



wwPDB X-ray Structure Validation Summary Report

Mar 9, 2026 – 01:55 AM UTC

PDB ID : 1F38 / pdb_00001f38
Title : X-RAY CRYSTALLOGRAPHIC STRUCTURE OF PRECORRIN 8W
DECARBOXYLASE, THE PRODUCT OF GENE MT0146 IN THE
METHANOBACTERIUM THERMOAUTOTROPHICUM GENOME
Authors : Keller, J.P.; Smith, P.M.; Hunt, J.F.; Northeast Structural Genomics Consor-
tium (NESG)
Deposited on : 2000-05-31
Resolution : 2.40 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 : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

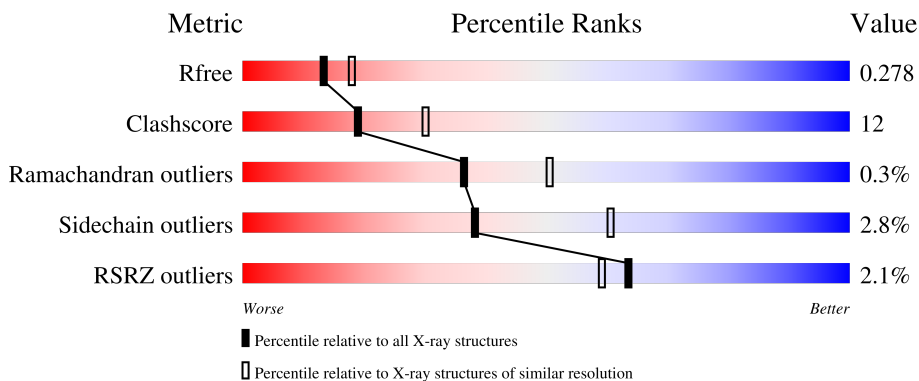
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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}	180053	4912 (2.40-2.40)
Clashscore	190562	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (2.40-2.40)
RSRZ outliers	180081	4916 (2.40-2.40)

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	192	 2% (red), 74% (green), 21% (yellow), .. (grey)
1	B	192	 % (red), 80% (green), 16% (yellow), .. (grey)
1	C	192	 3% (red), 71% (green), 25% (yellow), .. (grey)
1	D	192	 2% (red), 78% (green), 18% (yellow), .. (grey)

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 5748 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 PRECORRIN-8W DECARBOXYLASE.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	186	1392	868	244	267	5	8	0	0	0
1	B	186	1392	868	244	267	5	8	0	0	0
1	C	186	1392	868	244	267	5	8	0	0	0
1	D	186	1392	868	244	267	5	8	0	0	0

There are 32 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1101	MSE	MET	modified residue	UNP O26249
A	1119	MSE	MET	modified residue	UNP O26249
A	1126	MSE	MET	modified residue	UNP O26249
A	1173	MSE	MET	modified residue	UNP O26249
A	1187	MSE	MET	modified residue	UNP O26249
A	1244	MSE	MET	modified residue	UNP O26249
A	1272	MSE	MET	modified residue	UNP O26249
A	1273	MSE	MET	modified residue	UNP O26249
B	2101	MSE	MET	modified residue	UNP O26249
B	2119	MSE	MET	modified residue	UNP O26249
B	2126	MSE	MET	modified residue	UNP O26249
B	2173	MSE	MET	modified residue	UNP O26249
B	2187	MSE	MET	modified residue	UNP O26249
B	2244	MSE	MET	modified residue	UNP O26249
B	2272	MSE	MET	modified residue	UNP O26249
B	2273	MSE	MET	modified residue	UNP O26249
C	3101	MSE	MET	modified residue	UNP O26249
C	3119	MSE	MET	modified residue	UNP O26249
C	3126	MSE	MET	modified residue	UNP O26249
C	3173	MSE	MET	modified residue	UNP O26249
C	3187	MSE	MET	modified residue	UNP O26249

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
C	3244	MSE	MET	modified residue	UNP O26249
C	3272	MSE	MET	modified residue	UNP O26249
C	3273	MSE	MET	modified residue	UNP O26249
D	4101	MSE	MET	modified residue	UNP O26249
D	4119	MSE	MET	modified residue	UNP O26249
D	4126	MSE	MET	modified residue	UNP O26249
D	4173	MSE	MET	modified residue	UNP O26249
D	4187	MSE	MET	modified residue	UNP O26249
D	4244	MSE	MET	modified residue	UNP O26249
D	4272	MSE	MET	modified residue	UNP O26249
D	4273	MSE	MET	modified residue	UNP O26249

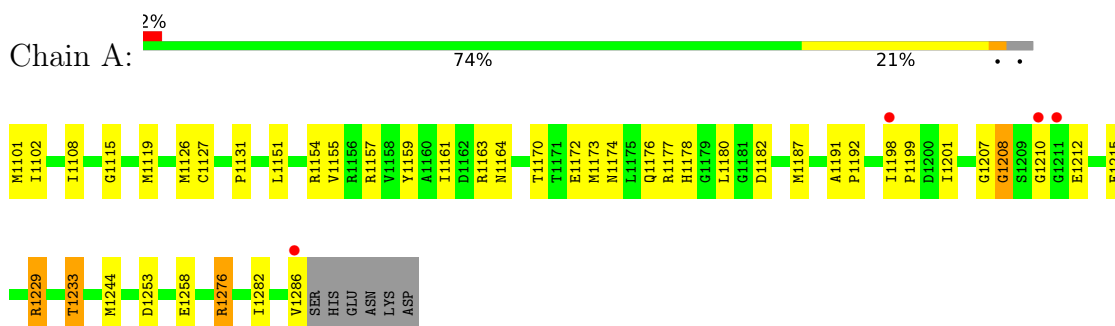
- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	45	Total O 45 45	0	0
2	B	50	Total O 50 50	0	0
2	C	47	Total O 47 47	0	0
2	D	38	Total O 38 38	0	0

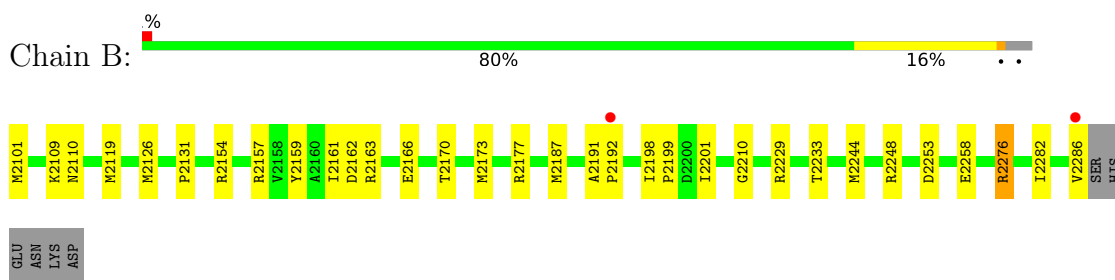
3 Residue-property plots [i](#)

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.

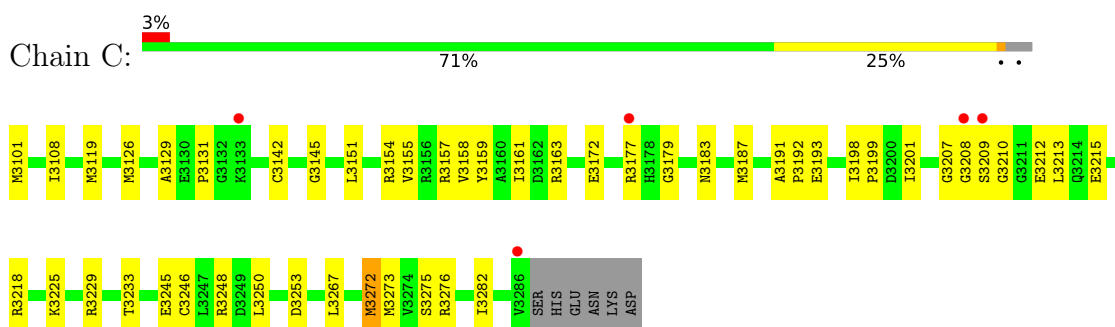
- Molecule 1: PRECORRIN-8W DECARBOXYLASE



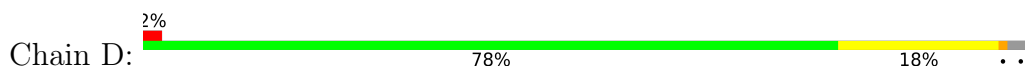
- Molecule 1: PRECORRIN-8W DECARBOXYLASE

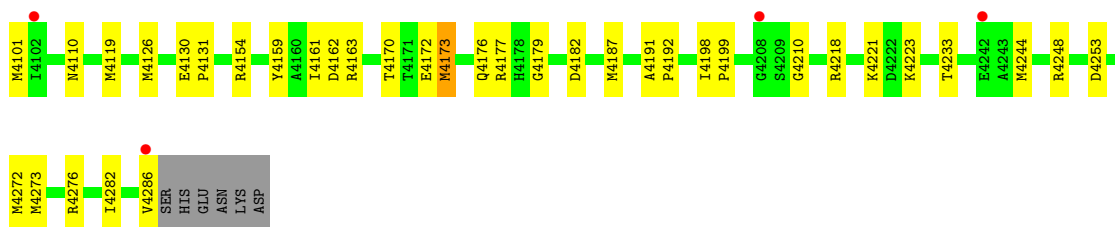


- Molecule 1: PRECORRIN-8W DECARBOXYLASE



- Molecule 1: PRECORRIN-8W DECARBOXYLASE





4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	74.47Å 194.76Å 59.24Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	100.00 – 2.40 97.38 – 2.40	Depositor EDS
% Data completeness (in resolution range)	(Not available) (100.00-2.40) 98.9 (97.38-2.40)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.80 (at 2.34Å)	Xtrriage
Refinement program	X-PLOR 3.851	Depositor
R, R_{free}	0.236 , 0.291 0.235 , 0.278	Depositor DCC
R_{free} test set	1836 reflections (4.95%)	wwPDB-VP
Wilson B-factor (Å ²)	52.2	Xtrriage
Anisotropy	0.060	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 45.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.42$, $\langle L^2 \rangle = 0.24$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	5748	wwPDB-VP
Average B, all atoms (Å ²)	55.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.89% 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](#)

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	0.83	0/1400	1.16	3/1882 (0.2%)
1	B	0.86	0/1400	1.15	2/1882 (0.1%)
1	C	0.84	1/1400 (0.1%)	1.17	4/1882 (0.2%)
1	D	0.84	1/1400 (0.1%)	1.14	4/1882 (0.2%)
All	All	0.84	2/5600 (0.0%)	1.15	13/7528 (0.2%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	3158	VAL	CA-CB	5.65	1.61	1.54
1	D	4173	MSE	SE-CE	-5.57	1.78	1.95

The worst 5 of 13 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1253	ASP	N-CA-C	-6.95	97.91	108.96
1	D	4276	ARG	N-CA-C	-6.63	99.41	109.95
1	B	2276	ARG	N-CA-C	-6.60	99.91	110.14
1	C	3253	ASP	N-CA-C	-6.14	98.53	108.41
1	A	1212	GLU	N-CA-C	-6.09	105.68	112.57

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	1392	0	1432	37	0
1	B	1392	0	1432	26	0
1	C	1392	0	1432	40	0
1	D	1392	0	1432	32	0
2	A	45	0	0	11	0
2	B	50	0	0	6	0
2	C	47	0	0	17	0
2	D	38	0	0	10	0
All	All	5748	0	5728	133	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 12.

The worst 5 of 133 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:D:4187:MSE:HE1	1:D:4198:ILE:HD11	1.24	1.16
1:C:3187:MSE:HE1	1:C:3198:ILE:HD11	1.25	1.13
1:B:2187:MSE:HE1	1:B:2198:ILE:HD11	1.25	1.11
1:A:1187:MSE:HE1	1:A:1198:ILE:HD11	1.32	1.05
1:C:3145:GLY:HA2	2:C:7166:HOH:O	1.68	0.92

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	184/192 (96%)	178 (97%)	5 (3%)	1 (0%)	24 37
1	B	184/192 (96%)	178 (97%)	6 (3%)	0	100 100
1	C	184/192 (96%)	176 (96%)	7 (4%)	1 (0%)	24 37
1	D	184/192 (96%)	177 (96%)	7 (4%)	0	100 100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	736/768 (96%)	709 (96%)	25 (3%)	2 (0%)	36 50

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	3208	GLY
1	A	1208	GLY

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	152/150 (101%)	146 (96%)	6 (4%)	28 48
1	B	152/150 (101%)	148 (97%)	4 (3%)	40 63
1	C	152/150 (101%)	149 (98%)	3 (2%)	48 70
1	D	152/150 (101%)	148 (97%)	4 (3%)	40 63
All	All	608/600 (101%)	591 (97%)	17 (3%)	38 60

5 of 17 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	4182	ASP
1	D	4272	MSE
1	B	2119	MSE
1	B	2201	ILE
1	B	2233	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1176	GLN
1	A	1178	HIS
1	B	2176	GLN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	C	3176	GLN
1	D	4176	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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, 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	178/192 (92%)	0.12	4 (2%) 62 58	29, 52, 79, 106	0
1	B	178/192 (92%)	0.16	2 (1%) 78 74	27, 51, 77, 103	0
1	C	178/192 (92%)	0.45	5 (2%) 55 51	31, 56, 82, 106	0
1	D	178/192 (92%)	0.23	4 (2%) 62 58	28, 54, 80, 103	0
All	All	712/768 (92%)	0.24	15 (2%) 63 59	27, 54, 80, 106	0

The worst 5 of 15 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	4286	VAL	5.1
1	C	3286	VAL	5.0
1	B	2286	VAL	4.9
1	A	1286	VAL	4.1
1	D	4208	GLY	3.1

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 oligosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.