



wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 15, 2024 – 01:31 PM EDT

PDB ID : 2VKZ
Title : Structure of the cerulenin-inhibited fungal fatty acid synthase type I multienzyme complex
Authors : Johansson, P.; Wiltschi, B.; Kumari, P.; Kessler, B.; Vonrhein, C.; Vonck, J.; Oesterhelt, D.; Gringer, M.
Deposited on : 2008-01-07
Resolution : 4.00 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 1.20.1
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

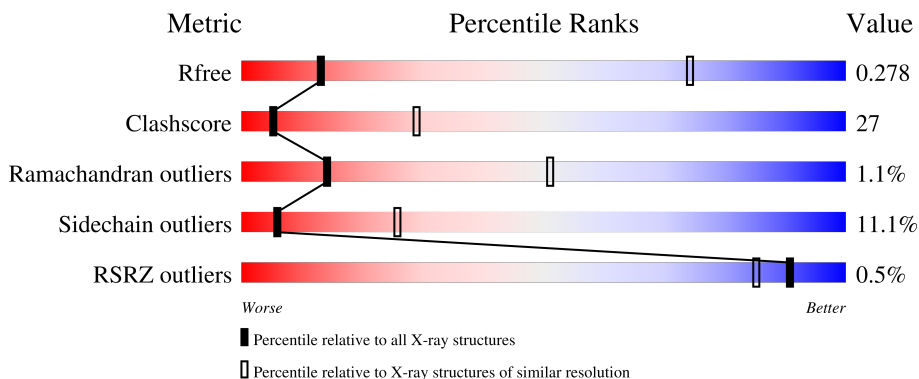
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 4.00 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.



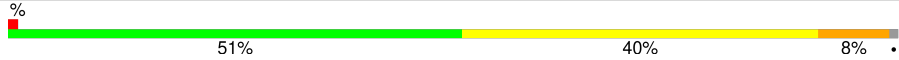

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1087 (4.30-3.70)
Clashscore	141614	1148 (4.30-3.70)
Ramachandran outliers	138981	1108 (4.30-3.70)
Sidechain outliers	138945	1099 (4.30-3.70)
RSRZ outliers	127900	1028 (4.34-3.66)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	1887	
1	B	1887	
1	C	1887	
2	G	2051	

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Mol	Chain	Length	Quality of chain
2	H	2051	 <p>%</p> <p>51% 40% 8%</p>
2	I	2051	 <p>51% 40% 8%</p>

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 85959 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.

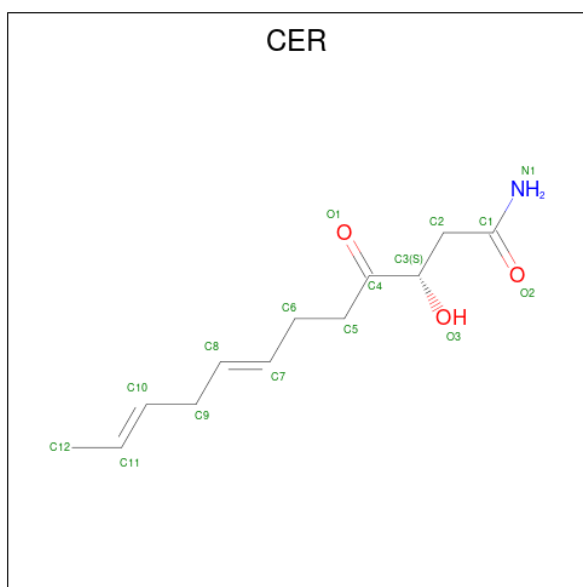
- Molecule 1 is a protein called FATTY ACID SYNTHASE SUBUNIT ALPHA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	1614	12615	7997	2127	2443	48	0	0	0
1	B	1614	12615	7997	2127	2443	48	0	0	0
1	C	1614	12615	7997	2127	2443	48	0	0	0

- Molecule 2 is a protein called FATTY ACID SYNTHASE SUBUNIT BETA.

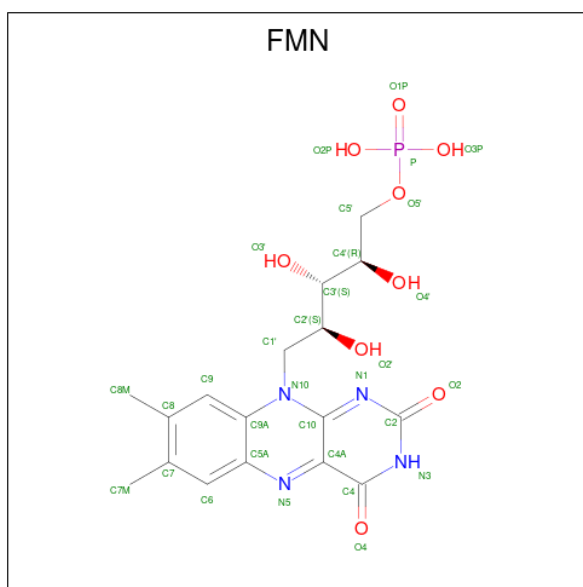
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	G	2033	15995	10253	2660	3026	56	0	0	0
2	H	2033	15995	10253	2660	3026	56	0	0	0
2	I	2033	15995	10253	2660	3026	56	0	0	0

- Molecule 3 is (2S, 3R)-3-HYDROXY-4-OXO-7,10-TRANS,TRANS-DODECADIENAMIDE (three-letter code: CER) (formula: C₁₂H₁₉NO₃).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			12	8	1	3		
3	B	1	Total	C	N	O	0	0
			12	8	1	3		
3	C	1	Total	C	N	O	0	0
			12	8	1	3		

- Molecule 4 is FLAVIN MONONUCLEOTIDE (three-letter code: FMN) (formula: C₁₇H₂₁N₄O₉P).

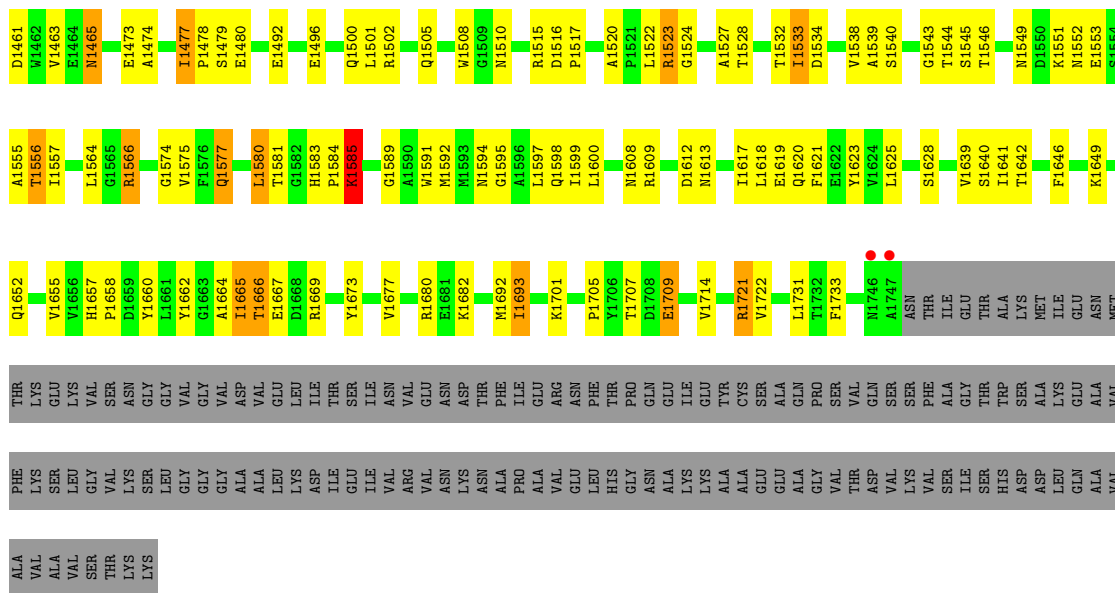


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	G	1	Total	C	N	O	P	0	0
			31	17	4	9	1		

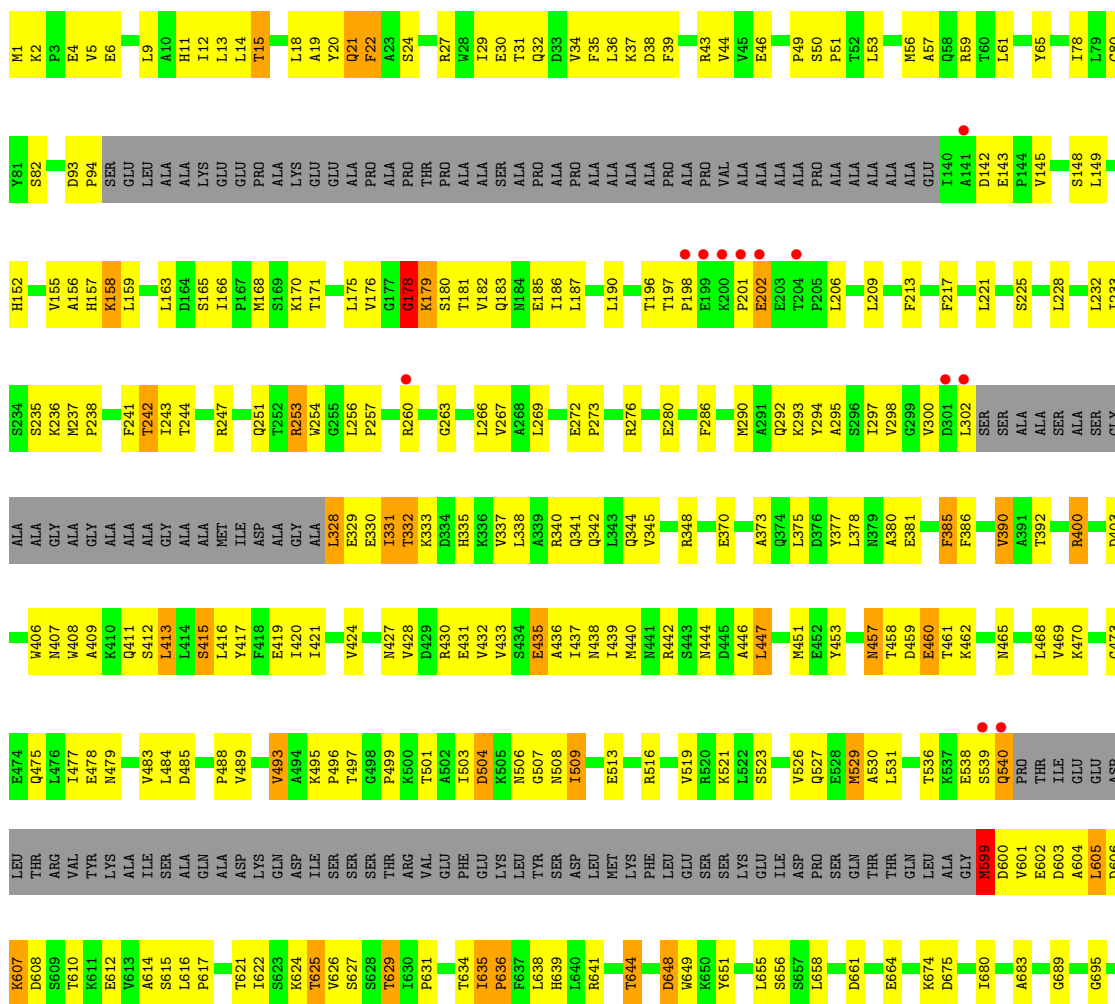
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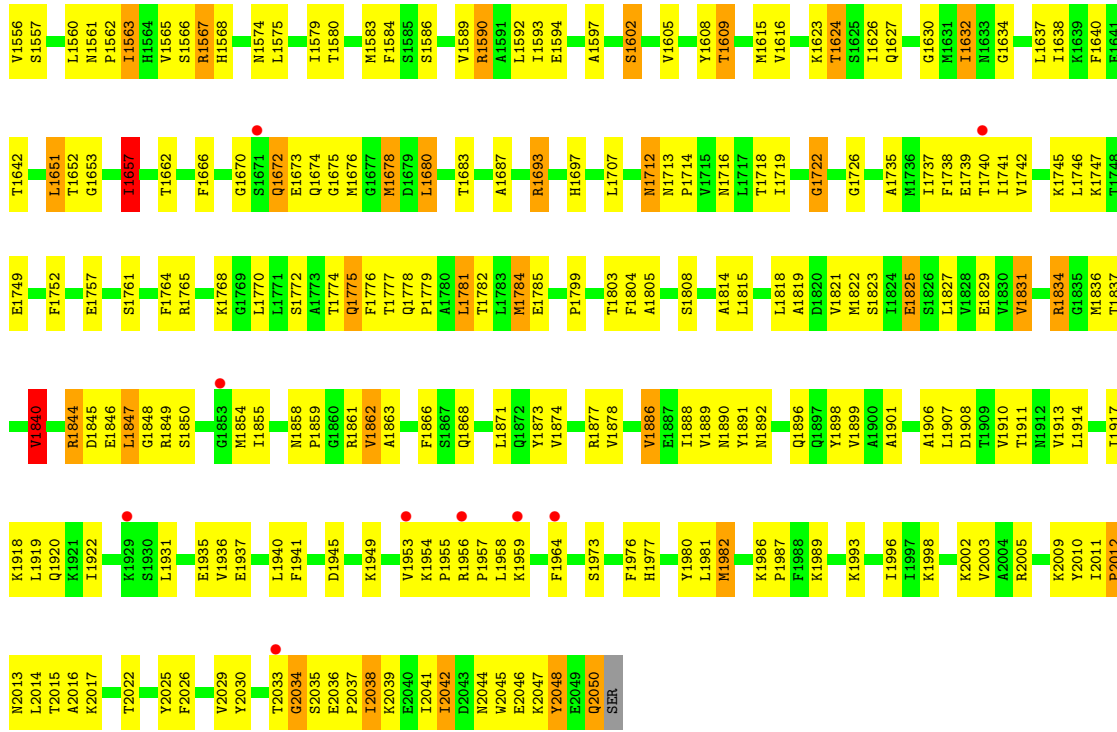
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	H	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
4	I	1	Total	C	N	O	P	0	0
			31	17	4	9	1		



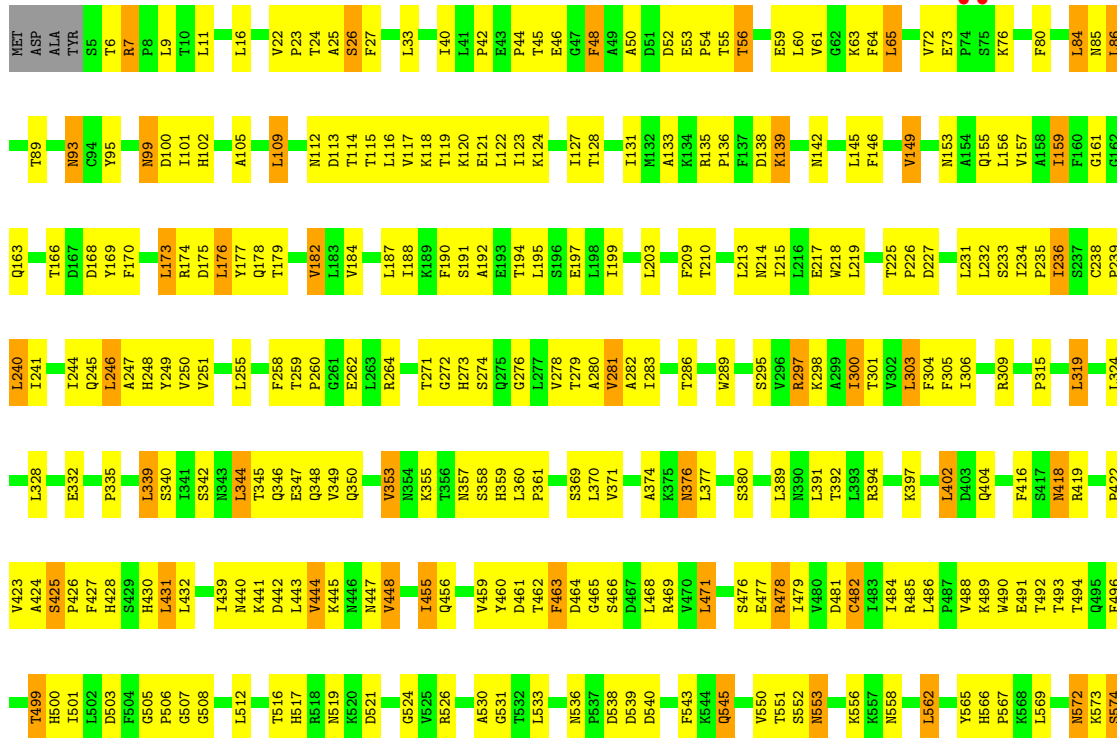
● Molecule 1: FATTY ACID SYNTHASE SUBUNIT ALPHA

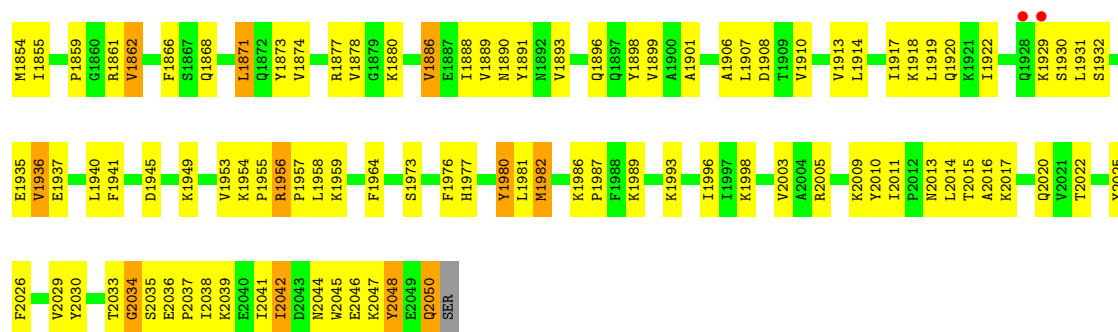


D1458	T1374	F1279	L1197	VAL	L1040	T945	A858	E784	W716	I634	Y565	C482	L402	P315
K1462	V1377	D1290	S1198	GLN	E1041	F946	T859	W785	I717	W638	L668	I483	D403	R318
T1463	I1378	P1281	SER	GLN	V1043	T947	R860	T787	W718	V638	L569	I484	Q404	S318
T1468	V1381	V1284	ASP	VAL	D1045	D948	K866	F789	A720	E642	N572	R486	S405	L319
E1469	V1382	L1292	SER	ASP	Q1046	F950	F867	W790	K721	K643	K573	P487	R407	P320
T1470	M1383	T1293	SER	VAL	V1048	R952	F868	Y791	A722	S644	S574	P408	P409	P321
V1472	M1383	L1294	SER	VAL	Q1049	F953	D869	F792	H723	S645	S575	K489	F409	L324
T1473	G1387	K1295	VAL	VAL	R1050	E954	F870	W793	F726	G648	K576	W490	F416	L328
F1474	K1388	E1296	SER	SER	R1051	E955	T871	M794	P727	G649	K577	E491	S417	L328
K1475	I1389	F1300	GLU	GLU	C1052	E956	R872	T1051	I728	I649	F578	T492	M418	E332
S1481	V1390	I1219	D1123	D1123	L1053	K860	F873	F796	A729	W730	S580	T493	R419	E332
S1482	Q1220	Q1220	K1128	K1128	L1054	Y860	D797	D797	L730	I652	T581	T494	F420	P335
S1483	M1221	M1221	L1129	L1129	L1058	L964	F798	G798	Q731	V653	F581	P496	L421	P335
F1486	E1222	E1222	T1130	T1130	A1058	I967	W881	F799	W732	V654	F583	P422	P422	M338
V1491	M1223	M1223	T1133	T1133	A1059	Y970	P882	R804	R736	M658	S584	T499	V423	M338
E1492	R1227	R1227	D1134	D1134	A1060	S971	K887	R805	G739	L659	K585	H500	A424	L339
L1493	T1228	T1228	E1135	E1135	Q1061	S972	R888	I807	H740	I663	L586	P504	V426	S340
P1494	G1231	G1231	W1138	W1138	T1063	L973	R892	I807	H741	P664	L587	F504	H428	S342
K1496	K1232	K1232	S1145	S1145	I1066	Y887	R894	R810	S742	L665	P591	L512	L431	T345
E1497	V1233	V1233	E1146	E1146	E1068	Q893	R895	K812	D745	I666	V594	T516	L432	Q346
T1498	V1234	V1234	I1147	I1147	P1069	K998	R896	T813	A746	K667	P595	H517	V433	E347
V1499	S1235	S1235	M1148	M1148	L1070	L995	D898	D816	T748	L669	G596	T516	V349	Q348
E1500	L1236	L1236	W1149	W1149	K1071	L995	D898	A817	T749	L669	G597	K520	N440	Q350
I1501	P1237	P1237	R1150	R1150	K1071	L995	D898	A817	T749	L669	G597	D521	K441	V353
C1502	L1238	L1238	H1151	H1151	M1074	Q988	Q900	K818	W750	R670	T598	D522	D442	K354
I1503	M1241	M1241	A1152	A1152	D1075	Q989	K901	L751	L751	V674	P599	G522	L443	K356
V1504	F1242	F1242	I1159	I1159	G1076	I1000	F902	I821	G752	P675	G600	P537	L444	N357
V1505	N1243	N1243	Q1161	Q1161	I1077	D1001	W903	A822	W753	I676	T601	R526	V444	N357
Y1506	P1244	P1244	D1160	D1160	H1078	H1002	F904	A823	Y754	I677	V602	V527	K445	S358
A1510	G1247	G1247	D1162	D1162	G1080	L1004	T906	T825	I757	F678	S603	L533	M446	H359
S1511	S1252	S1252	K1163	K1163	H1081	S1065	Y907	G826	R758	G682	F606	L533	N447	L360
H1512	E1256	E1256	V1166	V1166	I1082	M1006	Q910	W827	R758	A683	V607	M536	V048	P361
P1515	E1257	E1257	S1167	S1167	K1083	P1010	A911	P828	H760	I455	P537	P537	I455	P361
T1526	N1258	N1258	N1168	N1168	L1085	M1011	R912	W832	P761	W690	T610	D538	Q456	S369
L1527	Q1260	Q1260	P1169	P1169	L1086	Q1012	D913	E834	W763	E693	N612	D539	L370	L370
E1528	Q1261	Q1261	I1170	I1170	Y1090	V1015	T916	W835	L765	V694	N612	D540	V371	V371
Q1529	R1261	R1261	K1172	K1172	G1091	P1016	Y836	Y836	I766	T697	Y615	F543	Y460	A374
K1530	I1262	I1262	V1173	V1173	D1092	F1017	E921	F767	F767	L698	T616	K594	D461	K375
S1438	K1263	K1263	F1174	F1174	D1093	P1019	P839	G768	G768	E618	Y616	K594	T462	N376
L1347	E1264	E1264	K1175	K1175	L1097	M1019	L926	T840	S769	Q699	L619	Q545	D464	L377
K1349	M1265	M1265	P1176	P1176	K1096	V1020	L926	T840	S769	Y702	A620	V550	C465	L377
V1350	Y1266	Y1266	S1177	S1177	I1097	L1021	L929	W844	G772	L703	G621	S551	S466	S380
V1351	L1269	L1269	M1180	M1180	V1100	R1024	I932	T845	S773	L703	G622	S552	R469	L389
H1352	W1270	W1270	V1181	V1181	E1101	F1025	I932	W846	A774	L705	G623	S553	R469	N390
M1355	I1271	I1271	Y1102	Y1102	F1103	E1026	Y938	E852	D775	K706	Y624	K556	V470	N390
M1359	D1272	D1272	F1103	F1103	I1027	I1027	F939	E852	I776	P707	G629	K557	L471	L391
I1360	E1273	E1273	P1109	P1109	K1031	K1031	T942	W855	I778	A712	M630	M558	S476	T392
V1368	F1275	F1275	V1195	V1195	D1032	D1032	W943	R856	P779	I713	T631	P589	E477	I393
			T1196	T1196	ASP	ASP	R944	I857	W780	Q715	A633	L562	D481	K397



• Molecule 2: FATTY ACID SYNTHASE SUBUNIT BETA





4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	231.90Å 231.90Å 756.80Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	24.99 – 4.00 24.99 – 4.00	Depositor EDS
% Data completeness (in resolution range)	97.3 (24.99-4.00) 97.3 (24.99-4.00)	Depositor EDS
R_{merge}	0.24	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.66 (at 3.97Å)	Xtrriage
Refinement program		Depositor
R, R_{free}	0.268 , 0.268 0.276 , 0.278	Depositor DCC
R_{free} test set	8547 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å ²)	130.2	Xtrriage
Anisotropy	0.319	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.24 , 76.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.36$, $\langle L^2 \rangle = 0.19$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.89	EDS
Total number of atoms	85959	wwPDB-VP
Average B, all atoms (Å ²)	164.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 1.69% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: FMN, CER

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	0.50	9/12855 (0.1%)	0.61	8/17369 (0.0%)
1	B	0.44	3/12855 (0.0%)	0.62	9/17369 (0.1%)
1	C	0.48	8/12855 (0.1%)	0.61	7/17369 (0.0%)
2	G	0.42	11/16360 (0.1%)	0.58	7/22198 (0.0%)
2	H	0.55	13/16360 (0.1%)	0.61	9/22198 (0.0%)
2	I	0.42	8/16360 (0.0%)	0.59	12/22198 (0.1%)
All	All	0.47	52/87645 (0.1%)	0.60	52/118701 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
2	G	0	1
2	H	0	3
2	I	0	1
All	All	0	5

The worst 5 of 52 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	H	1657	ILE	C-N	-32.81	0.58	1.34
2	H	559	PRO	C-N	23.37	1.87	1.34
1	A	485	ASP	C-N	18.89	1.77	1.34
1	C	1430	ARG	C-N	-13.61	1.02	1.34
2	H	1422	THR	C-N	-13.47	1.03	1.34

The worst 5 of 52 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	1657	ILE	O-C-N	-17.23	95.13	122.70
2	H	1657	ILE	CA-C-N	12.14	143.92	117.20
1	B	1116	PRO	O-C-N	-11.67	104.02	122.70
2	H	1657	ILE	C-N-CA	11.19	149.68	121.70
1	C	178	GLY	O-C-N	10.12	138.89	122.70

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	G	1108	PRO	Peptide
2	H	1108	PRO	Peptide
2	H	1256	GLU	Mainchain
2	H	1657	ILE	Mainchain
2	I	1108	PRO	Peptide

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	12615	0	12589	601	1
1	B	12615	0	12591	582	6
1	C	12615	0	12587	588	0
2	G	15995	0	15975	998	10
2	H	15995	0	15974	997	7
2	I	15995	0	15976	977	12
3	A	12	0	10	3	0
3	B	12	0	10	4	0
3	C	12	0	10	4	0
4	G	31	0	19	7	0
4	H	31	0	19	6	0
4	I	31	0	19	8	0
All	All	85959	0	85779	4568	18

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 27.

The worst 5 of 4568 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:485:ASP:C	1:A:486:VAL:N	1.77	1.36
2:H:559:PRO:C	2:H:560:ASN:N	1.87	1.26
2:H:1956:ARG:HB2	2:H:1957:PRO:HD3	1.24	1.18
2:G:28:PHE:CE2	2:H:7:ARG:HD2	1.80	1.16
2:G:1859:PRO:HG3	2:G:1871:LEU:HD12	1.29	1.15

The worst 5 of 18 symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1480:GLU:OE2	2:H:290:GLU:CB[6_555]	0.75	1.45
1:B:1480:GLU:CD	2:H:290:GLU:CB[6_555]	1.29	0.91
2:G:77:VAL:CB	2:I:1929:LYS:CD[6_455]	1.32	0.88
1:B:1480:GLU:OE2	2:H:290:GLU:CG[6_555]	1.43	0.77
2:G:77:VAL:CG2	2:I:1929:LYS:NZ[6_455]	1.47	0.73

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	1604/1887 (85%)	1498 (93%)	92 (6%)	14 (1%)	17 55
1	B	1604/1887 (85%)	1497 (93%)	94 (6%)	13 (1%)	19 58
1	C	1604/1887 (85%)	1499 (94%)	90 (6%)	15 (1%)	17 55
2	G	2029/2051 (99%)	1836 (90%)	167 (8%)	26 (1%)	12 48
2	H	2029/2051 (99%)	1836 (90%)	170 (8%)	23 (1%)	14 51
2	I	2029/2051 (99%)	1833 (90%)	171 (8%)	25 (1%)	13 49
All	All	10899/11814 (92%)	9999 (92%)	784 (7%)	116 (1%)	14 51

5 of 116 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	504	ASP
1	A	538	GLU
1	A	605	LEU
1	A	834	GLY
1	B	504	ASP

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	1367/1566 (87%)	1224 (90%)	143 (10%)	7	27
1	B	1367/1566 (87%)	1225 (90%)	142 (10%)	7	28
1	C	1367/1566 (87%)	1227 (90%)	140 (10%)	7	28
2	G	1772/1789 (99%)	1567 (88%)	205 (12%)	5	24
2	H	1772/1789 (99%)	1566 (88%)	206 (12%)	5	24
2	I	1772/1789 (99%)	1562 (88%)	210 (12%)	5	24
All	All	9417/10065 (94%)	8371 (89%)	1046 (11%)	6	26

5 of 1046 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	I	767	PHE
2	I	993	GLN
2	I	762	ASN
2	I	2003	VAL
1	C	1283	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 288 such sidechains are listed below:

Mol	Chain	Res	Type
2	H	1355	ASN
2	I	2013	ASN
2	H	1896	GLN
2	I	740	HIS

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Mol	Chain	Res	Type
1	B	1577	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

6 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
4	FMN	G	3051	-	33,33,33	6.45	22 (66%)	48,50,50	1.36	6 (12%)
3	CER	A	2748	1	11,11,15	4.18	3 (27%)	11,13,17	4.44	4 (36%)
4	FMN	I	3051	-	33,33,33	6.45	24 (72%)	48,50,50	1.36	8 (16%)
4	FMN	H	3051	-	33,33,33	6.35	21 (63%)	48,50,50	1.36	7 (14%)
3	CER	C	2748	1	11,11,15	4.19	3 (27%)	11,13,17	4.43	4 (36%)
3	CER	B	2748	1	11,11,15	4.17	3 (27%)	11,13,17	4.27	4 (36%)

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	FMN	G	3051	-	-	5/18/18/18	0/3/3/3
3	CER	A	2748	1	-	4/12/12/16	-
4	FMN	I	3051	-	-	5/18/18/18	0/3/3/3
4	FMN	H	3051	-	-	5/18/18/18	0/3/3/3
3	CER	C	2748	1	-	4/12/12/16	-
3	CER	B	2748	1	-	4/12/12/16	-

The worst 5 of 76 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	G	3051	FMN	C6-C7	13.44	1.57	1.39
4	I	3051	FMN	C6-C7	13.08	1.57	1.39
4	H	3051	FMN	C6-C7	12.77	1.57	1.39
4	I	3051	FMN	C6-C5A	12.55	1.59	1.40
4	I	3051	FMN	C9-C8	12.37	1.56	1.39

The worst 5 of 33 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	2748	CER	O1-C4-C3	-11.11	108.66	120.07
3	C	2748	CER	O1-C4-C3	-11.09	108.69	120.07
3	B	2748	CER	O1-C4-C3	-10.73	109.06	120.07
3	C	2748	CER	O1-C4-C5	-8.10	107.97	121.68
3	A	2748	CER	O1-C4-C5	-8.05	108.06	121.68

There are no chirality outliers.

5 of 27 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	2748	CER	C2-C3-C4-O1
3	B	2748	CER	C2-C3-C4-O1
3	C	2748	CER	C2-C3-C4-O1
4	G	3051	FMN	C2'-C3'-C4'-C5'
4	G	3051	FMN	O3'-C3'-C4'-C5'

There are no ring outliers.

6 monomers are involved in 32 short contacts:

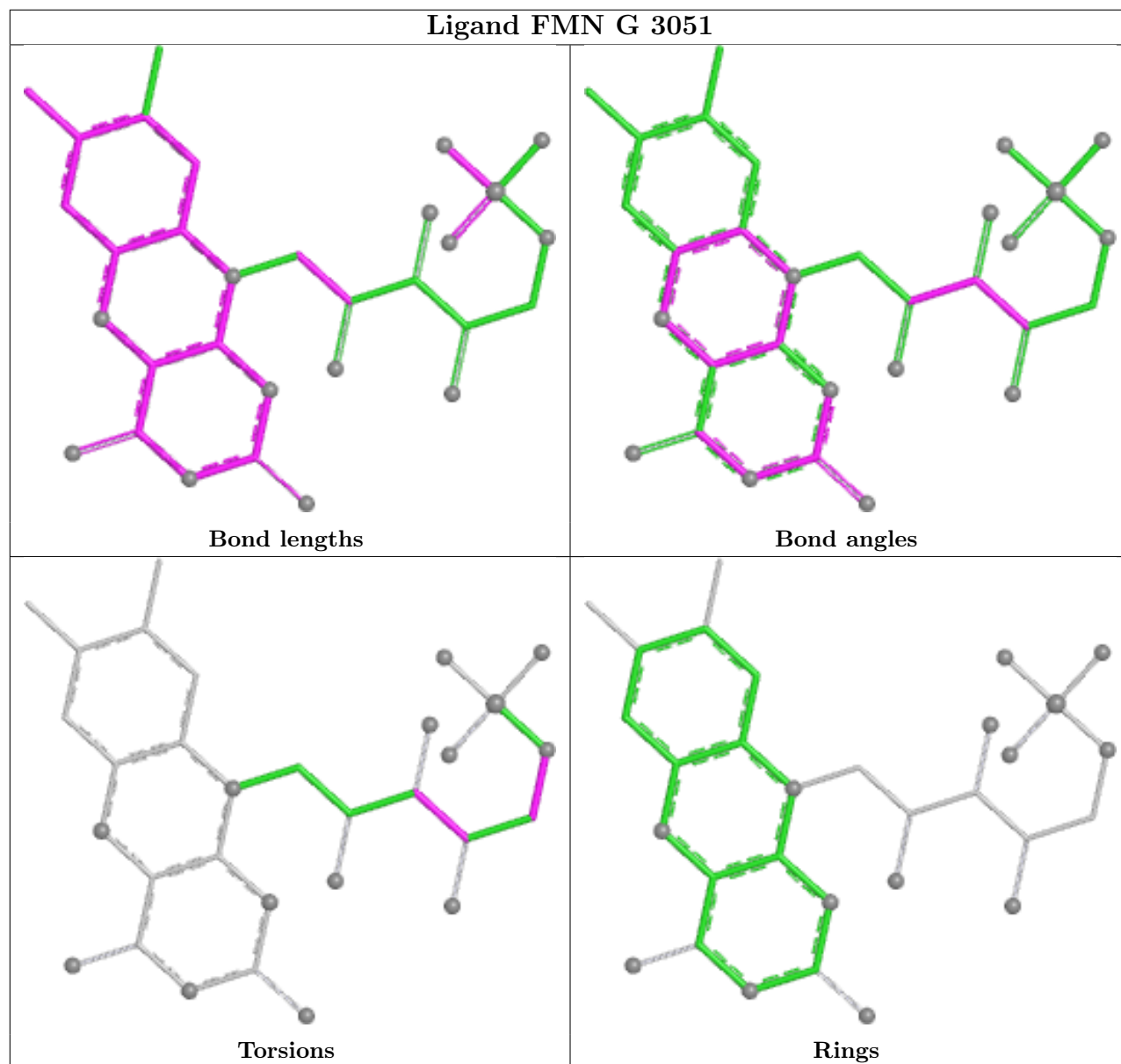
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	G	3051	FMN	7	0

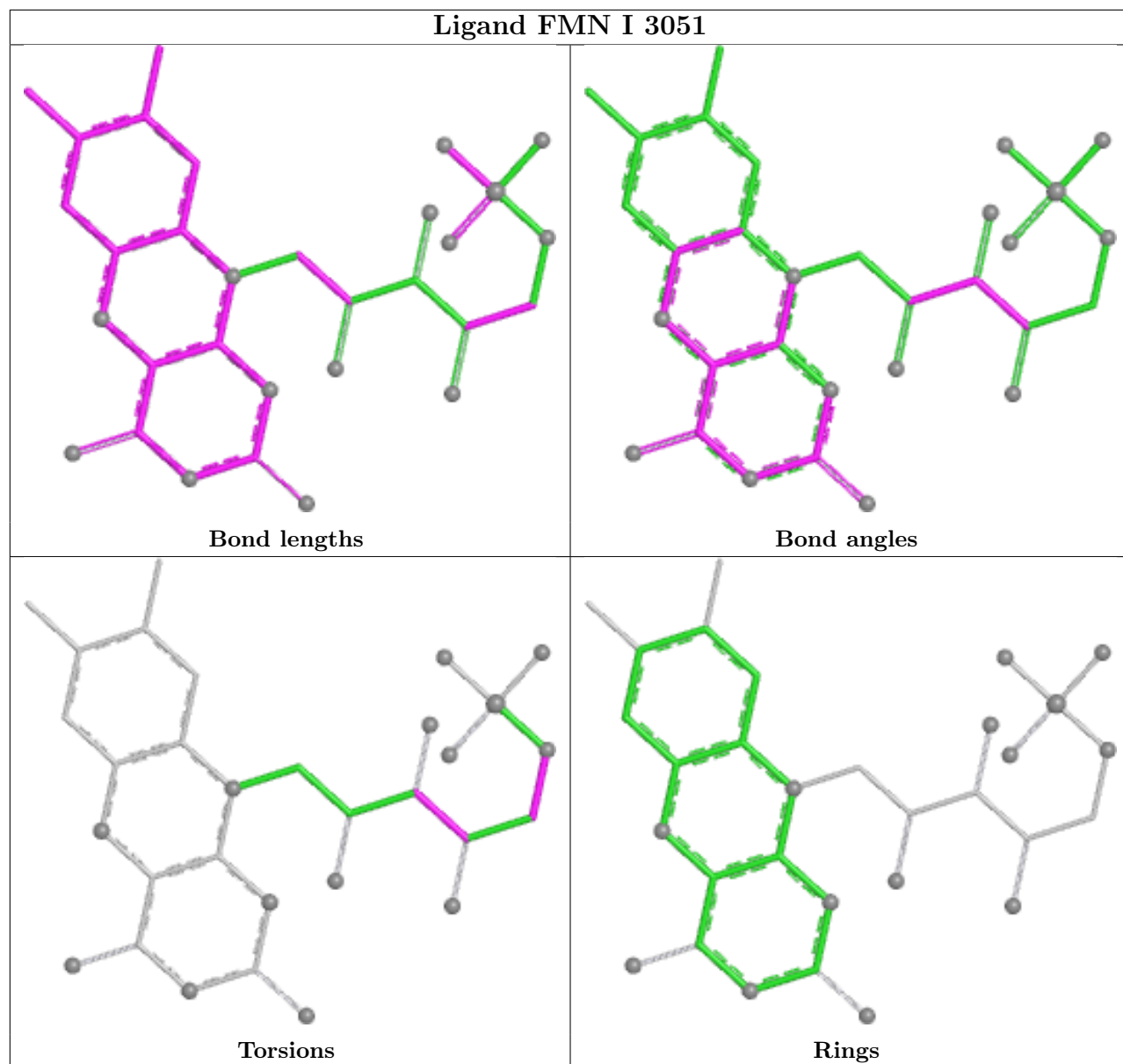
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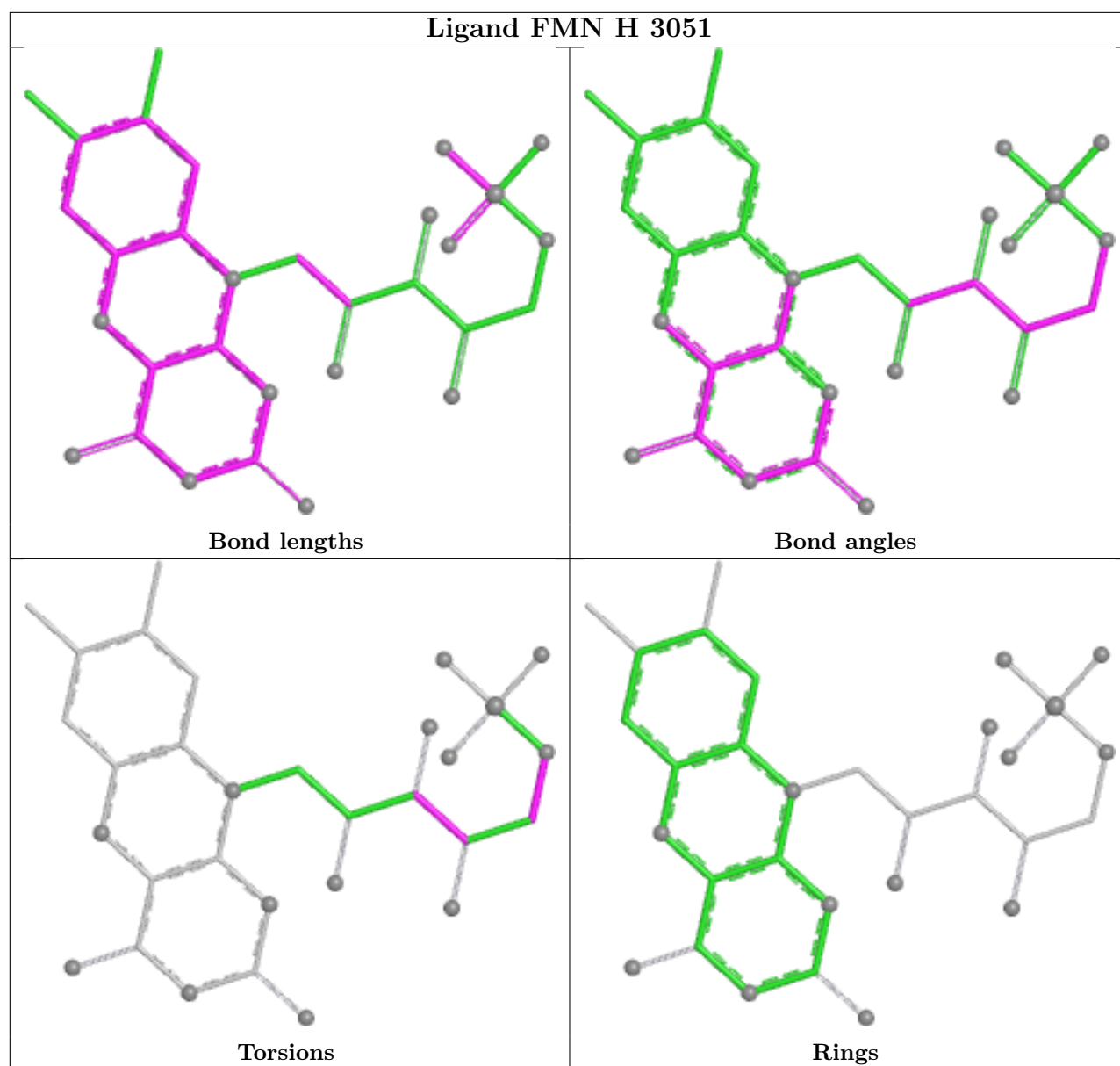
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Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	2748	CER	3	0
4	I	3051	FMN	8	0
4	H	3051	FMN	6	0
3	C	2748	CER	4	0
3	B	2748	CER	4	0

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 [\(i\)](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
2	H	6
1	C	4
1	A	3

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Mol	Chain	Number of breaks
2	G	3
2	I	2

The worst 5 of 18 chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	H	559:PRO	C	560:ASN	N	1.87
1	A	485:ASP	C	486:VAL	N	1.77
1	H	315:PRO	C	316:ASN	N	1.64
1	H	1530:LYS	C	1531:VAL	N	1.60
1	C	932:PHE	C	933:VAL	N	1.19

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, 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	1614/1887 (85%)	-0.42	11 (0%) 87 82	98, 134, 233, 288	0
1	B	1614/1887 (85%)	-0.42	10 (0%) 89 84	99, 133, 233, 296	0
1	C	1614/1887 (85%)	-0.41	14 (0%) 84 77	100, 135, 233, 294	0
2	G	2033/2051 (99%)	-0.42	6 (0%) 94 90	134, 172, 221, 270	0
2	H	2033/2051 (99%)	-0.31	11 (0%) 91 85	133, 173, 218, 268	0
2	I	2033/2051 (99%)	-0.39	6 (0%) 94 90	134, 173, 218, 264	0
All	All	10941/11814 (92%)	-0.39	58 (0%) 91 85	98, 164, 226, 296	0

The worst 5 of 58 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	539	SER	6.2
1	C	875	THR	5.8
1	B	875	THR	5.3
1	B	1747	ALA	5.3
1	A	540	GLN	4.1

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](#)

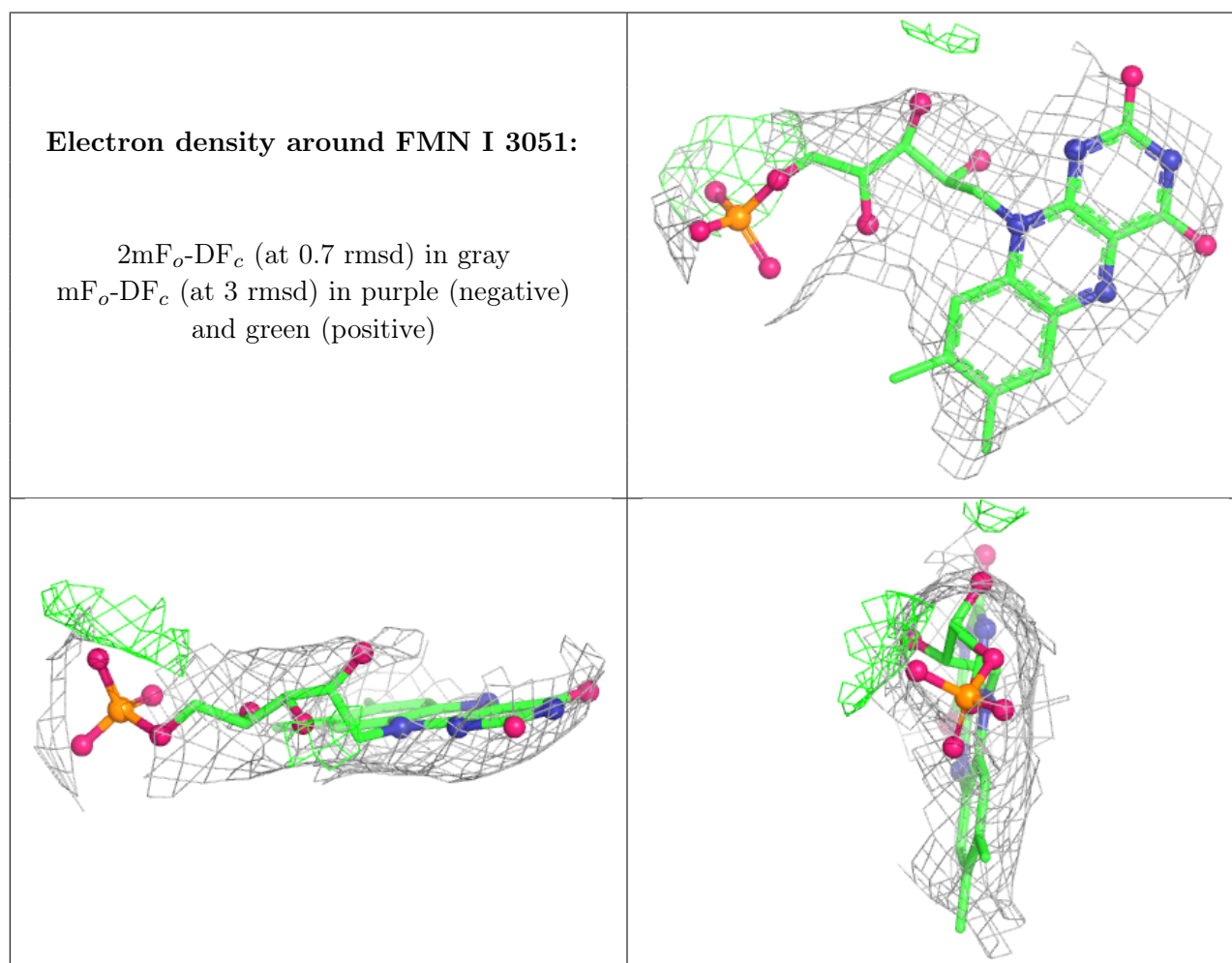
There are no monosaccharides in this entry.

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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q<0.9' lists the number of atoms with occupancy less than 0.9.

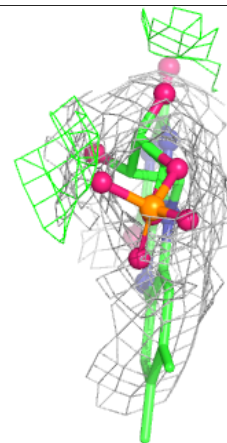
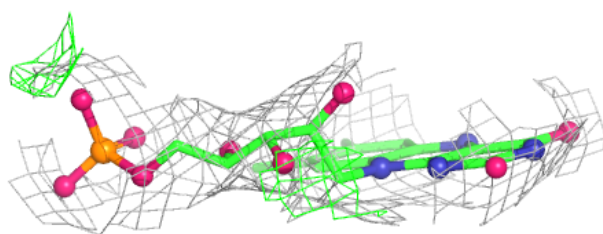
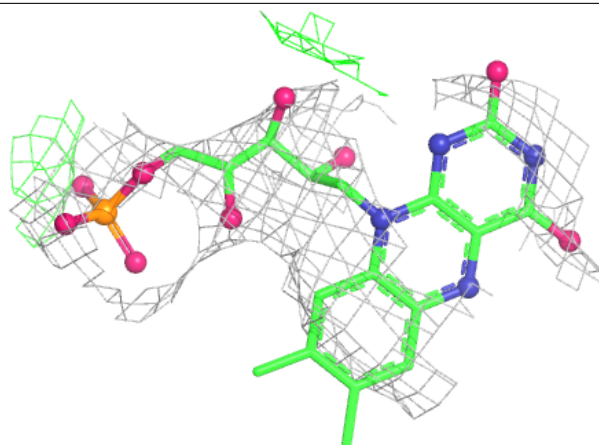
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	CER	A	2748	12/16	0.81	0.32	70,134,243,252	0
4	FMN	I	3051	31/31	0.85	0.41	132,164,181,204	0
4	FMN	G	3051	31/31	0.87	0.33	137,161,187,206	0
4	FMN	H	3051	31/31	0.88	0.26	133,160,184,188	0
3	CER	C	2748	12/16	0.90	0.37	70,134,252,253	0
3	CER	B	2748	12/16	0.91	0.21	70,134,252,253	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.

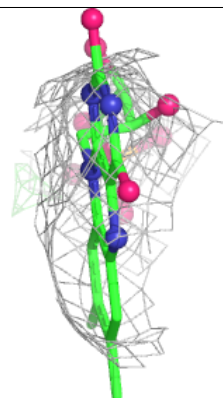
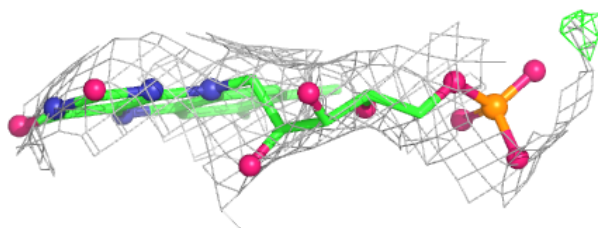
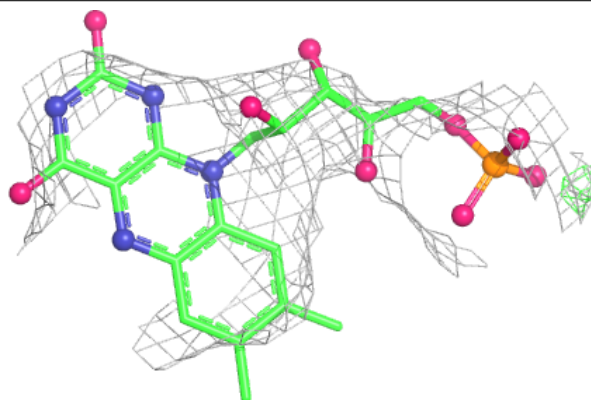


Electron density around FMN G 3051:

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

**Electron density around FMN H 3051:**

$2mF_o-DF_c$ (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.