



# wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 1, 2016 – 12:08 AM GMT

PDB ID : 1ZS3  
Title : The crystal structure of the Lactococcus lactis MG1363 DpsB protein  
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Artymiuk, P.J.; Green, J.  
Deposited on : 2005-05-23  
Resolution : 2.70 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](mailto:validation@mail.wwpdb.org)  
A user guide is available at  
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467  
Mogul : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk26865

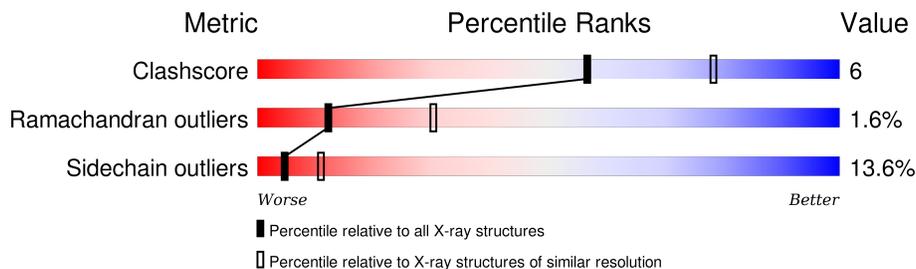
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.70 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	102246	2422 (2.70-2.70)
Ramachandran outliers	100387	2382 (2.70-2.70)
Sidechain outliers	100360	2382 (2.70-2.70)

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. 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.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	182	
1	B	182	
1	C	182	
1	D	182	
1	E	182	
1	F	182	
1	G	182	

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Mol	Chain	Length	Quality of chain
1	H	182	 71% 18% • • 6%
1	I	182	 70% 18% • • 6%
1	J	182	 62% 29% • 6%
1	K	182	 68% 21% • • 6%
1	L	182	 71% 19% • • 6%

## 2 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 16775 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 Lactococcus lactis MG1363 DpsA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	171	1387	897	223	263	4	0	0	0
1	B	171	1387	897	223	263	4	0	0	0
1	C	171	1387	897	223	263	4	0	0	0
1	D	171	1387	897	223	263	4	0	0	0
1	E	171	1387	897	223	263	4	0	0	0
1	F	171	1387	897	223	263	4	0	0	0
1	G	171	1387	897	223	263	4	0	0	0
1	H	171	1387	897	223	263	4	0	0	0
1	I	171	1387	897	223	263	4	0	0	0
1	J	171	1387	897	223	263	4	0	0	0
1	K	171	1387	897	223	263	4	0	0	0
1	L	171	1387	897	223	263	4	0	0	0

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	12	Total	O	0	0
			12	12		
2	B	13	Total	O	0	0
			13	13		

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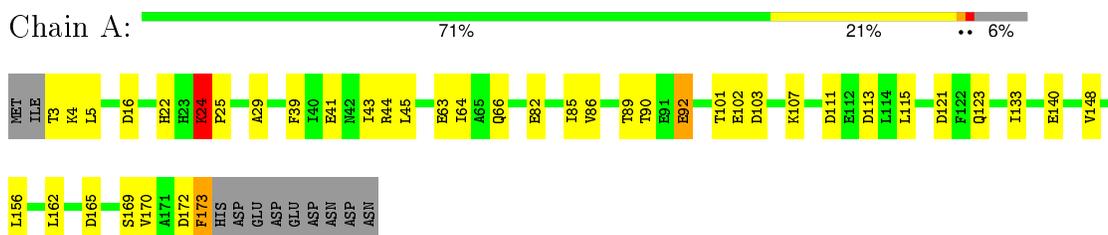
<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
2	C	9	Total 9	O 9	0	0
2	D	13	Total 13	O 13	0	0
2	E	13	Total 13	O 13	0	0
2	F	10	Total 10	O 10	0	0
2	G	15	Total 15	O 15	0	0
2	H	8	Total 8	O 8	0	0
2	I	13	Total 13	O 13	0	0
2	J	6	Total 6	O 6	0	0
2	K	12	Total 12	O 12	0	0
2	L	7	Total 7	O 7	0	0

### 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 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.

Note EDS was not executed.

- Molecule 1: *Lactococcus lactis* MG1363 DpsA





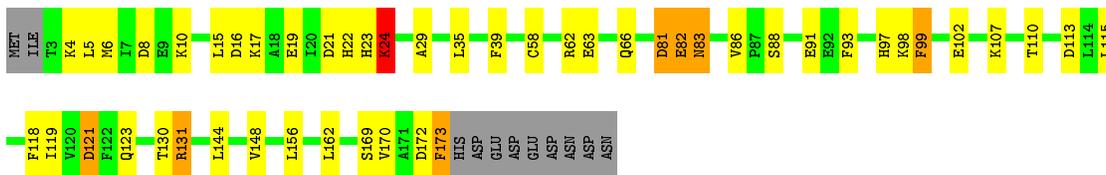
- Molecule 1: *Lactococcus lactis* MG1363 DpsA

Chain E: 74% 16% 6%



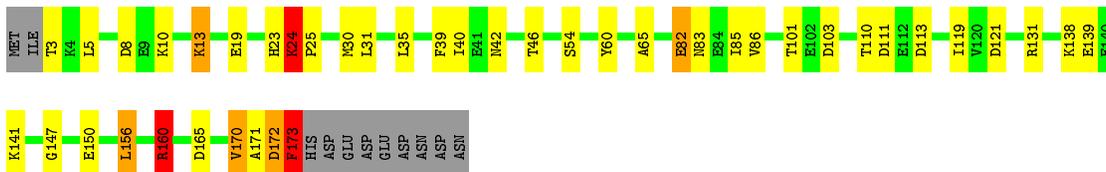
- Molecule 1: *Lactococcus lactis* MG1363 DpsA

Chain F: 67% 23% 6%



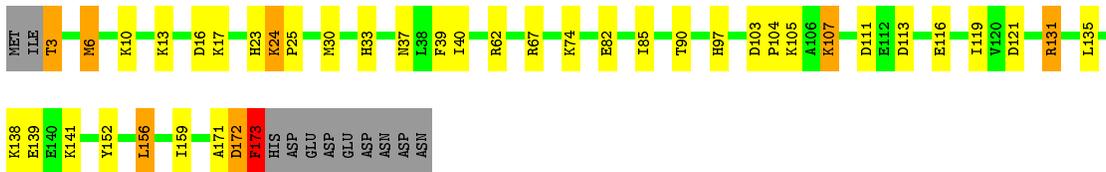
- Molecule 1: *Lactococcus lactis* MG1363 DpsA

Chain G: 70% 19% 6%



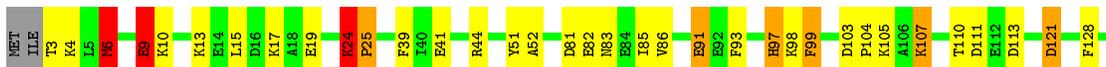
- Molecule 1: *Lactococcus lactis* MG1363 DpsA

Chain H: 71% 18% 6%



- Molecule 1: *Lactococcus lactis* MG1363 DpsA

Chain I: 70% 18% 6%





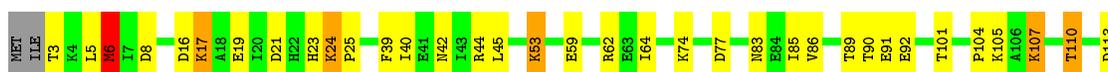
- Molecule 1: *Lactococcus lactis* MG1363 DpsA

Chain J: 62% 29% 6%



- Molecule 1: *Lactococcus lactis* MG1363 DpsA

Chain K: 68% 21% 6%



- Molecule 1: *Lactococcus lactis* MG1363 DpsA

Chain L: 71% 19% 6%



## 4 Data and refinement statistics

Xtrriage (Phenix) and EDS were not executed - this section will therefore be incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	127.98Å 128.38Å 193.90Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	15.00 – 2.70	Depositor
% Data completeness (in resolution range)	92.3 (15.00-2.70)	Depositor
$R_{merge}$	0.07	Depositor
$R_{sym}$	0.07	Depositor
Refinement program	REFMAC 5.1.24	Depositor
R, $R_{free}$	0.207 , 0.258	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	16775	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	46.0	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	0.86	0/1414	0.91	5/1907 (0.3%)
1	B	0.98	2/1414 (0.1%)	0.96	3/1907 (0.2%)
1	C	0.90	1/1414 (0.1%)	0.95	7/1907 (0.4%)
1	D	1.01	2/1414 (0.1%)	1.01	6/1907 (0.3%)
1	E	0.96	2/1414 (0.1%)	0.95	7/1907 (0.4%)
1	F	0.94	0/1414	1.00	6/1907 (0.3%)
1	G	1.00	4/1414 (0.3%)	1.03	7/1907 (0.4%)
1	H	0.95	2/1414 (0.1%)	0.98	7/1907 (0.4%)
1	I	1.72	6/1414 (0.4%)	1.04	9/1907 (0.5%)
1	J	0.91	1/1414 (0.1%)	0.96	6/1907 (0.3%)
1	K	1.04	5/1414 (0.4%)	1.13	13/1907 (0.7%)
1	L	0.87	0/1414	0.91	5/1907 (0.3%)
All	All	1.03	25/16968 (0.1%)	0.99	81/22884 (0.4%)

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	1
1	B	0	1
1	C	0	1
1	D	0	1
1	E	0	1
1	F	0	1
1	G	0	1
1	H	0	1
1	I	0	1
1	J	0	1
1	K	0	2
1	L	0	1
All	All	0	13

The worst 5 of 25 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	I	9	GLU	CD-OE1	41.07	1.70	1.25
1	I	9	GLU	CD-OE2	29.05	1.57	1.25
1	K	173	PHE	N-CA	14.25	1.74	1.46
1	I	91	GLU	CD-OE2	10.75	1.37	1.25
1	I	6	MET	SD-CE	9.91	2.33	1.77

The worst 5 of 81 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	K	62	ARG	NE-CZ-NH2	16.21	128.41	120.30
1	K	172	ASP	CB-CG-OD2	11.62	128.76	118.30
1	I	9	GLU	OE1-CD-OE2	10.75	136.20	123.30
1	G	172	ASP	CB-CG-OD2	10.58	127.83	118.30
1	F	172	ASP	CB-CG-OD2	10.37	127.64	118.30

There are no chirality outliers.

5 of 13 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	24	LYS	Peptide
1	B	24	LYS	Peptide
1	C	24	LYS	Peptide
1	D	24	LYS	Peptide
1	E	24	LYS	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	1387	0	1386	14	0
1	B	1387	0	1386	19	0
1	C	1387	0	1386	22	0
1	D	1387	0	1386	13	0
1	E	1387	0	1386	18	0
1	F	1387	0	1386	24	0
1	G	1387	0	1386	17	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	H	1387	0	1386	15	0
1	I	1387	0	1386	21	0
1	J	1387	0	1386	23	0
1	K	1387	0	1386	20	0
1	L	1387	0	1386	15	0
2	A	12	0	0	0	0
2	B	13	0	0	1	0
2	C	9	0	0	0	0
2	D	13	0	0	0	0
2	E	13	0	0	3	0
2	F	10	0	0	3	0
2	G	15	0	0	4	0
2	H	8	0	0	4	0
2	I	13	0	0	1	0
2	J	6	0	0	5	0
2	K	12	0	0	4	0
2	L	7	0	0	1	0
All	All	16775	0	16632	202	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.

The worst 5 of 202 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:G:13:LYS:CE	1:G:13:LYS:NZ	1.70	1.52
1:K:173:PHE:CA	1:K:173:PHE:N	1.74	1.47
1:E:6:MET:CE	1:E:6:MET:SD	2.03	1.46
1:B:127:MET:SD	1:B:127:MET:CE	2.05	1.44
1:K:6:MET:CE	1:K:6:MET:SD	2.05	1.43

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	169/182 (93%)	160 (95%)	5 (3%)	4 (2%)	7	19
1	B	169/182 (93%)	162 (96%)	6 (4%)	1 (1%)	30	59
1	C	169/182 (93%)	157 (93%)	9 (5%)	3 (2%)	11	27
1	D	169/182 (93%)	161 (95%)	6 (4%)	2 (1%)	16	39
1	E	169/182 (93%)	158 (94%)	7 (4%)	4 (2%)	7	19
1	F	169/182 (93%)	160 (95%)	7 (4%)	2 (1%)	16	39
1	G	169/182 (93%)	161 (95%)	6 (4%)	2 (1%)	16	39
1	H	169/182 (93%)	159 (94%)	9 (5%)	1 (1%)	30	59
1	I	169/182 (93%)	158 (94%)	7 (4%)	4 (2%)	7	19
1	J	169/182 (93%)	160 (95%)	4 (2%)	5 (3%)	5	13
1	K	169/182 (93%)	162 (96%)	5 (3%)	2 (1%)	16	39
1	L	169/182 (93%)	158 (94%)	9 (5%)	2 (1%)	16	39
All	All	2028/2184 (93%)	1916 (94%)	80 (4%)	32 (2%)	12	30

5 of 32 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	4	LYS
1	D	24	LYS
1	G	25	PRO
1	H	24	LYS
1	J	25	PRO

### 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	148/159 (93%)	131 (88%)	17 (12%)	7	16
1	B	148/159 (93%)	133 (90%)	15 (10%)	9	21

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	148/159 (93%)	127 (86%)	21 (14%)	4	10
1	D	148/159 (93%)	130 (88%)	18 (12%)	6	14
1	E	148/159 (93%)	133 (90%)	15 (10%)	9	21
1	F	148/159 (93%)	125 (84%)	23 (16%)	3	8
1	G	148/159 (93%)	127 (86%)	21 (14%)	4	10
1	H	148/159 (93%)	127 (86%)	21 (14%)	4	10
1	I	148/159 (93%)	127 (86%)	21 (14%)	4	10
1	J	148/159 (93%)	124 (84%)	24 (16%)	3	7
1	K	148/159 (93%)	122 (82%)	26 (18%)	2	6
1	L	148/159 (93%)	128 (86%)	20 (14%)	5	11
All	All	1776/1908 (93%)	1534 (86%)	242 (14%)	5	11

5 of 242 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	G	3	THR
1	H	30	MET
1	L	4	LYS
1	G	19	GLU
1	G	86	VAL

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 25 such sidechains are listed below:

Mol	Chain	Res	Type
1	F	42	ASN
1	G	42	ASN
1	L	83	ASN
1	F	83	ASN
1	G	83	ASN

### 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

### 6.1 Protein, DNA and RNA chains

EDS was not executed - this section will therefore be empty.

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

EDS was not executed - this section will therefore be empty.

### 6.3 Carbohydrates

EDS was not executed - this section will therefore be empty.

### 6.4 Ligands

EDS was not executed - this section will therefore be empty.

### 6.5 Other polymers

EDS was not executed - this section will therefore be empty.