



Full wwPDB X-ray Structure Validation Report ⓘ

May 15, 2020 – 09:07 pm BST

PDB ID : 2YH3
Title : The structure of BamB from E. coli
Authors : Albrecht, R.; Zeth, K.
Deposited on : 2011-04-27
Resolution : 2.60 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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Xtrriage (Phenix) : 1.13
EDS : 2.11
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) : 2.11

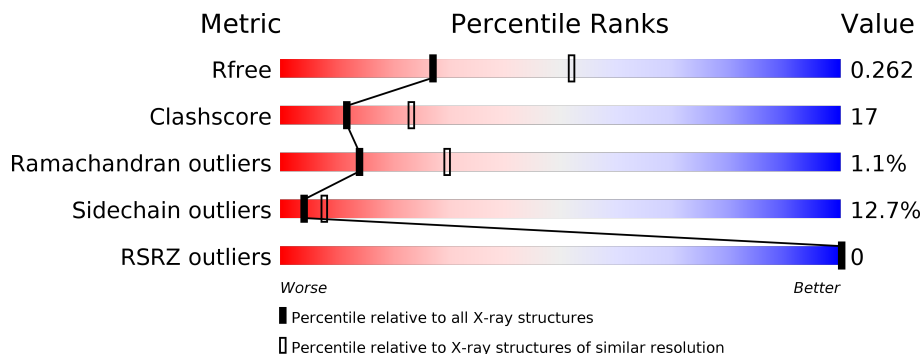
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

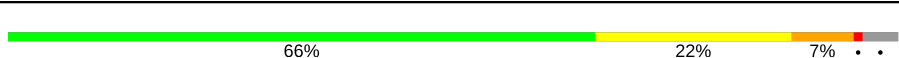
The reported resolution of this entry is 2.60 Å.

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	3163 (2.60-2.60)
Clashscore	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (2.60-2.60)
RSRZ outliers	127900	3104 (2.60-2.60)

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 on 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	379	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2782 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 LIPOPROTEIN YFGL.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	362	2715	1703	467	540	5	0	0	0

There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	13	SER	MET	conflict	UNP P77774
A	374	ALA	-	expression tag	UNP P77774
A	375	ASP	-	expression tag	UNP P77774
A	376	HIS	-	expression tag	UNP P77774
A	377	HIS	-	expression tag	UNP P77774
A	378	HIS	-	expression tag	UNP P77774
A	379	HIS	-	expression tag	UNP P77774
A	380	HIS	-	expression tag	UNP P77774
A	381	HIS	-	expression tag	UNP P77774

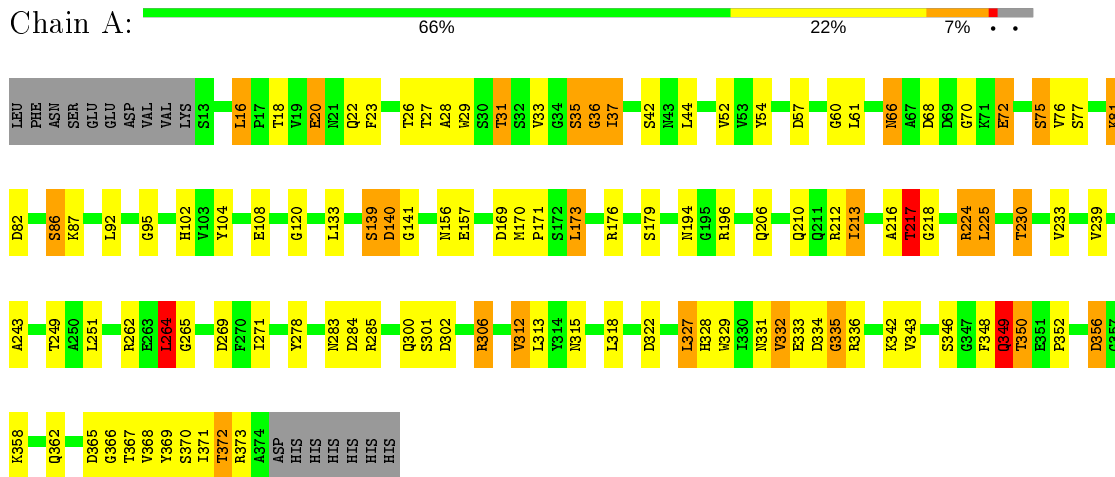
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	67	Total	O	0	0
			67	67		

3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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: LIPOPROTEIN YFGL



4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	101.84Å 101.84Å 110.60Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.60 74.92 – 2.60	Depositor EDS
% Data completeness (in resolution range)	100.0 (50.00-2.60) 100.0 (74.92-2.60)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.46 (at 2.62Å)	Xtrriage
Refinement program	REFMAC 5.5.0110	Depositor
R, R_{free}	0.211 , 0.270 0.212 , 0.262	Depositor DCC
R_{free} test set	926 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	69.4	Xtrriage
Anisotropy	0.067	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 47.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.45$, $\langle L^2 \rangle = 0.28$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	2782	wwPDB-VP
Average B, all atoms (Å ²)	66.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.23% of the height of the origin peak. No significant pseudotranslation is detected.*

¹ Intensities estimated from amplitudes.

² 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

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	0.89	0/2765	0.99	7/3773 (0.2%)

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
1	A	0	4

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	335	GLY	N-CA-C	-7.76	93.71	113.10
1	A	264	LEU	CA-CB-CG	7.06	131.53	115.30
1	A	16	LEU	CA-CB-CG	6.97	131.34	115.30
1	A	36	GLY	N-CA-C	-6.43	97.02	113.10
1	A	318	LEU	CA-CB-CG	5.59	128.15	115.30
1	A	306	ARG	C-N-CA	-5.44	108.09	121.70
1	A	35	SER	N-CA-C	5.12	124.81	111.00

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	332	VAL	Peptide
1	A	35	SER	Peptide
1	A	81	LYS	Peptide
1	A	86	SER	Peptide

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	2715	0	2658	93	0
2	A	67	0	0	11	0
All	All	2782	0	2658	93	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 17.

All (93) 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:173:LEU:HD12	1:A:173:LEU:H	1.14	1.10
1:A:169:ASP:HB2	2:A:2030:HOH:O	1.55	1.07
1:A:33:VAL:HB	1:A:367:THR:HG21	1.51	0.91
1:A:37:ILE:HD11	1:A:44:LEU:HD12	1.55	0.88
1:A:362:GLN:HE21	1:A:367:THR:HG23	1.39	0.87
1:A:300:GLN:HE21	1:A:302:ASP:H	1.24	0.85
1:A:333:GLU:HA	2:A:2058:HOH:O	1.81	0.80
1:A:139:SER:O	1:A:140:ASP:HB2	1.85	0.75
1:A:31:THR:HG21	1:A:70:GLY:O	1.89	0.72
1:A:173:LEU:H	1:A:173:LEU:CD1	1.96	0.72
1:A:33:VAL:CB	1:A:367:THR:HG21	2.20	0.71
1:A:368:VAL:HG12	1:A:369:TYR:N	2.05	0.70
1:A:224:ARG:HD2	1:A:225:LEU:N	2.06	0.70
1:A:362:GLN:NE2	1:A:367:THR:HG23	2.06	0.69
1:A:333:GLU:CA	2:A:2058:HOH:O	2.41	0.67
1:A:331:ASN:HD21	1:A:333:GLU:HB2	1.59	0.67
1:A:173:LEU:HD12	1:A:173:LEU:N	1.99	0.67
1:A:44:LEU:HD23	1:A:95:GLY:HA2	1.79	0.64
1:A:66:ASN:ND2	1:A:68:ASP:H	1.97	0.63
1:A:362:GLN:HE21	1:A:367:THR:CG2	2.12	0.62
1:A:368:VAL:CG1	1:A:369:TYR:N	2.61	0.62
1:A:141:GLY:HA2	1:A:157:GLU:HG3	1.81	0.62
1:A:283:ASN:O	1:A:284:ASP:HB2	1.99	0.62
1:A:367:THR:HG22	1:A:368:VAL:N	2.14	0.62
1:A:334:ASP:N	2:A:2058:HOH:O	2.34	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:23:PHE:HB3	1:A:373:ARG:HH21	1.67	0.59
1:A:33:VAL:CG2	1:A:367:THR:HG21	2.34	0.58
1:A:44:LEU:HA	1:A:95:GLY:HA2	1.86	0.56
1:A:28:ALA:HB3	1:A:370:SER:HB3	1.87	0.56
1:A:367:THR:HG22	1:A:368:VAL:H	1.71	0.56
1:A:213:ILE:HG22	1:A:243:ALA:HB2	1.87	0.55
1:A:346:SER:CB	1:A:365:ASP:HB2	2.37	0.55
1:A:349:GLN:HG3	1:A:350:THR:N	2.21	0.55
1:A:224:ARG:HD2	1:A:224:ARG:C	2.27	0.54
1:A:171:PRO:HD3	2:A:2026:HOH:O	2.07	0.54
1:A:210:GLN:CD	2:A:2027:HOH:O	2.46	0.53
1:A:327:LEU:HD22	1:A:343:VAL:HG21	1.90	0.53
1:A:336:ARG:HD2	2:A:2062:HOH:O	2.08	0.52
1:A:284:ASP:OD2	1:A:306:ARG:O	2.27	0.52
1:A:278:TYR:OH	1:A:332:VAL:HG13	2.11	0.51
1:A:108:GLU:HG2	1:A:133:LEU:HD21	1.92	0.50
1:A:196:ARG:HH21	1:A:212:ARG:HH12	1.60	0.50
1:A:37:ILE:HD11	1:A:44:LEU:CD1	2.37	0.50
1:A:370:SER:C	1:A:371:ILE:HG12	2.31	0.49
1:A:44:LEU:HD11	1:A:92:LEU:HB2	1.93	0.49
1:A:81:LYS:NZ	1:A:87:LYS:HE3	2.27	0.49
1:A:224:ARG:CD	1:A:225:LEU:HD13	2.42	0.49
1:A:300:GLN:NE2	1:A:302:ASP:H	2.04	0.49
1:A:356:ASP:OD1	1:A:356:ASP:N	2.44	0.49
1:A:82:ASP:O	1:A:86:SER:OG	2.24	0.49
1:A:368:VAL:CG1	1:A:369:TYR:H	2.25	0.49
1:A:141:GLY:CA	1:A:157:GLU:HG3	2.43	0.48
1:A:285:ARG:HG3	1:A:301:SER:HB3	1.94	0.48
1:A:23:PHE:CB	1:A:373:ARG:HH21	2.27	0.48
1:A:37:ILE:HG12	1:A:42:SER:OG	2.13	0.48
1:A:179:SER:CB	1:A:230:THR:HG22	2.44	0.47
1:A:44:LEU:O	1:A:350:THR:HG21	2.15	0.47
1:A:20:GLU:OE1	1:A:20:GLU:HA	2.15	0.46
1:A:239:VAL:HB	1:A:251:LEU:HB2	1.98	0.46
1:A:312:VAL:HG22	1:A:352:PRO:HG2	1.96	0.46
1:A:66:ASN:HD21	1:A:68:ASP:HB2	1.81	0.46
1:A:224:ARG:HD3	1:A:225:LEU:HD13	1.97	0.46
1:A:327:LEU:HB3	1:A:329:TRP:CZ3	2.50	0.46
1:A:196:ARG:CZ	1:A:210:GLN:HE21	2.28	0.46
1:A:283:ASN:O	1:A:284:ASP:CB	2.64	0.46
1:A:26:THR:O	1:A:371:ILE:HG23	2.16	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:60:GLY:HA2	1:A:92:LEU:HD11	1.99	0.45
1:A:76:VAL:HG21	1:A:120:GLY:O	2.16	0.44
1:A:52:VAL:HG11	1:A:54:TYR:CZ	2.51	0.44
1:A:36:GLY:CA	1:A:57:ASP:HB2	2.47	0.44
1:A:139:SER:O	1:A:140:ASP:CB	2.56	0.43
1:A:76:VAL:HG12	1:A:77:SER:N	2.33	0.43
1:A:102:HIS:HB2	1:A:104:TYR:CZ	2.53	0.43
1:A:356:ASP:O	1:A:358:LYS:HG3	2.18	0.43
1:A:57:ASP:OD1	1:A:57:ASP:C	2.56	0.43
1:A:327:LEU:HA	1:A:327:LEU:HD12	1.91	0.43
1:A:322:ASP:OD2	1:A:328:HIS:HE1	2.02	0.43
1:A:334:ASP:OD1	1:A:335:GLY:HA3	2.19	0.42
1:A:333:GLU:C	2:A:2058:HOH:O	2.57	0.42
1:A:346:SER:HB2	1:A:365:ASP:HB2	2.00	0.42
1:A:213:ILE:HA	1:A:213:ILE:HD13	1.59	0.42
1:A:262:ARG:HH11	1:A:264:LEU:CB	2.32	0.42
1:A:210:GLN:HG3	2:A:2027:HOH:O	2.20	0.42
1:A:29:TRP:CE2	1:A:370:SER:HB2	2.55	0.42
1:A:72:GLU:OE1	1:A:75:SER:OG	2.38	0.42
1:A:176:ARG:NH2	1:A:224:ARG:O	2.52	0.41
1:A:33:VAL:HG23	1:A:367:THR:CG2	2.50	0.41
1:A:210:GLN:CG	2:A:2027:HOH:O	2.69	0.41
1:A:216:ALA:O	1:A:217:THR:C	2.60	0.41
1:A:348:PHE:O	1:A:349:GLN:HB3	2.21	0.41
1:A:216:ALA:O	1:A:218:GLY:N	2.54	0.40
1:A:265:GLY:N	2:A:2048:HOH:O	2.50	0.40
1:A:300:GLN:NE2	1:A:302:ASP:HB2	2.36	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	360/379 (95%)	316 (88%)	40 (11%)	4 (1%)	14 30

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	366	GLY
1	A	217	THR
1	A	349	GLN
1	A	372	THR

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	291/309 (94%)	254 (87%)	37 (13%)	4 8

All (37) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	16	LEU
1	A	18	THR
1	A	20	GLU
1	A	22	GLN
1	A	27	THR
1	A	31	THR
1	A	37	ILE
1	A	61	LEU
1	A	66	ASN
1	A	72	GLU
1	A	75	SER
1	A	139	SER
1	A	140	ASP
1	A	156	ASN
1	A	170	MET
1	A	173	LEU
1	A	194	ASN

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Mol	Chain	Res	Type
1	A	206	GLN
1	A	213	ILE
1	A	217	THR
1	A	224	ARG
1	A	225	LEU
1	A	230	THR
1	A	233	VAL
1	A	249	THR
1	A	264	LEU
1	A	269	ASP
1	A	271	ILE
1	A	312	VAL
1	A	313	LEU
1	A	315	ASN
1	A	327	LEU
1	A	342	LYS
1	A	349	GLN
1	A	350	THR
1	A	356	ASP
1	A	372	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	43	ASN
1	A	66	ASN
1	A	116	ASN
1	A	156	ASN
1	A	194	ASN
1	A	210	GLN
1	A	236	ASN
1	A	283	ASN
1	A	300	GLN
1	A	328	HIS
1	A	331	ASN
1	A	340	GLN
1	A	341	GLN
1	A	362	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 carbohydrates 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	362/379 (95%)	-0.05	0 100 100	42, 65, 94, 106	0

There are no RSRZ outliers to report.

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 carbohydrates 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.