



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 25, 2026 – 08:37 PM EDT

PDB ID : 3UTM / pdb_00003utm
Title : Crystal structure of a mouse Tankyrase-Axin complex
Authors : Cheng, Z.; Morrone, S.; Xu, W.
Deposited on : 2011-11-26
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
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

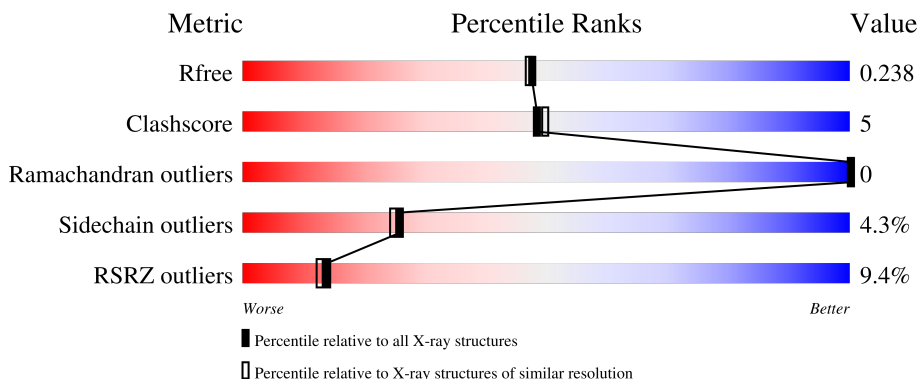
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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	351	
1	B	351	
2	C	83	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 5263 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 Tankyrase-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	320	Total	C	N	O	S	0	0	0
			2446	1527	450	455	14			
1	B	307	Total	C	N	O	S	0	0	0
			2353	1469	436	434	14			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	305	GLY	-	expression tag	UNP Q6PFX9
A	306	GLU	-	expression tag	UNP Q6PFX9
A	307	PHE	-	expression tag	UNP Q6PFX9
B	305	GLY	-	expression tag	UNP Q6PFX9
B	306	GLU	-	expression tag	UNP Q6PFX9
B	307	PHE	-	expression tag	UNP Q6PFX9

- Molecule 2 is a protein called Axin-1.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	C	32	Total	C	N	O	0	0	0
			237	143	41	53			

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-2	SER	-	expression tag	UNP O35625
C	-1	HIS	-	expression tag	UNP O35625
C	0	MET	-	expression tag	UNP O35625

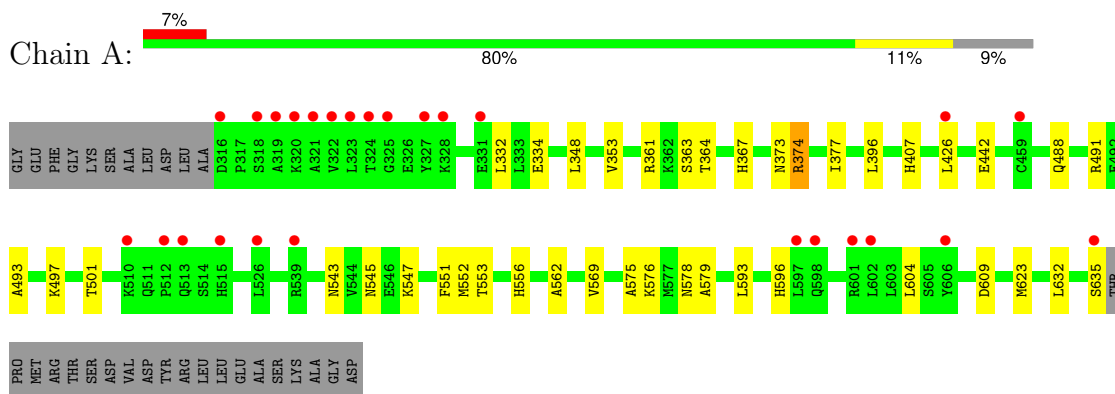
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	111	Total 111	O 111	0	0
3	B	112	Total 112	O 112	0	0
3	C	4	Total 4	O 4	0	0

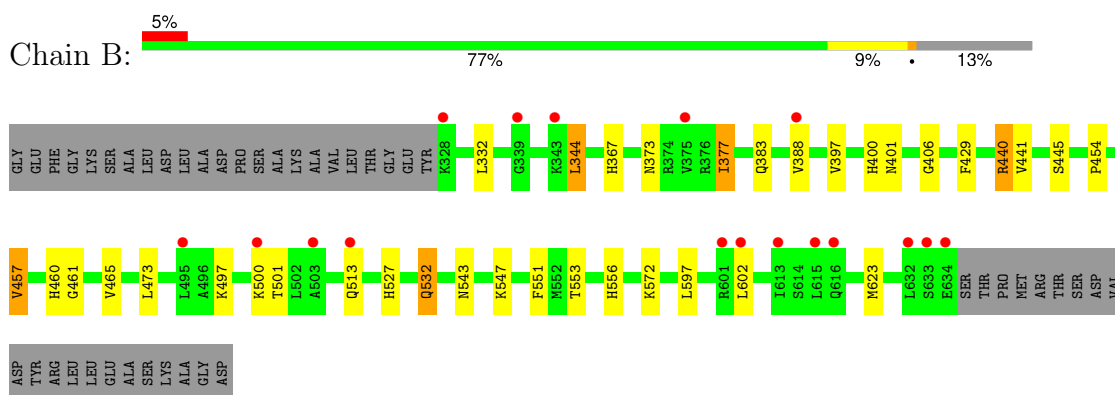
3 Residue-property plots [i](#)

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.

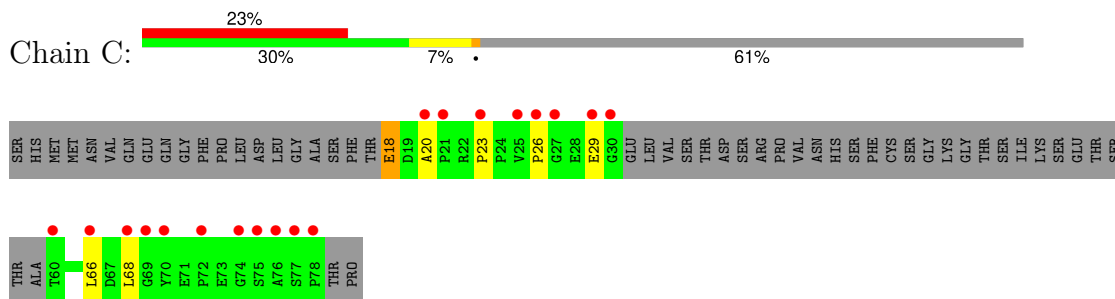
- Molecule 1: Tankyrase-1



- Molecule 1: Tankyrase-1



- Molecule 2: Axin-1



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	131.67Å 106.54Å 73.43Å 90.00° 105.76° 90.00°	Depositor
Resolution (Å)	30.00 – 2.00 30.00 – 2.00	Depositor EDS
% Data completeness (in resolution range)	99.8 (30.00-2.00) 99.8 (30.00-2.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.06	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.84 (at 1.95Å)	Xtrriage
Refinement program	REFMAC 5.6.0117	Depositor
R, R_{free}	0.207 , 0.238 0.207 , 0.238	Depositor DCC
R_{free} test set	3573 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	37.0	Xtrriage
Anisotropy	0.304	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 42.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	5263	wwPDB-VP
Average B, all atoms (Å ²)	63.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.82% 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	0/2490	0.85	0/3368
1	B	0.84	0/2395	0.85	0/3238
2	C	0.58	0/243	0.85	0/331
All	All	0.83	0/5128	0.85	0/6937

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	2446	0	2470	28	0
1	B	2353	0	2381	26	0
2	C	237	0	212	6	0
3	A	111	0	0	2	0
3	B	112	0	0	2	0
3	C	4	0	0	1	0
All	All	5263	0	5063	55	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 5.

All (55) 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:532:GLN:H	1:B:532:GLN:HE21	1.05	0.94
1:A:578:ASN:HD21	1:A:609:ASP:H	1.08	0.90
1:B:397:VAL:H	1:B:400:HIS:HD2	1.29	0.80
1:B:532:GLN:HE21	1:B:532:GLN:N	1.82	0.76
1:A:553:THR:H	1:A:556:HIS:HD2	1.33	0.74
1:A:545:ASN:HD21	1:A:576:LYS:H	1.36	0.74
1:B:553:THR:H	1:B:556:HIS:HD2	1.37	0.70
1:A:578:ASN:ND2	1:A:609:ASP:H	1.88	0.70
1:B:406:GLY:CA	1:B:440:ARG:HG2	2.22	0.69
1:A:497:LYS:O	1:A:501:THR:HG23	1.93	0.68
1:A:361:ARG:NH2	3:A:80:HOH:O	2.28	0.67
1:B:457:VAL:HG13	1:B:461:GLY:HA2	1.79	0.65
1:B:497:LYS:O	1:B:501:THR:HG23	1.97	0.64
1:B:397:VAL:H	1:B:400:HIS:CD2	2.15	0.62
1:B:532:GLN:H	1:B:532:GLN:NE2	1.89	0.60
1:A:373:ASN:HB2	1:A:407:HIS:CE1	2.38	0.59
1:B:441:VAL:HG12	1:B:473:LEU:HD13	1.86	0.58
1:B:553:THR:H	1:B:556:HIS:CD2	2.23	0.55
2:C:18:GLU:HG3	2:C:20:ALA:H	1.71	0.55
1:B:547:LYS:HB3	1:B:551:PHE:HA	1.89	0.55
1:A:364:THR:H	1:A:367:HIS:HD2	1.55	0.54
1:B:543:ASN:HB3	3:B:20:HOH:O	2.08	0.54
1:A:364:THR:H	1:A:367:HIS:CD2	2.26	0.53
1:B:457:VAL:CG1	1:B:461:GLY:HA2	2.38	0.53
1:A:553:THR:H	1:A:556:HIS:CD2	2.22	0.52
1:B:406:GLY:HA3	1:B:440:ARG:HG2	1.92	0.52
1:B:344:LEU:HG	1:B:377:ILE:HD13	1.91	0.51
1:B:373:ASN:ND2	3:B:16:HOH:O	2.43	0.51
1:A:361:ARG:HD3	2:C:26:PRO:HD3	1.93	0.50
1:A:545:ASN:ND2	1:A:576:LYS:H	2.07	0.50
1:A:488:GLN:NE2	1:A:491:ARG:HH11	2.10	0.50
1:A:367:HIS:HE1	1:A:396:LEU:O	1.95	0.50
1:A:579:ALA:HB3	3:A:660:HOH:O	2.12	0.49
1:A:593:LEU:HD13	1:A:623:MET:HE2	1.95	0.49
1:A:348:LEU:HD11	1:A:353:VAL:HG23	1.93	0.49
1:B:332:LEU:HD12	1:B:344:LEU:HD22	1.95	0.48
1:A:578:ASN:HD21	1:A:609:ASP:N	1.91	0.48
1:A:374:ARG:HB3	1:A:377:ILE:HB	1.95	0.47
1:A:604:LEU:HD11	1:A:632:LEU:HD23	1.96	0.47
1:B:406:GLY:HA2	1:B:440:ARG:HG2	1.96	0.47
1:A:562:ALA:HB2	1:A:596:HIS:CG	2.50	0.47
1:A:426:LEU:HB3	3:C:304:HOH:O	2.16	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:400:HIS:HE1	1:B:429:PHE:O	1.98	0.46
2:C:68:LEU:HD23	2:C:68:LEU:HA	1.87	0.44
1:B:460:HIS:HE1	2:C:66:LEU:HD13	1.83	0.44
1:B:429:PHE:HE1	2:C:68:LEU:HD22	1.83	0.43
1:B:367:HIS:HD2	1:B:401:ASN:HD21	1.67	0.43
1:B:397:VAL:HG22	1:B:400:HIS:CD2	2.54	0.43
1:A:545:ASN:HD21	1:A:575:ALA:HA	1.85	0.42
1:A:547:LYS:HB3	1:A:551:PHE:HA	2.02	0.42
1:A:363:SER:HB3	1:A:367:HIS:HB2	2.02	0.41
1:A:543:ASN:ND2	1:A:545:ASN:H	2.19	0.41
1:A:361:ARG:NH1	2:C:23:PRO:O	2.53	0.41
1:A:493:ALA:HB3	1:B:527:HIS:HB2	2.03	0.40
1:B:454:PRO:HB2	1:B:465:VAL:HG23	2.02	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	318/351 (91%)	316 (99%)	2 (1%)	0	100	100
1	B	305/351 (87%)	299 (98%)	6 (2%)	0	100	100
2	C	28/83 (34%)	27 (96%)	1 (4%)	0	100	100
All	All	651/785 (83%)	642 (99%)	9 (1%)	0	100	100

There are no Ramachandran outliers to report.

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	261/285 (92%)	254 (97%)	7 (3%)	39	42
1	B	251/285 (88%)	237 (94%)	14 (6%)	19	16
2	C	26/71 (37%)	24 (92%)	2 (8%)	12	8
All	All	538/641 (84%)	515 (96%)	23 (4%)	26	25

All (23) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	332	LEU
1	A	334	GLU
1	A	374	ARG
1	A	442	GLU
1	A	552	MET
1	A	569	VAL
1	A	635	SER
1	B	344	LEU
1	B	377	ILE
1	B	383	GLN
1	B	388	VAL
1	B	440	ARG
1	B	445	SER
1	B	457	VAL
1	B	500	LYS
1	B	513	GLN
1	B	532	GLN
1	B	572	LYS
1	B	597	LEU
1	B	602	LEU
1	B	623	MET
2	C	18	GLU
2	C	29	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (24) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	367	HIS
1	A	383	GLN
1	A	384	HIS

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Mol	Chain	Res	Type
1	A	389	HIS
1	A	401	ASN
1	A	428	GLN
1	A	460	HIS
1	A	488	GLN
1	A	513	GLN
1	A	543	ASN
1	A	545	ASN
1	A	556	HIS
1	A	564	ASN
1	A	573	HIS
1	A	578	ASN
1	A	598	GLN
1	B	389	HIS
1	B	400	HIS
1	B	401	ASN
1	B	460	HIS
1	B	484	HIS
1	B	513	GLN
1	B	532	GLN
1	B	556	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	320/351 (91%)	0.68	26 (8%) 18 17	41, 59, 89, 124	0
1	B	307/351 (87%)	0.69	17 (5%) 30 29	39, 58, 83, 112	0
2	C	32/83 (38%)	2.41	19 (59%) 0 0	78, 95, 128, 146	0
All	All	659/785 (83%)	0.77	62 (9%) 14 13	39, 59, 95, 146	0

All (62) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	C	78	PRO	5.2
2	C	60	THR	5.1
1	A	327	TYR	5.0
1	A	635	SER	5.0
1	A	323	LEU	4.2
2	C	30	GLY	4.1
1	A	321	ALA	3.9
1	A	526	LEU	3.9
2	C	23	PRO	3.6
2	C	25	VAL	3.2
2	C	70	TYR	3.2
1	B	328	LYS	3.2
1	A	426	LEU	3.1
2	C	72	PRO	2.9
2	C	75	SER	2.9
1	A	512	PRO	2.8
1	A	510	LYS	2.7
2	C	74	GLY	2.7
2	C	20	ALA	2.7
2	C	29	GLU	2.6
1	A	318	SER	2.6
1	A	320	LYS	2.6
1	B	634	GLU	2.6

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Mol	Chain	Res	Type	RSRZ
1	B	602	LEU	2.6
2	C	76	ALA	2.5
1	B	500	LYS	2.5
1	A	316	ASP	2.4
2	C	27	GLY	2.4
1	A	598	GLN	2.4
1	B	632	LEU	2.4
2	C	68	LEU	2.3
1	A	328	LYS	2.3
1	B	613	ILE	2.3
1	B	633	SER	2.3
1	A	331	GLU	2.3
2	C	21	PRO	2.3
1	A	513	GLN	2.3
1	B	343	LYS	2.3
1	B	495	LEU	2.3
1	B	615	LEU	2.3
1	A	515	HIS	2.3
1	A	539	ARG	2.3
1	A	597	LEU	2.3
1	B	513	GLN	2.2
1	A	325	GLY	2.2
1	A	459	CYS	2.2
2	C	66	LEU	2.2
1	B	616	GLN	2.2
2	C	69	GLY	2.2
2	C	26	PRO	2.1
1	B	388	VAL	2.1
1	A	322	VAL	2.1
2	C	77	SER	2.1
1	A	319	ALA	2.1
1	A	601	ARG	2.0
1	A	324	THR	2.0
1	B	375	VAL	2.0
1	B	503	ALA	2.0
1	A	602	LEU	2.0
1	B	601	ARG	2.0
1	B	339	GLY	2.0
1	A	606	TYR	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](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.