



# Full wwPDB X-ray Structure Validation Report

Feb 26, 2014 – 03:31 PM GMT

PDB ID : 4DOV  
Title : Structure of free mouse ORC1 BAH domain  
Authors : Song, J.; Patel, D.J.  
Deposited on : 2012-02-10  
Resolution : 1.70 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>

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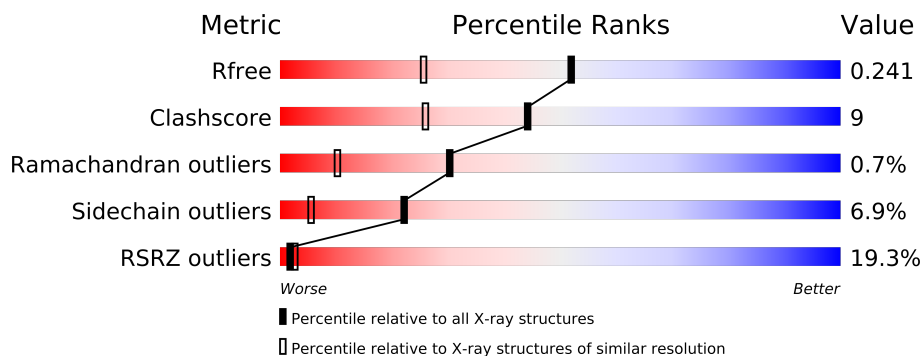
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.15 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 1.70 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))
$R_{free}$	66092	2456 (1.70-1.70)
Clashscore	79885	2929 (1.70-1.70)
Ramachandran outliers	78287	2878 (1.70-1.70)
Sidechain outliers	78261	2878 (1.70-1.70)
RSRZ outliers	66119	2456 (1.70-1.70)

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. 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	163	
1	C	163	

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2707 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 Origin recognition complex subunit 1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	157	Total	C	N	O	S	Se	0	0	0
			1266	825	215	221	3	2			
1	C	154	Total	C	N	O	S	Se	0	0	0
			1201	790	202	204	3	2			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	8	SER	-	EXPRESSION TAG	UNP Q9Z1N2
C	8	SER	-	EXPRESSION TAG	UNP Q9Z1N2

- Molecule 2 is water.

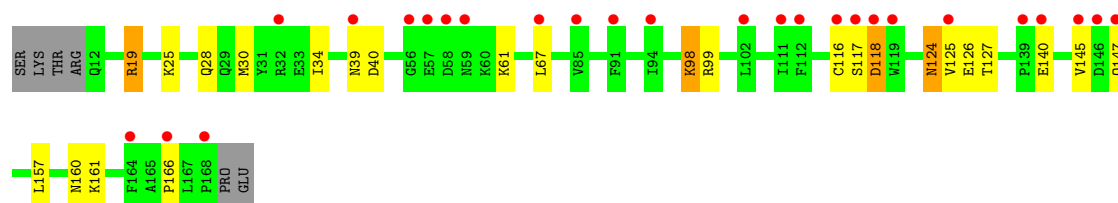
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	129	Total	O	0	0
			129	129		
2	C	111	Total	O	0	0
			111	111		

### 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 ( $\text{RSRZ} > 2$ ). 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.

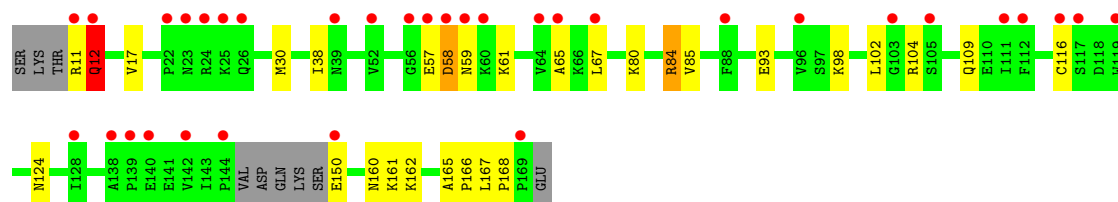
- Molecule 1: Origin recognition complex subunit 1

Chain A: 



- Molecule 1: Origin recognition complex subunit 1

Chain C: 



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	49.92Å 53.92Å 71.97Å 90.00° 102.41° 90.00°	Depositor
Resolution (Å)	22.41 – 1.70 22.41 – 1.70	Depositor EDS
% Data completeness (in resolution range)	96.9 (22.41-1.70) 94.8 (22.41-1.70)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.06	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.24 (at 1.70Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.7.1_743)	Depositor
R, $R_{free}$	0.215 , 0.243 0.212 , 0.241	Depositor DCC
$R_{free}$ test set	1912 reflections (4.86%)	DCC
Wilson B-factor (Å <sup>2</sup> )	25.2	Xtriage
Anisotropy	0.456	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.43 , 54.8	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 41036 reflections	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	2707	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	31.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.34% 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	0.36	0/1300	0.54	0/1765
1	C	0.34	0/1234	0.55	0/1678
All	All	0.35	0/2534	0.55	0/3443

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	1266	0	1257	19	0
1	C	1201	0	1164	23	0
2	A	129	0	0	7	0
2	C	111	0	0	14	0
All	All	2707	0	2421	42	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 9.

All (42) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:C:58:ASP:N	2:C:298:HOH:O	1.96	0.96

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:C:98:LYS:NZ	2:C:253:HOH:O	2.04	0.90
1:C:150:GLU:N	2:C:307:HOH:O	2.04	0.89
1:A:166:PRO:O	2:A:268:HOH:O	1.94	0.84
1:A:124:ASN:O	1:A:127:THR:HG22	1.82	0.78
1:A:28:GLN:OE1	2:A:326:HOH:O	2.03	0.74
1:C:11:ARG:CB	1:C:38:ILE:HG22	2.21	0.70
1:C:168:PRO:O	2:C:272:HOH:O	2.10	0.69
1:A:140:GLU:OE1	2:A:317:HOH:O	2.11	0.69
1:C:57:GLU:O	1:C:58:ASP:HB2	1.94	0.67
1:A:124:ASN:HD22	1:A:125:VAL:N	1.94	0.65
1:C:104:ARG:HD3	2:C:291:HOH:O	1.95	0.65
1:A:160:ASN:O	1:A:161:LYS:HB2	1.96	0.65
1:C:84:ARG:NE	2:C:247:HOH:O	2.26	0.64
1:C:80:LYS:HE3	1:C:124:ASN:ND2	2.14	0.62
1:C:12:GLN:OE1	1:C:12:GLN:HA	1.98	0.62
1:C:104:ARG:NE	2:C:291:HOH:O	2.36	0.58
1:C:104:ARG:CD	2:C:291:HOH:O	2.51	0.56
1:A:39:ASN:OD1	2:A:278:HOH:O	2.18	0.55
1:C:160:ASN:O	1:C:161:LYS:HB2	2.08	0.53
1:C:80:LYS:NZ	2:C:310:HOH:O	2.44	0.51
1:A:25:LYS:HE2	2:A:329:HOH:O	2.10	0.51
1:C:116:CYS:SG	1:C:161:LYS:HD2	2.52	0.49
1:C:165:ALA:HB1	1:C:166:PRO:HD2	1.94	0.49
1:A:116:CYS:SG	1:A:118:ASP:HB2	2.53	0.49
1:C:17:VAL:O	2:C:260:HOH:O	2.18	0.48
1:C:93:GLU:OE1	2:C:225:HOH:O	2.20	0.48
1:C:59:ASN:HA	2:C:286:HOH:O	2.14	0.47
1:A:19:ARG:CZ	1:A:19:ARG:HB3	2.45	0.46
1:A:99:ARG:NH1	2:A:295:HOH:O	2.48	0.46
1:A:98:LYS:NZ	2:A:263:HOH:O	2.48	0.45
1:C:162:LYS:NZ	2:C:295:HOH:O	2.41	0.45
1:A:124:ASN:C	1:A:124:ASN:HD22	2.19	0.45
1:C:58:ASP:CA	2:C:298:HOH:O	2.53	0.44
1:A:34:ILE:CD1	1:A:125:VAL:HG11	2.47	0.44
1:A:124:ASN:ND2	1:A:126:GLU:H	2.15	0.43
1:A:34:ILE:HD13	1:A:125:VAL:HG11	2.00	0.43
1:C:65:ALA:HB1	1:C:85:VAL:HB	2.01	0.42
1:A:124:ASN:HD21	1:A:126:GLU:HG3	1.84	0.42
1:A:157:LEU:HD23	1:A:166:PRO:HA	2.02	0.41
1:C:160:ASN:O	1:C:161:LYS:CB	2.69	0.40
1:A:40:ASP:C	1:A:40:ASP:OD1	2.60	0.40

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	155/163 (95%)	151 (97%)	4 (3%)	0	100	100
1	C	150/163 (92%)	144 (96%)	4 (3%)	2 (1%)	18	3
All	All	305/326 (94%)	295 (97%)	8 (3%)	2 (1%)	30	10

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	58	ASP
1	C	12	GLN

### 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	137/147 (93%)	127 (93%)	10 (7%)	20	5
1	C	122/147 (83%)	114 (93%)	8 (7%)	24	6
All	All	259/294 (88%)	241 (93%)	18 (7%)	22	5

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	19	ARG
1	A	30	MSE
1	A	61	LYS
1	A	67	LEU
1	A	98	LYS
1	A	117	SER
1	A	118	ASP

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Mol	Chain	Res	Type
1	A	124	ASN
1	A	145	VAL
1	A	147	GLN
1	C	12	GLN
1	C	30	MSE
1	C	61	LYS
1	C	67	LEU
1	C	84	ARG
1	C	102	LEU
1	C	109	GLN
1	C	167	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	124	ASN

### 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	157/163 (96%)	1.01	26 (16%) 2 3	19, 30, 47, 57	0
1	C	154/163 (94%)	1.20	34 (22%) 1 2	19, 32, 49, 62	0
All	All	311/326 (95%)	1.11	60 (19%) 2 2	19, 30, 48, 62	0

All (60) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	24	ARG	11.1
1	A	59	ASN	8.5
1	A	57	GLU	7.2
1	A	145	VAL	6.7
1	A	58	ASP	6.5
1	C	169	PRO	5.6
1	A	168	PRO	5.4
1	C	56	GLY	5.4
1	C	144	PRO	5.2
1	C	22	PRO	5.0
1	C	58	ASP	4.8
1	A	140	GLU	4.7
1	C	23	ASN	4.5
1	A	39	ASN	4.4
1	A	146	ASP	4.3
1	A	119	TRP	4.3
1	C	57	GLU	4.1
1	C	119	TRP	4.1
1	C	140	GLU	4.0
1	C	26	GLN	3.7
1	C	59	ASN	3.7
1	A	118	ASP	3.5
1	C	12	GLN	3.3
1	A	117	SER	3.2

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Mol	Chain	Res	Type	RSRZ
1	C	139	PRO	3.2
1	C	65	ALA	3.1
1	C	64	VAL	2.9
1	C	25	LYS	2.9
1	A	56	GLY	2.7
1	C	142	VAL	2.7
1	A	67	LEU	2.7
1	A	166	PRO	2.7
1	C	105	SER	2.6
1	C	150	GLU	2.6
1	A	32	ARG	2.6
1	C	112	PHE	2.6
1	A	91	PHE	2.5
1	A	164	PHE	2.5
1	A	112	PHE	2.5
1	C	60	LYS	2.5
1	C	11	ARG	2.5
1	C	116	CYS	2.5
1	A	116	CYS	2.4
1	A	147	GLN	2.4
1	A	94	ILE	2.4
1	C	111	ILE	2.3
1	C	128	ILE	2.3
1	A	111	ILE	2.2
1	C	96	VAL	2.2
1	A	139	PRO	2.2
1	C	117	SER	2.2
1	C	138	ALA	2.1
1	C	67	LEU	2.1
1	A	102	LEU	2.1
1	C	88	PHE	2.1
1	A	125	VAL	2.1
1	C	103	GLY	2.0
1	C	52	VAL	2.0
1	A	85	VAL	2.0
1	C	39	ASN	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.