



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 11:39 AM UTC

PDB ID : 7ESY / pdb_00007esy
Title : Crystal structure of the complex formed by Wolbachia cytoplasmic incompatibility factors CidA and CidBND1-ND2 from wPip
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Deposited on : 2021-05-12
Resolution : 2.30 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
Xtriage (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

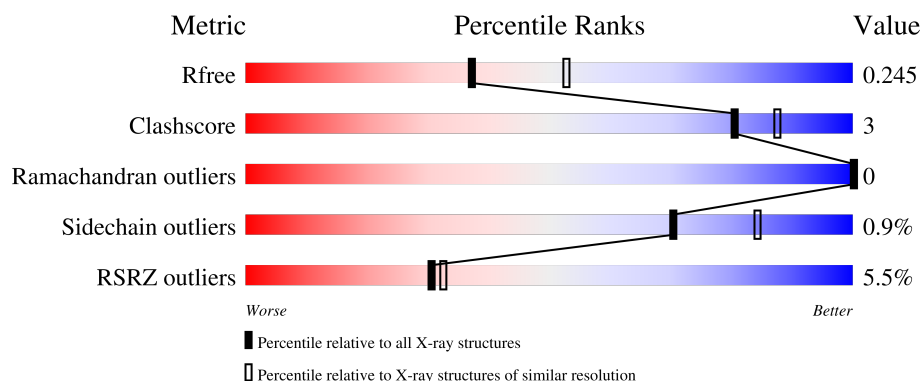
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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	6319 (2.30-2.30)
Clashscore	190562	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)
Sidechain outliers	187428	6854 (2.30-2.30)
RSRZ outliers	180081	6325 (2.30-2.30)

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	499	
2	B	769	

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 9198 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 Bacteria factor 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	406	Total	C	N	O	S	0	0	0
			3307	2125	557	609	16			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	492	LEU	-	expression tag	UNP B3CP62
A	493	GLU	-	expression tag	UNP B3CP62
A	494	HIS	-	expression tag	UNP B3CP62
A	495	HIS	-	expression tag	UNP B3CP62
A	496	HIS	-	expression tag	UNP B3CP62
A	497	HIS	-	expression tag	UNP B3CP62
A	498	HIS	-	expression tag	UNP B3CP62
A	499	HIS	-	expression tag	UNP B3CP62

- Molecule 2 is a protein called ULP_PROTEASE domain-containing protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	732	Total	C	N	O	S	0	0	0
			5835	3671	1063	1086	15			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	762	LEU	-	expression tag	UNP B3CP63
B	763	GLU	-	expression tag	UNP B3CP63
B	764	HIS	-	expression tag	UNP B3CP63
B	765	HIS	-	expression tag	UNP B3CP63
B	766	HIS	-	expression tag	UNP B3CP63
B	767	HIS	-	expression tag	UNP B3CP63
B	768	HIS	-	expression tag	UNP B3CP63
B	769	HIS	-	expression tag	UNP B3CP63

- Molecule 3 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	1	Total 1	Ca 1	0	0

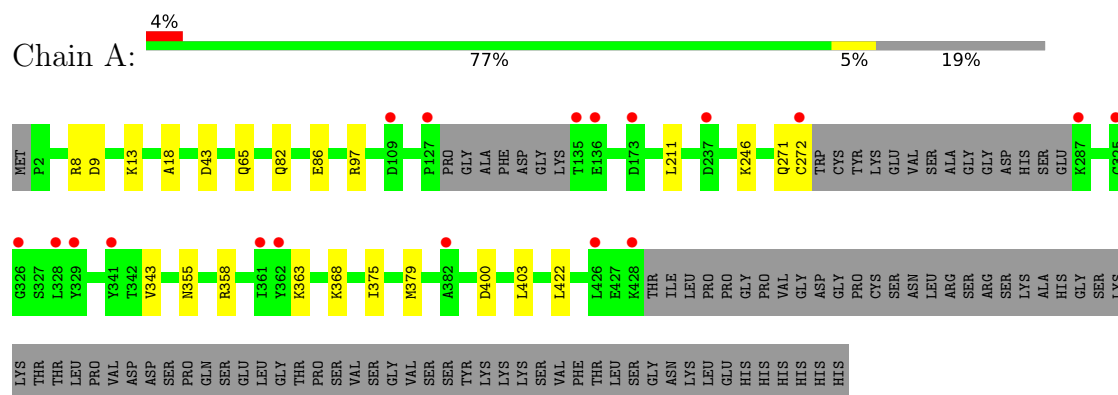
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	16	Total 16	O 16	0	0
4	B	39	Total 39	O 39	0	0

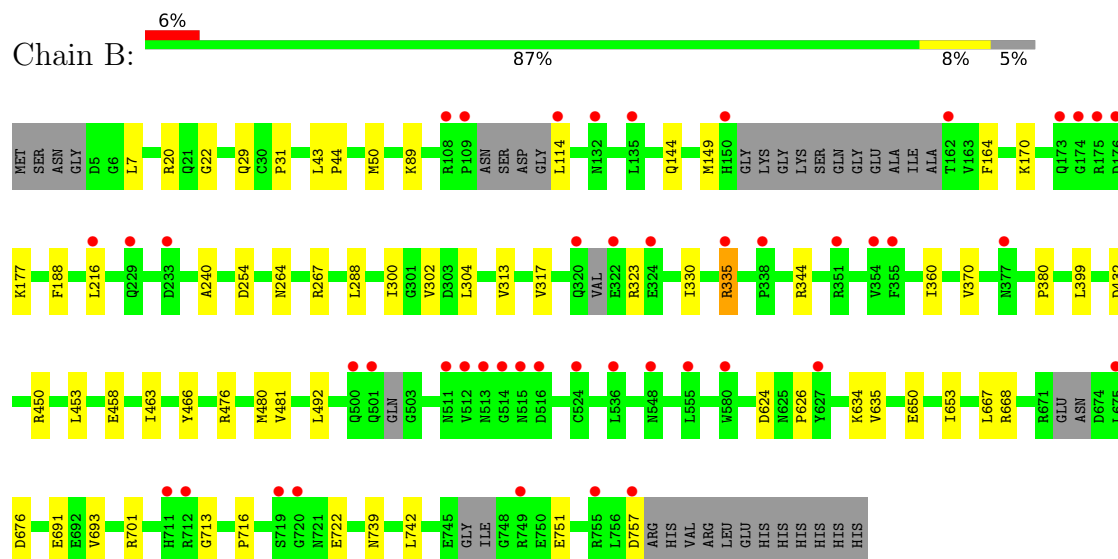
3 Residue-property plots [i](#)

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: Bacteria factor 1



• Molecule 2: ULP_PROTEASE domain-containing protein



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	102.36Å 154.56Å 83.39Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.59 – 2.30 49.59 – 2.30	Depositor EDS
% Data completeness (in resolution range)	96.6 (49.59-2.30) 95.6 (49.59-2.30)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.35 (at 2.29Å)	Xtriage
Refinement program	PHENIX 1.14_3260	Depositor
R, R_{free}	0.217 , 0.243 0.218 , 0.245	Depositor DCC
R_{free} test set	2000 reflections (3.35%)	wwPDB-VP
Wilson B-factor (Å ²)	46.4	Xtriage
Anisotropy	0.564	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 33.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	9198	wwPDB-VP
Average B, all atoms (Å ²)	59.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.92% 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

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	0.09	0/3375	0.26	0/4530
2	B	0.09	0/5953	0.28	0/8065
All	All	0.09	0/9328	0.27	0/12595

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

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	3307	0	3282	12	0
2	B	5835	0	5557	37	0
3	B	1	0	0	0	0
4	A	16	0	0	0	0
4	B	39	0	0	0	0
All	All	9198	0	8839	47	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 3.

All (47) 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:379:MET:HE1	1:A:422:LEU:HB3	1.64	0.79
2:B:170:LYS:HG3	2:B:650:GLU:HB2	1.70	0.73
2:B:450:ARG:NH2	2:B:624:ASP:OD2	2.31	0.64
1:A:211:LEU:O	1:A:246:LYS:NZ	2.31	0.58
2:B:323:ARG:NH1	2:B:716:PRO:O	2.37	0.57
1:A:355:ASN:HA	1:A:358:ARG:HG3	1.87	0.56
1:A:403:LEU:HA	2:B:380:PRO:HD2	1.88	0.56
2:B:693:VAL:HG11	2:B:742:LEU:HG	1.86	0.56
2:B:149:MET:HG2	2:B:164:PHE:HB2	1.88	0.56
2:B:453:LEU:HB2	2:B:463:ILE:HD11	1.87	0.56
2:B:335:ARG:NH2	2:B:344:ARG:HH12	2.04	0.55
1:A:355:ASN:O	1:A:363:LYS:NZ	2.40	0.55
2:B:399:LEU:HD11	2:B:492:LEU:HD22	1.89	0.54
2:B:288:LEU:HD21	2:B:302:VAL:HG11	1.89	0.54
1:A:375:ILE:HG22	1:A:379:MET:HE2	1.89	0.54
2:B:29:GLN:HB3	2:B:300:ILE:O	2.08	0.54
1:A:363:LYS:O	1:A:368:LYS:NZ	2.41	0.53
2:B:264:ASN:OD1	2:B:267:ARG:NH2	2.38	0.53
2:B:668:ARG:NH2	2:B:676:ASP:O	2.42	0.53
2:B:330:ILE:HG12	2:B:370:VAL:HB	1.91	0.51
2:B:335:ARG:HH21	2:B:344:ARG:HH12	1.61	0.49
1:A:82:GLN:O	1:A:86:GLU:HG2	2.13	0.48
2:B:288:LEU:HD11	2:B:304:LEU:HD11	1.95	0.48
2:B:635:VAL:O	2:B:713:GLY:HA3	2.14	0.47
2:B:432:ASP:OD1	2:B:476:ARG:NH1	2.46	0.47
2:B:240:ALA:HB2	2:B:317:VAL:HG12	1.97	0.47
2:B:323:ARG:NH1	2:B:360:ILE:O	2.48	0.46
2:B:7:LEU:HB2	2:B:50:MET:HE1	1.97	0.46
2:B:89:LYS:HE2	2:B:114:LEU:O	2.16	0.45
2:B:701:ARG:HD2	2:B:751:GLU:OE2	2.15	0.45
2:B:304:LEU:HD23	2:B:313:VAL:HG22	1.99	0.44
1:A:18:ALA:O	1:A:65:GLN:HG2	2.18	0.44
2:B:31:PRO:O	2:B:634:LYS:NZ	2.47	0.44
1:A:97:ARG:HA	2:B:458:GLU:HG3	2.00	0.43
2:B:7:LEU:HD21	2:B:22:GLY:C	2.43	0.43
2:B:691:GLU:OE1	2:B:691:GLU:N	2.52	0.43
2:B:466:TYR:HB2	2:B:481:VAL:HB	2.02	0.42
2:B:188:PHE:CD1	2:B:216:LEU:HD13	2.54	0.42
2:B:144:GLN:NE2	2:B:177:LYS:O	2.53	0.42
1:A:8:ARG:HD3	1:A:43:ASP:OD1	2.19	0.41
2:B:480:MET:HE3	2:B:492:LEU:HD23	2.02	0.41
2:B:626:PRO:HB2	2:B:667:LEU:O	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:9:ASP:OD2	1:A:13:LYS:NZ	2.36	0.41
2:B:20:ARG:HD3	2:B:653:ILE:HG21	2.03	0.41
2:B:149:MET:HE2	2:B:149:MET:HB3	1.96	0.41
2:B:43:LEU:HB3	2:B:44:PRO:HD3	2.03	0.40
2:B:288:LEU:HD23	2:B:288:LEU:HA	1.96	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	400/499 (80%)	396 (99%)	4 (1%)	0	100	100
2	B	718/769 (93%)	697 (97%)	21 (3%)	0	100	100
All	All	1118/1268 (88%)	1093 (98%)	25 (2%)	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	358/447 (80%)	354 (99%)	4 (1%)	65	81
2	B	617/680 (91%)	612 (99%)	5 (1%)	73	86
All	All	975/1127 (86%)	966 (99%)	9 (1%)	70	84

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

Mol	Chain	Res	Type
1	A	271	GLN
1	A	272	CYS
1	A	343	VAL
1	A	400	ASP
2	B	254	ASP
2	B	335	ARG
2	B	722	GLU
2	B	739	ASN
2	B	757	ASP

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

Mol	Chain	Res	Type
2	B	221	ASN
2	B	310	ASN
2	B	319	HIS
2	B	331	ASN
2	B	353	HIS
2	B	518	HIS
2	B	528	ASN
2	B	544	HIS
2	B	607	ASN
2	B	625	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

Of 1 ligands modelled in this entry, 1 is 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

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, 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	406/499 (81%)	0.30	18 (4%) 39 41	39, 55, 85, 105	0
2	B	732/769 (95%)	0.51	45 (6%) 27 29	38, 57, 89, 112	0
All	All	1138/1268 (89%)	0.43	63 (5%) 30 32	38, 57, 88, 112	0

All (63) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	329	TYR	4.5
2	B	109	PRO	4.3
2	B	515	ASN	4.1
2	B	580	TRP	3.8
1	A	127	PRO	3.7
2	B	675	LEU	3.7
2	B	548	ASN	3.6
2	B	338	PRO	3.6
2	B	322	GLU	3.5
1	A	272	CYS	3.3
1	A	326	GLY	3.2
1	A	135	THR	3.2
2	B	176	ASP	3.2
1	A	341	TYR	3.1
2	B	135	LEU	3.1
2	B	511	ASN	3.1
2	B	108	ARG	3.0
2	B	320	GLN	2.9
2	B	627	TYR	2.9
2	B	114	LEU	2.9
1	A	325	CYS	2.9
2	B	355	PHE	2.8
2	B	173	GLN	2.8
2	B	150	HIS	2.7

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Mol	Chain	Res	Type	RSRZ
2	B	513	ASN	2.7
2	B	757	ASP	2.6
2	B	516	ASP	2.6
2	B	229	GLN	2.6
1	A	328	LEU	2.5
1	A	426	LEU	2.5
2	B	536	LEU	2.5
2	B	162	THR	2.5
1	A	361	ILE	2.5
2	B	351	ARG	2.4
1	A	362	TYR	2.4
2	B	712	ARG	2.4
2	B	512	VAL	2.4
2	B	524	CYS	2.4
1	A	109	ASP	2.3
2	B	720	GLY	2.3
2	B	719	SER	2.3
1	A	237	ASP	2.3
2	B	514	GLY	2.3
2	B	132	ASN	2.2
2	B	377	ASN	2.2
1	A	136	GLU	2.2
1	A	428	LYS	2.2
2	B	354	VAL	2.2
1	A	173	ASP	2.2
2	B	335	ARG	2.1
2	B	749	ARG	2.1
2	B	324	GLU	2.1
2	B	755	ARG	2.1
1	A	287	LYS	2.1
2	B	175	ARG	2.1
1	A	382	ALA	2.1
2	B	555	LEU	2.1
2	B	233	ASP	2.1
2	B	500	GLN	2.1
2	B	711	HIS	2.0
2	B	216	LEU	2.0
2	B	174	GLY	2.0
2	B	501	GLN	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](#)

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($\text{\AA}^2$)	Q<0.9
3	CA	B	1201	1/1	0.99	0.05	60,60,60,60	0

6.5 Other polymers [i](#)

There are no such residues in this entry.