



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 24, 2021 – 02:08 PM EST

PDB ID : 3CE2
Title : Crystal structure of putative peptidase from *Chlamydomonas reinhardtii*
Authors : Ramagopal, U.A.; Toro, R.; Gilmore, M.; Eberle, M.; Maletic, M.; Meyer, A.J.; Rodgers, L.; Sauder, J.M.; Burley, S.K.; Almo, S.C.; New York SGX Research Center for Structural Genomics (NYSGXRC)
Deposited on : 2008-02-28
Resolution : 2.60 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 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 : 2.16
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) : 2.16

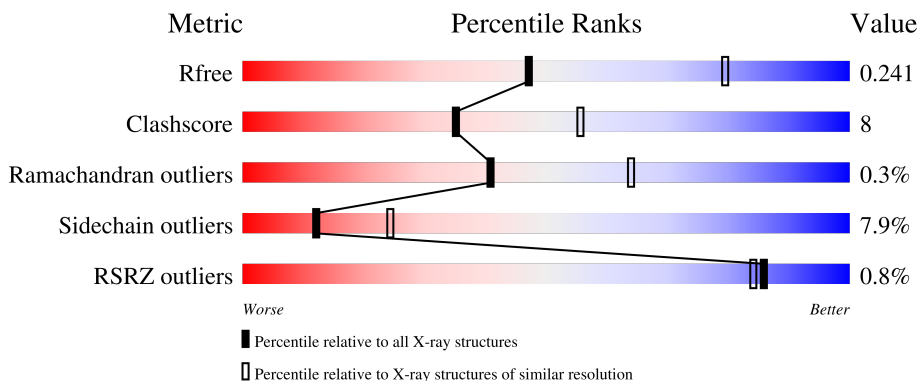
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 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	3163 (2.60-2.60)
Clashscore	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (2.60-2.60)
RSRZ outliers	127900	3104 (2.60-2.60)

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	618	

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 4833 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 Putative peptidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	595	4808	3094	785	914	15	0	0	0

There are 11 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	MET	-	expression tag	UNP Q5L5N2
A	0	SER	-	expression tag	UNP Q5L5N2
A	1	LEU	-	expression tag	UNP Q5L5N2
A	609	GLU	-	expression tag	UNP Q5L5N2
A	610	GLY	-	expression tag	UNP Q5L5N2
A	611	HIS	-	expression tag	UNP Q5L5N2
A	612	HIS	-	expression tag	UNP Q5L5N2
A	613	HIS	-	expression tag	UNP Q5L5N2
A	614	HIS	-	expression tag	UNP Q5L5N2
A	615	HIS	-	expression tag	UNP Q5L5N2
A	616	HIS	-	expression tag	UNP Q5L5N2

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	6	Total	Zn	0	0
			6	6		

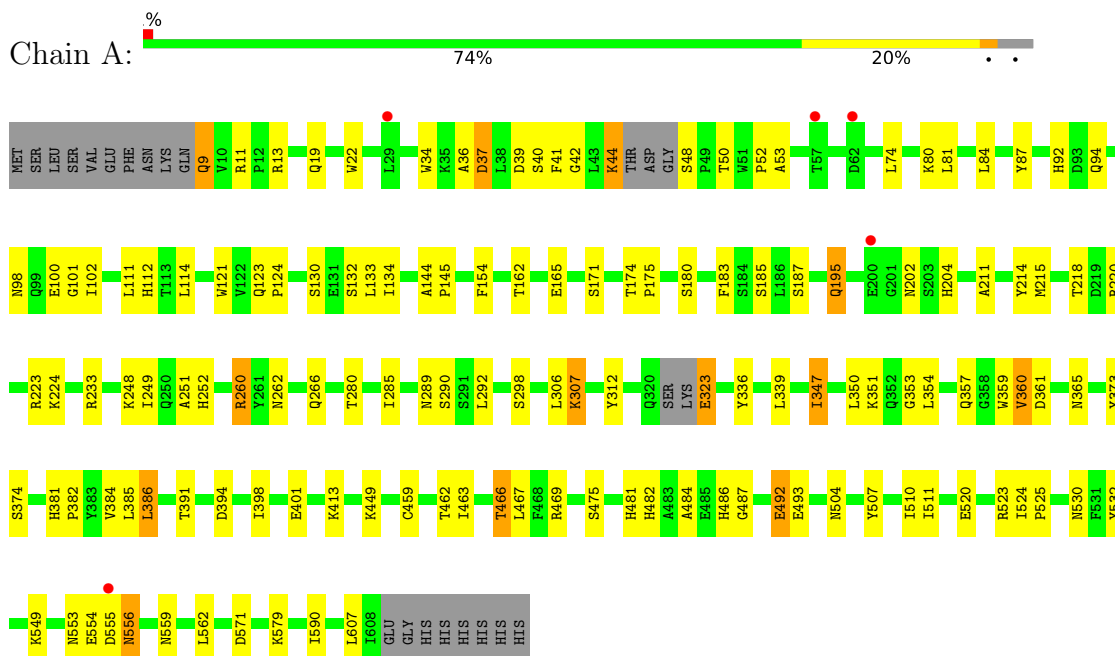
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	19	Total	O	0	0
			19	19		

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: Putative peptidase



4 Data and refinement statistics

Property	Value	Source
Space group	P 65 2 2	Depositor
Cell constants a, b, c, α , β , γ	147.78Å 147.78Å 143.66Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	36.94 – 2.60 36.94 – 2.60	Depositor EDS
% Data completeness (in resolution range)	99.9 (36.94-2.60) 99.9 (36.94-2.60)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	0.09	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.29 (at 2.61Å)	Xtrriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.192 , 0.246 0.191 , 0.241	Depositor DCC
R_{free} test set	1474 reflections (5.09%)	wwPDB-VP
Wilson B-factor (Å ²)	54.4	Xtrriage
Anisotropy	0.010	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 29.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	4833	wwPDB-VP
Average B, all atoms (Å ²)	54.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.32% 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](#)

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	0.59	0/4929	0.68	0/6688

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	4808	0	4694	78	0
2	A	6	0	0	0	0
3	A	19	0	0	5	0
All	All	4833	0	4694	78	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 8.

All (78) 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:260:ARG:HG3	1:A:260:ARG:HH11	1.22	1.02

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:532:TYR:CE1	1:A:532:TYR:CE2	2.47	0.98
1:A:462:THR:O	1:A:466:THR:HG23	1.71	0.90
1:A:492:GLU:HG3	3:A:827:HOH:O	1.80	0.81
1:A:339:LEU:HB2	1:A:347:ILE:HD11	1.63	0.80
1:A:260:ARG:HG3	1:A:260:ARG:NH1	1.96	0.80
1:A:134:ILE:HD12	1:A:154:PHE:CD1	2.16	0.79
1:A:336:TYR:CE1	1:A:347:ILE:HG23	2.18	0.78
1:A:556:ASN:HB2	1:A:559:ASN:HD22	1.56	0.68
1:A:13:ARG:CZ	1:A:94:GLN:HG2	2.27	0.64
1:A:130:SER:O	1:A:134:ILE:HG12	1.98	0.64
1:A:339:LEU:CB	1:A:347:ILE:HD11	2.31	0.61
1:A:381:HIS:HB2	1:A:382:PRO:HD2	1.83	0.60
1:A:469:ARG:HD2	3:A:808:HOH:O	2.02	0.60
1:A:9:GLN:O	1:A:9:GLN:HG3	2.03	0.59
1:A:549:LYS:HA	1:A:554:GLU:HG3	1.86	0.57
1:A:556:ASN:HD22	1:A:556:ASN:H	1.50	0.57
1:A:44:LYS:HG2	1:A:48:SER:OG	2.05	0.56
1:A:449:LYS:HE3	1:A:607:LEU:O	2.04	0.56
1:A:162:THR:HG23	1:A:165:GLU:OE1	2.06	0.56
1:A:187:SER:O	1:A:233:ARG:NH2	2.22	0.55
1:A:41:PHE:CZ	1:A:80:LYS:HD2	2.41	0.55
1:A:220:ARG:HG3	1:A:223:ARG:NH2	2.23	0.54
1:A:556:ASN:N	1:A:556:ASN:HD22	2.05	0.54
1:A:339:LEU:C	1:A:347:ILE:HD11	2.28	0.54
1:A:354:LEU:HA	1:A:360:VAL:CG2	2.38	0.53
1:A:121:TRP:O	1:A:124:PRO:HD2	2.09	0.53
1:A:174:THR:HB	1:A:175:PRO:CD	2.38	0.53
1:A:384:VAL:HG12	1:A:386:LEU:HD13	1.91	0.52
1:A:36:ALA:O	1:A:39:ASP:HB2	2.09	0.52
1:A:262:ASN:HB2	1:A:266:GLN:OE1	2.09	0.52
1:A:354:LEU:HA	1:A:360:VAL:HG21	1.92	0.52
1:A:285:ILE:O	1:A:289:ASN:ND2	2.39	0.52
1:A:386:LEU:HD21	1:A:398:ILE:HG12	1.93	0.51
1:A:467:LEU:HD12	1:A:467:LEU:C	2.31	0.51
1:A:34:TRP:CD1	1:A:87:TYR:CD2	2.99	0.50
1:A:13:ARG:NH2	1:A:94:GLN:HG2	2.27	0.50
1:A:183:PHE:CE2	1:A:525:PRO:HA	2.47	0.49
1:A:98:ASN:O	1:A:102:ILE:HG13	2.12	0.48
1:A:391:THR:O	1:A:394:ASP:HB2	2.14	0.48
1:A:211:ALA:O	1:A:215:MET:HG3	2.15	0.47
1:A:482:HIS:HE1	3:A:801:HOH:O	1.98	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:510:ILE:HG23	1:A:511:ILE:HG12	1.96	0.46
1:A:204:HIS:HB3	1:A:214:TYR:OH	2.15	0.46
1:A:336:TYR:CD1	1:A:351:LYS:HD2	2.51	0.46
1:A:92:HIS:NE2	3:A:814:HOH:O	2.36	0.46
1:A:44:LYS:HG2	1:A:48:SER:CB	2.46	0.45
1:A:224:LYS:HG3	1:A:312:TYR:CZ	2.52	0.45
1:A:133:LEU:HD23	1:A:133:LEU:HA	1.69	0.44
1:A:384:VAL:CG1	1:A:386:LEU:HD13	2.47	0.44
1:A:555:ASP:OD2	1:A:556:ASN:N	2.50	0.44
1:A:37:ASP:HB3	1:A:84:LEU:HD21	2.00	0.44
1:A:350:LEU:O	1:A:354:LEU:HG	2.18	0.44
1:A:121:TRP:C	1:A:124:PRO:HD2	2.38	0.43
1:A:307:LYS:HB3	1:A:307:LYS:NZ	2.32	0.43
1:A:484:ALA:O	1:A:487:GLY:N	2.45	0.43
1:A:144:ALA:N	1:A:145:PRO:CD	2.81	0.42
1:A:524:ILE:HA	1:A:525:PRO:HD3	1.81	0.42
1:A:285:ILE:CG2	1:A:590:ILE:HD13	2.49	0.42
1:A:353:GLY:O	1:A:359:TRP:HB2	2.20	0.42
1:A:52:PRO:HD2	1:A:53:ALA:H	1.85	0.42
1:A:571:ASP:OD2	1:A:579:LYS:NZ	2.53	0.42
1:A:100:GLU:O	1:A:101:GLY:C	2.57	0.42
1:A:111:LEU:HA	1:A:111:LEU:HD23	1.43	0.42
1:A:248:LYS:HE3	1:A:252:HIS:NE2	2.35	0.42
1:A:248:LYS:O	1:A:251:ALA:HB3	2.20	0.42
1:A:401:GLU:OE1	1:A:401:GLU:HA	2.20	0.41
1:A:81:LEU:HB3	1:A:112:HIS:CE1	2.55	0.41
1:A:385:LEU:C	1:A:385:LEU:HD23	2.40	0.41
1:A:459:CYS:O	1:A:463:ILE:HG13	2.20	0.41
1:A:195:GLN:HE21	1:A:195:GLN:HB2	1.65	0.41
1:A:292:LEU:HA	1:A:292:LEU:HD23	1.78	0.41
1:A:486:HIS:HE1	3:A:802:HOH:O	1.86	0.41
1:A:202:ASN:HB2	1:A:204:HIS:HE1	1.86	0.41
1:A:249:ILE:HD12	1:A:481:HIS:CE1	2.56	0.41
1:A:323:GLU:N	1:A:323:GLU:CD	2.74	0.40
1:A:373:TYR:C	1:A:373:TYR:CD1	2.94	0.40
1:A:507:TYR:HB3	1:A:511:ILE:HG13	2.04	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	589/618 (95%)	558 (95%)	29 (5%)	2 (0%)	41 64

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	530	ASN
1	A	42	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	532/554 (96%)	490 (92%)	42 (8%)	12 24

All (42) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	9	GLN
1	A	11	ARG
1	A	19	GLN
1	A	22	TRP
1	A	37	ASP
1	A	40	SER
1	A	44	LYS
1	A	50	THR
1	A	74	LEU

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Mol	Chain	Res	Type
1	A	114	LEU
1	A	123	GLN
1	A	132	SER
1	A	171	SER
1	A	180	SER
1	A	185	SER
1	A	195	GLN
1	A	218	THR
1	A	260	ARG
1	A	280	THR
1	A	290	SER
1	A	298	SER
1	A	306	LEU
1	A	307	LYS
1	A	323	GLU
1	A	347	ILE
1	A	357	GLN
1	A	360	VAL
1	A	361	ASP
1	A	365	ASN
1	A	374	SER
1	A	386	LEU
1	A	413	LYS
1	A	466	THR
1	A	475	SER
1	A	492	GLU
1	A	493	GLU
1	A	504	ASN
1	A	520	GLU
1	A	523	ARG
1	A	553	ASN
1	A	556	ASN
1	A	562	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	110	HIS
1	A	112	HIS
1	A	195	GLN
1	A	272	ASN
1	A	320	GLN

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Mol	Chain	Res	Type
1	A	352	GLN
1	A	357	GLN
1	A	556	ASN
1	A	559	ASN
1	A	602	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](#)

Of 6 ligands modelled in this entry, 6 are 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 [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	595/618 (96%)	-0.22	5 (0%) 86 84	33, 52, 76, 107	0

All (5) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	29	LEU	4.5
1	A	200	GLU	3.0
1	A	57	THR	3.0
1	A	555	ASP	2.9
1	A	62	ASP	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](#)

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(Å ²)	Q<0.9
2	ZN	A	706	1/1	0.85	0.19	51,51,51,51	1
2	ZN	A	704	1/1	0.89	0.07	60,60,60,60	1

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	ZN	A	705	1/1	0.90	0.23	69,69,69,69	1
2	ZN	A	702	1/1	0.90	0.13	83,83,83,83	0
2	ZN	A	701	1/1	0.91	0.09	122,122,122,122	0
2	ZN	A	703	1/1	0.96	0.23	77,77,77,77	0

6.5 Other polymers [i](#)

There are no such residues in this entry.