Full wwPDB X-ray Structure Validation Report ⓘ

Jun 16, 2024 – 10:34 AM EDT

PDB ID	:	4ZOZ
Title	:	Crystal structure of the Chaetomium thermophilum Sqt1 bound to the N-terminus of the ribosomal protein L10
Authors	:	Pausch, P.; Altegoer, F.; Bange, G.
Deposited on	:	2015-05-07
Resolution	:	1.70 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:

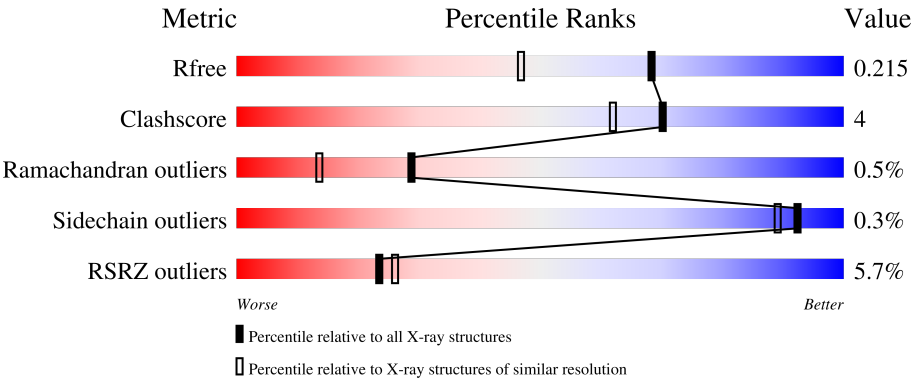
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 1.70 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}	130704	4298 (1.70-1.70)
Clashscore	141614	4695 (1.70-1.70)
Ramachandran outliers	138981	4610 (1.70-1.70)
Sidechain outliers	138945	4610 (1.70-1.70)
RSRZ outliers	127900	4222 (1.70-1.70)

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 <=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	480	3% 76% 6% 18%
1	B	480	5% 76% 6% 18%
2	C	28	7% 36% 57%
2	Y	28	7% 43% 57%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 6591 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 Sqt1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	394	Total	C	N	O	S	0	0	0
			2907	1834	494	572	7			
1	B	394	Total	C	N	O	S	0	0	0
			2907	1834	494	572	7			

- Molecule 2 is a protein called 60S ribosomal protein L10-like protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	Y	12	Total	C	N	O	S	0	0	0
			106	65	25	14	2			
2	C	12	Total	C	N	O	S	0	0	0
			106	65	25	14	2			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
Y	21	GLY	-	expression tag	UNP G0SEI1
Y	22	SER	-	expression tag	UNP G0SEI1
Y	23	HIS	-	expression tag	UNP G0SEI1
Y	24	HIS	-	expression tag	UNP G0SEI1
Y	25	HIS	-	expression tag	UNP G0SEI1
Y	26	HIS	-	expression tag	UNP G0SEI1
Y	27	HIS	-	expression tag	UNP G0SEI1
Y	28	HIS	-	expression tag	UNP G0SEI1
C	21	GLY	-	expression tag	UNP G0SEI1
C	22	SER	-	expression tag	UNP G0SEI1
C	23	HIS	-	expression tag	UNP G0SEI1
C	24	HIS	-	expression tag	UNP G0SEI1
C	25	HIS	-	expression tag	UNP G0SEI1
C	26	HIS	-	expression tag	UNP G0SEI1
C	27	HIS	-	expression tag	UNP G0SEI1
C	28	HIS	-	expression tag	UNP G0SEI1

- Molecule 3 is water.

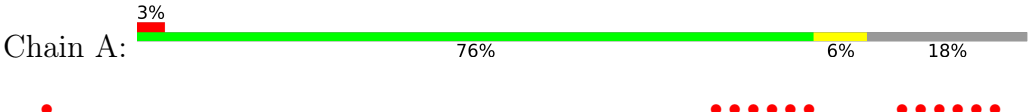
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	301	Total O 301 301	0	0
3	Y	11	Total O 11 11	0	0
3	B	247	Total O 247 247	0	0
3	C	6	Total O 6 6	0	0

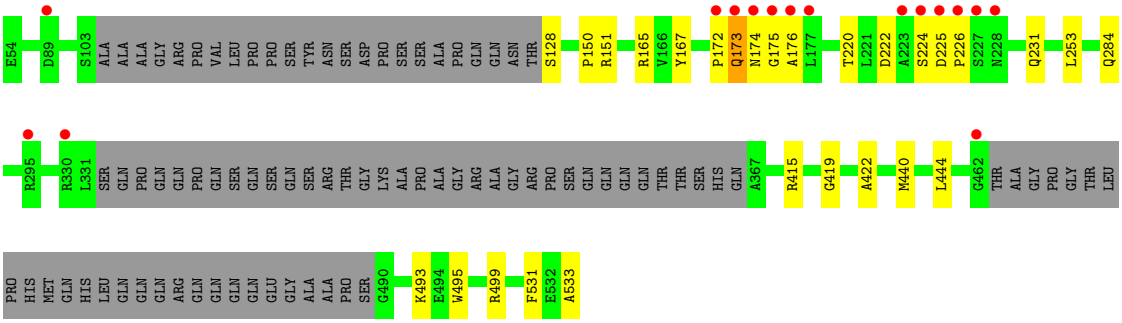
3 Residue-property plots (i)

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: Sqt1

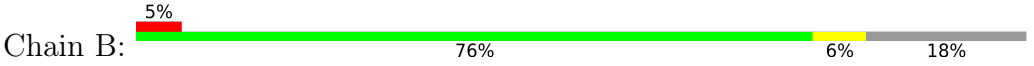
Chain A:

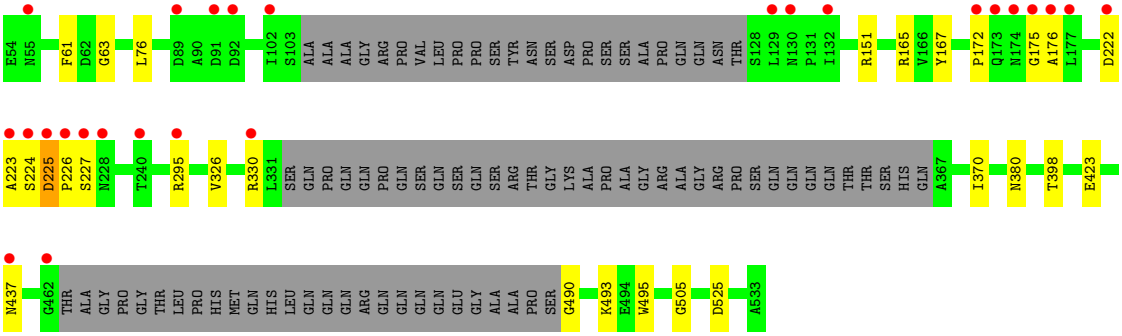




• Molecule 1: Sqt1

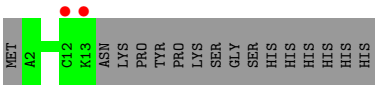
Chain B:





• Molecule 2: 60S ribosomal protein L10-like protein

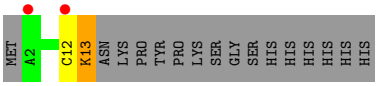
Chain Y:



• Molecule 2: 60S ribosomal protein L10-like protein

Chain C:


7%
36%
57%


MET
A2
C12
K13
ASN
LYS
PRO
TYR
PRO
LYS
SER
GLY
SER
HIS
HIS
HIS
HIS
HIS
HIS

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	47.50Å 67.18Å 72.81Å 89.92° 108.92° 92.03°	Depositor
Resolution (Å)	48.33 – 1.70 48.33 – 1.70	Depositor EDS
% Data completeness (in resolution range)	93.6 (48.33-1.70) 90.0 (48.33-1.70)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.86 (at 1.70Å)	Xtriage
Refinement program	PHENIX 1.9_1685	Depositor
R, R_{free}	0.191 , 0.216 0.192 , 0.215	Depositor DCC
R_{free} test set	4693 reflections (5.35%)	wwPDB-VP
Wilson B-factor (Å^2)	18.3	Xtriage
Anisotropy	0.515	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 48.9	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	0.026 for h,-k,-h-l 0.019 for -h,k,-l 0.010 for -h,-k,h+l	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	6591	wwPDB-VP
Average B, all atoms (Å^2)	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.21% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

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	0.38	0/2970	0.56	0/4046
1	B	0.37	0/2970	0.57	0/4046
2	C	0.32	0/108	0.58	0/142
2	Y	0.35	0/108	0.55	0/142
All	All	0.37	0/6156	0.57	0/8376

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	B	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	224	SER	Peptide

5.2 Too-close contacts

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	2907	0	2809	20	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	2907	0	2809	23	0
2	C	106	0	109	2	0
2	Y	106	0	109	0	0
3	A	301	0	0	8	1
3	B	247	0	0	10	1
3	C	6	0	0	0	0
3	Y	11	0	0	0	0
All	All	6591	0	5836	43	1

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 (43) 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:165:ARG:NH1	1:A:167:TYR:OH	2.00	0.94
1:B:165:ARG:NH1	1:B:167:TYR:OH	2.06	0.88
1:B:490:GLY:N	3:B:605:HOH:O	2.17	0.78
1:A:225:ASP:N	1:B:330:ARG:HH12	1.86	0.73
1:B:505:GLY:O	3:B:601:HOH:O	2.06	0.72
1:A:222:ASP:OD2	3:A:601:HOH:O	2.10	0.70
1:B:437:ASN:HB2	3:B:821:HOH:O	1.94	0.66
1:A:150:PRO:HG2	1:A:151:ARG:HG2	1.78	0.65
1:A:493:LYS:NZ	1:A:533:ALA:O	2.29	0.65
1:B:222:ASP:OD2	3:B:603:HOH:O	2.15	0.63
1:B:76:LEU:HD11	1:B:151:ARG:HG2	1.80	0.63
2:C:12:CYS:O	2:C:13:LYS:HD2	2.02	0.59
1:B:61:PHE:O	3:B:606:HOH:O	2.18	0.57
1:B:437:ASN:ND2	3:B:604:HOH:O	2.16	0.56
1:A:128:SER:N	3:A:610:HOH:O	2.41	0.54
1:A:499:ARG:HD3	3:A:840:HOH:O	2.09	0.51
1:B:493:LYS:HD3	1:B:495:TRP:CZ2	2.46	0.51
1:A:225:ASP:H	1:B:330:ARG:HH12	1.60	0.50
1:B:223:ALA:O	1:B:226:PRO:HD3	2.12	0.50
1:A:172:PRO:HB2	1:A:176:ALA:H	1.77	0.49
1:A:174:ASN:O	1:A:174:ASN:OD1	2.31	0.48
1:B:326:VAL:HG22	1:B:370:ILE:HD13	1.96	0.47
1:A:224:SER:HB2	3:A:619:HOH:O	2.15	0.47
1:A:440:MET:HB3	1:A:444:LEU:HG	1.97	0.47
1:B:437:ASN:OD1	1:B:437:ASN:N	2.40	0.46
1:B:222:ASP:HB2	3:B:619:HOH:O	2.15	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:225:ASP:HA	1:B:226:PRO:HD2	1.72	0.45
1:A:284:GLN:NE2	3:A:602:HOH:O	2.20	0.45
1:A:173:GLN:HB2	3:A:624:HOH:O	2.16	0.45
1:A:419:GLY:HA2	1:A:422:ALA:O	2.17	0.45
1:A:253:LEU:HD21	3:A:639:HOH:O	2.18	0.44
2:C:12:CYS:O	2:C:13:LYS:HB2	2.18	0.44
1:B:61:PHE:CZ	1:B:63:GLY:HA3	2.52	0.44
1:B:423:GLU:OE1	3:B:608:HOH:O	2.21	0.44
1:B:295:ARG:NH2	3:B:627:HOH:O	2.51	0.43
1:B:172:PRO:HB2	1:B:176:ALA:H	1.83	0.43
1:B:380:ASN:HB2	1:B:398:THR:OG1	2.17	0.42
1:A:495:TRP:CD1	1:A:531:PHE:HB3	2.56	0.41
1:B:525:ASP:OD1	1:B:525:ASP:N	2.49	0.41
1:A:225:ASP:N	1:A:226:PRO:HD3	2.36	0.41
1:A:415:ARG:HD3	3:A:607:HOH:O	2.19	0.41
1:B:165:ARG:NH2	3:B:620:HOH:O	2.43	0.41
1:A:220:THR:HG23	1:A:231:GLN:HB2	2.04	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:826:HOH:O	3:B:801:HOH:O[1_556]	1.96	0.24

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	386/480 (80%)	373 (97%)	11 (3%)	2 (0%)	29 13
1	B	386/480 (80%)	373 (97%)	11 (3%)	2 (0%)	29 13
2	C	10/28 (36%)	10 (100%)	0	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
2	Y	10/28 (36%)	10 (100%)	0	0	100 100
All	All	792/1016 (78%)	766 (97%)	22 (3%)	4 (0%)	29 13

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	175	GLY
1	B	225	ASP
1	A	173	GLN
1	A	175	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	308/377 (82%)	308 (100%)	0	100 100
1	B	308/377 (82%)	307 (100%)	1 (0%)	92 89
2	C	10/25 (40%)	9 (90%)	1 (10%)	7 1
2	Y	10/25 (40%)	10 (100%)	0	100 100
All	All	636/804 (79%)	634 (100%)	2 (0%)	92 89

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	227	SER
2	C	13	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA (i)

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 monosaccharides in this entry.

5.6 Ligand geometry

There are no ligands in this entry.

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

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, 95^{th} 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	394/480 (82%)	0.28	16 (4%)	37	41	12, 20, 40, 75	0
1	B	394/480 (82%)	0.46	26 (6%)	18	20	12, 25, 48, 77	0
2	C	12/28 (42%)	0.96	2 (16%)	1	1	29, 36, 50, 51	0
2	Y	12/28 (42%)	0.38	2 (16%)	1	1	22, 26, 45, 47	0
All	All	812/1016 (79%)	0.38	46 (5%)	23	26	12, 22, 45, 77	0

All (46) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	175	GLY	13.3
1	A	175	GLY	11.7
1	A	174	ASN	10.1
1	B	174	ASN	9.2
1	B	225	ASP	9.1
1	B	176	ALA	6.7
1	A	225	ASP	6.5
1	A	173	GLN	6.5
1	B	223	ALA	6.3
1	B	177	LEU	6.2
1	B	227	SER	6.1
1	A	462	GLY	5.9
1	A	227	SER	5.9
1	B	462	GLY	5.8
2	C	12	CYS	5.7
1	A	223	ALA	5.6
1	B	437	ASN	5.2
1	A	224	SER	5.0
2	Y	12	CYS	4.9
1	A	228	ASN	4.7
1	B	228	ASN	4.4

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Mol	Chain	Res	Type	RSRZ
1	A	177	LEU	3.9
1	B	92	ASP	3.9
1	A	226	PRO	3.6
1	A	89	ASP	3.6
1	A	330	ARG	3.6
1	B	91	ASP	3.5
1	B	172	PRO	3.5
1	A	176	ALA	3.3
1	B	295	ARG	3.2
2	C	2	ALA	3.1
1	B	226	PRO	3.0
1	B	224	SER	3.0
1	B	330	ARG	2.8
1	B	130	ASN	2.8
1	B	102	ILE	2.7
1	B	89	ASP	2.6
1	B	173	GLN	2.6
1	A	172	PRO	2.5
1	B	240	THR	2.5
2	Y	13	LYS	2.5
1	B	222	ASP	2.4
1	B	132	ILE	2.2
1	A	295	ARG	2.1
1	B	55	ASN	2.1
1	B	129	LEU	2.1

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.