



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 04:24 PM UTC

PDB ID : 2CM6 / pdb\_00002cm6  
Title : crystal structure of the C2B domain of rabphilin3A  
Authors : Schlicker, C.; Montaville, P.; Sheldrick, G.M.; Becker, S.  
Deposited on : 2006-05-04  
Resolution : 1.85 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.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4-5-2 with Phenix2.0  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtrriage (Phenix) : 2.0  
EDS : 3.0  
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)  
CCP4 : 9.0.010 (Gargrove)  
Density-Fitness : 1.0.12  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.49

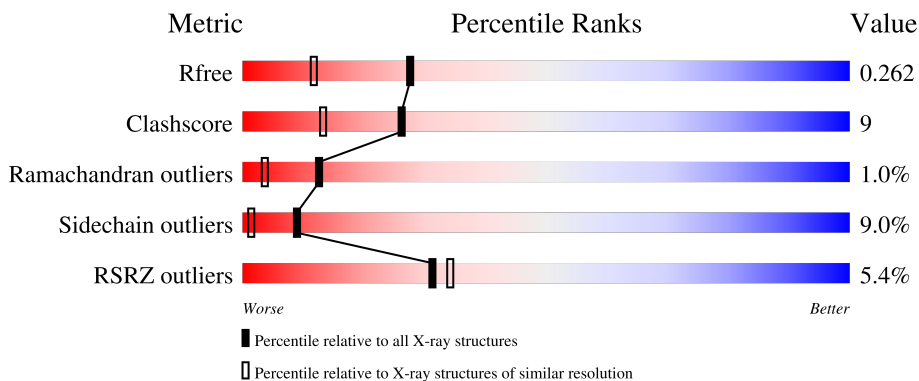
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.85 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))
$R_{free}$	180053	3428 (1.86-1.86)
Clashscore	190562	3579 (1.86-1.86)
Ramachandran outliers	187476	3553 (1.86-1.86)
Sidechain outliers	187428	3553 (1.86-1.86)
RSRZ outliers	180081	3429 (1.86-1.86)

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  $\geq 3$ , 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	166	
1	B	166	

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 2397 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.

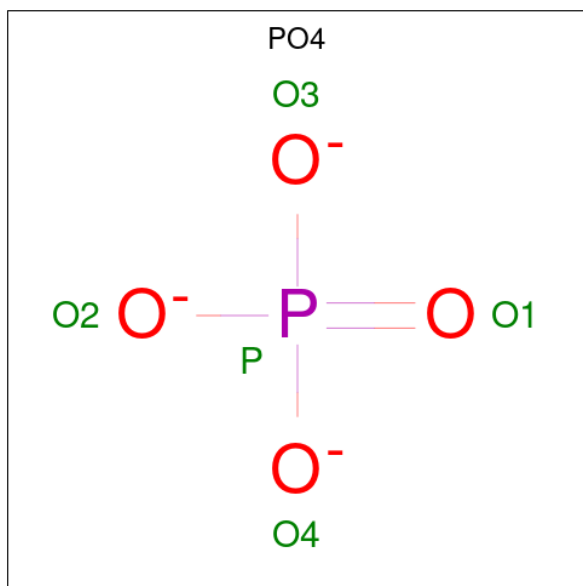
- Molecule 1 is a protein called RABPHILIN-3A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	149	1153	743	193	211	6	0	0	0
1	B	148	1159	742	198	213	6	0	0	0

- Molecule 2 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total	Ca	0	0
			2	2		
2	B	2	Total	Ca	0	0
			2	2		

- Molecule 3 is PHOSPHATE ION (CCD ID: PO4) (formula: O<sub>4</sub>P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	O	P	0	0
			5	4	1		

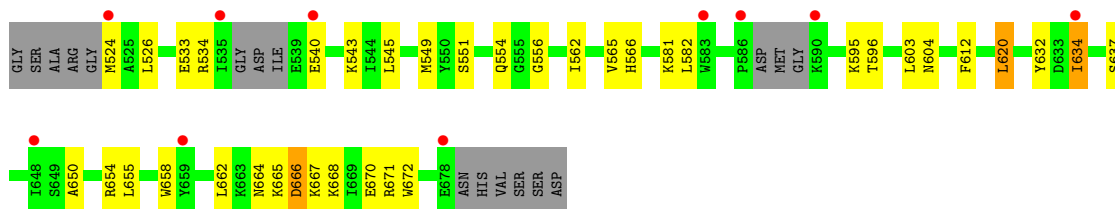
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	39	Total	O	0	0
			39	39		
4	B	37	Total	O	0	0
			37	37		

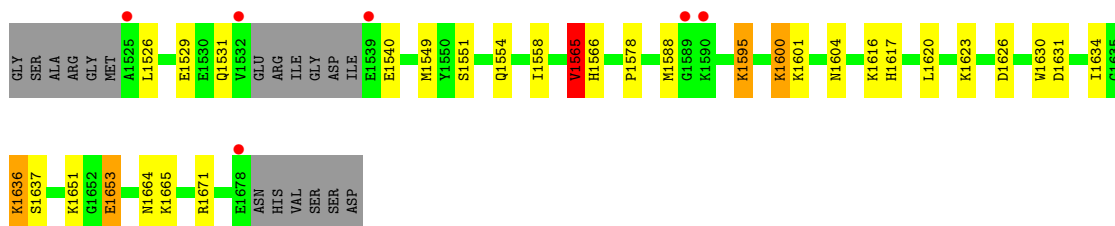
### 3 Residue-property plots [i](#)

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: RABPHILIN-3A



- Molecule 1: RABPHILIN-3A



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	40.07Å 59.61Å 66.39Å 90.00° 103.89° 90.00°	Depositor
Resolution (Å)	43.76 – 1.85 43.76 – 1.85	Depositor EDS
% Data completeness (in resolution range)	97.2 (43.76-1.85) 96.6 (43.76-1.85)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.36 (at 1.86Å)	Xtrriage
Refinement program	SHELXL-97	Depositor
R, $R_{free}$	0.198 , 0.268 0.195 , 0.262	Depositor DCC
$R_{free}$ test set	1270 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	21.6	Xtrriage
Anisotropy	0.303	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 57.0	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	0.95	EDS
Total number of atoms	2397	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	28.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.66% 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: PO4, CA

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	0/1177	1.32	6/1584 (0.4%)
1	B	0.38	0/1184	1.30	3/1594 (0.2%)
All	All	0.39	0/2361	1.31	9/3178 (0.3%)

There are no bond length outliers.

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	533	GLU	CA-C-N	8.51	137.02	121.70
1	A	533	GLU	C-N-CA	8.51	137.02	121.70
1	B	1626	ASP	CA-CB-CG	7.43	120.03	112.60
1	A	654	ARG	CA-C-O	6.86	127.69	120.42
1	A	666	ASP	CA-CB-CG	-5.70	106.91	112.60
1	B	1565	VAL	N-CA-CB	-5.12	102.97	111.36
1	B	1653	GLU	CB-CG-CD	5.10	121.28	112.60
1	A	603	LEU	CA-C-N	-5.09	116.94	122.59
1	A	603	LEU	C-N-CA	-5.09	116.94	122.59

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	1153	0	1072	23	0
1	B	1159	0	1100	19	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
3	B	5	0	0	0	0
4	A	39	0	0	2	0
4	B	37	0	0	1	0
All	All	2397	0	2172	42	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 9.

All (42) 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:526:LEU:HD21	1:A:634:ILE:HG22	1.55	0.89
1:B:1565:VAL:HA	1:B:1604:ASN:ND2	2.14	0.63
1:B:1565:VAL:HA	1:B:1604:ASN:HD22	1.69	0.58
1:B:1565:VAL:HG13	1:B:1566:HIS:CD2	2.41	0.55
1:B:1588:MET:SD	1:B:1623:LYS:HE3	2.46	0.55
1:B:1565:VAL:HG22	1:B:1604:ASN:HD22	1.72	0.54
1:A:566:HIS:H	1:A:604:ASN:ND2	2.06	0.54
1:B:1526:LEU:HD21	1:B:1634:ILE:HG13	1.88	0.53
1:B:1554:GLN:HG3	1:B:1558:ILE:HD11	1.91	0.53
1:A:543:LYS:HG2	1:A:565:VAL:HG12	1.91	0.52
1:B:1566:HIS:H	1:B:1604:ASN:ND2	2.08	0.52
1:B:1578:PRO:HA	1:B:1630:TRP:O	2.10	0.51
1:A:545:LEU:HG	1:A:562:ILE:HD12	1.91	0.51
1:A:632:TYR:OH	1:A:634:ILE:HD11	2.10	0.51
1:B:1617:HIS:CD2	1:B:1665:LYS:HD3	2.46	0.51
1:A:565:VAL:HG23	1:A:604:ASN:HD22	1.76	0.50
1:B:1600:LYS:HB3	1:B:1600:LYS:NZ	2.27	0.50
1:B:1526:LEU:O	1:B:1529:GLU:HB2	2.12	0.50
1:B:1565:VAL:CG2	1:B:1604:ASN:HD22	2.24	0.49
1:A:551:SER:OG	1:A:554:GLN:HB2	2.12	0.49
1:A:526:LEU:HD21	1:A:634:ILE:CG2	2.35	0.47
1:A:549:MET:HG3	1:A:667:LYS:C	2.39	0.47
1:A:581:LYS:C	1:A:582:LEU:HD23	2.40	0.47
1:A:565:VAL:HG22	1:A:566:HIS:CD2	2.50	0.46
1:A:565:VAL:HA	1:A:604:ASN:HD22	1.79	0.46
1:B:1636:LYS:NZ	1:B:1637:SER:O	2.50	0.45
1:B:1664:ASN:ND2	4:B:2035:HOH:O	2.50	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:556:GLY:HA3	1:A:612:PHE:CZ	2.53	0.44
1:B:1565:VAL:HG22	1:B:1604:ASN:ND2	2.31	0.44
1:A:620:LEU:HD22	1:A:658:TRP:CZ2	2.53	0.43
1:B:1595:LYS:HB3	1:B:1595:LYS:HE3	1.57	0.43
1:A:650:ALA:O	1:A:655:LEU:HB2	2.19	0.43
1:A:665:LYS:O	1:A:666:ASP:HB2	2.19	0.42
1:A:634:ILE:HD13	1:A:634:ILE:HA	1.77	0.42
1:A:595:LYS:HG3	1:A:596:THR:O	2.19	0.42
1:A:565:VAL:HG23	1:A:604:ASN:ND2	2.34	0.42
1:A:665:LYS:HG3	4:A:2037:HOH:O	2.18	0.42
1:A:664:ASN:ND2	4:A:2036:HOH:O	2.52	0.42
1:A:543:LYS:HG3	1:A:672:TRP:CE3	2.55	0.41
1:A:620:LEU:HD23	1:A:620:LEU:HA	1.88	0.41
1:B:1549:MET:HE2	1:B:1551:SER:HB2	2.03	0.40
1:B:1566:HIS:H	1:B:1604:ASN:HD21	1.68	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	143/166 (86%)	137 (96%)	4 (3%)	2 (1%)	<b>9</b> <b>2</b>
1	B	144/166 (87%)	139 (96%)	4 (3%)	1 (1%)	<b>18</b> <b>8</b>
All	All	287/332 (86%)	276 (96%)	8 (3%)	3 (1%)	<b>12</b> <b>4</b>

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	1540	GLU
1	A	540	GLU
1	A	534	ARG

### 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	108/144 (75%)	100 (93%)	8 (7%)	13 3
1	B	115/144 (80%)	103 (90%)	12 (10%)	7 1
All	All	223/288 (77%)	203 (91%)	20 (9%)	9 1

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	524	MET
1	A	620	LEU
1	A	634	ILE
1	A	637	SER
1	A	662	LEU
1	A	668	LYS
1	A	670	GLU
1	A	671	ARG
1	B	1531	GLN
1	B	1565	VAL
1	B	1595	LYS
1	B	1600	LYS
1	B	1601	LYS
1	B	1616	LYS
1	B	1620	LEU
1	B	1631	ASP
1	B	1636	LYS
1	B	1651	LYS
1	B	1653	GLU
1	B	1671	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	594	HIS
1	A	604	ASN

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Mol	Chain	Res	Type
1	A	608	ASN
1	A	664	ASN
1	B	1566	HIS
1	B	1597	GLN
1	B	1604	ASN
1	B	1664	ASN

### 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 oligosaccharides in this entry.

### 5.6 Ligand geometry [i](#)

Of 5 ligands modelled in this entry, 4 are monoatomic - leaving 1 for Mogul analysis.

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	$\# Z  > 2$
3	PO4	B	2681	-	4,4,4	0.55	0	6,6,6	0.39	0

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	149/166 (89%)	0.41	10 (6%) 24 26	18, 27, 44, 58	2 (1%)
1	B	148/166 (89%)	0.19	6 (4%) 41 45	16, 26, 43, 69	1 (0%)
All	All	297/332 (89%)	0.30	16 (5%) 31 34	16, 26, 44, 69	3 (1%)

All (16) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	535	ILE	5.1
1	A	540	GLU	4.7
1	B	1589	GLY	3.4
1	A	634	ILE	3.2
1	A	678	GLU	3.1
1	B	1525	ALA	2.7
1	A	583	TRP	2.7
1	B	1539	GLU	2.6
1	A	590	LYS	2.6
1	A	659	TYR	2.5
1	A	648	ILE	2.5
1	A	524	MET	2.3
1	A	586	PRO	2.3
1	B	1532	VAL	2.2
1	B	1678	GLU	2.0
1	B	1590	LYS	2.0

### 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 oligosaccharides 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( $\text{\AA}^2$ )	Q<0.9
3	PO4	B	2681	5/5	0.96	0.11	28,31,53,62	0
2	CA	B	2679	1/1	0.99	0.03	21,21,21,21	0
2	CA	A	1680	1/1	0.99	0.04	18,18,18,18	0
2	CA	B	2680	1/1	1.00	0.01	20,20,20,20	0
2	CA	A	1679	1/1	1.00	0.02	18,18,18,18	0

### 6.5 Other polymers [i](#)

There are no such residues in this entry.