



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 02:08 AM UTC

PDB ID : 7CUJ / pdb_00007cuj
Title : Crystal structure of fission yeast Ccq1 and Tpz1
Authors : Sun, H.; Wu, Z.; Wu, J.; Lei, M.
Deposited on : 2020-08-23
Resolution : 2.40 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
Xtrriage (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

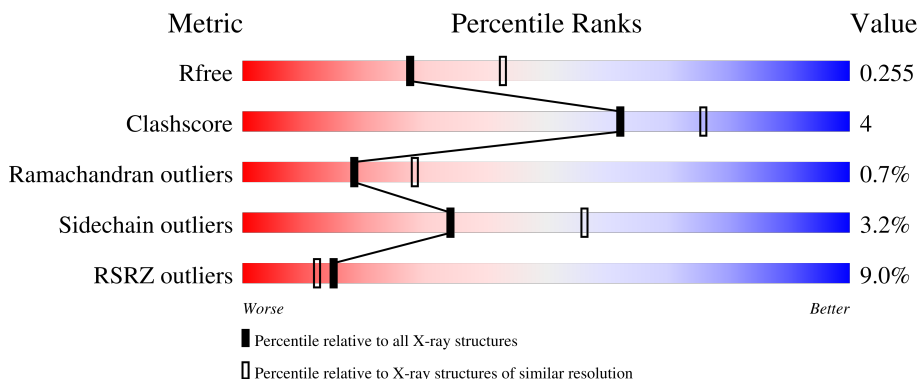
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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	4912 (2.40-2.40)
Clashscore	190562	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (2.40-2.40)
RSRZ outliers	180081	4916 (2.40-2.40)

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	317	 7% 72% 8% • 19%
1	B	317	 9% 73% 7% • 19%
2	C	45	 78% • • 16%
2	D	45	 4% 78% • 20%

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 4806 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 Coiled-coil quantitatively-enriched protein 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	258	2046	1318	338	380	10	0	0	0
1	B	256	2031	1310	336	375	10	0	0	0

- Molecule 2 is a protein called Protection of telomeres protein tpz1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	C	38	334	217	56	60	1	0	0	0
2	D	36	315	202	54	58	1	0	0	0

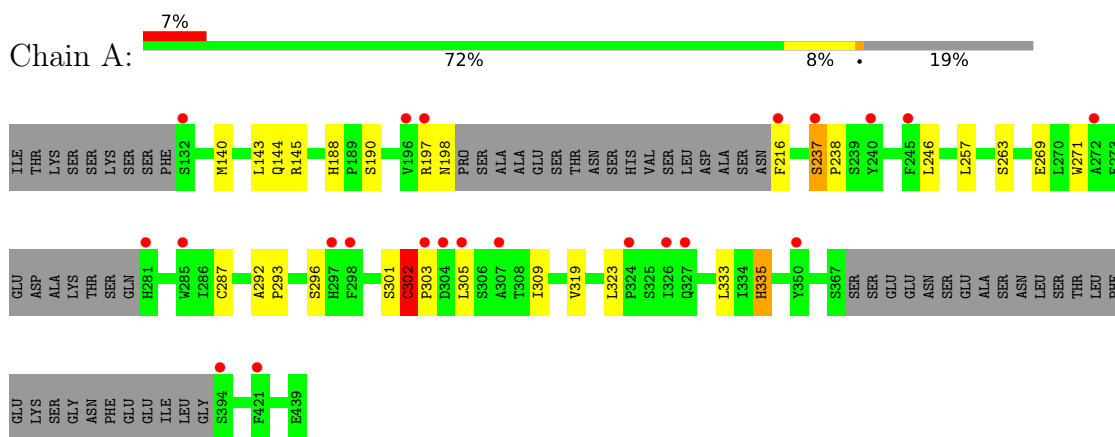
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	37	Total	O	0	0
			37	37		
3	C	9	Total	O	0	0
			9	9		
3	B	28	Total	O	0	0
			28	28		
3	D	6	Total	O	0	0
			6	6		

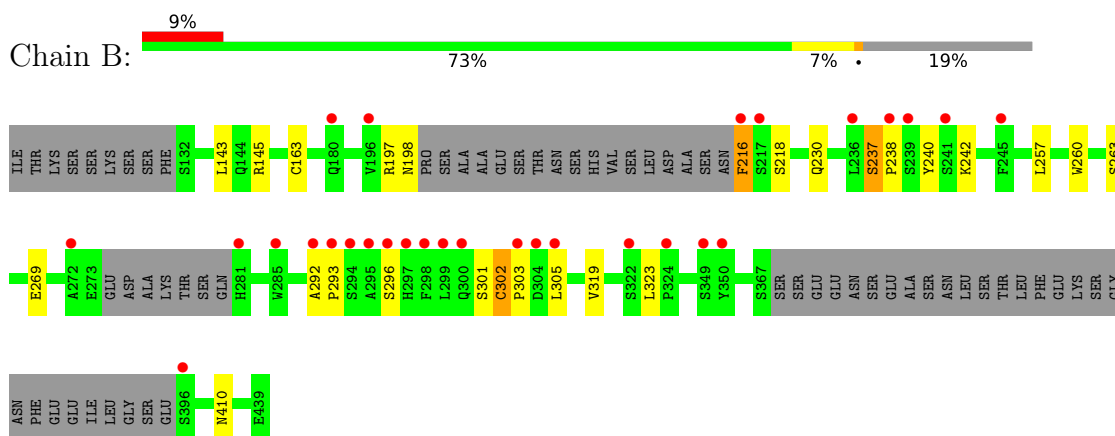
3 Residue-property plots [i](#)

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.

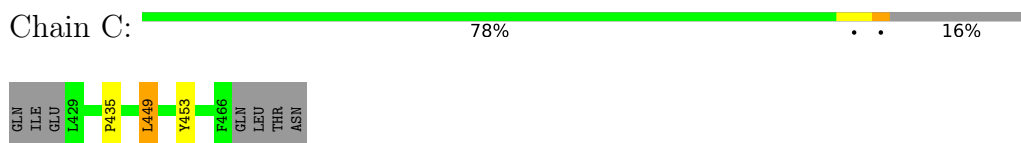
- Molecule 1: Coiled-coil quantitatively-enriched protein 1



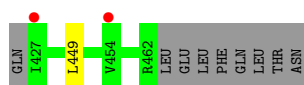
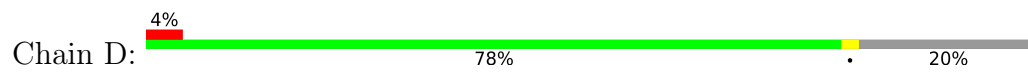
- Molecule 1: Coiled-coil quantitatively-enriched protein 1



- Molecule 2: Protection of telomeres protein tpz1



- Molecule 2: Protection of telomeres protein tpz1



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	58.30Å 71.75Å 95.18Å 90.00° 103.89° 90.00°	Depositor
Resolution (Å)	38.87 – 2.40 38.87 – 2.40	Depositor EDS
% Data completeness (in resolution range)	83.5 (38.87-2.40) 83.6 (38.87-2.40)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.75 (at 2.39Å)	Xtrriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.197 , 0.255 0.197 , 0.255	Depositor DCC
R_{free} test set	1240 reflections (4.10%)	wwPDB-VP
Wilson B-factor (Å ²)	33.9	Xtrriage
Anisotropy	0.126	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 55.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	4806	wwPDB-VP
Average B, all atoms (Å ²)	55.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.47% 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	0.46	0/2096	0.92	0/2841
1	B	0.46	0/2081	0.91	0/2821
2	C	0.41	0/341	0.89	0/455
2	D	0.41	0/321	0.94	0/428
All	All	0.45	0/4839	0.91	0/6545

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	2046	0	2023	19	0
1	B	2031	0	2012	19	0
2	C	334	0	340	3	0
2	D	315	0	320	0	0
3	A	37	0	0	1	0
3	B	28	0	0	0	0
3	C	9	0	0	0	0
3	D	6	0	0	0	0
All	All	4806	0	4695	39	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 (39) 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:198:ASN:C	1:B:216:PHE:N	2.28	0.92
1:B:296:SER:HB2	1:B:323:LEU:HD22	1.58	0.86
1:A:197:ARG:NH1	2:C:453:TYR:OH	2.22	0.72
1:A:292:ALA:N	1:A:293:PRO:HD2	2.06	0.71
1:B:237:SER:HB3	1:B:238:PRO:HD2	1.77	0.67
1:A:237:SER:HB3	1:A:238:PRO:HD2	1.76	0.66
1:B:302:CYS:N	1:B:303:PRO:CD	2.62	0.63
1:A:302:CYS:N	1:A:303:PRO:CD	2.63	0.62
1:B:292:ALA:N	1:B:293:PRO:HD2	2.14	0.62
1:A:140:MET:HE2	1:A:144:GLN:HB3	1.82	0.60
1:A:237:SER:HB3	1:A:238:PRO:CD	2.32	0.58
1:A:198:ASN:C	1:A:216:PHE:N	2.63	0.56
1:A:296:SER:HB2	1:A:323:LEU:HD13	1.86	0.56
1:A:302:CYS:N	1:A:303:PRO:HD2	2.21	0.56
1:B:301:SER:C	1:B:303:PRO:HD2	2.34	0.53
1:B:237:SER:HB3	1:B:238:PRO:CD	2.38	0.52
1:B:197:ARG:HD3	1:B:218:SER:CB	2.39	0.52
1:A:301:SER:C	1:A:303:PRO:HD2	2.35	0.52
1:A:271:TRP:CD1	1:A:287:CYS:HG	2.28	0.51
1:B:296:SER:CB	1:B:323:LEU:HD22	2.38	0.50
1:A:296:SER:HB2	1:A:323:LEU:HD22	1.95	0.48
1:B:302:CYS:N	1:B:303:PRO:HD2	2.28	0.47
1:A:292:ALA:N	1:A:293:PRO:CD	2.78	0.47
1:B:292:ALA:HB2	1:B:319:VAL:HG22	1.96	0.46
1:A:188:HIS:HD2	1:A:190:SER:H	1.63	0.46
1:A:237:SER:CB	1:A:238:PRO:CD	2.94	0.44
1:B:230:GLN:HB2	1:B:260:TRP:CH2	2.53	0.43
1:B:296:SER:HB2	1:B:323:LEU:CD2	2.39	0.43
1:B:240:TYR:CE2	1:B:242:LYS:HB3	2.54	0.43
1:A:335:HIS:HE1	3:A:502:HOH:O	2.00	0.43
1:B:197:ARG:HD3	1:B:218:SER:HB2	1.99	0.42
2:C:435:PRO:HG3	1:B:163:CYS:HB2	2.01	0.42
1:A:237:SER:CB	1:A:238:PRO:HD2	2.49	0.42
1:B:296:SER:HB2	1:B:323:LEU:HD13	2.01	0.42
1:A:246:LEU:HA	1:A:309:ILE:O	2.20	0.42
1:A:319:VAL:HG13	1:A:323:LEU:HD12	2.02	0.41
2:C:449:LEU:HD12	2:C:449:LEU:HA	1.90	0.41
1:B:260:TRP:O	1:B:263:SER:HB3	2.21	0.41
1:B:302:CYS:O	1:B:305:LEU:N	2.50	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	250/317 (79%)	236 (94%)	12 (5%)	2 (1%)	16	25
1	B	248/317 (78%)	229 (92%)	17 (7%)	2 (1%)	16	25
2	C	36/45 (80%)	36 (100%)	0	0	100	100
2	D	34/45 (76%)	34 (100%)	0	0	100	100
All	All	568/724 (78%)	535 (94%)	29 (5%)	4 (1%)	18	28

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	237	SER
1	B	237	SER
1	A	302	CYS
1	B	302	CYS

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	233/285 (82%)	224 (96%)	9 (4%)	28	48
1	B	231/285 (81%)	225 (97%)	6 (3%)	40	63
2	C	37/44 (84%)	36 (97%)	1 (3%)	39	62

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	D	35/44 (80%)	34 (97%)	1 (3%)	37	60
All	All	536/658 (82%)	519 (97%)	17 (3%)	34	56

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	143	LEU
1	A	145	ARG
1	A	257	LEU
1	A	263	SER
1	A	269	GLU
1	A	302	CYS
1	A	305	LEU
1	A	333	LEU
1	A	335	HIS
2	C	449	LEU
1	B	143	LEU
1	B	145	ARG
1	B	216	PHE
1	B	257	LEU
1	B	269	GLU
1	B	410	ASN
2	D	449	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	188	HIS
1	A	222	ASN
1	A	335	HIS
2	C	457	GLN
1	B	153	GLN
1	B	188	HIS
1	B	230	GLN
1	B	259	GLN
1	B	410	ASN
2	D	456	HIS

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 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](#)

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	258/317 (81%)	0.31	22 (8%) 16 13	14, 50, 100, 124	0
1	B	256/317 (80%)	0.35	29 (11%) 10 7	16, 47, 111, 131	0
2	C	38/45 (84%)	0.22	0 100 100	26, 46, 69, 76	0
2	D	36/45 (80%)	0.57	2 (5%) 30 26	29, 56, 119, 146	0
All	All	588/724 (81%)	0.34	53 (9%) 15 12	14, 49, 107, 146	0

All (53) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	298	PHE	4.8
1	A	305	LEU	4.0
1	B	196	VAL	3.9
1	A	245	PHE	3.9
1	A	298	PHE	3.9
1	B	350	TYR	3.7
1	B	295	ALA	3.7
2	D	427	ILE	3.6
1	B	305	LEU	3.4
1	B	238	PRO	3.4
1	B	299	LEU	3.3
1	B	396	SER	3.2
1	B	324	PRO	3.2
1	A	324	PRO	3.1
1	A	196	VAL	3.1
1	B	303	PRO	3.0
1	A	281	HIS	3.0
1	A	350	TYR	3.0
1	B	245	PHE	2.9
1	A	297	HIS	2.9
1	B	281	HIS	2.9

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Mol	Chain	Res	Type	RSRZ
1	B	304	ASP	2.9
1	A	421	PHE	2.9
1	A	394	SER	2.8
1	B	293	PRO	2.8
1	A	216	PHE	2.7
1	B	216	PHE	2.7
1	B	294	SER	2.7
1	A	327	GLN	2.6
1	B	285	TRP	2.6
1	A	326	ILE	2.5
1	A	240	TYR	2.5
1	A	307	ALA	2.5
1	B	322	SER	2.5
1	B	239	SER	2.4
1	B	241	SER	2.4
1	B	297	HIS	2.4
2	D	454	VAL	2.4
1	A	197	ARG	2.3
1	A	304	ASP	2.3
1	B	217	SER	2.3
1	B	300	GLN	2.3
1	A	303	PRO	2.3
1	B	180	GLN	2.2
1	A	237	SER	2.2
1	B	349	SER	2.2
1	B	292	ALA	2.1
1	B	296	SER	2.1
1	A	272	ALA	2.1
1	B	272	ALA	2.1
1	A	285	TRP	2.1
1	A	132	SER	2.1
1	B	236	LEU	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

There are no ligands in this entry.

6.5 Other polymers

There are no such residues in this entry.