



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 8, 2026 – 08:44 AM UTC

PDB ID : 5EJS / pdb_00005ejs
Title : Structure of Dictyostelium Discoideum Myosin VII MyTH4-FERM MF2 domain, mutant 1
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Deposited on : 2015-11-02
Resolution : 2.70 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

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>.

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

MolProbity	:	4-5-2 with Phenix2.0
Xtriage (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

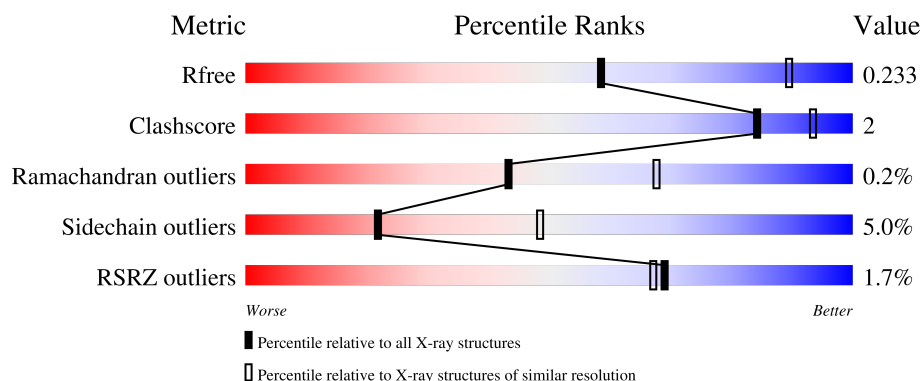
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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}	180053	3538 (2.70-2.70)
Clashscore	190562	3843 (2.70-2.70)
Ramachandran outliers	187476	3778 (2.70-2.70)
Sidechain outliers	187428	3778 (2.70-2.70)
RSRZ outliers	180081	3538 (2.70-2.70)

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 of the lower bar indicate the fraction of residues that contain outliers for ≥ 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	496	<div> <div>%</div> <div> <div></div> <div>90%</div> <div>9%</div> <div>.</div> </div> </div>
1	B	496	<div> <div>3%</div> <div> <div></div> <div>87%</div> <div>9%</div> <div>..</div> </div> </div>

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 8269 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 Myosin-I heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	496	Total	C	N	O	S	0	0	0
			4005	2554	659	770	22			
1	B	485	Total	C	N	O	S	0	0	0
			3922	2504	647	750	21			

There are 34 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	?	-	GLN	deletion	UNP Q9U1M8
A	?	-	GLN	deletion	UNP Q9U1M8
A	?	-	ALA	deletion	UNP Q9U1M8
A	?	-	THR	deletion	UNP Q9U1M8
A	?	-	LEU	deletion	UNP Q9U1M8
A	?	-	LYS	deletion	UNP Q9U1M8
A	?	-	ARG	deletion	UNP Q9U1M8
A	?	-	LYS	deletion	UNP Q9U1M8
A	?	-	ALA	deletion	UNP Q9U1M8
A	?	-	PRO	deletion	UNP Q9U1M8
A	?	-	VAL	deletion	UNP Q9U1M8
A	1909	GLU	LYS	engineered mutation	UNP Q9U1M8
A	1912	GLU	LYS	engineered mutation	UNP Q9U1M8
A	1913	GLU	LYS	engineered mutation	UNP Q9U1M8
A	2358	LEU	-	expression tag	UNP Q9U1M8
A	2359	GLU	-	expression tag	UNP Q9U1M8
A	2360	HIS	-	expression tag	UNP Q9U1M8
B	?	-	GLN	deletion	UNP Q9U1M8
B	?	-	GLN	deletion	UNP Q9U1M8
B	?	-	ALA	deletion	UNP Q9U1M8
B	?	-	THR	deletion	UNP Q9U1M8
B	?	-	LEU	deletion	UNP Q9U1M8
B	?	-	LYS	deletion	UNP Q9U1M8
B	?	-	ARG	deletion	UNP Q9U1M8
B	?	-	LYS	deletion	UNP Q9U1M8

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Chain	Residue	Modelled	Actual	Comment	Reference
B	?	-	ALA	deletion	UNP Q9U1M8
B	?	-	PRO	deletion	UNP Q9U1M8
B	?	-	VAL	deletion	UNP Q9U1M8
B	1909	GLU	LYS	engineered mutation	UNP Q9U1M8
B	1912	GLU	LYS	engineered mutation	UNP Q9U1M8
B	1913	GLU	LYS	engineered mutation	UNP Q9U1M8
B	2359	LEU	-	expression tag	UNP Q9U1M8
B	2360	GLU	-	expression tag	UNP Q9U1M8
B	2361	HIS	-	expression tag	UNP Q9U1M8

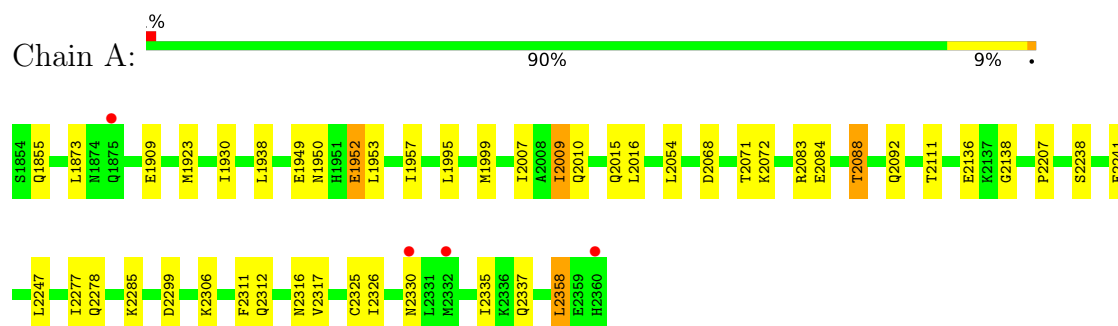
- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	202	Total O 202 202	0	0
2	B	140	Total O 140 140	0	0

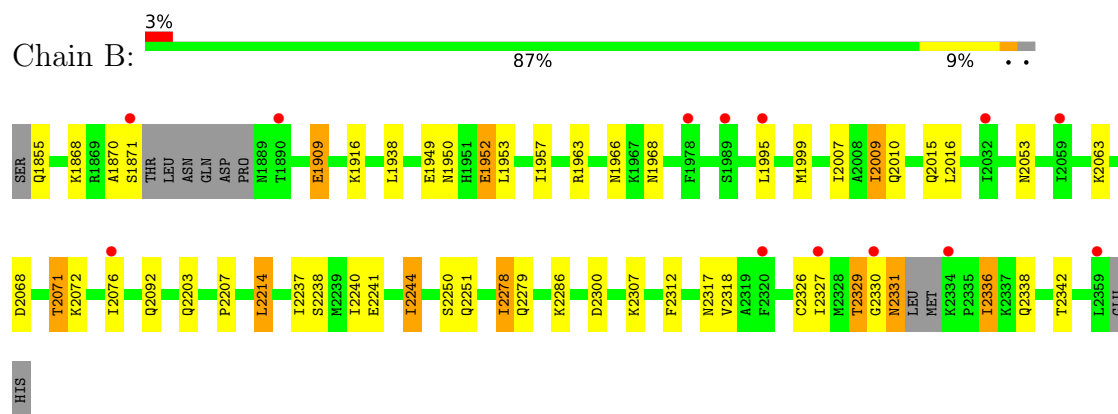
3 Residue-property plots

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: Myosin-I heavy chain



• Molecule 1: Myosin-I heavy chain



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	40.17Å 158.84Å 194.66Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	38.91 – 2.70 38.91 – 2.70	Depositor EDS
% Data completeness (in resolution range)	99.2 (38.91-2.70) 99.6 (38.91-2.70)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.09	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.21 (at 2.69Å)	Xtriage
Refinement program	BUSTER-TNT BUSTER 2.10.1	Depositor
R, R_{free}	0.205 , 0.235 0.205 , 0.233	Depositor DCC
R_{free} test set	1756 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	59.6	Xtriage
Anisotropy	0.415	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 74.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	8269	wwPDB-VP
Average B, all atoms (Å ²)	79.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.33% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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	0.83	0/4087	1.28	9/5526 (0.2%)
1	B	0.84	0/4002	1.31	12/5408 (0.2%)
All	All	0.84	0/8089	1.30	21/10934 (0.2%)

There are no bond length outliers.

The worst 5 of 21 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	2136	GLU	N-CA-C	6.15	118.95	111.82
1	A	2335	ILE	N-CA-CB	6.03	117.51	110.82
1	B	2068	ASP	CA-CB-CG	5.77	118.37	112.60
1	B	2250	SER	CA-C-N	5.75	129.88	121.31
1	B	2250	SER	C-N-CA	5.75	129.88	121.31

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	4005	0	3967	14	0
1	B	3922	0	3892	22	0
2	A	202	0	0	0	0
2	B	140	0	0	1	0
All	All	8269	0	7859	36	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 2.

The worst 5 of 36 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:B:2331:ASN:O	1:B:2331:ASN:ND2	1.93	1.02
1:B:2329:THR:OG1	1:B:2336:ILE:O	2.09	0.71
1:B:2329:THR:OG1	1:B:2336:ILE:HG23	1.93	0.69
1:A:2312:GLN:HE22	1:A:2358:LEU:HD12	1.67	0.59
1:B:1952:GLU:H	1:B:1952:GLU:CD	2.13	0.57

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	492/496 (99%)	477 (97%)	14 (3%)	1 (0%)	43	68
1	B	479/496 (97%)	461 (96%)	17 (4%)	1 (0%)	43	68
All	All	971/992 (98%)	938 (97%)	31 (3%)	2 (0%)	43	68

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	2207	PRO
1	B	2207	PRO

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	455/458 (99%)	434 (95%)	21 (5%)	24	51
1	B	445/458 (97%)	421 (95%)	24 (5%)	20	45
All	All	900/916 (98%)	855 (95%)	45 (5%)	22	48

5 of 45 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	1963	ARG
1	B	2244	ILE
1	B	2009	ILE
1	B	2203	GLN
1	B	2278	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 18 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	2188	ASN
1	B	2358	GLN
1	B	2317	ASN
1	A	2330	ASN
1	B	2133	GLN

5.3.3 RNA ⓘ

There are no RNA molecules 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 oligosaccharides 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](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	A	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	1875:GLN	C	1887:ASP	N	16.94

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, 95th 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 ²)	Q<0.9
1	A	496/496 (100%)	-0.08	4 (0%) 82 81	36, 67, 116, 205	0
1	B	485/496 (97%)	0.15	13 (2%) 56 53	38, 82, 144, 187	0
All	All	981/992 (98%)	0.04	17 (1%) 69 67	36, 72, 137, 205	0

The worst 5 of 17 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	2359	LEU	4.7
1	A	2360	HIS	4.2
1	B	2327	ILE	3.1
1	B	1989	SER	3.0
1	B	2330	GLY	2.7

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](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.