



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 12:30 AM UTC

PDB ID : 1FUX / pdb_00001fux
Title : CRYSTAL STRUCTURE OF E.COLI YBCL, A NEW MEMBER OF THE MAMMALIAN PEBP FAMILY
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Deposited on : 2000-09-18
Resolution : 1.81 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

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)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

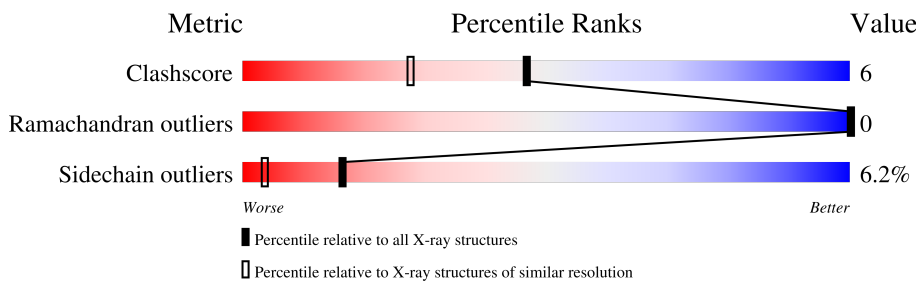
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.81 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))
Clashscore	190562	1148 (1.82-1.82)
Ramachandran outliers	187476	1140 (1.82-1.82)
Sidechain outliers	187428	1140 (1.82-1.82)

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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	166	 79% 16% . .
1	B	166	 77% 16% . . .

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2707 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 HYPOTHETICAL 19.5 KDA PROTEIN IN EMRE-RUS INTERGENIC REGION.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	165	Total	C	N	O	S	Se	0	3	0
			1251	796	211	241	2	1			
1	B	164	Total	C	N	O	S	Se	0	4	0
			1250	800	207	240	2	1			

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	ALA	-	cloning artifact	UNP P77368
A	0	GLU	-	cloning artifact	UNP P77368
A	144	MSE	MET	modified residue	UNP P77368
A	163	LEU	-	cloning artifact	UNP P77368
A	164	GLU	-	cloning artifact	UNP P77368
B	-1	ALA	-	cloning artifact	UNP P77368
B	0	GLU	-	cloning artifact	UNP P77368
B	144	MSE	MET	modified residue	UNP P77368
B	163	LEU	-	cloning artifact	UNP P77368
B	164	GLU	-	cloning artifact	UNP P77368

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	104	Total	O	0	0
			104	104		
2	B	102	Total	O	0	0
			102	102		

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.

Note EDS was not executed.

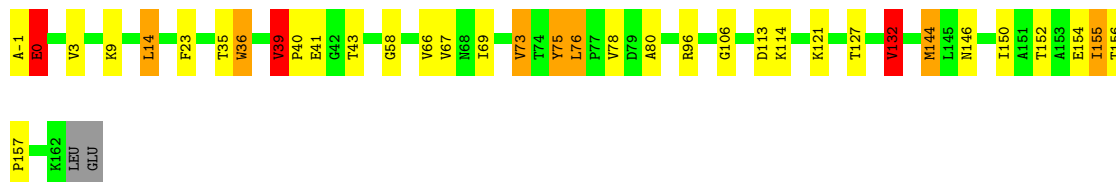
- Molecule 1: HYPOTHETICAL 19.5 KDA PROTEIN IN EMRE-RUS INTERGENIC REGION

Chain A: 



- Molecule 1: HYPOTHETICAL 19.5 KDA PROTEIN IN EMRE-RUS INTERGENIC REGION

Chain B: 



4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	49.42Å 55.53Å 60.15Å 90.00° 105.39° 90.00°	Depositor
Resolution (Å)	25.00 – 1.81	Depositor
% Data completeness (in resolution range)	97.5 (25.00-1.81)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	0.03	Depositor
Refinement program	REFMAC	Depositor
R, R_{free}	0.200 , 0.254	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2707	wwPDB-VP
Average B, all atoms (Å ²)	21.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

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	0.94	1/1304 (0.1%)	2.15	29/1778 (1.6%)
1	B	0.95	1/1302 (0.1%)	1.79	26/1780 (1.5%)
All	All	0.95	2/2606 (0.1%)	1.98	55/3558 (1.5%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	144	MSE	SE-CE	-6.29	1.76	1.95
1	A	144	MSE	SE-CE	-5.92	1.77	1.95

All (55) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	163	LEU	CA-C-N	26.86	170.05	121.70
1	A	163	LEU	C-N-CA	26.86	170.05	121.70
1	A	163	LEU	CA-C-O	19.56	141.36	120.82
1	A	163	LEU	O-C-N	-17.58	103.96	122.07
1	A	96	ARG	NE-CZ-NH1	-12.99	108.51	121.50
1	B	96	ARG	CD-NE-CZ	11.89	141.05	124.40
1	A	39	VAL	N-CA-CB	10.87	122.23	110.17
1	A	96	ARG	NE-CZ-NH2	10.84	128.95	119.20
1	B	69	ILE	CA-C-O	9.46	127.22	119.47
1	B	23	PHE	CA-CB-CG	9.11	122.91	113.80
1	A	119	GLN	OE1-CD-NE2	-9.06	113.54	122.60
1	B	0	GLU	OE1-CD-OE2	-8.39	102.76	122.90
1	B	0	GLU	CG-CD-OE2	8.28	137.44	118.40
1	A	66	VAL	CB-CA-C	-7.87	97.85	110.28
1	B	39	VAL	N-CA-CB	7.79	118.82	110.17
1	B	73	VAL	N-CA-CB	7.55	121.83	111.41
1	A	0	GLU	CA-C-O	-7.55	107.97	120.80
1	A	150	ILE	N-CA-C	-7.50	104.54	111.67
1	A	119	GLN	CB-CG-CD	6.97	124.45	112.60
1	B	-1	ALA	CA-C-N	6.94	130.15	120.29

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	-1	ALA	C-N-CA	6.94	130.15	120.29
1	A	23	PHE	CA-CB-CG	6.92	120.72	113.80
1	B	69	ILE	N-CA-C	-6.90	102.69	108.63
1	A	117	HIS	CA-CB-CG	-6.89	106.91	113.80
1	B	66	VAL	CB-CA-C	-6.74	99.64	110.28
1	A	43	THR	O-C-N	-6.68	114.66	122.95
1	B	150	ILE	N-CA-C	-6.57	105.43	111.67
1	A	164	GLU	N-CA-C	-6.50	92.80	111.00
1	B	76[A]	LEU	N-CA-CB	6.35	121.47	110.23
1	B	76[B]	LEU	N-CA-CB	6.35	121.47	110.23
1	B	75	TYR	N-CA-CB	-6.04	100.83	111.39
1	A	1	PHE	CA-CB-CG	5.89	119.69	113.80
1	B	146	ASN	CA-CB-CG	-5.88	106.72	112.60
1	B	114	LYS	O-C-N	5.85	127.81	121.60
1	A	57	THR	CA-CB-OG1	-5.85	100.82	109.60
1	B	43	THR	CA-C-O	-5.85	114.08	120.81
1	A	119	GLN	CG-CD-NE2	5.81	125.11	116.40
1	A	75	TYR	CA-C-O	-5.75	113.64	120.43
1	A	30	THR	CA-C-O	-5.68	114.57	120.70
1	A	75	TYR	O-C-N	5.62	129.89	123.48
1	B	106	GLY	O-C-N	-5.51	118.41	122.71
1	A	73	VAL	CB-CA-C	5.50	118.73	110.98
1	B	113	ASP	CA-C-O	-5.33	115.53	121.81
1	B	36	TRP	O-C-N	5.31	129.00	122.84
1	B	58	GLY	O-C-N	5.28	128.88	122.60
1	B	69	ILE	O-C-N	-5.20	115.59	121.57
1	A	13	GLN	CA-C-O	5.18	126.82	120.92
1	A	66	VAL	CA-C-N	-5.17	115.67	123.27
1	A	66	VAL	C-N-CA	-5.17	115.67	123.27
1	A	114	LYS	CA-C-O	-5.11	114.94	120.87
1	B	132	VAL	CA-CB-CG2	5.04	118.96	110.40
1	A	73	VAL	O-C-N	-5.04	117.59	122.93
1	A	40	PRO	CA-C-O	5.03	128.00	121.86
1	B	155	ILE	N-CA-CB	5.03	118.87	111.52
1	B	114	LYS	N-CA-C	-5.02	102.98	110.20

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

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	1251	0	1192	9	0
1	B	1250	0	1206	19	0
2	A	104	0	0	0	0
2	B	102	0	0	2	0
All	All	2707	0	2398	28	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 6.

All (28) 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:3:VAL:HG13	1:B:155:ILE:HG13	1.70	0.74
1:B:0:GLU:H	1:B:0:GLU:CD	1.97	0.69
1:B:36:TRP:HH2	1:B:76[B]:LEU:HD23	1.59	0.67
1:B:121:LYS:HE2	1:B:152:THR:CB	2.26	0.66
1:B:132:VAL:HG12	1:B:144:MSE:HE1	1.79	0.65
1:B:14:LEU:HD13	1:B:157:PRO:HB2	1.78	0.65
1:A:9[B]:LYS:HE2	1:A:12:GLU:HG3	1.82	0.61
1:B:121:LYS:HE2	1:B:152:THR:HB	1.84	0.59
1:B:36:TRP:CH2	1:B:76[B]:LEU:HD23	2.37	0.58
1:A:14:LEU:HD13	1:A:157:PRO:HB2	1.86	0.57
1:A:9[A]:LYS:HB3	1:A:12:GLU:HG3	1.88	0.56
1:A:149:LYS:HE3	1:A:152:THR:HG23	1.90	0.54
1:B:76[B]:LEU:HD12	1:B:80:ALA:CB	2.38	0.54
1:A:9[B]:LYS:HE2	1:A:12:GLU:CG	2.39	0.53
1:A:67:VAL:HG21	1:A:132:VAL:HG13	1.92	0.51
1:B:78[A]:VAL:HG23	2:B:227:HOH:O	2.12	0.49
1:A:67:VAL:HG21	1:A:132:VAL:CG1	2.43	0.48
1:A:163:LEU:N	1:A:164:GLU:OXT	2.48	0.47
1:A:126:LYS:HE2	1:A:148:ASN:HA	1.99	0.45
1:B:41:GLU:HG3	2:B:260:HOH:O	2.17	0.44
1:B:76[B]:LEU:HD12	1:B:80:ALA:HB1	1.99	0.44
1:B:39:VAL:HA	1:B:40:PRO:HD3	1.85	0.43
1:B:67:VAL:HG21	1:B:132:VAL:HG13	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:35:THR:OG1	1:B:75:TYR:HD1	2.03	0.41
1:B:155:ILE:HD13	1:B:155:ILE:HG21	1.78	0.41
1:B:132:VAL:HG12	1:B:144:MSE:CE	2.49	0.41
1:B:9:LYS:HB2	1:B:9:LYS:HE3	1.78	0.40
1:B:156:THR:HA	1:B:157:PRO:HD2	1.95	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	166/166 (100%)	162 (98%)	4 (2%)	0	100	100
1	B	166/166 (100%)	163 (98%)	3 (2%)	0	100	100
All	All	332/332 (100%)	325 (98%)	7 (2%)	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 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	133/132 (101%)	123 (92%)	10 (8%)	12	1
1	B	134/132 (102%)	126 (94%)	8 (6%)	17	4
All	All	267/264 (101%)	249 (93%)	18 (7%)	16	3

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	9[A]	LYS
1	A	9[B]	LYS
1	A	14	LEU
1	A	39	VAL
1	A	44	LYS
1	A	72	THR
1	A	73	VAL
1	A	88	LEU
1	A	127	THR
1	A	132	VAL
1	B	0	GLU
1	B	14	LEU
1	B	39	VAL
1	B	73	VAL
1	B	127[A]	THR
1	B	127[B]	THR
1	B	132	VAL
1	B	154	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	146	ASN
1	B	6	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

There are no ligands in this entry.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.