



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 26, 2020 – 10:43 am BST

PDB ID : 2BAP  
Title : Crystal structure of the N-terminal mDia1 Armadillo Repeat Region and Dimerisation Domain in complex with the mDia1 autoregulatory domain (DAD)  
Authors : Lammers, M.; Rose, R.; Scrima, A.; Wittinghofer, A.  
Deposited on : 2005-10-14  
Resolution : 3.30 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](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

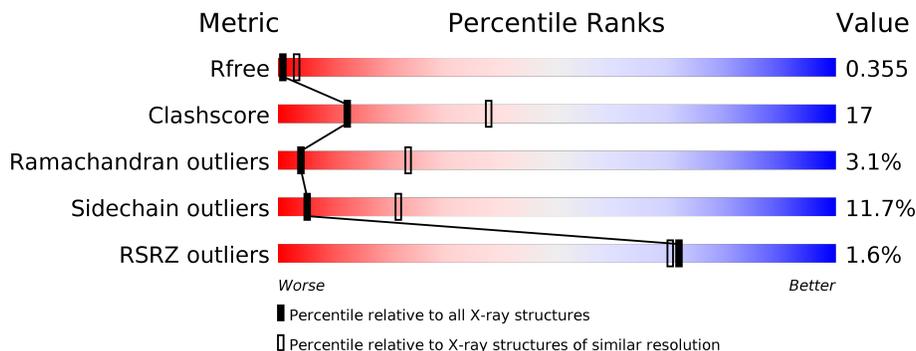
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.30 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	1149 (3.34-3.26)
Clashscore	141614	1205 (3.34-3.26)
Ramachandran outliers	138981	1183 (3.34-3.26)
Sidechain outliers	138945	1182 (3.34-3.26)
RSRZ outliers	127900	1115 (3.34-3.26)

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	317	
1	B	317	
2	C	56	
2	D	56	

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4960 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 Diaphanous protein homolog 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	B	294	2363	1490	404	448	21	0	0	0
1	A	295	2375	1499	405	450	21	0	0	0

- Molecule 2 is a protein called Diaphanous protein homolog 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	D	16	111	70	17	23	1	0	0	0
2	C	16	111	70	17	23	1	0	0	0





- Molecule 2: Diaphanous protein homolog 1



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 61 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	138.45Å 138.45Å 210.89Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	19.98 – 3.30 19.96 – 3.30	Depositor EDS
% Data completeness (in resolution range)	100.0 (19.98-3.30) 100.0 (19.96-3.30)	Depositor EDS
$R_{merge}$	0.14	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	6.21 (at 3.29Å)	Xtrriage
Refinement program	REFMAC	Depositor
R, $R_{free}$	0.288 , 0.364 0.285 , 0.355	Depositor DCC
$R_{free}$ test set	925 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	89.0	Xtrriage
Anisotropy	0.068	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.29 , 58.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.90	EDS
Total number of atoms	4960	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	92.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.93% 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 [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	0.63	1/2408 (0.0%)	0.65	1/3242 (0.0%)
1	B	0.40	0/2395	0.59	0/3224
2	C	0.41	0/111	0.67	0/148
2	D	0.40	0/111	0.52	0/148
All	All	0.52	1/5025 (0.0%)	0.62	1/6762 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	435	HIS	C-O	21.22	1.63	1.23

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	435	HIS	CA-C-O	-6.75	105.92	120.10

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	2375	0	2395	92	0
1	B	2363	0	2386	76	0
2	C	111	0	108	4	0
2	D	111	0	108	4	0
All	All	4960	0	4997	168	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 17.

The worst 5 of 168 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:A:435:HIS:O	1:A:435:HIS:C	1.63	1.36
1:A:239:MET:CE	1:A:254:LEU:HD12	1.79	1.12
1:A:239:MET:HE1	1:A:254:LEU:HD12	1.30	1.11
1:A:421:TYR:HE1	1:A:425:ILE:HD11	1.12	1.06
1:A:402:LEU:O	1:A:406:GLN:HG3	1.65	0.95

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	291/317 (92%)	237 (81%)	47 (16%)	7 (2%)	6	28
1	B	290/317 (92%)	248 (86%)	32 (11%)	10 (3%)	3	22
2	C	14/56 (25%)	11 (79%)	2 (14%)	1 (7%)	1	7
2	D	14/56 (25%)	10 (71%)	3 (21%)	1 (7%)	1	7
All	All	609/746 (82%)	506 (83%)	84 (14%)	19 (3%)	4	23

5 of 19 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	147	LEU
1	B	411	VAL
1	A	217	ASN
1	A	219	LYS
1	A	231	GLY

### 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	267/287 (93%)	228 (85%)	39 (15%)	3	14
1	B	266/287 (93%)	240 (90%)	26 (10%)	8	29
2	C	11/45 (24%)	11 (100%)	0	100	100
2	D	11/45 (24%)	11 (100%)	0	100	100
All	All	555/664 (84%)	490 (88%)	65 (12%)	5	21

5 of 65 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	166	ASN
1	A	201	ASP
1	A	411	VAL
1	A	173	THR
1	A	184	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 12 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	406	GLN
1	A	166	ASN
1	A	346	ASN
1	B	359	GLN
1	A	205	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 [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	295/317 (93%)	0.08	4 (1%) 75 75	29, 95, 108, 114	0
1	B	294/317 (92%)	-0.05	5 (1%) 70 68	29, 93, 105, 112	0
2	C	16/56 (28%)	0.21	1 (6%) 20 20	114, 116, 117, 118	0
2	D	16/56 (28%)	0.20	0 100 100	112, 115, 116, 117	0
All	All	621/746 (83%)	0.03	10 (1%) 72 70	29, 95, 113, 118	0

The worst 5 of 10 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	242	ALA	3.5
1	B	296	GLY	2.7
1	B	295	SER	2.4
1	A	282	GLU	2.3
1	B	331	ARG	2.2

### 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

There are no such residues in this entry.