



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 26, 2014 – 03:07 PM GMT

PDB ID : 3UAQ  
Title : Crystal Structure of the N-lobe Domain of Lactoferrin Binding Protein B (LbpB) of Moraxella bovis  
Authors : Arutyunova, E; Brooks, C.L.; Beddeck, A; Mak, M.W.; Schryvers, A.B.; Lemieux, M.J.  
Deposited on : 2011-10-21  
Resolution : 2.93 Å(reported)

This is a full wwPDB validation report for a publicly released PDB entry.  
We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)  
A user guide is available at <http://wwpdb.org/ValidationPDFNotes.html>

---

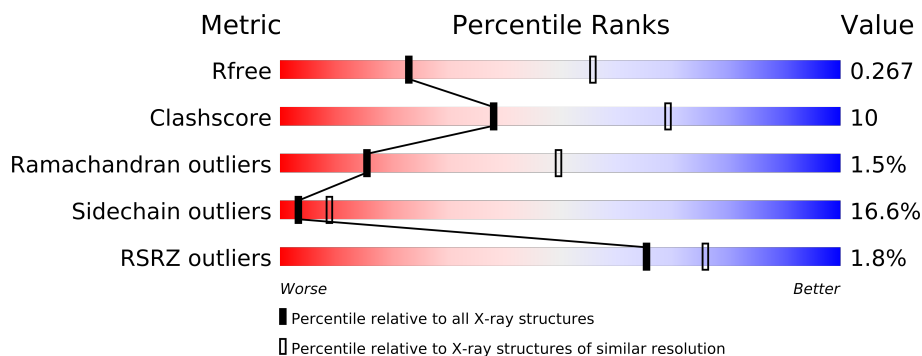
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.15 2013  
Xtriage (Phenix) : dev-1323  
EDS : stable22639  
Percentile statistics : 21963  
Refmac : 5.8.0049  
CCP4 : 6.3.0 (Settle)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)  
Validation Pipeline (wwPDB-VP) : stable22683

# 1 Overall quality at a glance

The reported resolution of this entry is 2.93 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))
$R_{free}$	66092	1424 (2.98-2.90)
Clashscore	79885	1761 (2.98-2.90)
Ramachandran outliers	78287	1708 (2.98-2.90)
Sidechain outliers	78261	1710 (2.98-2.90)
RSRZ outliers	66119	1425 (2.98-2.90)

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  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	341	
1	B	341	

## 2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 4326 atoms, of which 0 are hydrogen and 0 are deuterium.

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 LbpB B-lobe.

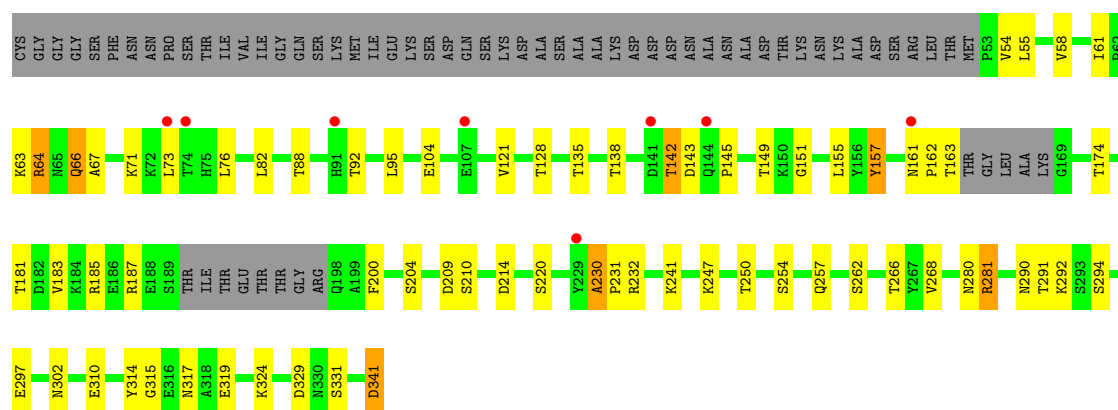
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	276	Total	C	N	O	S	0	0	0
			2174	1371	370	432	1			
1	B	273	Total	C	N	O	S	0	0	0
			2152	1358	366	427	1			

### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

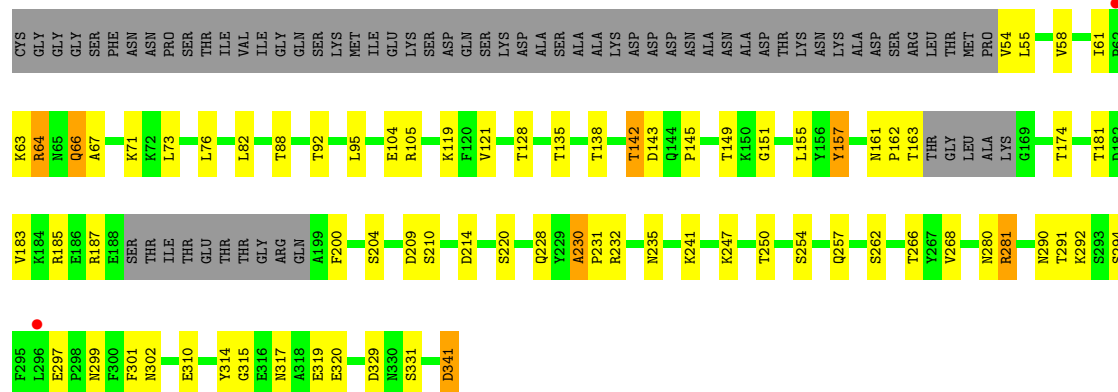
#### • Molecule 1: LbpB B-lobe

Chain A: 



#### • Molecule 1: LbpB B-lobe

Chain B: 



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	42.60Å 83.93Å 98.59Å 90.00° 101.11° 90.00°	Depositor
Resolution (Å)	33.03 – 2.93 33.03 – 2.93	Depositor EDS
% Data completeness (in resolution range)	97.0 (33.03-2.93) 93.0 (33.03-2.93)	Depositor EDS
$R_{merge}$	0.12	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.87 (at 2.95Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.7.1_743)	Depositor
R, $R_{free}$	0.220 , 0.269 0.215 , 0.267	Depositor DCC
$R_{free}$ test set	693 reflections (5.06%)	DCC
Wilson B-factor (Å <sup>2</sup> )	39.4	Xtriage
Anisotropy	0.347	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 18.6	EDS
Estimated twinning fraction	0.039 for h,-k,-h-l	Xtriage
L-test for twinning	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	0 of 14314 reflections	Xtriage
$F_o, F_c$ correlation	0.90	EDS
Total number of atoms	4326	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	42.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.34% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

## 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	0.30	0/2223	0.49	0/2998
1	B	0.30	0/2200	0.49	0/2967
All	All	0.30	0/4423	0.49	0/5965

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2174	0	16	20	0
1	B	2152	0	8	23	0
All	All	4326	0	24	43	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 10.

All (43) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:B:63:LYS:NZ	1:B:181:THR:O	2.07	0.88
1:A:63:LYS:NZ	1:A:181:THR:O	2.07	0.87

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:281:ARG:NH2	1:A:314:TYR:OH	2.17	0.78
1:B:281:ARG:NH2	1:B:314:TYR:OH	2.19	0.76
1:A:66:GLN:NE2	1:A:145:PRO:O	2.24	0.71
1:B:66:GLN:NE2	1:B:145:PRO:O	2.27	0.68
1:A:317:ASN:N	1:A:319:GLU:OE1	2.34	0.59
1:A:64:ARG:NH2	1:A:151:GLY:O	2.37	0.58
1:B:317:ASN:N	1:B:319:GLU:OE1	2.37	0.56
1:B:64:ARG:NH2	1:B:151:GLY:O	2.39	0.56
1:A:163:THR:OG1	1:A:315:GLY:O	2.24	0.56
1:B:64:ARG:NH2	1:B:149:THR:O	2.39	0.55
1:B:163:THR:OG1	1:B:315:GLY:O	2.23	0.55
1:B:230:ALA:CB	1:B:231:PRO:CD	2.84	0.55
1:A:230:ALA:CB	1:A:231:PRO:CD	2.84	0.55
1:A:64:ARG:NH2	1:A:149:THR:O	2.39	0.55
1:B:341:ASP:N	1:B:341:ASP:OD1	2.41	0.54
1:A:341:ASP:N	1:A:341:ASP:OD1	2.41	0.53
1:B:209:ASP:OD2	1:B:232:ARG:NH1	2.42	0.52
1:A:209:ASP:OD2	1:A:232:ARG:NH1	2.43	0.51
1:B:290:ASN:O	1:B:291:THR:OG1	2.29	0.51
1:B:299:ASN:OD1	1:B:301:PHE:N	2.45	0.50
1:B:142:THR:OG1	1:B:143:ASP:N	2.42	0.49
1:A:290:ASN:O	1:A:291:THR:OG1	2.32	0.48
1:A:294:SER:N	1:A:297:GLU:O	2.47	0.47
1:B:294:SER:N	1:B:297:GLU:O	2.47	0.47
1:A:142:THR:OG1	1:A:143:ASP:N	2.43	0.47
1:B:302:ASN:OD1	1:B:302:ASN:N	2.48	0.46
1:A:157:TYR:OH	1:A:310:GLU:OE2	2.33	0.46
1:A:214:ASP:N	1:A:214:ASP:OD1	2.48	0.45
1:B:187:ARG:N	1:B:200:PHE:O	2.50	0.45
1:A:302:ASN:N	1:A:302:ASN:OD1	2.50	0.45
1:A:187:ARG:N	1:A:200:PHE:O	2.51	0.44
1:B:329:ASP:OD1	1:B:331:SER:OG	2.36	0.43
1:B:214:ASP:N	1:B:214:ASP:OD1	2.51	0.43
1:A:280:ASN:N	1:A:280:ASN:OD1	2.52	0.42
1:A:329:ASP:OD1	1:A:331:SER:OG	2.37	0.42
1:B:157:TYR:OH	1:B:310:GLU:OE2	2.36	0.42
1:B:67:ALA:O	1:B:76:LEU:N	2.53	0.42
1:B:228:GLN:NE2	1:B:235:ASN:OD1	2.52	0.42
1:B:119:LYS:N	1:B:320:GLU:OE2	2.53	0.42
1:A:67:ALA:O	1:A:76:LEU:N	2.54	0.41
1:B:280:ASN:N	1:B:280:ASN:OD1	2.52	0.41

There are no symmetry-related clashes.

## 5.3 Torsion angles

### 5.3.1 Protein backbone ⓘ

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	270/341 (79%)	240 (89%)	26 (10%)	4 (2%)	15	50
1	B	267/341 (78%)	239 (90%)	24 (9%)	4 (2%)	15	50
All	All	537/682 (79%)	479 (89%)	50 (9%)	8 (2%)	15	50

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	66	GLN
1	B	66	GLN
1	A	230	ALA
1	B	230	ALA
1	A	204	SER
1	B	204	SER
1	A	162	PRO
1	B	162	PRO

### 5.3.2 Protein sidechains ⓘ

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	225/277 (81%)	188 (84%)	37 (16%)	3	9
1	B	222/277 (80%)	185 (83%)	37 (17%)	3	8
All	All	447/554 (81%)	373 (83%)	74 (17%)	3	9

All (74) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	54	VAL

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
1	A	55	LEU
1	A	58	VAL
1	A	61	ILE
1	A	64	ARG
1	A	71	LYS
1	A	73	LEU
1	A	82	LEU
1	A	88	THR
1	A	92	THR
1	A	95	LEU
1	A	104	GLU
1	A	121	VAL
1	A	128	THR
1	A	135	THR
1	A	138	THR
1	A	142	THR
1	A	155	LEU
1	A	157	TYR
1	A	161	ASN
1	A	174	THR
1	A	183	VAL
1	A	185	ARG
1	A	210	SER
1	A	220	SER
1	A	241	LYS
1	A	247	LYS
1	A	250	THR
1	A	254	SER
1	A	257	GLN
1	A	262	SER
1	A	266	THR
1	A	268	VAL
1	A	281	ARG
1	A	292	LYS
1	A	324	LYS
1	A	341	ASP
1	B	54	VAL
1	B	55	LEU
1	B	58	VAL
1	B	61	ILE
1	B	64	ARG
1	B	71	LYS

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
1	B	73	LEU
1	B	82	LEU
1	B	88	THR
1	B	92	THR
1	B	95	LEU
1	B	104	GLU
1	B	105	ARG
1	B	121	VAL
1	B	128	THR
1	B	135	THR
1	B	138	THR
1	B	142	THR
1	B	155	LEU
1	B	157	TYR
1	B	161	ASN
1	B	174	THR
1	B	183	VAL
1	B	185	ARG
1	B	210	SER
1	B	220	SER
1	B	241	LYS
1	B	247	LYS
1	B	250	THR
1	B	254	SER
1	B	257	GLN
1	B	262	SER
1	B	266	THR
1	B	268	VAL
1	B	281	ARG
1	B	292	LYS
1	B	341	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 5.3.3 RNA ⓘ

There are no RNA chains 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 carbohydrates 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 ⓘ

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	276/341 (80%)	-0.07	8 (2%) 49 59	21, 41, 63, 80	0
1	B	273/341 (80%)	-0.07	2 (0%) 84 91	20, 40, 62, 79	0
All	All	549/682 (80%)	-0.07	10 (1%) 65 76	20, 41, 63, 80	0

All (10) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	296	LEU	2.9
1	A	144	GLN	2.6
1	A	74	THR	2.5
1	A	229	TYR	2.4
1	A	141	ASP	2.2
1	A	161	ASN	2.2
1	A	91	HIS	2.1
1	A	107	GLU	2.0
1	A	73	LEU	2.0
1	B	62	PRO	2.0

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

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

### 6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

### 6.4 Ligands ⓘ

There are no ligands in this entry.

## 6.5 Other polymers ⓘ

There are no such residues in this entry.