



# Full wwPDB X-ray Structure Validation Report ⓘ

May 16, 2020 – 08:01 pm BST

PDB ID : 6N8S  
Title : Crystal structure of the human cell polarity protein Lethal Giant Larvae 2 (Lgl2). aPKC phosphorylated, crystal form 3.  
Authors : Almagor, L.; Weis, W.I.  
Deposited on : 2018-11-30  
Resolution : 3.90 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](mailto: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.

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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  
Xtriage (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

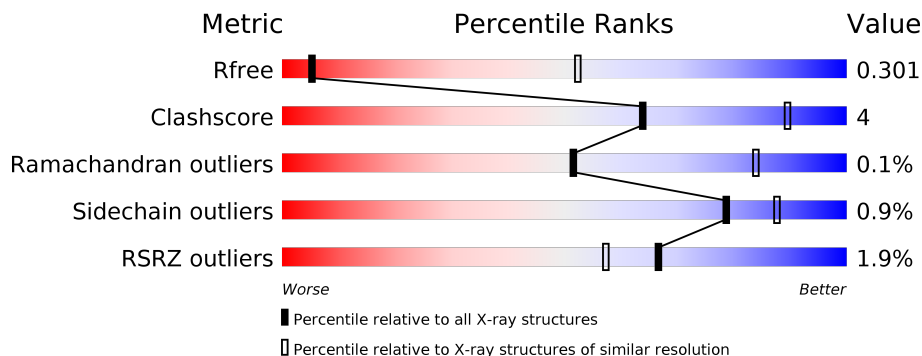
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.90 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	1002 (4.14-3.66)
Clashscore	141614	1004 (4.12-3.68)
Ramachandran outliers	138981	1021 (4.14-3.66)
Sidechain outliers	138945	1014 (4.14-3.66)
RSRZ outliers	127900	1275 (4.20-3.60)

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  $\geq 3$ , 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	979	 2% 74% 11% 13%
1	D	979	 2% 75% 9% 14%

## 2 Entry composition i

There is only 1 type of molecule in this entry. The entry contains 12829 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 Lethal(2) giant larvae protein homolog 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	834	6434	4116	1110	1185	23	0	0	0
1	D	830	6395	4098	1101	1172	24	0	0	0

There are 26 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	12	MET	-	initiating methionine	UNP Q6P1M3
A	979	GLU	-	expression tag	UNP Q6P1M3
A	980	PHE	-	expression tag	UNP Q6P1M3
A	981	THR	-	expression tag	UNP Q6P1M3
A	982	THR	-	expression tag	UNP Q6P1M3
A	983	ALA	-	expression tag	UNP Q6P1M3
A	984	SER	-	expression tag	UNP Q6P1M3
A	985	GLU	-	expression tag	UNP Q6P1M3
A	986	ASN	-	expression tag	UNP Q6P1M3
A	987	LEU	-	expression tag	UNP Q6P1M3
A	988	TYR	-	expression tag	UNP Q6P1M3
A	989	PHE	-	expression tag	UNP Q6P1M3
A	990	GLN	-	expression tag	UNP Q6P1M3
D	12	MET	-	initiating methionine	UNP Q6P1M3
D	979	GLU	-	expression tag	UNP Q6P1M3
D	980	PHE	-	expression tag	UNP Q6P1M3
D	981	THR	-	expression tag	UNP Q6P1M3
D	982	THR	-	expression tag	UNP Q6P1M3
D	983	ALA	-	expression tag	UNP Q6P1M3
D	984	SER	-	expression tag	UNP Q6P1M3
D	985	GLU	-	expression tag	UNP Q6P1M3
D	986	ASN	-	expression tag	UNP Q6P1M3
D	987	LEU	-	expression tag	UNP Q6P1M3
D	988	TYR	-	expression tag	UNP Q6P1M3
D	989	PHE	-	expression tag	UNP Q6P1M3

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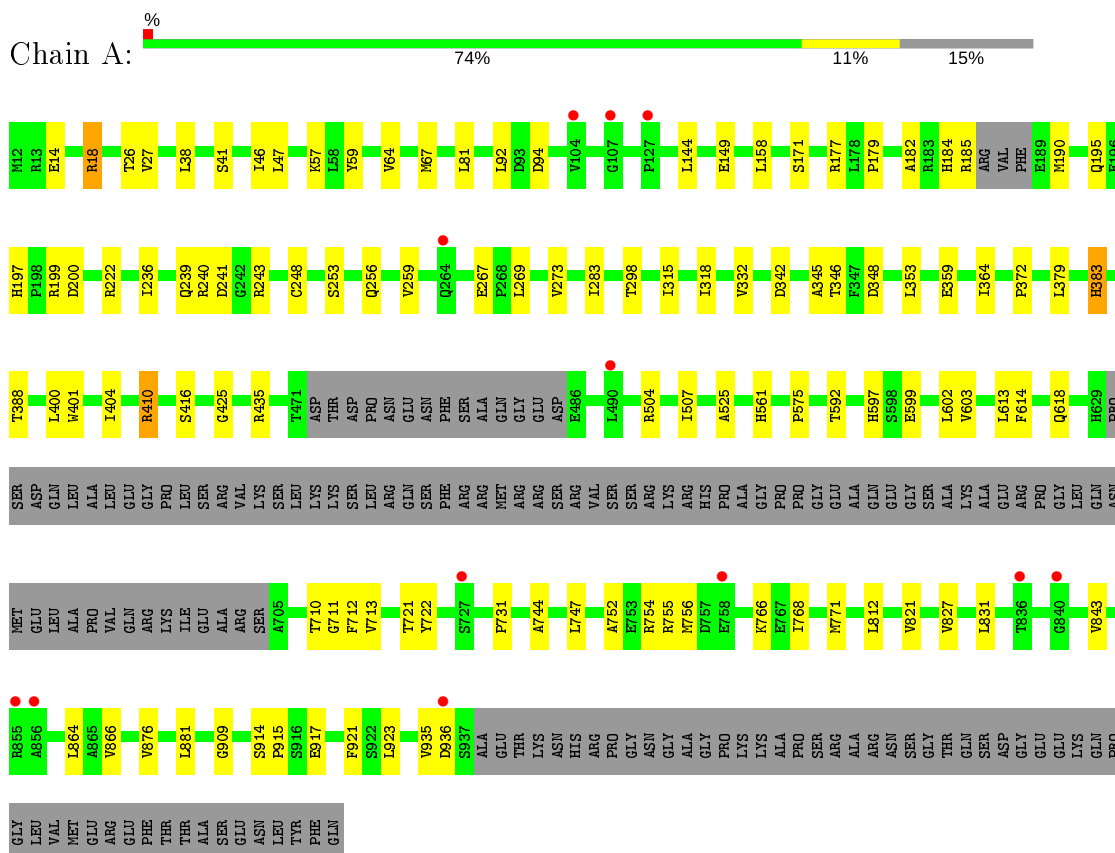
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<b>Chain</b>	<b>Residue</b>	<b>Modelled</b>	<b>Actual</b>	<b>Comment</b>	<b>Reference</b>
D	990	GLN	-	expression tag	UNP Q6P1M3

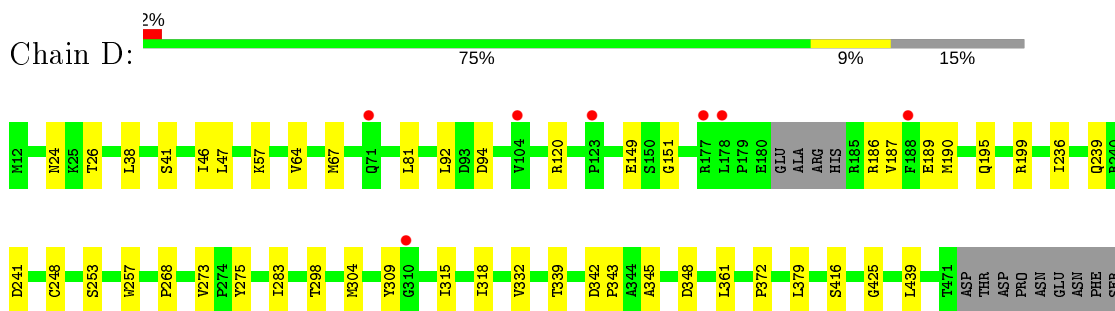
### 3 Residue-property plots i

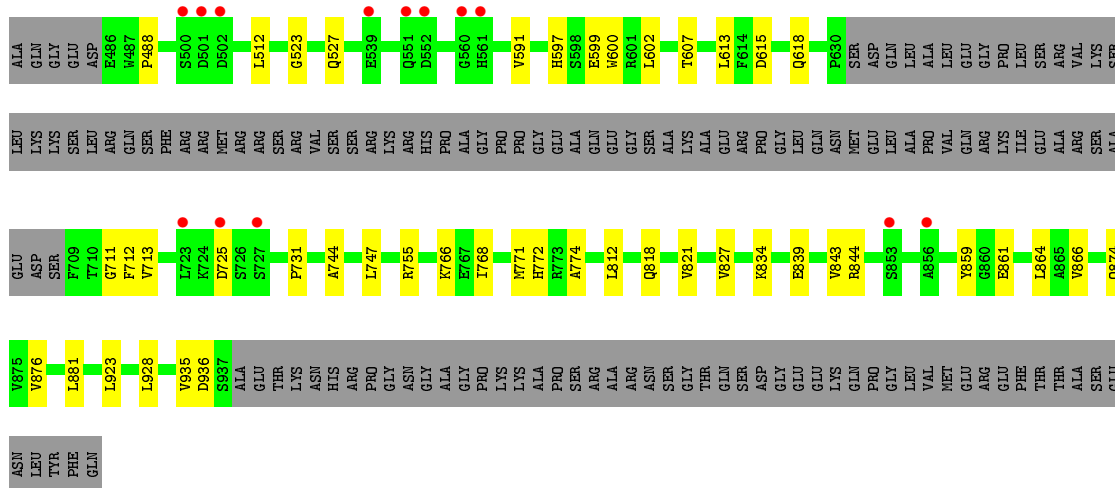
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are 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: Lethal(2) giant larvae protein homolog 2



- Molecule 1: Lethal(2) giant larvae protein homolog 2





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	130.87Å 130.87Å 277.65Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	39.66 – 3.90 39.66 – 3.90	Depositor EDS
% Data completeness (in resolution range)	99.6 (39.66-3.90) 100.0 (39.66-3.90)	Depositor EDS
$R_{merge}$	1.25	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.63 (at 3.87Å)	Xtrriage
Refinement program	PHENIX (1.14_3260: ???)	Depositor
R, $R_{free}$	0.252 , 0.298 0.258 , 0.301	Depositor DCC
$R_{free}$ test set	1998 reflections (8.78%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	75.1	Xtrriage
Anisotropy	0.220	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.28 , 22.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.42$ , $\langle L^2 \rangle = 0.25$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.85	EDS
Total number of atoms	12829	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	103.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 21.58 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 6.8136e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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

<sup>2</sup> 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 [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	0.25	0/6603	0.43	0/9008
1	D	0.25	0/6564	0.43	0/8957
All	All	0.25	0/13167	0.43	0/17965

There are no bond length outliers.

There are no bond angle outliers.

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	6434	0	6262	61	0
1	D	6395	0	6240	48	0
All	All	12829	0	12502	106	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 4.

All (106) 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:64:VAL:HG11	1:D:425:GLY:HA3	1.74	0.68
1:D:744:ALA:HB3	1:D:766:LYS:HB2	1.76	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:195:GLN:NE2	1:D:236:ILE:O	2.27	0.67
1:A:410:ARG:HD3	1:A:575:PRO:HG2	1.76	0.66
1:A:195:GLN:NE2	1:A:236:ILE:O	2.28	0.66
1:A:618:GLN:NE2	1:A:755:ARG:O	2.31	0.64
1:A:602:LEU:HB3	1:A:613:LEU:HD11	1.81	0.63
1:A:240:ARG:NH2	1:A:342:ASP:O	2.31	0.63
1:D:768:ILE:HG12	1:D:827:VAL:HG11	1.80	0.63
1:D:199:ARG:NH2	1:D:345:ALA:O	2.33	0.60
1:D:253:SER:HB3	1:D:273:VAL:HG22	1.84	0.60
1:A:248:CYS:HB2	1:A:283:ILE:HB	1.85	0.59
1:A:744:ALA:HB3	1:A:766:LYS:HB2	1.85	0.58
1:D:342:ASP:HB2	1:D:343:PRO:HD2	1.85	0.58
1:A:57:LYS:HG2	1:A:67:MET:HG3	1.85	0.58
1:A:64:VAL:HG11	1:A:425:GLY:HA3	1.85	0.58
1:A:253:SER:HB3	1:A:273:VAL:HG22	1.86	0.58
1:A:239:GLN:NE2	1:A:241:ASP:OD1	2.37	0.57
1:D:239:GLN:NE2	1:D:241:ASP:OD1	2.36	0.57
1:A:18:ARG:HG2	1:D:24:ASN:ND2	2.19	0.57
1:A:41:SER:HB2	1:A:81:LEU:HD22	1.86	0.57
1:A:171:SER:OG	1:A:185:ARG:NH1	2.37	0.57
1:A:199:ARG:NH2	1:A:345:ALA:O	2.36	0.57
1:A:315:ILE:HD11	1:A:332:VAL:HG11	1.87	0.56
1:D:361:LEU:HD22	1:D:379:LEU:HD23	1.87	0.56
1:A:768:ILE:HG12	1:A:827:VAL:HG11	1.86	0.55
1:A:592:THR:OG1	1:A:713:VAL:O	2.22	0.55
1:D:821:VAL:HG23	1:D:881:LEU:HD11	1.87	0.55
1:D:57:LYS:HG2	1:D:67:MET:HG3	1.88	0.54
1:A:26:THR:OG1	1:A:27:VAL:N	2.41	0.54
1:A:240:ARG:NH1	1:A:348:ASP:OD1	2.40	0.54
1:A:504:ARG:HB3	1:A:525:ALA:HB2	1.90	0.54
1:D:731:PRO:HB2	1:D:747:LEU:HB2	1.89	0.54
1:D:818:GLN:HG2	1:D:834:LYS:HA	1.88	0.54
1:D:248:CYS:HB2	1:D:283:ILE:HB	1.91	0.52
1:D:600:TRP:O	1:D:755:ARG:NH2	2.42	0.52
1:A:256:GLN:HB2	1:A:269:LEU:HB2	1.90	0.52
1:D:602:LEU:HD13	1:D:613:LEU:HD21	1.92	0.52
1:D:602:LEU:HB3	1:D:613:LEU:HD11	1.92	0.52
1:A:240:ARG:HD3	1:A:346:THR:O	2.10	0.52
1:A:843:VAL:HG13	1:A:866:VAL:HG13	1.93	0.51
1:A:731:PRO:HB2	1:A:747:LEU:HB2	1.93	0.51
1:D:618:GLN:NE2	1:D:755:ARG:O	2.35	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:864:LEU:HB2	1:A:876:VAL:HB	1.93	0.51
1:D:315:ILE:HD11	1:D:332:VAL:HG11	1.92	0.50
1:D:859:TYR:OH	1:D:861:GLU:OE2	2.26	0.50
1:A:359:GLU:OE1	1:A:383:HIS:NE2	2.32	0.50
1:A:821:VAL:HG23	1:A:881:LEU:HD11	1.94	0.50
1:D:597:HIS:CE1	1:D:599:GLU:HB3	2.47	0.49
1:A:710:THR:HG22	1:A:711:GLY:H	1.77	0.49
1:A:298:THR:HB	1:A:318:ILE:HB	1.94	0.49
1:D:591:VAL:HA	1:D:607:THR:HG22	1.93	0.49
1:A:936:ASP:OD1	1:A:936:ASP:N	2.45	0.49
1:A:603:VAL:HG13	1:A:614:PHE:HB3	1.95	0.49
1:A:353:LEU:HB3	1:A:364:ILE:HB	1.94	0.48
1:D:839:GLU:OE1	1:D:874:GLN:NE2	2.43	0.48
1:D:304:MET:HB3	1:D:309:TYR:HB2	1.96	0.48
1:D:372:PRO:HG2	1:D:416:SER:HB2	1.96	0.48
1:A:812:LEU:HD21	1:A:864:LEU:HD11	1.96	0.47
1:A:597:HIS:CE1	1:A:599:GLU:HB3	2.50	0.47
1:A:602:LEU:HD13	1:A:613:LEU:HD21	1.96	0.47
1:D:843:VAL:HG13	1:D:866:VAL:HG13	1.97	0.47
1:A:38:LEU:HD11	1:A:47:LEU:HD11	1.96	0.47
1:A:177:ARG:HG2	1:A:222:ARG:HA	1.96	0.47
1:D:151:GLY:HA3	1:D:189:GLU:HB2	1.96	0.47
1:D:711:GLY:O	1:D:713:VAL:N	2.48	0.46
1:A:59:TYR:CZ	1:A:379:LEU:HD21	2.49	0.46
1:A:914:SER:OG	1:A:917:GLU:HG2	2.15	0.46
1:A:197:HIS:HB3	1:A:200:ASP:O	2.17	0.45
1:A:383:HIS:HB3	1:A:915:PRO:O	2.17	0.45
1:A:821:VAL:HB	1:A:831:LEU:HB2	1.98	0.45
1:A:149:GLU:HA	1:A:190:MET:HA	1.99	0.45
1:A:372:PRO:HG2	1:A:416:SER:HB2	1.98	0.45
1:A:400:LEU:O	1:A:404:ILE:HG12	2.17	0.44
1:A:182:ALA:O	1:A:184:HIS:N	2.50	0.44
1:D:46:ILE:HD11	1:D:935:VAL:HG21	2.00	0.44
1:D:439:LEU:HD11	1:D:512:LEU:HD22	1.99	0.43
1:A:92:LEU:HB2	1:A:94:ASP:OD1	2.18	0.43
1:D:298:THR:HB	1:D:318:ILE:HB	2.00	0.43
1:A:46:ILE:HD11	1:A:935:VAL:HG21	2.01	0.43
1:A:144:LEU:HG	1:A:158:LEU:HD11	2.00	0.43
1:D:92:LEU:HB2	1:D:94:ASP:OD1	2.19	0.43
1:A:401:TRP:CG	1:A:435:ARG:HD2	2.53	0.43
1:A:721:THR:OG1	1:A:722:TYR:N	2.50	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:752:ALA:HA	1:A:755:ARG:HB2	2.01	0.42
1:D:257:TRP:CH2	1:D:268:PRO:HG3	2.54	0.42
1:D:186:ARG:HG3	1:D:187:VAL:H	1.84	0.42
1:A:18:ARG:CZ	1:D:928:LEU:HD13	2.50	0.42
1:A:756:MET:SD	1:A:756:MET:N	2.93	0.42
1:D:812:LEU:HD21	1:D:864:LEU:HD11	1.99	0.42
1:D:615:ASP:OD1	1:D:755:ARG:NH2	2.53	0.42
1:A:504:ARG:HE	1:A:561:HIS:HB3	1.84	0.42
1:D:864:LEU:HB2	1:D:876:VAL:HB	2.02	0.41
1:A:14:GLU:HG2	1:D:26:THR:HA	2.02	0.41
1:D:523:GLY:HA3	1:D:527:GLN:NE2	2.35	0.41
1:A:267:GLU:CD	1:A:267:GLU:H	2.24	0.41
1:A:909:GLY:HA3	1:A:921:PHE:CZ	2.56	0.41
1:D:275:TYR:CE1	1:D:488:PRO:HB3	2.55	0.41
1:D:38:LEU:HD11	1:D:47:LEU:HD11	2.03	0.41
1:D:936:ASP:OD1	1:D:936:ASP:N	2.52	0.40
1:D:149:GLU:HA	1:D:190:MET:HA	2.03	0.40
1:D:772:HIS:HD2	1:D:774:ALA:HB3	1.87	0.40
1:A:388:THR:OG1	1:A:507:ILE:O	2.26	0.40
1:A:243:ARG:HA	1:A:259:VAL:HB	2.04	0.40
1:D:339:THR:OG1	1:D:348:ASP:O	2.36	0.40
1:D:41:SER:HB2	1:D:81:LEU:HD22	2.03	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	826/979 (84%)	760 (92%)	65 (8%)	1 (0%)	51	84
1	D	822/979 (84%)	764 (93%)	57 (7%)	1 (0%)	51	84
All	All	1648/1958 (84%)	1524 (92%)	122 (7%)	2 (0%)	51	84

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	712	PHE
1	A	179	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	689/837 (82%)	682 (99%)	7 (1%)	76	86
1	D	686/837 (82%)	681 (99%)	5 (1%)	84	90
All	All	1375/1674 (82%)	1363 (99%)	12 (1%)	78	87

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	18	ARG
1	A	383	HIS
1	A	410	ARG
1	A	712	PHE
1	A	754	ARG
1	A	771	MET
1	A	923	LEU
1	D	120	ARG
1	D	725	ASP
1	D	771	MET
1	D	844	ARG
1	D	923	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	884	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

### 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	834/979 (85%)	-0.03	12 (1%) 75 66	48, 95, 153, 223	0
1	D	830/979 (84%)	0.01	20 (2%) 59 48	52, 102, 161, 248	0
All	All	1664/1958 (84%)	-0.01	32 (1%) 66 57	48, 99, 158, 248	0

All (32) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	501	ASP	4.9
1	D	502	ASP	3.7
1	A	127	PRO	3.1
1	D	561	HIS	3.0
1	D	725	ASP	3.0
1	A	856	ALA	2.8
1	D	552	ASP	2.8
1	D	500	SER	2.7
1	D	560	GLY	2.6
1	A	104	VAL	2.6
1	A	840	GLY	2.5
1	D	856	ALA	2.5
1	D	551	GLN	2.5
1	A	855	ARG	2.5
1	D	727	SER	2.5
1	A	727	SER	2.5
1	D	310	GLY	2.4
1	A	758	GLU	2.4
1	D	178	LEU	2.3
1	A	107	GLY	2.3
1	D	71	GLN	2.3
1	D	123	PRO	2.3
1	D	723	LEU	2.3
1	A	264	GLN	2.3

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Mol	Chain	Res	Type	RSRZ
1	D	188	PHE	2.2
1	A	936	ASP	2.2
1	A	490	LEU	2.2
1	A	836	THR	2.1
1	D	104	VAL	2.1
1	D	853	SER	2.1
1	D	539	GLU	2.1
1	D	177	ARG	2.1

## 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 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.