



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 01:09 PM UTC

PDB ID : 1DYO / pdb_00001dyo
Title : Xylan-Binding Domain from CBM 22, formally x6b domain
Authors : Davies, G.J.; Charnock, S.J.; Gilbert, H.J.; Fontes, C.M.G.A.
Deposited on : 2000-02-03
Resolution : 2.10 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
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

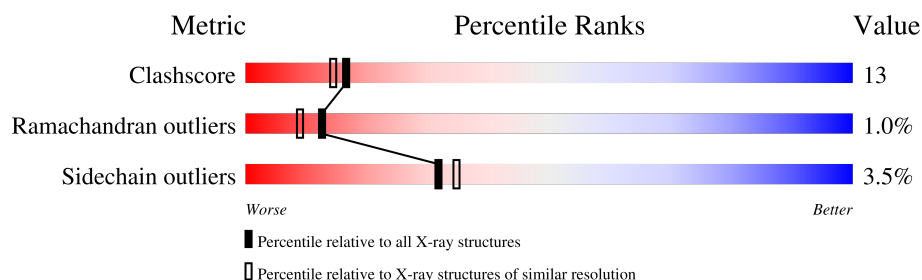
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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))
Clashscore	190562	7164 (2.10-2.10)
Ramachandran outliers	187476	7099 (2.10-2.10)
Sidechain outliers	187428	7100 (2.10-2.10)

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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	160	 64% 27% . . .
1	B	160	 78% 15% . . .

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 2731 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 ENDO-1,4-BETA-XYLANASE Y.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	156	Total	C	N	O	S	Se	0	0	0
			1216	769	203	239	2	3			
1	B	156	Total	C	N	O	S	Se	0	0	0
			1216	769	203	239	2	3			

- Molecule 2 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Ca	0	0
			1	1		
2	B	1	Total	Ca	0	0
			1	1		

- Molecule 3 is water.

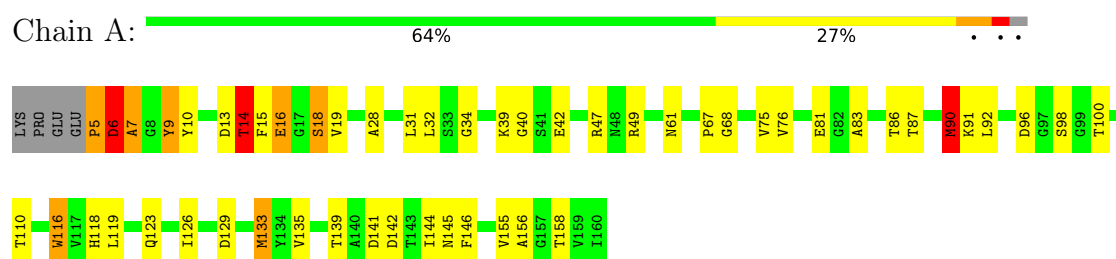
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	144	Total	O	0	0
			144	144		
3	B	153	Total	O	0	0
			153	153		

3 Residue-property plots [i](#)

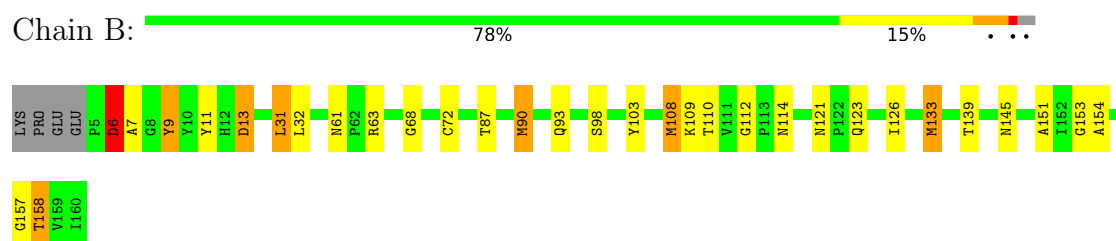
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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. 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.

Note EDS was not executed.

• Molecule 1: ENDO-1,4-BETA-XYLANASE Y



• Molecule 1: ENDO-1,4-BETA-XYLANASE Y



4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 61 2 2	Depositor
Cell constants a, b, c, α , β , γ	89.49Å 89.49Å 207.69Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	10.00 – 2.10	Depositor
% Data completeness (in resolution range)	98.5 (10.00-2.10)	Depositor
R_{merge}	0.07	Depositor
R_{sym}	0.07	Depositor
Refinement program	REFMAC	Depositor
R, R_{free}	0.190 , 0.250	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2731	wwPDB-VP
Average B, all atoms (Å ²)	41.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

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

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	1.31	2/1245 (0.2%)	2.14	52/1693 (3.1%)
1	B	1.12	3/1245 (0.2%)	1.78	20/1693 (1.2%)
All	All	1.22	5/2490 (0.2%)	1.97	72/3386 (2.1%)

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	A	0	1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	133	MSE	SE-CE	-26.87	1.14	1.95
1	B	133	MSE	SE-CE	-25.05	1.20	1.95
1	A	90	MSE	SE-CE	-23.14	1.26	1.95
1	B	108	MSE	SE-CE	-7.44	1.73	1.95
1	B	90	MSE	SE-CE	-5.65	1.78	1.95

All (72) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	6	ASP	CA-CB-CG	16.22	128.82	112.60
1	A	7	ALA	CA-C-O	14.43	137.41	119.95
1	A	6	ASP	CA-C-N	13.93	144.35	122.49
1	A	6	ASP	C-N-CA	13.93	144.35	122.49
1	A	7	ALA	CA-C-N	11.49	139.67	122.10
1	A	7	ALA	C-N-CA	11.49	139.67	122.10

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	83	ALA	CA-C-O	-10.23	110.50	121.45
1	A	133	MSE	CG-SE-CE	10.05	121.02	98.92
1	A	6	ASP	O-C-N	-9.43	110.05	122.59
1	B	133	MSE	CG-SE-CE	8.62	117.89	98.92
1	B	68	GLY	N-CA-C	-8.33	105.16	115.08
1	A	141	ASP	CA-CB-CG	8.33	120.93	112.60
1	A	9	TYR	CA-C-O	-8.32	111.35	120.92
1	A	6	ASP	N-CA-C	8.12	128.09	110.80
1	A	90	MSE	CA-C-O	-8.12	111.58	120.43
1	B	9	TYR	N-CA-C	8.10	123.56	109.96
1	A	7	ALA	N-CA-C	-7.65	102.47	112.41
1	B	13	ASP	CA-CB-CG	-7.64	104.96	112.60
1	A	15	PHE	CA-CB-CG	-7.47	106.33	113.80
1	A	90	MSE	O-C-N	7.46	131.70	123.27
1	A	135	VAL	N-CA-CB	7.27	118.64	110.72
1	A	13	ASP	CA-C-O	7.08	128.15	120.58
1	A	68	GLY	N-CA-C	-6.73	106.87	115.42
1	A	90	MSE	CA-C-N	-6.62	111.77	122.36
1	A	90	MSE	C-N-CA	-6.62	111.77	122.36
1	B	123	GLN	OE1-CD-NE2	-6.49	116.11	122.60
1	A	67	PRO	CA-C-O	-6.33	114.22	121.56
1	A	13	ASP	CA-CB-CG	-6.26	106.34	112.60
1	A	86	THR	CA-C-N	-6.16	114.08	123.07
1	A	86	THR	C-N-CA	-6.16	114.08	123.07
1	B	93	GLN	CA-C-O	-6.08	114.05	120.80
1	A	39	LYS	CA-C-O	-6.06	114.03	121.06
1	A	118	HIS	CA-C-O	-6.00	114.16	120.58
1	A	5	PRO	CB-CA-C	5.91	121.33	110.10
1	A	40	GLY	CA-C-O	-5.87	113.90	122.06
1	A	16	GLU	CB-CA-C	-5.77	102.59	111.83
1	A	16	GLU	N-CA-C	5.77	118.56	108.52
1	A	92	LEU	O-C-N	5.76	130.06	123.27
1	B	145	ASN	N-CA-C	-5.74	102.96	110.53
1	B	98	SER	CA-CB-OG	-5.69	99.72	111.10
1	B	158	THR	N-CA-CB	5.67	118.27	109.48
1	A	139	THR	N-CA-CB	5.67	120.78	111.08
1	A	91	LYS	N-CA-C	5.58	117.46	109.14
1	B	103	TYR	CA-C-N	-5.56	114.60	122.94
1	B	103	TYR	C-N-CA	-5.56	114.60	122.94
1	A	92	LEU	CB-CA-C	-5.53	101.12	110.19
1	A	116	TRP	CA-C-N	-5.52	115.44	123.06
1	A	116	TRP	C-N-CA	-5.52	115.44	123.06

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	18	SER	CA-C-N	5.44	129.56	120.64
1	A	18	SER	C-N-CA	5.44	129.56	120.64
1	B	139	THR	N-CA-C	-5.40	101.78	110.14
1	A	98	SER	CA-C-O	5.38	125.64	119.35
1	A	34	GLY	CA-C-O	5.37	123.92	119.04
1	A	61	ASN	CA-C-N	5.34	125.00	119.56
1	A	61	ASN	C-N-CA	5.34	125.00	119.56
1	A	16	GLU	CB-CG-CD	5.31	121.63	112.60
1	A	6	ASP	CB-CA-C	-5.29	99.90	110.42
1	A	123	GLN	CA-C-N	-5.28	115.75	122.77
1	A	123	GLN	C-N-CA	-5.28	115.75	122.77
1	A	90	MSE	N-CA-C	-5.27	100.65	109.24
1	A	146	PHE	CA-C-O	-5.24	115.84	121.45
1	A	14	THR	CA-C-O	-5.21	113.65	120.00
1	B	6	ASP	CA-C-N	5.18	131.44	121.54
1	B	6	ASP	C-N-CA	5.18	131.44	121.54
1	B	123	GLN	CG-CD-NE2	5.16	124.14	116.40
1	A	100	THR	CA-CB-OG1	-5.11	101.94	109.60
1	B	31	LEU	CA-CB-CG	5.07	134.06	116.30
1	B	114	ASN	CA-CB-CG	-5.07	107.53	112.60
1	A	123	GLN	OE1-CD-NE2	5.06	127.66	122.60
1	A	49	ARG	CD-NE-CZ	5.02	131.42	124.40
1	B	112	GLY	CA-C-N	5.01	124.99	120.03
1	B	112	GLY	C-N-CA	5.01	124.99	120.03

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	6	ASP	Mainchain

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	1216	0	1144	38	0
1	B	1216	0	1144	23	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	144	0	0	1	1
3	B	153	0	0	1	0
All	All	2731	0	2288	61	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 13.

All (61) 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:90:MSE:CE	1:A:90:MSE:SE	1.26	1.45
1:B:133:MSE:CE	1:B:133:MSE:SE	1.20	1.39
1:A:133:MSE:CE	1:A:133:MSE:SE	1.14	1.34
1:A:90:MSE:SE	1:A:90:MSE:HE2	1.83	1.14
1:A:90:MSE:SE	1:A:90:MSE:HE3	1.82	1.12
1:B:133:MSE:SE	1:B:133:MSE:HE2	1.78	1.09
1:B:133:MSE:SE	1:B:133:MSE:HE1	1.78	1.05
1:A:90:MSE:SE	1:A:90:MSE:HE1	1.83	1.05
1:A:133:MSE:SE	1:A:133:MSE:HE1	1.73	1.04
1:A:14:THR:HG23	1:A:16:GLU:HG2	1.40	1.04
1:A:133:MSE:SE	1:A:133:MSE:HE3	1.73	1.02
1:B:133:MSE:SE	1:B:133:MSE:HE3	1.78	1.01
1:A:133:MSE:SE	1:A:133:MSE:HE2	1.73	0.99
1:B:90:MSE:SE	3:B:2076:HOH:O	2.35	0.95
1:A:90:MSE:CE	1:A:90:MSE:CG	2.59	0.81
1:B:6:ASP:CG	1:B:7:ALA:H	1.92	0.77
1:A:14:THR:CG2	1:A:16:GLU:HG2	2.16	0.75
1:A:126:ILE:HD13	1:A:133:MSE:HE1	1.77	0.66
1:B:108:MSE:O	1:B:109:LYS:HG3	1.94	0.66
1:A:18:SER:N	1:A:32:LEU:HD21	2.11	0.65
1:A:142:ASP:OD1	1:A:144:ILE:HG12	1.97	0.65
1:A:19:VAL:HG13	1:A:32:LEU:HD11	1.79	0.64
1:A:19:VAL:HG13	1:A:32:LEU:CD1	2.29	0.62
1:A:126:ILE:HG21	1:A:133:MSE:CE	2.32	0.60
1:B:87:THR:HG23	1:B:110:THR:HG22	1.84	0.59
1:A:14:THR:HG21	3:A:2010:HOH:O	2.04	0.57
1:A:126:ILE:HG21	1:A:133:MSE:HE1	1.86	0.57
1:B:87:THR:OG1	1:B:110:THR:HG22	2.04	0.56
1:B:126:ILE:HD13	1:B:133:MSE:HE1	1.88	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:87:THR:OG1	1:A:110:THR:HG22	2.06	0.55
1:B:133:MSE:CE	1:B:133:MSE:CG	2.72	0.55
1:A:133:MSE:CE	1:A:133:MSE:CG	2.69	0.54
1:B:13:ASP:HB2	1:B:151:ALA:HB3	1.90	0.54
1:A:6:ASP:HB3	1:A:9:TYR:H	1.73	0.53
1:B:6:ASP:HB3	1:B:9:TYR:O	2.10	0.52
1:B:61:ASN:OD1	1:B:63:ARG:HB3	2.10	0.52
1:A:87:THR:HG23	1:A:110:THR:HG22	1.93	0.51
1:A:126:ILE:HD13	1:A:133:MSE:CE	2.40	0.50
1:A:96:ASP:HB2	1:A:129:ASP:OD2	2.12	0.49
1:B:157:GLY:O	1:B:158:THR:C	2.57	0.47
1:A:6:ASP:HB2	1:A:9:TYR:O	2.15	0.46
1:B:126:ILE:HG21	1:B:133:MSE:CE	2.46	0.46
1:B:126:ILE:HD13	1:B:133:MSE:CE	2.46	0.45
1:A:47:ARG:HA	1:A:145:ASN:HD22	1.82	0.45
1:A:6:ASP:HB3	1:A:7:ALA:H	1.18	0.45
1:A:155:VAL:O	1:A:156:ALA:C	2.60	0.45
1:B:87:THR:CG2	1:B:110:THR:HG22	2.48	0.44
1:A:76:VAL:HG22	1:A:116:TRP:HE3	1.82	0.44
1:B:72:CYS:SG	1:B:158:THR:HG22	2.58	0.44
1:B:11:TYR:CE2	1:B:153:GLY:HA3	2.53	0.43
1:B:154:ALA:HB3	1:B:158:THR:HG21	2.00	0.43
1:A:5:PRO:HG3	1:A:10:TYR:HE1	1.84	0.43
1:A:16:GLU:HA	1:A:42:GLU:HG3	2.00	0.43
1:A:76:VAL:CG2	1:A:116:TRP:HB3	2.49	0.42
1:B:154:ALA:CB	1:B:158:THR:HG21	2.50	0.42
1:A:76:VAL:HG22	1:A:116:TRP:CE3	2.55	0.42
1:A:6:ASP:CB	1:A:9:TYR:H	2.32	0.41
1:A:126:ILE:HG21	1:A:133:MSE:HE3	2.00	0.41
1:A:75:VAL:CG1	1:A:119:LEU:HB2	2.51	0.41
1:A:19:VAL:HG13	1:A:32:LEU:HD12	2.01	0.41
1:B:72:CYS:HA	1:B:121:ASN:O	2.21	0.41

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:2094:HOH:O	3:A:2096:HOH:O[12_556]	2.14	0.06

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	154/160 (96%)	146 (95%)	6 (4%)	2 (1%)	9	6
1	B	154/160 (96%)	143 (93%)	10 (6%)	1 (1%)	21	18
All	All	308/320 (96%)	289 (94%)	16 (5%)	3 (1%)	12	9

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	6	ASP
1	B	6	ASP
1	A	28	ALA

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	127/128 (99%)	121 (95%)	6 (5%)	23	24
1	B	127/128 (99%)	124 (98%)	3 (2%)	43	49
All	All	254/256 (99%)	245 (96%)	9 (4%)	32	35

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	6	ASP
1	A	14	THR
1	A	31	LEU

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Mol	Chain	Res	Type
1	A	81	GLU
1	A	90	MSE
1	A	158	THR
1	B	6	ASP
1	B	31	LEU
1	B	32	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	48	ASN
1	A	145	ASN
1	B	48	ASN
1	B	69	ASN
1	B	114	ASN

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](#)

Of 2 ligands modelled in this entry, 2 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

6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.