP-CEP
3	C	501	COA	C9P-CAP-CBP-CEP
3	C	501	COA	CAP-C9P-N8P-C7P
3	C	501	COA	O9P-C9P-N8P-C7P

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Mol	Chain	Res	Type	Atoms
3	C	501	COA	S1P-C2P-C3P-N4P
3	B	501	COA	CCP-O6A-P2A-O4A
3	B	501	COA	CAP-CBP-CCP-O6A
3	B	501	COA	O9P-C9P-CAP-CBP
3	B	501	COA	N8P-C9P-CAP-CBP
3	B	501	COA	O9P-C9P-CAP-OAP
3	B	501	COA	N8P-C9P-CAP-OAP
3	B	501	COA	CAP-C9P-N8P-C7P
3	B	501	COA	C6P-C5P-N4P-C3P
3	B	501	COA	S1P-C2P-C3P-N4P
3	B	501	COA	O5P-C5P-N4P-C3P
3	B	501	COA	O9P-C9P-N8P-C7P
3	B	501	COA	C4B-C3B-O3B-P3B
3	C	501	COA	CDP-CBP-CCP-O6A
3	B	501	COA	C2B-C3B-O3B-P3B
3	C	501	COA	C4B-C5B-O5B-P1A
3	C	501	COA	CEP-CBP-CCP-O6A
3	B	501	COA	CEP-CBP-CCP-O6A
3	B	501	COA	C4B-C5B-O5B-P1A
3	B	501	COA	C3B-O3B-P3B-O7A
3	C	501	COA	C5P-C6P-C7P-N8P
3	B	501	COA	CCP-O6A-P2A-O3A
3	C	501	COA	CCP-O6A-P2A-O4A
3	B	501	COA	CCP-O6A-P2A-O5A
3	C	501	COA	O9P-C9P-CAP-CBP
3	B	501	COA	CDP-CBP-CCP-O6A
3	C	501	COA	N8P-C9P-CAP-CBP
3	B	501	COA	C3B-C4B-C5B-O5B
3	C	501	COA	C5B-O5B-P1A-O1A
3	B	501	COA	C5B-O5B-P1A-O1A

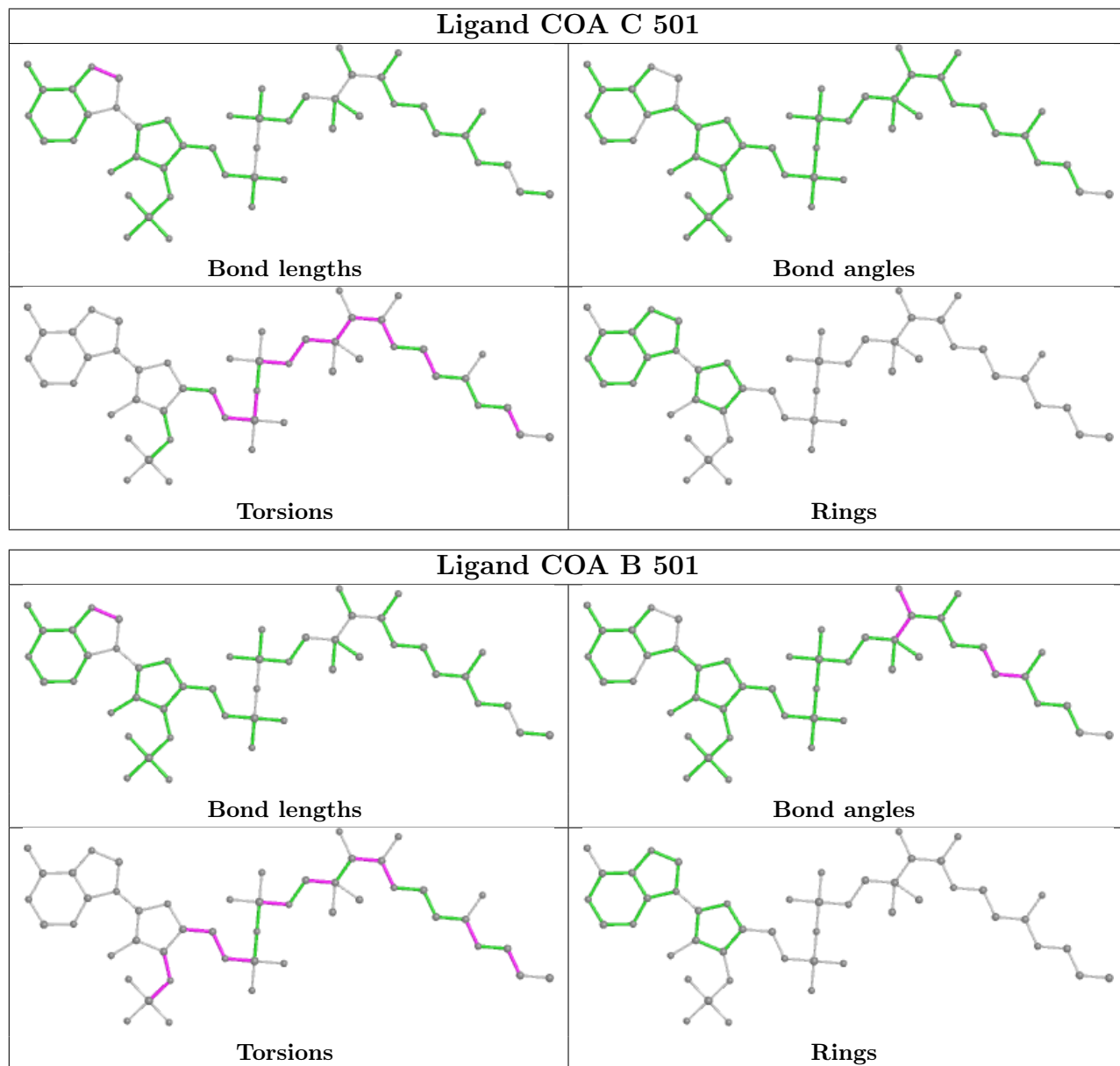
There are no ring outliers.

2 monomers are involved in 25 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	501	COA	12	0
3	B	501	COA	13	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

There are no chain breaks in this entry.