WORLDWIDE wwPDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report ⓘ

May 3, 2025 – 04:19 PM EDT

PDB ID	:	4DNV / pdb_00004dnv
Title	:	Crystal structure of the W285F mutant of UVB-resistance protein UVR8
Authors	:	Wu, D.; Hu, Q.; Yan, Z.; Chen, W.; Yan, C.; Zhang, J.; Wang, J.; Shi, Y.
Deposited on	:	2012-02-09
Resolution	:	2.00 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*
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:

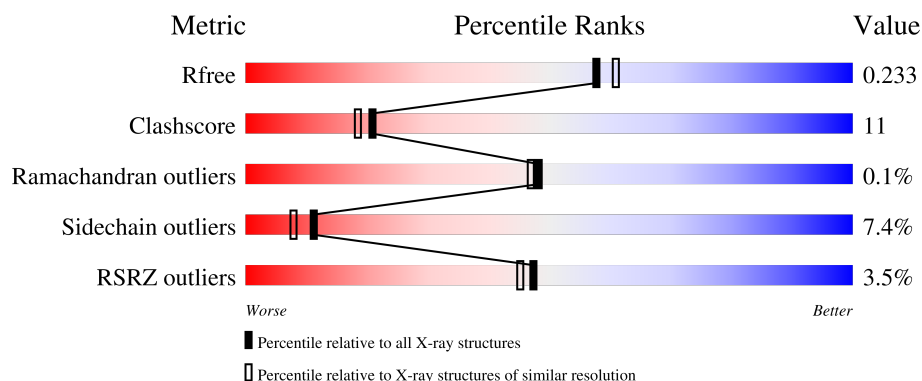|		
MolProbity	:	4-5-2 with Phenix2.0rc1
Xtriage (Phenix)	:	2.0rc1
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.006 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.43.1

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 2.00 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	Percentile Ranks	Value
Rfree		0.233
Clashscore		11
Ramachandran outliers		0.1%
Sidechain outliers		7.4%
RSRZ outliers		3.5%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	9409 (2.00-2.00)
Clashscore	180529	10737 (2.00-2.00)
Ramachandran outliers	177936	10628 (2.00-2.00)
Sidechain outliers	177891	10627 (2.00-2.00)
RSRZ outliers	164620	9409 (2.00-2.00)

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 <=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	370	
1	B	370	
1	C	370	
1	D	370	

2 Entry composition ⓘ

There are 2 unique types of molecules in this entry. The entry contains 11846 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 AT5g63860/MGI19_6.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	370	Total 2802	C 1747	N 506	O 536	S 13	0	0	0
1	B	368	Total 2786	C 1736	N 503	O 534	S 13	0	0	0
1	C	370	Total 2810	C 1752	N 507	O 537	S 14	0	1	0
1	D	368	Total 2790	C 1739	N 504	O 534	S 13	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	285	PHE	TRP	engineered mutation	UNP Q9FN03
B	285	PHE	TRP	engineered mutation	UNP Q9FN03
C	285	PHE	TRP	engineered mutation	UNP Q9FN03
D	285	PHE	TRP	engineered mutation	UNP Q9FN03

- Molecule 2 is water.

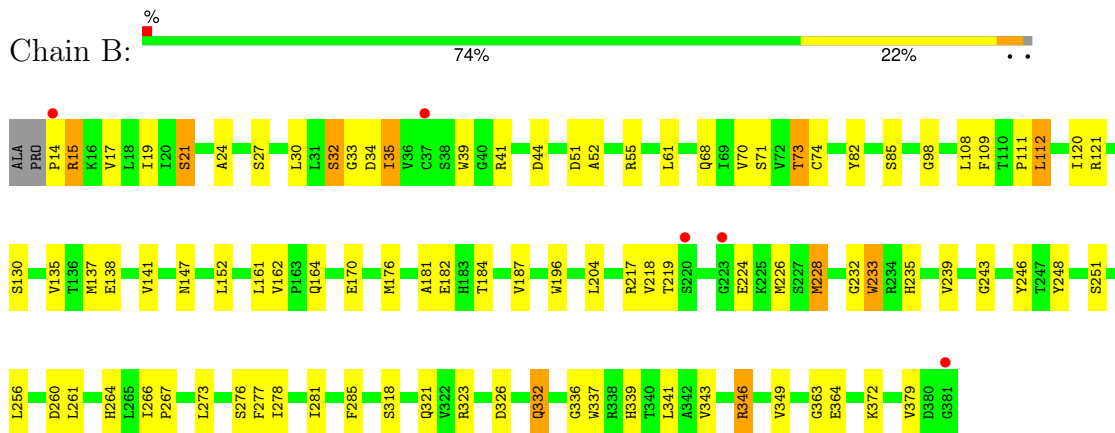| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	176	Total 176	O 176	0	0
2	B	166	Total 166	O 166	0	0
2	C	171	Total 171	O 171	0	0
2	D	145	Total 145	O 145	0	0

3 Residue-property plots ⓘ

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 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.
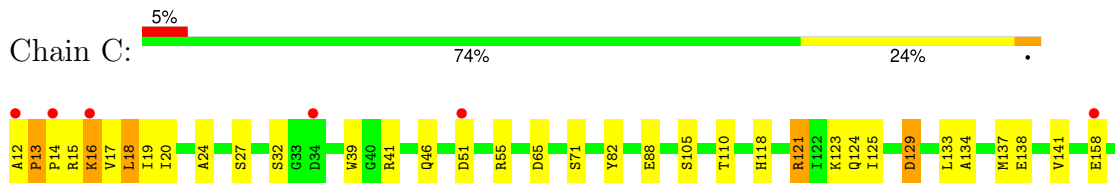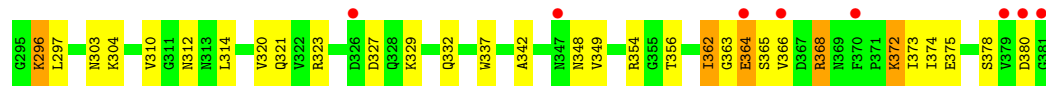
- Molecule 1: AT5g63860/MGI19_6

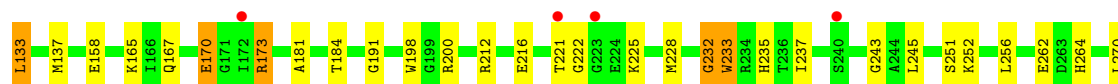
- Molecule 1: AT5g63860/MGI19_6

- Molecule 1: AT5g63860/MGI19_6

Q167 R173 I174 K175 M176 G180 A181 E182 H183 T184 D190 R200 Y201 G202 N203 R209 E216 T219 G222 G223 E224 K225 M226 S227 M228 W233 V239 S240 Y241 Y246 S251 L256 L265 K269 L270 E271 S279 Q280 F285 A290 D294

G295 K296 L297 N303 K304 V310 G311 N312 N313 L314 V320 Q321 V322 R323 D326 D327 Q328 K329 Q332 W337 A342 N347 N348 V349 R354 G355 T356 I362 G363 E364 S365 V366 D367 R368 N369 F370 P371 K372 I373 I374 E375 S378 V379 D380 G381

• Molecule 1: AT5g63860/MGI19_6

Chain D:

4%

75% 20%

ALA PRO P14 R15 K16 V17 L18 I19 I20 S27 S32 G33 D34 W39 G50 D51 A52 E53 Q60 L61 S62 A63 L64 D65 S71 Y82 S83 Q84 S85 G86 M87 S106 F109 T110 P111 L112 P113 A116 G119 I120 R121 I125 A126 C127 G128 D129 C132

L133 M137 E158 K165 I166 Q167 E170 G171 I172 R173 A181 T184 G191 W198 G199 R200 R212 E216 T221 G222 G223 E224 K225 M228 G232 W233 R234 H235 T236 I237 S240 G243 A244 L245 S251 K252 L256 E262 D263 H264 L270

N275 S276 F277 I278 S279 F285 R286 D294 G295 K296 W302 N303 K304 F305 P325 Q328 K329 Q332 W337 R338 T344 E345 R346 N347 N348 R354 G363 E364 K372 A376 L377 S378 V379 D380 G381

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	55.57Å 67.21Å 93.63Å 85.06° 81.45° 66.04°	Depositor
Resolution (Å)	33.02 – 2.00 33.02 – 2.00	Depositor EDS
% Data completeness (in resolution range)	93.5 (33.02-2.00) 93.5 (33.02-2.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.58 (at 2.00Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.7.1_743)	Depositor
R, R_{free}	0.207 , 0.240 0.201 , 0.233	Depositor DCC
R_{free} test set	3875 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	23.6	Xtriage
Anisotropy	0.661	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 37.9	EDS
L-test for twinning[2]	$< |L| > = 0.48, < L^2 > = 0.31$	Xtriage
Estimated twinning fraction	0.015 for -h,-h+k,-l	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	11846	wwPDB-VP
Average B, all atoms (Å^2)	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.97% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ 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	0.54	0/2869	0.81	1/3890 (0.0%)
1	B	0.50	0/2852	0.81	1/3866 (0.0%)
1	C	0.51	0/2877	0.80	0/3900
1	D	0.50	0/2856	0.78	3/3870 (0.1%)
All	All	0.51	0/11454	0.80	5/15526 (0.0%)

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	15	ARG	N-CA-C	-6.69	101.70	110.53
1	D	380	ASP	N-CA-C	5.74	118.28	110.35
1	D	222	GLY	N-CA-C	-5.62	107.48	115.30
1	B	33	GLY	N-CA-C	-5.28	107.40	115.00
1	D	232	GLY	N-CA-C	-5.03	105.67	112.57

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	2802	0	2680	52	1
1	B	2786	0	2658	64	1
1	C	2810	0	2688	59	1
1	D	2790	0	2669	69	1

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	176	0	0	8	0
2	B	166	0	0	12	0
2	C	171	0	0	4	0
2	D	145	0	0	8	0
All	All	11846	0	10695	238	2

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 11.

The worst 5 of 238 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:138:GLU:HG3	2:B:564:HOH:O	1.36	1.24
1:D:51:ASP:OD2	1:D:53:GLU:HG3	1.66	0.93
1:B:248:TYR:HB2	2:B:532:HOH:O	1.66	0.93
1:D:170:GLU:HG3	2:D:524:HOH:O	1.73	0.89
1:C:65:ASP:OD2	2:C:541:HOH:O	1.90	0.89

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:329:LYS:NZ	1:D:84:GLN:OE1[1_465]	2.04	0.16
1:A:167:GLN:OE1	1:B:55:ARG:NH1[1_455]	2.12	0.08

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	368/370 (100%)	360 (98%)	8 (2%)	0	100	100
1	B	366/370 (99%)	358 (98%)	8 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	369/370 (100%)	359 (97%)	8 (2%)	2 (0%)	25	21
1	D	366/370 (99%)	351 (96%)	15 (4%)	0	100	100
All	All	1469/1480 (99%)	1428 (97%)	39 (3%)	2 (0%)	48	47

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	13	PRO
1	C	364	GLU

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	292/292 (100%)	273 (94%)	19 (6%)	14	11
1	B	290/292 (99%)	273 (94%)	17 (6%)	16	13
1	C	293/292 (100%)	269 (92%)	24 (8%)	9	6
1	D	291/292 (100%)	265 (91%)	26 (9%)	8	5
All	All	1166/1168 (100%)	1080 (93%)	86 (7%)	11	8

5 of 86 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	368	ARG
1	D	170	GLU
1	C	373	ILE
1	D	87	MET
1	D	233	TRP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 14 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	347	ASN
1	D	68	GLN
1	D	332	GLN
1	D	264	HIS
1	D	321	GLN

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 ⓘ

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(Å²)	Q<0.9
1	A	370/370 (100%)	0.24	13 (3%)	47	45	15, 25, 48, 113	0
1	B	368/370 (99%)	0.28	5 (1%)	73	72	15, 27, 57, 78	0
1	C	370/370 (100%)	0.38	17 (4%)	38	36	17, 28, 52, 119	1 (0%)
1	D	368/370 (99%)	0.57	16 (4%)	40	38	20, 33, 60, 112	0
All	All	1476/1480 (99%)	0.37	51 (3%)	47	45	15, 29, 57, 119	1 (0%)

The worst 5 of 51 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	12	ALA	5.2
1	A	221	THR	4.8
1	A	12	ALA	4.8
1	B	14	PRO	3.6
1	C	190	ASP	3.6

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 monosaccharides 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.