



# wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 15, 2024 – 08:18 PM EDT

PDB ID : 4Q58  
Title : Crystal structure of the plectin 1a actin-binding domain/integrin beta 4 fragment complex  
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Deposited on : 2014-04-16  
Resolution : 4.00 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.

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	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
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)	:	2.37.1

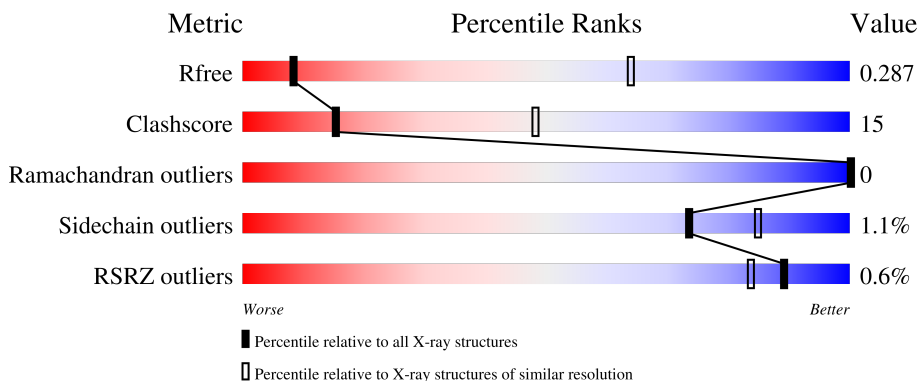
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 4.00 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	1087 (4.30-3.70)
Clashscore	141614	1148 (4.30-3.70)
Ramachandran outliers	138981	1108 (4.30-3.70)
Sidechain outliers	138945	1099 (4.30-3.70)
RSRZ outliers	127900	1028 (4.34-3.66)

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	226	<div> <div>72%</div> <div>27%</div> </div>
1	B	226	<div> <div>73%</div> <div>26%</div> <div>.</div> </div>
2	C	195	<div> <div>3%</div> <div>59%</div> <div>34%</div> <div>6%</div> <div>.</div> </div>
2	D	195	<div> <div>65%</div> <div>34%</div> <div>.</div> </div>

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 6619 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 Plectin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	225	Total	C	N	O	S	20	0	0
			1851	1164	337	344	6			
1	B	223	Total	C	N	O	S	20	0	0
			1830	1154	332	338	6			

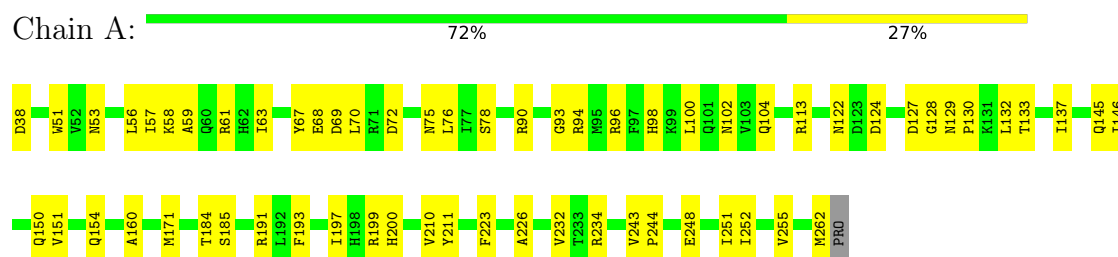
- Molecule 2 is a protein called Integrin beta-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	183	Total	C	N	O	S	0	0	0
			1424	895	246	275	8			
2	D	194	Total	C	N	O	S	0	0	0
			1514	953	264	289	8			

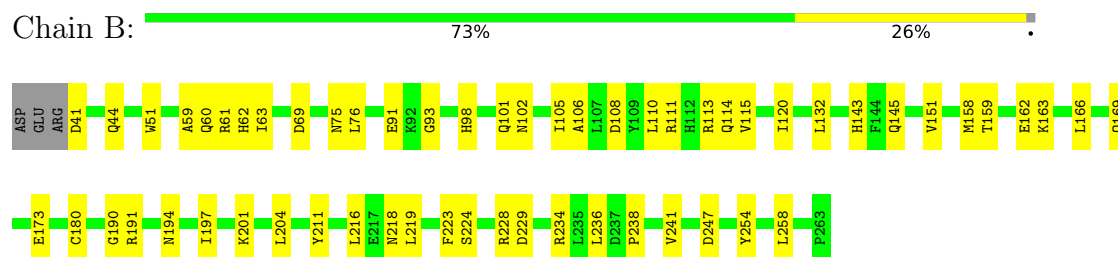
### 3 Residue-property plots

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.

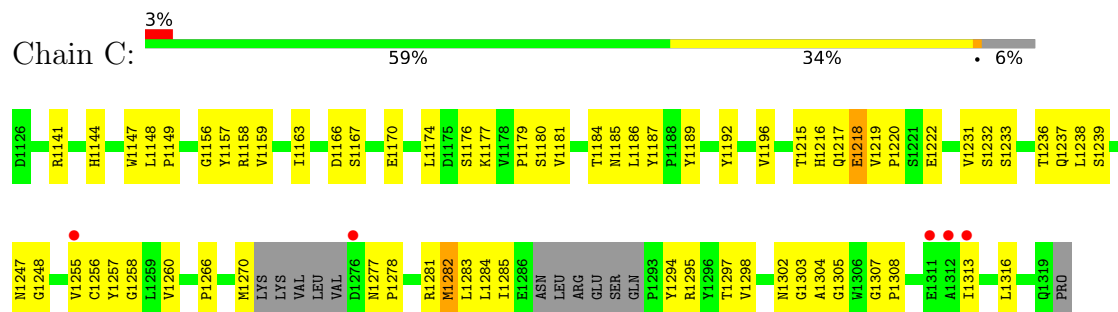
#### • Molecule 1: Plectin



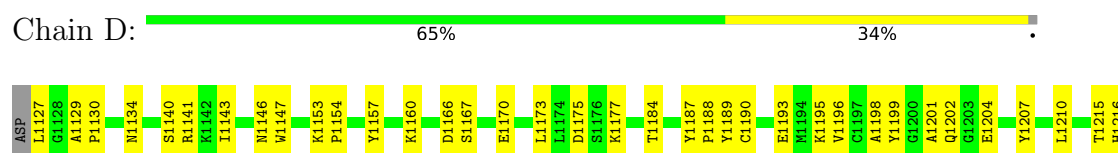
#### • Molecule 1: Plectin



#### • Molecule 2: Integrin beta-4



#### • Molecule 2: Integrin beta-4



Q1217	E1218	V1219	P1220	G1224	N1229	V1230	T1236	Q1237	A1241	E1242	P1243	A1244	E1245	T1246	N1247	G1248	Y1253	L1259	D1262	M1270	V1275	R1281	L1284	R1295	R1301	N1302	G1303	A1304	G1305	H1306	G1307	E1311	Q1319	P1320
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## 4 Data and refinement statistics

Property	Value	Source
Space group	P 65	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	96.34Å 96.34Å 208.03Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	46.93 – 4.00 46.93 – 4.00	Depositor EDS
% Data completeness (in resolution range)	98.8 (46.93-4.00) 99.0 (46.93-4.00)	Depositor EDS
$R_{merge}$	0.27	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.06 (at 4.00Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.4_1496)	Depositor
R, $R_{free}$	0.224 , 0.287 0.226 , 0.287	Depositor DCC
$R_{free}$ test set	440 reflections (4.81%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	100.1	Xtriage
Anisotropy	0.062	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.30 , 59.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.079 for h,-h-k,-l	Xtriage
$F_o, F_c$ correlation	0.88	EDS
Total number of atoms	6619	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	116.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.13% 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	0.24	0/1884	0.47	0/2543
1	B	0.24	0/1864	0.47	0/2518
2	C	0.27	0/1461	0.50	1/1988 (0.1%)
2	D	0.25	0/1554	0.46	0/2117
All	All	0.25	0/6763	0.47	1/9166 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	1282	MET	N-CA-C	5.40	125.58	111.00

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	1851	0	1859	43	0
1	B	1830	0	1843	44	0
2	C	1424	0	1366	63	0
2	D	1514	0	1474	54	0
All	All	6619	0	6542	195	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.

The worst 5 of 195 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:C:1141:ARG:HG3	2:D:1141:ARG:HD2	1.43	0.99
2:C:1237:GLN:HE21	2:C:1282:MET:CE	1.78	0.96
2:C:1237:GLN:HE21	2:C:1282:MET:HE3	1.31	0.95
2:C:1180:SER:O	2:C:1181:VAL:HG13	1.72	0.90
2:C:1236:THR:O	2:C:1284:LEU:HB2	1.72	0.89

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	223/226 (99%)	210 (94%)	13 (6%)	0	100	100
1	B	221/226 (98%)	207 (94%)	14 (6%)	0	100	100
2	C	177/195 (91%)	166 (94%)	11 (6%)	0	100	100
2	D	192/195 (98%)	176 (92%)	16 (8%)	0	100	100
All	All	813/842 (97%)	759 (93%)	54 (7%)	0	100	100

There are no Ramachandran outliers to report.

### 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	207/208 (100%)	205 (99%)	2 (1%)	76	86
1	B	205/208 (99%)	204 (100%)	1 (0%)	88	93
2	C	153/165 (93%)	149 (97%)	4 (3%)	46	67
2	D	164/165 (99%)	163 (99%)	1 (1%)	86	92
All	All	729/746 (98%)	721 (99%)	8 (1%)	73	85

5 of 8 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	D	1143	ILE
2	C	1281	ARG
2	C	1174	LEU
2	C	1144	HIS
2	C	1218	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	60	GLN
1	A	98	HIS
2	C	1237	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 monosaccharides 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	225/226 (99%)	-0.30	0	100 100	51, 97, 148, 176	7 (3%)
1	B	223/226 (98%)	-0.22	0	100 100	51, 103, 160, 213	7 (3%)
2	C	183/195 (93%)	0.07	5 (2%)	54 44	54, 128, 240, 329	0
2	D	194/195 (99%)	0.08	0	100 100	57, 125, 192, 230	0
All	All	825/842 (97%)	-0.11	5 (0%)	89 84	51, 109, 191, 329	14 (1%)

All (5) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	C	1312	ALA	2.9
2	C	1255	VAL	2.5
2	C	1276	ASP	2.5
2	C	1313	ILE	2.2
2	C	1311	GLU	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 monosaccharides in this entry.

### 6.4 Ligands [i](#)

There are no ligands in this entry.

## 6.5 Other polymers [i](#)

There are no such residues in this entry.