



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 11:16 AM GMT

PDB ID : 3ODC  
Title : Human PARP-1 zinc finger 2 (Zn2) bound to DNA  
Authors : Pascal, J.M.; Langelier, M.-F.  
Deposited on : 2010-08-11  
Resolution : 2.80 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  
<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) : 1.9-1692  
EDS : rb-20026688  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk26865

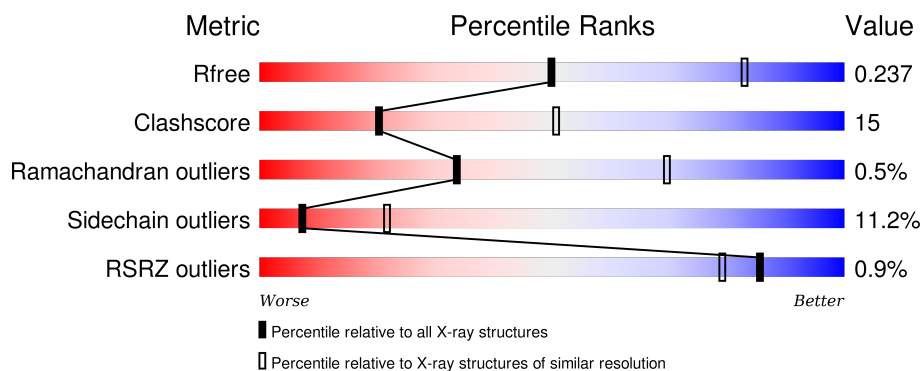
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.80 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))
$R_{free}$	91344	2393 (2.80-2.80)
Clashscore	102246	2827 (2.80-2.80)
Ramachandran outliers	100387	2782 (2.80-2.80)
Sidechain outliers	100360	2784 (2.80-2.80)
RSRZ outliers	91569	2404 (2.80-2.80)

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.

Mol	Chain	Length	Quality of chain
1	A	111	<div> <div>2%</div> <div>60%</div> <div>18%</div> <div>5%</div> <div>16%</div> </div>
1	B	111	<div> <div>61%</div> <div>25%</div> <div>•</div> <div>10%</div> </div>
2	C	8	<div> <div>50%</div> <div>50%</div> </div>
2	E	8	<div> <div>38%</div> <div>38%</div> <div>25%</div> </div>
3	D	8	<div> <div>25%</div> <div>63%</div> <div>13%</div> </div>

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Mol	Chain	Length	Quality of chain
3	F	8	 A horizontal bar chart showing the quality of chain F. The bar is divided into three segments: green (50%), yellow (38%), and orange (13%).

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 2205 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 Poly [ADP-ribose] polymerase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	93	Total	C	N	O	S	0	1	0
			743	470	130	137	6			
1	B	100	Total	C	N	O	S	0	0	0
			777	490	136	144	7			

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	104	MET	-	EXPRESSION TAG	UNP P09874
A	207	LEU	-	EXPRESSION TAG	UNP P09874
A	208	GLU	-	EXPRESSION TAG	UNP P09874
A	209	HIS	-	EXPRESSION TAG	UNP P09874
A	210	HIS	-	EXPRESSION TAG	UNP P09874
A	211	HIS	-	EXPRESSION TAG	UNP P09874
A	212	HIS	-	EXPRESSION TAG	UNP P09874
A	213	HIS	-	EXPRESSION TAG	UNP P09874
A	214	HIS	-	EXPRESSION TAG	UNP P09874
B	104	MET	-	EXPRESSION TAG	UNP P09874
B	207	LEU	-	EXPRESSION TAG	UNP P09874
B	208	GLU	-	EXPRESSION TAG	UNP P09874
B	209	HIS	-	EXPRESSION TAG	UNP P09874
B	210	HIS	-	EXPRESSION TAG	UNP P09874
B	211	HIS	-	EXPRESSION TAG	UNP P09874
B	212	HIS	-	EXPRESSION TAG	UNP P09874
B	213	HIS	-	EXPRESSION TAG	UNP P09874
B	214	HIS	-	EXPRESSION TAG	UNP P09874

- Molecule 2 is a DNA chain called 5'-D(\*CP\*CP\*CP\*AP\*GP\*AP\*CP\*G)-3'.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	8	Total	C	N	O	P	0	0	0
			159	76	32	44	7			

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	E	8	Total	C	N	O	P	0	0	0
			159	76	32	44	7			

- Molecule 3 is a DNA chain called 5'-D(\*CP\*GP\*TP\*CP\*TP\*GP\*GP\*G)-3'.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	D	8	Total	C	N	O	P	0	0	0
			163	78	30	48	7			
3	F	8	Total	C	N	O	P	0	0	0
			163	78	30	48	7			

- Molecule 4 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	1	Total	Zn	0	0
			1	1		
4	A	1	Total	Zn	0	0
			1	1		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	13	Total	O	0	0
			13	13		
5	B	17	Total	O	0	0
			17	17		
5	C	5	Total	O	0	0
			5	5		
5	D	1	Total	O	0	0
			1	1		
5	E	2	Total	O	0	0
			2	2		
5	F	1	Total	O	0	0
			1	1		



Chain F:



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	63.73Å 63.73Å 192.41Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	36.26 – 2.80 36.26 – 2.80	Depositor EDS
% Data completeness (in resolution range)	99.9 (36.26-2.80) 100.0 (36.26-2.80)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.08 (at 2.81Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.6.2_432)	Depositor
R, $R_{free}$	0.193 , 0.240 0.193 , 0.237	Depositor DCC
$R_{free}$ test set	556 reflections (4.94%)	DCC
Wilson B-factor (Å <sup>2</sup> )	56.3	Xtriage
Anisotropy	0.019	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 37.3	EDS
Estimated twinning fraction	0.028 for -h,-k,l	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 11801 reflections	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	2205	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	48.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.40% of the height of the origin peak. No significant pseudotranslation is detected.*

<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, 0.375 respectively for untwinned datasets, and 0.333, 0.2 for perfectly twinned datasets.



## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ZN

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	0.41	0/760	0.54	0/1013
1	B	0.41	0/791	0.57	0/1057
2	C	0.71	0/178	1.54	2/272 (0.7%)
2	E	0.85	0/178	1.71	6/272 (2.2%)
3	D	0.91	0/182	1.48	3/280 (1.1%)
3	F	0.80	0/182	1.60	3/280 (1.1%)
All	All	0.57	0/2271	1.04	14/3174 (0.4%)

There are no bond length outliers.

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	5	DG	O4'-C1'-N9	9.39	114.58	108.00
3	F	6	DG	O4'-C4'-C3'	-9.32	100.41	106.00
2	E	6	DA	O4'-C1'-N9	-7.24	102.93	108.00
2	E	5	DG	C4'-C3'-C2'	-6.43	97.31	103.10
2	E	5	DG	C3'-C2'-C1'	-6.03	95.27	102.50
2	C	4	DA	O4'-C1'-N9	-5.96	103.83	108.00
2	E	2	DC	O4'-C1'-N1	-5.96	103.83	108.00
3	D	4	DC	O4'-C1'-N1	-5.81	103.93	108.00
2	C	8	DG	O4'-C1'-N9	5.70	111.99	108.00
3	F	4	DC	C1'-O4'-C4'	-5.35	104.75	110.10
3	F	4	DC	O4'-C1'-N1	-5.22	104.35	108.00
2	E	3	DC	C3'-C2'-C1'	-5.16	96.31	102.50
3	D	3	DT	N3-C4-O4	5.14	122.98	119.90
3	D	5	DT	O4'-C1'-C2'	-5.00	101.90	105.90

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	743	0	754	19	0
1	B	777	0	772	32	0
2	C	159	0	90	2	0
2	E	159	0	90	3	0
3	D	163	0	92	2	0
3	F	163	0	92	3	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
5	A	13	0	0	1	0
5	B	17	0	0	1	0
5	C	5	0	0	1	0
5	D	1	0	0	0	0
5	E	2	0	0	1	0
5	F	1	0	0	0	0
All	All	2205	0	1890	58	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 15.

All (58) 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:167:ARG:HB2	1:B:167:ARG:HH11	1.22	1.03
1:A:167:ARG:HH11	1:A:167:ARG:HB2	1.44	0.80
1:A:167:ARG:HD2	1:A:200:PRO:HG2	1.63	0.80
1:B:167:ARG:HG3	1:B:168:GLU:H	1.48	0.79
1:B:110:LEU:HD22	1:B:180:GLN:HB3	1.66	0.78
1:B:167:ARG:CB	1:B:167:ARG:HH11	2.00	0.73
1:B:167:ARG:HG3	1:B:168:GLU:N	2.03	0.72
1:B:126:LYS:HG3	1:B:156:ARG:HG3	1.74	0.69
1:B:104:MET:HE3	1:B:105:LYS:H	1.60	0.64
1:B:140:SER:HB3	1:B:157:TRP:CE3	2.31	0.64
1:B:167:ARG:NH1	1:B:167:ARG:HB2	2.06	0.61
1:B:104:MET:CE	1:B:105:LYS:H	2.14	0.61
1:A:112:ASP:HB2	1:A:182:LYS:NZ	2.16	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:185:SER:OG	1:B:169:GLU:HG2	2.02	0.59
1:A:140:SER:HB3	1:A:157:TRP:CE3	2.39	0.58
3:F:6:DG:H5'	3:F:6:DG:C8	2.41	0.56
1:A:140:SER:HB3	1:A:157:TRP:CZ3	2.44	0.53
1:B:148:LYS:N	1:B:149:PRO:HD3	2.24	0.52
3:D:1:DC:H2'	3:D:2:DG:C8	2.44	0.52
1:B:144:VAL:HG23	1:B:153:MET:CE	2.39	0.52
1:A:126:LYS:HE2	5:C:16:HOH:O	2.10	0.51
3:F:1:DC:H2''	3:F:2:DG:C8	2.49	0.47
3:F:1:DC:H6	3:F:1:DC:O5'	1.97	0.47
1:A:131[A]:LYS:HD3	1:A:133:GLU:OE1	2.14	0.47
2:E:3:DC:H2'	2:E:3:DC:O5'	2.15	0.47
2:E:1:DC:H2'	2:E:1:DC:O5'	2.16	0.46
1:A:141:LYS:HD3	1:A:143:MET:SD	2.56	0.46
1:A:120:SER:OG	1:A:122:ARG:HG2	2.16	0.45
1:A:167:ARG:HH11	1:A:167:ARG:CB	2.20	0.45
1:B:144:VAL:HG23	1:B:153:MET:HE3	1.99	0.44
1:B:194:ALA:O	1:B:197:LYS:HB3	2.17	0.44
1:B:167:ARG:CG	1:B:168:GLU:N	2.78	0.44
1:B:147:GLU:C	1:B:149:PRO:HD3	2.38	0.44
2:C:1:DC:H2''	2:C:2:DC:C5'	2.47	0.44
2:C:1:DC:H2''	2:C:2:DC:H5'	1.98	0.44
1:B:150:GLN:OE1	1:B:150:GLN:N	2.39	0.44
1:A:138:ARG:HG3	1:A:157:TRP:CE3	2.52	0.44
1:A:126:LYS:HE3	5:A:27:HOH:O	2.16	0.44
1:B:194:ALA:HB3	5:B:12:HOH:O	2.17	0.44
1:B:145:ASP:OD1	1:B:146:PRO:HD2	2.18	0.44
3:D:5:DT:H2''	3:D:6:DG:N7	2.33	0.43
1:B:138:ARG:O	1:B:139:LEU:HD23	2.18	0.43
1:B:166:ASN:O	1:B:167:ARG:C	2.57	0.43
1:A:150:GLN:H	1:A:150:GLN:HG3	1.22	0.43
1:A:187:LEU:HB2	1:A:192:LYS:HG2	2.00	0.43
1:A:185:SER:OG	1:B:169:GLU:CG	2.67	0.42
1:B:144:VAL:HG23	1:B:153:MET:HE2	2.01	0.42
1:B:122:ARG:NH2	2:E:5:DG:H21	2.18	0.42
1:B:104:MET:CE	1:B:105:LYS:N	2.82	0.41
1:A:112:ASP:HB2	1:A:182:LYS:HZ1	1.86	0.41
1:B:126:LYS:HG3	1:B:156:ARG:CG	2.48	0.41
1:A:159:HIS:HB2	1:A:162:CYS:SG	2.61	0.41
1:A:169:GLU:N	1:A:169:GLU:OE1	2.38	0.41
1:B:141:LYS:HD2	1:B:170:LEU:O	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:148:LYS:N	1:B:149:PRO:CD	2.84	0.40
1:B:126:LYS:HA	1:B:126:LYS:HD3	1.80	0.40
1:B:173:ARG:H	1:B:173:ARG:HG2	1.64	0.40
1:B:126:LYS:HE2	5:E:18:HOH:O	2.20	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	92/111 (83%)	90 (98%)	2 (2%)	0	100	100
1	B	98/111 (88%)	89 (91%)	8 (8%)	1 (1%)	19	52
All	All	190/222 (86%)	179 (94%)	10 (5%)	1 (0%)	34	69

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	108	LYS

### 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	80/95 (84%)	68 (85%)	12 (15%)	3	11

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	81/95 (85%)	74 (91%)	7 (9%)	13	36
All	All	161/190 (85%)	142 (88%)	19 (12%)	7	19

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	109	THR
1	A	112	ASP
1	A	122	ARG
1	A	131[A]	LYS
1	A	131[B]	LYS
1	A	140	SER
1	A	150	GLN
1	A	167	ARG
1	A	175	GLU
1	A	189	THR
1	A	195	LEU
1	A	198	GLN
1	B	110	LEU
1	B	122	ARG
1	B	131	LYS
1	B	148	LYS
1	B	167	ARG
1	B	193	GLU
1	B	198	GLN

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 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 carbohydrates in this entry.

## 5.6 Ligand geometry

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 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 [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, 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	93/111 (83%)	-0.23	2 (2%) 65 54	33, 50, 77, 86	0
1	B	100/111 (90%)	-0.32	0 100 100	34, 47, 65, 85	0
2	C	8/8 (100%)	-0.65	0 100 100	34, 37, 38, 40	0
2	E	8/8 (100%)	-0.41	0 100 100	39, 43, 50, 51	0
3	D	8/8 (100%)	-0.55	0 100 100	41, 47, 57, 58	0
3	F	8/8 (100%)	-0.37	0 100 100	44, 50, 58, 60	0
All	All	225/254 (88%)	-0.31	2 (0%) 85 79	33, 47, 70, 86	0

All (2) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	176	TYR	2.5
1	A	200	PRO	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](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors

of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
4	ZN	A	701	1/1	0.99	0.14	-0.11	40,40,40,40	0
4	ZN	B	701	1/1	1.00	0.12	-0.94	45,45,45,45	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.