



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 05:17 PM UTC

PDB ID : 5MW0 / pdb_00005mw0
Title : Complex between the Leucine Zipper (LZ) and Centrosomin-motif 2 (CM2) domains of Drosophila melanogaster Centrosomin (Cnn) - L535E mutant form
Authors : Feng, Z.; Johnson, S.; Raff, J.W.; Lea, S.M.
Deposited on : 2017-01-17
Resolution : 2.00 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

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

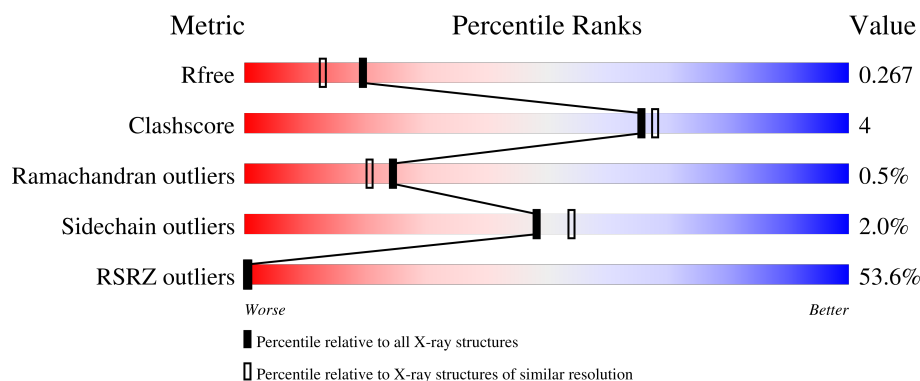
1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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}	180053	10052 (2.00-2.00)
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)
RSRZ outliers	180081	10067 (2.00-2.00)

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	70	31% 79% 10% 11%
1	B	70	31% 76% 10% 14%
2	C	58	60% 76% 9% 16%
2	D	58	69% 79% 9% 12%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 1940 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 Centrosomin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	62	Total	C	N	O	S	0	0	0
			504	310	100	92	2			
1	B	60	Total	C	N	O	S	0	0	0
			496	306	98	90	2			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1079	GLY	-	expression tag	UNP P54623
A	1080	GLY	-	expression tag	UNP P54623
A	1081	SER	-	expression tag	UNP P54623
B	1079	GLY	-	expression tag	UNP P54623
B	1080	GLY	-	expression tag	UNP P54623
B	1081	SER	-	expression tag	UNP P54623

- Molecule 2 is a protein called Centrosomin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	49	Total	C	N	O	S	0	0	0
			393	245	69	77	2			
2	D	51	Total	C	N	O	S	0	0	0
			404	251	71	80	2			

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	487	GLY	-	expression tag	UNP P54623
C	488	PRO	-	expression tag	UNP P54623
C	489	MET	-	expression tag	UNP P54623
C	522	ILE	VAL	conflict	UNP P54623
C	535	GLU	LEU	engineered mutation	UNP P54623
D	487	GLY	-	expression tag	UNP P54623

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Chain	Residue	Modelled	Actual	Comment	Reference
D	488	PRO	-	expression tag	UNP P54623
D	489	MET	-	expression tag	UNP P54623
D	522	ILE	VAL	conflict	UNP P54623
D	535	GLU	LEU	engineered mutation	UNP P54623

- Molecule 3 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Zn 1 1	0	0

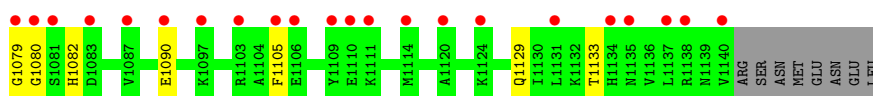
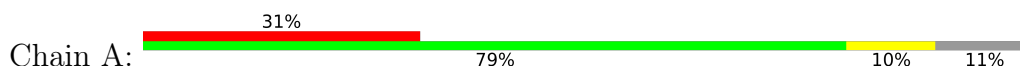
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	56	Total O 56 56	0	0
4	C	13	Total O 13 13	0	0
4	D	8	Total O 8 8	0	0
4	B	65	Total O 65 65	0	0

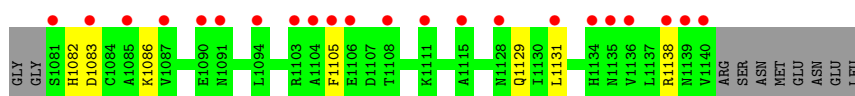
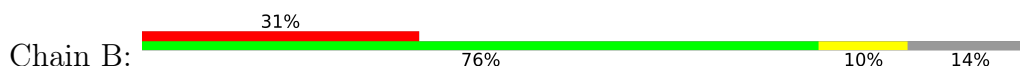
3 Residue-property plots

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.

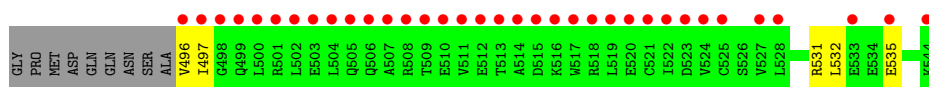
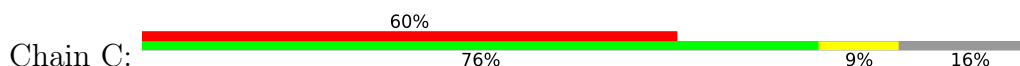
• Molecule 1: Centrosomin



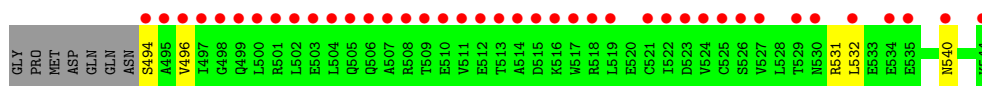
• Molecule 1: Centrosomin



• Molecule 2: Centrosomin



• Molecule 2: Centrosomin



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	45.77Å 43.93Å 68.64Å 90.00° 108.28° 90.00°	Depositor
Resolution (Å)	31.19 – 2.00 31.19 – 2.00	Depositor EDS
% Data completeness (in resolution range)	96.5 (31.19-2.00) 96.9 (31.19-2.00)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.14 (at 2.00Å)	Xtriage
Refinement program	PHENIX (1.10_2155: ???)	Depositor
R, R_{free}	0.237 , 0.264 0.240 , 0.267	Depositor DCC
R_{free} test set	887 reflections (3.63%)	wwPDB-VP
Wilson B-factor (Å ²)	28.1	Xtriage
Anisotropy	0.533	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 48.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.000 for h,-k,-h-l	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	1940	wwPDB-VP
Average B, all atoms (Å ²)	52.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 21.13 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 7.4848e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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](#)

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

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	0.23	0/507	0.40	0/674
1	B	0.23	0/499	0.38	0/664
2	C	0.21	0/395	0.35	0/532
2	D	0.17	0/406	0.30	0/547
All	All	0.21	0/1807	0.36	0/2417

There are no bond length outliers.

There are no bond angle outliers.

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	504	0	528	6	0
1	B	496	0	522	5	0
2	C	393	0	400	4	0
2	D	404	0	410	4	0
3	A	1	0	0	0	0
4	A	56	0	0	1	0
4	B	65	0	0	1	0
4	C	13	0	0	0	0
4	D	8	0	0	2	0
All	All	1940	0	1860	14	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 4.

All (14) 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:D:531:ARG:NH2	1:B:1129:GLN:OE1	2.14	0.77
1:A:1129:GLN:OE1	2:C:531:ARG:NH2	2.21	0.72
1:A:1133:THR:OG1	2:C:535:GLU:OE1	2.13	0.66
1:A:1090:GLU:OE1	4:A:1301:HOH:O	2.14	0.65
1:B:1138:ARG:NH1	4:B:1302:HOH:O	2.37	0.56
2:D:496:VAL:N	4:D:601:HOH:O	2.10	0.49
2:D:494:SER:O	4:D:601:HOH:O	2.20	0.48
1:A:1105:PHE:HB2	1:B:1105:PHE:HB2	1.96	0.48
1:B:1083:ASP:HB3	1:B:1086:LYS:HB3	1.97	0.46
2:C:532:LEU:HG	2:D:532:LEU:HG	1.97	0.45
1:A:1079:GLY:N	1:A:1082:HIS:O	2.50	0.44
1:B:1082:HIS:CD2	1:B:1082:HIS:C	2.96	0.44
2:C:531:ARG:HD2	2:C:531:ARG:HA	1.80	0.42
1:A:1082:HIS:CD2	1:A:1082:HIS:C	2.99	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	60/70 (86%)	59 (98%)	0	1 (2%)	7	3
1	B	58/70 (83%)	58 (100%)	0	0	100	100
2	C	47/58 (81%)	47 (100%)	0	0	100	100
2	D	49/58 (84%)	48 (98%)	1 (2%)	0	100	100
All	All	214/256 (84%)	212 (99%)	1 (0%)	1 (0%)	24	21

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1080	GLY

5.3.2 Protein sidechains ⓘ

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	54/62 (87%)	54 (100%)	0	100	100
1	B	54/62 (87%)	53 (98%)	1 (2%)	50	56
2	C	44/51 (86%)	42 (96%)	2 (4%)	24	23
2	D	45/51 (88%)	44 (98%)	1 (2%)	45	50
All	All	197/226 (87%)	193 (98%)	4 (2%)	48	54

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	C	496	VAL
2	C	497	ILE
2	D	540	ASN
1	B	1131	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
2	C	499	GLN
2	D	506	GLN

5.3.3 RNA ⓘ

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 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

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 [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

6.1 Protein, DNA and RNA chains

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	62/70 (88%)	2.24	22 (35%) 1 1	26, 42, 72, 106	0
1	B	60/70 (85%)	1.88	22 (36%) 1 1	27, 37, 69, 82	0
2	C	49/58 (84%)	3.65	35 (71%) 0 0	30, 56, 117, 126	0
2	D	51/58 (87%)	3.74	40 (78%) 0 0	34, 62, 94, 102	0
All	All	222/256 (86%)	2.80	119 (53%) 0 0	26, 44, 97, 126	0

All (119) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	C	497	ILE	9.9
1	A	1079	GLY	9.8
2	C	502	LEU	8.5
2	C	496	VAL	8.4
2	D	500	LEU	8.3
2	D	517	TRP	8.3
2	C	500	LEU	8.0
2	D	496	VAL	7.5
2	D	511	VAL	7.1
2	C	499	GLN	6.9
2	C	503	GLU	6.7
2	C	498	GLY	6.6
2	C	517	TRP	6.4
1	B	1081	SER	6.3
2	C	504	LEU	6.2
1	A	1080	GLY	6.2
2	D	507	ALA	6.0
2	D	502	LEU	5.9
2	D	497	ILE	5.7
1	A	1081	SER	5.7
2	D	505	GLN	5.7

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Mol	Chain	Res	Type	RSRZ
2	D	503	GLU	5.7
2	D	495	ALA	5.6
2	C	508	ARG	5.6
2	C	544	LYS	5.6
2	D	514	ALA	5.4
2	D	494	SER	5.3
2	D	513	THR	5.3
1	A	1140	VAL	5.2
2	D	515	ASP	5.2
2	C	501	ARG	5.1
2	C	507	ALA	5.0
2	D	504	LEU	5.0
2	D	526	SER	5.0
2	C	511	VAL	4.7
1	A	1134	HIS	4.7
2	D	510	GLU	4.6
2	D	499	GLN	4.6
2	D	512	GLU	4.5
1	B	1140	VAL	4.5
2	D	506	GLN	4.5
2	C	516	LYS	4.5
2	C	514	ALA	4.5
2	D	516	LYS	4.5
2	C	506	GLN	4.4
2	C	512	GLU	4.4
2	D	508	ARG	4.3
2	D	498	GLY	4.3
2	C	505	GLN	4.1
2	C	510	GLU	4.0
1	A	1090	GLU	3.9
1	A	1105	PHE	3.7
1	B	1135	ASN	3.7
2	D	509	THR	3.7
2	C	515	ASP	3.6
2	C	513	THR	3.6
1	B	1139	ASN	3.6
2	C	519	LEU	3.6
1	B	1136	VAL	3.5
1	A	1138	ARG	3.5
2	C	509	THR	3.4
2	D	524	VAL	3.4
1	A	1103	ARG	3.4

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Mol	Chain	Res	Type	RSRZ
1	A	1083	ASP	3.4
2	D	501	ARG	3.3
2	D	523	ASP	3.3
2	C	521	CYS	3.2
1	A	1111	LYS	3.2
2	D	522	ILE	3.1
1	B	1128	ASN	3.1
2	C	523	ASP	3.1
1	A	1109	TYR	3.1
2	D	519	LEU	3.1
2	C	525	CYS	3.0
2	D	525	CYS	2.9
1	B	1115	ALA	2.9
1	A	1124	LYS	2.8
1	B	1134	HIS	2.8
1	A	1110	GLU	2.8
2	D	532	LEU	2.7
1	B	1105	PHE	2.7
2	D	544	LYS	2.7
1	B	1138	ARG	2.7
2	D	530	ASN	2.7
1	B	1083	ASP	2.6
1	A	1087	VAL	2.6
2	D	521	CYS	2.6
2	D	518	ARG	2.6
1	B	1087	VAL	2.5
1	A	1135	ASN	2.5
1	A	1114	MET	2.5
2	C	527	VAL	2.5
2	D	540	ASN	2.5
2	C	535	GLU	2.4
1	B	1094	LEU	2.4
2	C	518	ARG	2.3
1	B	1090	GLU	2.3
1	B	1091	ASN	2.3
1	A	1097	LYS	2.3
2	D	527	VAL	2.3
2	C	522	ILE	2.3
1	B	1108	THR	2.2
1	B	1104	ALA	2.2
2	D	535	GLU	2.2
2	D	534	GLU	2.2

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Mol	Chain	Res	Type	RSRZ
1	B	1085	ALA	2.2
1	A	1131	LEU	2.2
1	A	1137	LEU	2.2
1	B	1131	LEU	2.2
1	B	1103	ARG	2.2
2	C	533	GLU	2.1
1	A	1106	GLU	2.1
1	B	1106	GLU	2.1
2	C	520	GLU	2.1
2	D	529	THR	2.1
2	C	524	VAL	2.1
2	C	528	LEU	2.0
1	B	1111	LYS	2.0
1	A	1120	ALA	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, 95th 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	ZN	A	1201	1/1	0.99	0.03	38,38,38,38	0

6.5 Other polymers [i](#)

There are no such residues in this entry.