



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2018 – 07:20 pm GMT

PDB ID : 4ZC7  
Title : Paromomycin bound to a leishmanial ribosomal A-site  
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Deposited on : 2015-04-15  
Resolution : 3.04 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  
Mogul : 1.7.3 (157068), CSD as539be (2018)  
Xtriage (Phenix) : 1.13  
EDS : trunk30967  
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)  
Refmac : 5.8.0158  
CCP4 : 7.0 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk30967

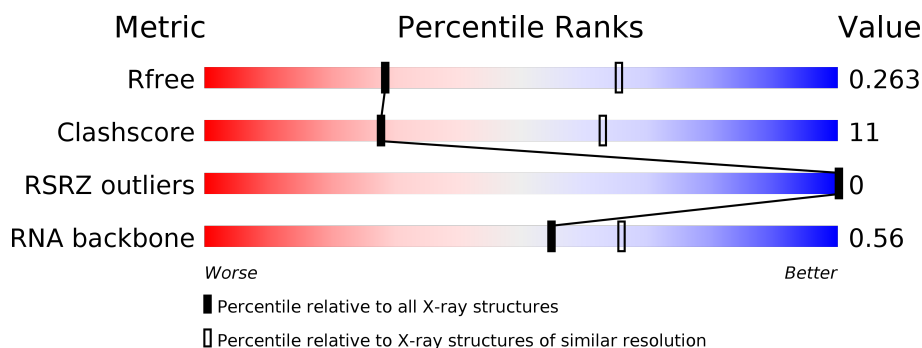
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.04 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))
$R_{free}$	111664	2391 (3.08-3.00)
Clashscore	122126	2726 (3.08-3.00)
RSRZ outliers	108989	2280 (3.08-3.00)
RNA backbone	2636	1049 (3.38-2.70)

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.

Mol	Chain	Length	Quality of chain
1	A	92	
1	B	92	
1	C	92	
1	D	92	

## 2 Entry composition [i](#)

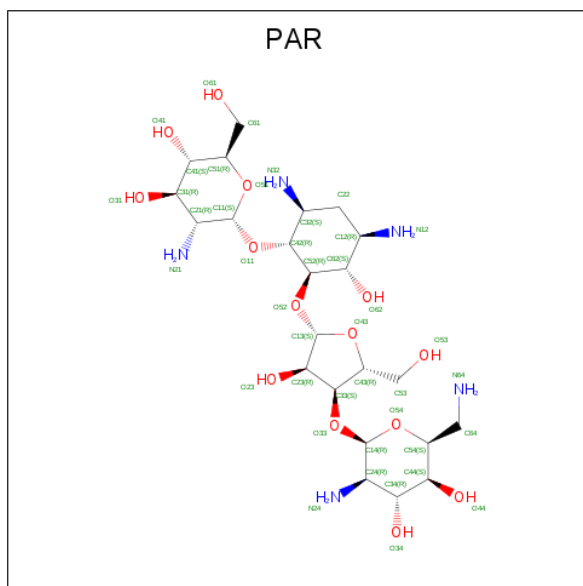
There are 3 unique types of molecules in this entry. The entry contains 1826 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 RNA chain called RNA duplex.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	21	Total 449	C 200	N 81	O 147	P 21	0	0	0
1	B	20	Total 427	C 190	N 76	O 141	P 20	0	0	0
1	C	21	Total 449	C 200	N 81	O 147	P 21	0	0	0
1	D	20	Total 424	C 190	N 76	O 139	P 19	0	0	0

- Molecule 2 is PAROMOMYCIN (three-letter code: PAR) (formula:  $C_{23}H_{45}N_5O_{14}$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			31	17	3	11		
2	C	1	Total	C	N	O	0	0
			42	23	5	14		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	1	Total 1	O 1	0	0
3	C	2	Total 2	O 2	0	0
3	D	1	Total 1	O 1	0	0



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	31.69Å 57.18Å 47.70Å 78.92° 109.44° 123.61°	Depositor
Resolution (Å)	44.98 – 3.04 44.98 – 3.04	Depositor EDS
% Data completeness (in resolution range)	96.9 (44.98-3.04) 91.2 (44.98-3.04)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.62 (at 3.06Å)	Xtriage
Refinement program	PHENIX	Depositor
R, $R_{free}$	0.183 , 0.261 0.188 , 0.263	Depositor DCC
$R_{free}$ test set	503 reflections (10.05%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	63.9	Xtriage
Anisotropy	0.953	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.18 , 43.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.447 for h,-2*h-k,-h-l 0.051 for -h,2*h+k,-l 0.044 for -h,-k,h+l	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	1826	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	97.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 13.41% 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, 0.333 respectively for untwinned datasets, and 0.375, 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: PAR

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	0.64	0/501	1.18	2/779 (0.3%)
1	B	0.58	0/475	1.17	2/736 (0.3%)
1	C	0.54	0/501	1.15	0/779
1	D	0.54	0/472	1.20	1/732 (0.1%)
All	All	0.58	0/1949	1.17	5/3026 (0.2%)

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	40	A	N1-C6-N6	6.58	122.55	118.60
1	A	3	G	N3-C4-C5	-5.66	125.77	128.60
1	A	3	G	N3-C4-N9	5.61	129.37	126.00
1	B	40	A	C5-C6-N6	-5.33	119.44	123.70
1	D	31	G	N9-C4-C5	-5.15	103.34	105.40

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	449	0	228	8	0
1	B	427	0	218	9	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	449	0	228	10	0
1	D	424	0	219	5	0
2	A	31	0	32	4	0
2	C	42	0	45	3	0
3	B	1	0	0	0	0
3	C	2	0	0	0	0
3	D	1	0	0	0	0
All	All	1826	0	970	29	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 11.

All (29) 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)
2:A:101:PAR:O43	2:A:101:PAR:C13	1.64	1.18
2:C:101:PAR:O43	2:C:101:PAR:C13	1.64	1.15
1:A:12:C:H42	1:B:36:G:H1	1.33	0.75
1:A:20:U:O4	2:A:101:PAR:N12	2.20	0.75
1:D:40:A:H8	1:D:40:A:O5'	1.77	0.68
1:B:40:A:O5'	1:B:40:A:H8	1.77	0.68
1:D:43:U:H2'	1:D:44:C:C6	2.42	0.55
2:A:101:PAR:O53	1:B:30:C:N4	2.40	0.54
1:C:20:U:O4	2:C:101:PAR:N12	2.39	0.54
1:A:18:A:H5''	1:A:19:G:OP2	2.09	0.53
1:B:42:G:C6	1:B:43:U:C4	2.99	0.51
1:C:20:U:H2'	1:C:21:C:C6	2.46	0.51
1:A:14:G:N2	1:B:35:C:C2	2.79	0.50
1:A:22:G:O2'	1:A:23:C:H5'	2.12	0.50
1:C:20:U:H2'	1:C:21:C:H6	1.76	0.50
1:C:14:G:N2	1:D:35:C:C2	2.80	0.49
1:C:18:A:H5''	1:C:19:G:OP2	2.13	0.49
1:B:39:A:H2'	1:B:40:A:C8	2.49	0.48
1:C:6:U:H2'	1:C:7:C:O4'	2.14	0.48
1:B:29:U:H2'	1:B:30:C:O4'	2.14	0.46
1:C:13:G:C2	1:D:36:G:C2	3.05	0.45
1:A:12:C:N4	1:B:36:G:H1	2.07	0.44
1:B:38:A:HO2'	1:C:13:G:HO2'	1.64	0.44
1:A:16:A:C6	2:A:101:PAR:H41	2.54	0.43
1:A:22:G:C2'	1:A:23:C:H5'	2.49	0.43
1:D:38:A:C6	1:D:39:A:C6	3.07	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:22:G:O2'	1:C:23:C:O5'	2.33	0.42
1:C:18:A:O5'	1:C:18:A:H8	2.04	0.41
2:C:101:PAR:H531	2:C:101:PAR:H11	2.03	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

There are no protein molecules in this entry.

### 5.3.2 Protein sidechains [i](#)

There are no protein molecules in this entry.

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	20/92 (21%)	3 (15%)	0
1	B	18/92 (19%)	4 (22%)	0
1	C	20/92 (21%)	4 (20%)	1 (5%)
1	D	18/92 (19%)	2 (11%)	0
All	All	76/368 (20%)	13 (17%)	1 (1%)

All (13) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	A	4	C
1	A	5	G
1	A	17	A
1	B	27	C
1	B	28	G
1	B	31	G
1	B	46	C
1	C	4	C
1	C	8	G
1	C	17	A
1	C	23	C

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Mol	Chain	Res	Type
1	D	27	C
1	D	31	G

All (1) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	C	22	G

## 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](#)

2 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	PAR	A	101	-	33,33,45	3.95	7 (21%)	46,49,67	1.32	7 (15%)
2	PAR	C	101	-	44,45,45	3.55	8 (18%)	62,67,67	1.26	10 (16%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	PAR	A	101	-	-	0/12/68/94	0/3/3/4

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	PAR	C	101	-	-	0/18/94/94	0/4/4/4

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	101	PAR	C13-C23	-15.93	1.32	1.52
2	C	101	PAR	C13-C23	-15.73	1.32	1.52
2	C	101	PAR	O43-C43	-6.48	1.30	1.45
2	A	101	PAR	O43-C43	-6.26	1.31	1.45
2	C	101	PAR	C31-C21	-4.83	1.47	1.53
2	A	101	PAR	C31-C21	-4.43	1.48	1.53
2	C	101	PAR	C34-C24	-4.40	1.48	1.53
2	C	101	PAR	O33-C33	-2.98	1.36	1.43
2	A	101	PAR	O33-C33	-2.55	1.36	1.43
2	A	101	PAR	O51-C51	2.11	1.49	1.44
2	C	101	PAR	O51-C11	3.02	1.49	1.41
2	A	101	PAR	O51-C11	3.25	1.50	1.41
2	C	101	PAR	O54-C14	3.81	1.51	1.41
2	A	101	PAR	O43-C13	12.51	1.64	1.41
2	C	101	PAR	O43-C13	12.59	1.64	1.41

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	101	PAR	C14-O33-C33	-3.24	109.87	117.97
2	C	101	PAR	C11-O11-C42	-3.06	110.32	117.97
2	C	101	PAR	C13-O52-C52	-2.64	111.38	117.97
2	A	101	PAR	C53-C43-C33	-2.42	109.19	115.06
2	A	101	PAR	O62-C62-C12	-2.11	105.94	109.86
2	C	101	PAR	O52-C13-O43	-2.08	109.18	111.43
2	C	101	PAR	C62-C12-N12	-2.08	106.85	110.97
2	A	101	PAR	C11-O11-C42	-2.07	112.79	117.97
2	A	101	PAR	O52-C13-O43	-2.02	109.24	111.43
2	C	101	PAR	O51-C11-C21	2.01	114.57	110.06
2	A	101	PAR	O51-C51-C61	2.03	111.53	106.43
2	C	101	PAR	O43-C13-C23	2.06	107.64	104.98
2	C	101	PAR	C62-C52-C42	2.10	116.43	111.67
2	C	101	PAR	C22-C12-C62	2.54	113.87	110.15
2	C	101	PAR	O54-C54-C64	2.57	110.88	106.01
2	A	101	PAR	O51-C11-C21	2.99	116.79	110.06
2	A	101	PAR	C22-C12-C62	3.23	114.89	110.15

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	101	PAR	4	0
2	C	101	PAR	3	0

## 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 [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	21/92 (22%)	-0.55	0 100 100	83, 98, 116, 122	0
1	B	20/92 (21%)	-0.88	0 100 100	80, 92, 110, 114	0
1	C	21/92 (22%)	-0.56	0 100 100	75, 98, 119, 135	0
1	D	20/92 (21%)	-0.87	0 100 100	75, 94, 113, 117	0
All	All	82/368 (22%)	-0.71	0 100 100	75, 95, 117, 135	0

There are no RSRZ outliers to report.

### 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. 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	B-factors(Å <sup>2</sup> )	Q<0.9
2	PAR	C	101	42/42	0.91	0.30	77,119,173,188	0
2	PAR	A	101	31/42	0.93	0.26	59,76,122,152	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.