



wwPDB X-ray Structure Validation Summary Report ⓘ

May 7, 2026 – 09:05 AM EDT

PDB ID : 3MX4 / pdb_00003mx4
Title : DNA binding and cleavage by the GIY-YIG endonuclease R.Eco29KI inactive variant E142Q
Authors : Mak, A.N.S.; Lambert, A.R.; Stoddard, B.L.
Deposited on : 2010-05-06
Resolution : 2.50 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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

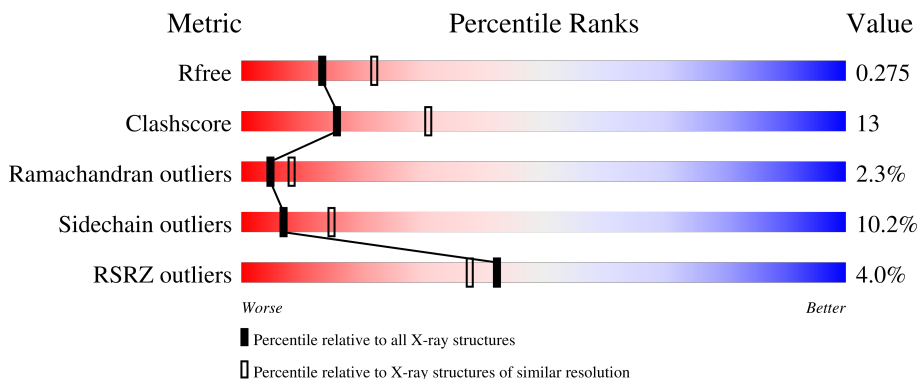
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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	5829 (2.50-2.50)
Clashscore	190562	6492 (2.50-2.50)
Ramachandran outliers	187476	6378 (2.50-2.50)
Sidechain outliers	187428	6380 (2.50-2.50)
RSRZ outliers	180081	5833 (2.50-2.50)

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	235	 4% 66% 20% 9%
1	B	235	 5% 63% 22% 5% 9%
1	C	235	 3% 58% 24% 6% 11%
1	D	235	 3% 60% 22% 6% 11%
1	E	235	 4% 63% 22% 6% 10%

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Mol	Chain	Length	Quality of chain
1	F	235	
1	G	235	
1	H	235	
2	I	22	
2	K	22	
2	M	22	
2	O	22	
3	J	22	
3	L	22	
3	N	22	
3	P	22	

2 Entry composition i

There are 4 unique types of molecules in this entry. The entry contains 17406 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 Eco29kIR.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	213	Total 1677	C 1069	N 298	O 306	S 4	0	0	0
1	B	213	Total 1687	C 1077	N 299	O 307	S 4	0	0	0
1	C	208	Total 1649	C 1051	N 292	O 302	S 4	0	0	0
1	D	208	Total 1634	C 1041	N 290	O 299	S 4	0	0	0
1	E	211	Total 1663	C 1062	N 297	O 300	S 4	0	0	0
1	F	210	Total 1674	C 1066	N 298	O 306	S 4	0	0	0
1	G	208	Total 1663	C 1062	N 294	O 303	S 4	0	0	0
1	H	209	Total 1658	C 1056	N 295	O 303	S 4	0	0	0

There are 192 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-20	MET	-	expression tag	UNP Q46944
A	-19	ALA	-	expression tag	UNP Q46944
A	-18	SER	-	expression tag	UNP Q46944
A	-17	SER	-	expression tag	UNP Q46944
A	-16	HIS	-	expression tag	UNP Q46944
A	-15	HIS	-	expression tag	UNP Q46944
A	-14	HIS	-	expression tag	UNP Q46944
A	-13	HIS	-	expression tag	UNP Q46944
A	-12	HIS	-	expression tag	UNP Q46944
A	-11	HIS	-	expression tag	UNP Q46944
A	-10	SER	-	expression tag	UNP Q46944
A	-9	SER	-	expression tag	UNP Q46944
A	-8	GLY	-	expression tag	UNP Q46944

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-7	LEU	-	expression tag	UNP Q46944
A	-6	VAL	-	expression tag	UNP Q46944
A	-5	PRO	-	expression tag	UNP Q46944
A	-4	ARG	-	expression tag	UNP Q46944
A	-3	GLY	-	expression tag	UNP Q46944
A	-2	SER	-	expression tag	UNP Q46944
A	-1	SER	-	expression tag	UNP Q46944
A	0	MET	-	expression tag	UNP Q46944
A	1	GLY	-	expression tag	UNP Q46944
A	69	LYS	LEU	engineered mutation	UNP Q46944
A	142	GLN	GLU	engineered mutation	UNP Q46944
B	-20	MET	-	expression tag	UNP Q46944
B	-19	ALA	-	expression tag	UNP Q46944
B	-18	SER	-	expression tag	UNP Q46944
B	-17	SER	-	expression tag	UNP Q46944
B	-16	HIS	-	expression tag	UNP Q46944
B	-15	HIS	-	expression tag	UNP Q46944
B	-14	HIS	-	expression tag	UNP Q46944
B	-13	HIS	-	expression tag	UNP Q46944
B	-12	HIS	-	expression tag	UNP Q46944
B	-11	HIS	-	expression tag	UNP Q46944
B	-10	SER	-	expression tag	UNP Q46944
B	-9	SER	-	expression tag	UNP Q46944
B	-8	GLY	-	expression tag	UNP Q46944
B	-7	LEU	-	expression tag	UNP Q46944
B	-6	VAL	-	expression tag	UNP Q46944
B	-5	PRO	-	expression tag	UNP Q46944
B	-4	ARG	-	expression tag	UNP Q46944
B	-3	GLY	-	expression tag	UNP Q46944
B	-2	SER	-	expression tag	UNP Q46944
B	-1	SER	-	expression tag	UNP Q46944
B	0	MET	-	expression tag	UNP Q46944
B	1	GLY	-	expression tag	UNP Q46944
B	69	LYS	LEU	engineered mutation	UNP Q46944
B	142	GLN	GLU	engineered mutation	UNP Q46944
C	-20	MET	-	expression tag	UNP Q46944
C	-19	ALA	-	expression tag	UNP Q46944
C	-18	SER	-	expression tag	UNP Q46944
C	-17	SER	-	expression tag	UNP Q46944
C	-16	HIS	-	expression tag	UNP Q46944
C	-15	HIS	-	expression tag	UNP Q46944
C	-14	HIS	-	expression tag	UNP Q46944

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Chain	Residue	Modelled	Actual	Comment	Reference
C	-13	HIS	-	expression tag	UNP Q46944
C	-12	HIS	-	expression tag	UNP Q46944
C	-11	HIS	-	expression tag	UNP Q46944
C	-10	SER	-	expression tag	UNP Q46944
C	-9	SER	-	expression tag	UNP Q46944
C	-8	GLY	-	expression tag	UNP Q46944
C	-7	LEU	-	expression tag	UNP Q46944
C	-6	VAL	-	expression tag	UNP Q46944
C	-5	PRO	-	expression tag	UNP Q46944
C	-4	ARG	-	expression tag	UNP Q46944
C	-3	GLY	-	expression tag	UNP Q46944
C	-2	SER	-	expression tag	UNP Q46944
C	-1	SER	-	expression tag	UNP Q46944
C	0	MET	-	expression tag	UNP Q46944
C	1	GLY	-	expression tag	UNP Q46944
C	69	LYS	LEU	engineered mutation	UNP Q46944
C	142	GLN	GLU	engineered mutation	UNP Q46944
D	-20	MET	-	expression tag	UNP Q46944
D	-19	ALA	-	expression tag	UNP Q46944
D	-18	SER	-	expression tag	UNP Q46944
D	-17	SER	-	expression tag	UNP Q46944
D	-16	HIS	-	expression tag	UNP Q46944
D	-15	HIS	-	expression tag	UNP Q46944
D	-14	HIS	-	expression tag	UNP Q46944
D	-13	HIS	-	expression tag	UNP Q46944
D	-12	HIS	-	expression tag	UNP Q46944
D	-11	HIS	-	expression tag	UNP Q46944
D	-10	SER	-	expression tag	UNP Q46944
D	-9	SER	-	expression tag	UNP Q46944
D	-8	GLY	-	expression tag	UNP Q46944
D	-7	LEU	-	expression tag	UNP Q46944
D	-6	VAL	-	expression tag	UNP Q46944
D	-5	PRO	-	expression tag	UNP Q46944
D	-4	ARG	-	expression tag	UNP Q46944
D	-3	GLY	-	expression tag	UNP Q46944
D	-2	SER	-	expression tag	UNP Q46944
D	-1	SER	-	expression tag	UNP Q46944
D	0	MET	-	expression tag	UNP Q46944
D	1	GLY	-	expression tag	UNP Q46944
D	69	LYS	LEU	engineered mutation	UNP Q46944
D	142	GLN	GLU	engineered mutation	UNP Q46944
E	-20	MET	-	expression tag	UNP Q46944

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-19	ALA	-	expression tag	UNP Q46944
E	-18	SER	-	expression tag	UNP Q46944
E	-17	SER	-	expression tag	UNP Q46944
E	-16	HIS	-	expression tag	UNP Q46944
E	-15	HIS	-	expression tag	UNP Q46944
E	-14	HIS	-	expression tag	UNP Q46944
E	-13	HIS	-	expression tag	UNP Q46944
E	-12	HIS	-	expression tag	UNP Q46944
E	-11	HIS	-	expression tag	UNP Q46944
E	-10	SER	-	expression tag	UNP Q46944
E	-9	SER	-	expression tag	UNP Q46944
E	-8	GLY	-	expression tag	UNP Q46944
E	-7	LEU	-	expression tag	UNP Q46944
E	-6	VAL	-	expression tag	UNP Q46944
E	-5	PRO	-	expression tag	UNP Q46944
E	-4	ARG	-	expression tag	UNP Q46944
E	-3	GLY	-	expression tag	UNP Q46944
E	-2	SER	-	expression tag	UNP Q46944
E	-1	SER	-	expression tag	UNP Q46944
E	0	MET	-	expression tag	UNP Q46944
E	1	GLY	-	expression tag	UNP Q46944
E	69	LYS	LEU	engineered mutation	UNP Q46944
E	142	GLN	GLU	engineered mutation	UNP Q46944
F	-20	MET	-	expression tag	UNP Q46944
F	-19	ALA	-	expression tag	UNP Q46944
F	-18	SER	-	expression tag	UNP Q46944
F	-17	SER	-	expression tag	UNP Q46944
F	-16	HIS	-	expression tag	UNP Q46944
F	-15	HIS	-	expression tag	UNP Q46944
F	-14	HIS	-	expression tag	UNP Q46944
F	-13	HIS	-	expression tag	UNP Q46944
F	-12	HIS	-	expression tag	UNP Q46944
F	-11	HIS	-	expression tag	UNP Q46944
F	-10	SER	-	expression tag	UNP Q46944
F	-9	SER	-	expression tag	UNP Q46944
F	-8	GLY	-	expression tag	UNP Q46944
F	-7	LEU	-	expression tag	UNP Q46944
F	-6	VAL	-	expression tag	UNP Q46944
F	-5	PRO	-	expression tag	UNP Q46944
F	-4	ARG	-	expression tag	UNP Q46944
F	-3	GLY	-	expression tag	UNP Q46944
F	-2	SER	-	expression tag	UNP Q46944

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Chain	Residue	Modelled	Actual	Comment	Reference
F	-1	SER	-	expression tag	UNP Q46944
F	0	MET	-	expression tag	UNP Q46944
F	1	GLY	-	expression tag	UNP Q46944
F	69	LYS	LEU	engineered mutation	UNP Q46944
F	142	GLN	GLU	engineered mutation	UNP Q46944
G	-20	MET	-	expression tag	UNP Q46944
G	-19	ALA	-	expression tag	UNP Q46944
G	-18	SER	-	expression tag	UNP Q46944
G	-17	SER	-	expression tag	UNP Q46944
G	-16	HIS	-	expression tag	UNP Q46944
G	-15	HIS	-	expression tag	UNP Q46944
G	-14	HIS	-	expression tag	UNP Q46944
G	-13	HIS	-	expression tag	UNP Q46944
G	-12	HIS	-	expression tag	UNP Q46944
G	-11	HIS	-	expression tag	UNP Q46944
G	-10	SER	-	expression tag	UNP Q46944
G	-9	SER	-	expression tag	UNP Q46944
G	-8	GLY	-	expression tag	UNP Q46944
G	-7	LEU	-	expression tag	UNP Q46944
G	-6	VAL	-	expression tag	UNP Q46944
G	-5	PRO	-	expression tag	UNP Q46944
G	-4	ARG	-	expression tag	UNP Q46944
G	-3	GLY	-	expression tag	UNP Q46944
G	-2	SER	-	expression tag	UNP Q46944
G	-1	SER	-	expression tag	UNP Q46944
G	0	MET	-	expression tag	UNP Q46944
G	1	GLY	-	expression tag	UNP Q46944
G	69	LYS	LEU	engineered mutation	UNP Q46944
G	142	GLN	GLU	engineered mutation	UNP Q46944
H	-20	MET	-	expression tag	UNP Q46944
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H	-17	SER	-	expression tag	UNP Q46944
H	-16	HIS	-	expression tag	UNP Q46944
H	-15	HIS	-	expression tag	UNP Q46944
H	-14	HIS	-	expression tag	UNP Q46944
H	-13	HIS	-	expression tag	UNP Q46944
H	-12	HIS	-	expression tag	UNP Q46944
H	-11	HIS	-	expression tag	UNP Q46944
H	-10	SER	-	expression tag	UNP Q46944
H	-9	SER	-	expression tag	UNP Q46944
H	-8	GLY	-	expression tag	UNP Q46944

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Chain	Residue	Modelled	Actual	Comment	Reference
H	-7	LEU	-	expression tag	UNP Q46944
H	-6	VAL	-	expression tag	UNP Q46944
H	-5	PRO	-	expression tag	UNP Q46944
H	-4	ARG	-	expression tag	UNP Q46944
H	-3	GLY	-	expression tag	UNP Q46944
H	-2	SER	-	expression tag	UNP Q46944
H	-1	SER	-	expression tag	UNP Q46944
H	0	MET	-	expression tag	UNP Q46944
H	1	GLY	-	expression tag	UNP Q46944
H	69	LYS	LEU	engineered mutation	UNP Q46944
H	142	GLN	GLU	engineered mutation	UNP Q46944

- Molecule 2 is a DNA chain called DNA (5'-D(P*CP*GP*GP*GP*AP*GP*GP*CP*CP*CP*GP*CP*GP*GP*GP*CP*CP*GP*CP*CP*GP*C)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
2	I	22	Total 453	C 210	N 90	O 131	P 22	0	0	0
2	K	22	Total 453	C 210	N 90	O 131	P 22	0	0	0
2	M	22	Total 453	C 210	N 90	O 131	P 22	0	0	0
2	O	22	Total 453	C 210	N 90	O 131	P 22	0	0	0

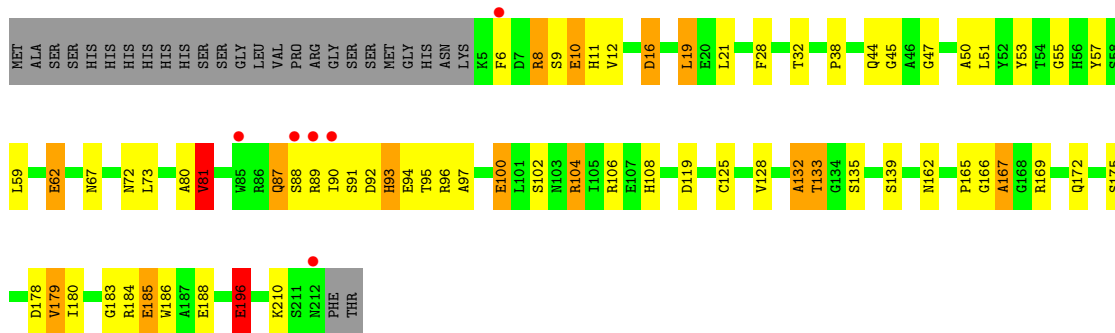
- Molecule 3 is a DNA chain called DNA (5'-D(P*GP*CP*GP*GP*CP*GP*GP*CP*CP*CP*GP*CP*GP*GP*GP*CP*CP*TP*CP*CP*CP*G)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
3	J	22	Total 449	C 209	N 85	O 133	P 22	0	0	0
3	L	22	Total 449	C 209	N 85	O 133	P 22	0	0	0
3	N	22	Total 449	C 209	N 85	O 133	P 22	0	0	0
3	P	22	Total 449	C 209	N 85	O 133	P 22	0	0	0

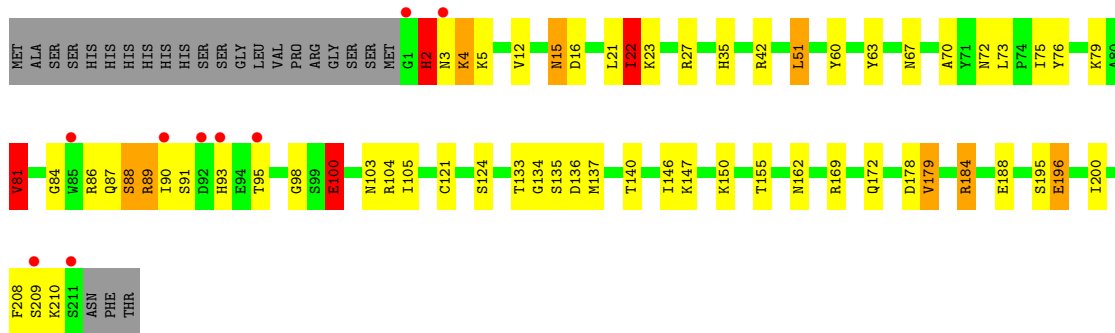
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	74	Total O 74 74	0	0
4	B	79	Total O 79 79	0	0
4	C	30	Total O 30 30	0	0
4	D	28	Total O 28 28	0	0
4	E	43	Total O 43 43	0	0
4	F	46	Total O 46 46	0	0
4	G	66	Total O 66 66	0	0
4	H	40	Total O 40 40	0	0
4	I	8	Total O 8 8	0	0
4	J	8	Total O 8 8	0	0
4	K	15	Total O 15 15	0	0
4	L	8	Total O 8 8	0	0
4	M	8	Total O 8 8	0	0
4	N	12	Total O 12 12	0	0
4	O	15	Total O 15 15	0	0
4	P	13	Total O 13 13	0	0

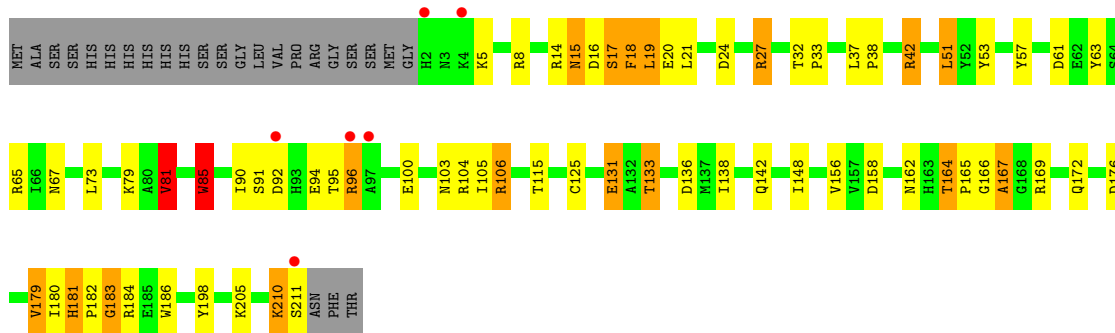
• Molecule 1: Eco29kIR



• Molecule 1: Eco29kIR

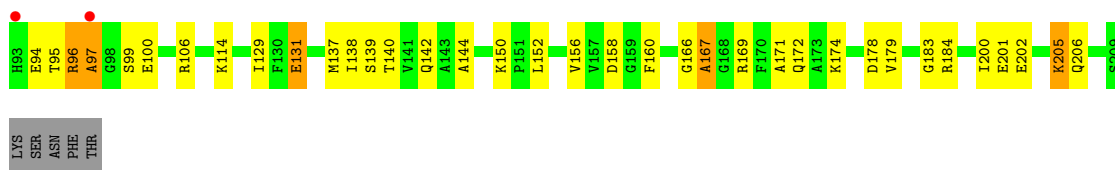


• Molecule 1: Eco29kIR

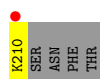
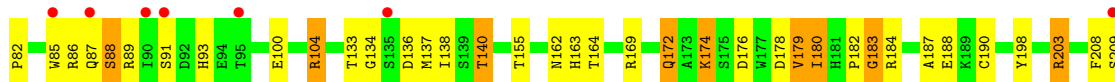


• Molecule 1: Eco29kIR

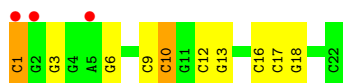




- Molecule 1: Eco29kIR



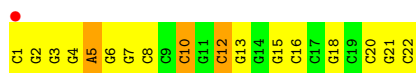
- Molecule 2: DNA (5'-D(P*CP*GP*GP*GP*AP*GP*GP*CP*CP*CP*GP*CP*GP*GP*GP*C P*CP*GP*CP*CP*GP*C)-3')



- Molecule 2: DNA (5'-D(P*CP*GP*GP*GP*AP*GP*GP*CP*CP*CP*GP*CP*GP*GP*GP*C P*CP*GP*CP*CP*GP*C)-3')



- Molecule 2: DNA (5'-D(P*CP*GP*GP*GP*AP*GP*GP*CP*CP*CP*GP*CP*GP*GP*GP*C P*CP*GP*CP*CP*GP*C)-3')



- Molecule 2: DNA (5'-D(P*CP*GP*GP*GP*AP*GP*GP*CP*CP*CP*GP*CP*GP*GP*GP*C P*CP*GP*CP*CP*GP*C)-3')

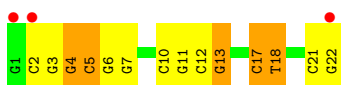




- Molecule 3: DNA (5'-D(P*GP*CP*GP*GP*CP*GP*GP*CP*CP*CP*GP*CP*GP*GP*GP*CP*CP*TP*CP*CP*CP*G)-3')



- Molecule 3: DNA (5'-D(P*GP*CP*GP*GP*CP*GP*GP*CP*CP*CP*GP*CP*GP*GP*GP*CP*CP*TP*CP*CP*CP*G)-3')



- Molecule 3: DNA (5'-D(P*GP*CP*GP*GP*CP*GP*GP*CP*CP*CP*GP*CP*GP*GP*GP*CP*CP*TP*CP*CP*CP*G)-3')



- Molecule 3: DNA (5'-D(P*GP*CP*GP*GP*CP*GP*GP*CP*CP*CP*GP*CP*GP*GP*GP*CP*CP*TP*CP*CP*CP*G)-3')



4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	99.86Å 101.46Å 144.40Å 90.00° 110.19° 90.00°	Depositor
Resolution (Å)	50.00 – 2.50 50.00 – 2.50	Depositor EDS
% Data completeness (in resolution range)	99.5 (50.00-2.50) 99.5 (50.00-2.50)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.28 (at 2.51Å)	Xtrriage
Refinement program	REFMAC 5.5.0088	Depositor
R, R_{free}	0.211 , 0.274 0.219 , 0.275	Depositor DCC
R_{free} test set	4677 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å ²)	45.9	Xtrriage
Anisotropy	0.734	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 50.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.000 for h,-k,-h-l	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	17406	wwPDB-VP
Average B, all atoms (Å ²)	56.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 52.34 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 4.9318e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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	1.21	0/1725	1.25	7/2334 (0.3%)
1	B	1.16	1/1738 (0.1%)	1.27	12/2357 (0.5%)
1	C	1.04	2/1698 (0.1%)	1.17	10/2302 (0.4%)
1	D	1.04	3/1682 (0.2%)	1.19	6/2279 (0.3%)
1	E	1.13	1/1713 (0.1%)	1.29	16/2325 (0.7%)
1	F	1.15	1/1723 (0.1%)	1.30	15/2333 (0.6%)
1	G	1.21	2/1712 (0.1%)	1.32	18/2322 (0.8%)
1	H	1.11	2/1708 (0.1%)	1.21	10/2317 (0.4%)
2	I	0.73	0/508	1.55	9/782 (1.2%)
2	K	0.69	0/508	1.49	7/782 (0.9%)
2	M	0.74	0/508	1.55	15/782 (1.9%)
2	O	0.73	0/508	1.60	13/782 (1.7%)
3	J	0.73	0/502	1.51	6/772 (0.8%)
3	L	0.67	0/502	1.70	14/772 (1.8%)
3	N	0.72	0/502	1.63	8/772 (1.0%)
3	P	0.73	0/502	1.65	14/772 (1.8%)
All	All	1.05	12/17739 (0.1%)	1.34	180/24785 (0.7%)

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
1	B	0	1
1	F	0	1
1	G	0	2
1	H	0	2
All	All	0	7

The worst 5 of 12 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	87	GLN	CA-C	7.85	1.56	1.52
1	G	144	ALA	CA-CB	-7.67	1.41	1.53
1	H	180	ILE	CA-CB	6.56	1.62	1.54
1	G	90	ILE	CA-CB	5.97	1.62	1.54
1	E	12	VAL	CA-CB	5.76	1.60	1.54

The worst 5 of 180 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	85	TRP	N-CA-C	12.87	127.39	108.60
1	F	131	GLU	N-CA-C	11.09	123.12	111.14
1	G	131	GLU	N-CA-C	11.04	122.88	111.07
1	F	167	ALA	N-CA-C	-10.70	96.41	110.43
3	J	12	DC	O3'-P-O5'	-9.59	89.62	104.00

There are no chirality outliers.

5 of 7 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	85	TRP	Peptide
1	B	183	GLY	Peptide
1	F	183	GLY	Peptide
1	G	183	GLY	Peptide
1	G	96	ARG	Peptide

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	1677	0	1578	51	1
1	B	1687	0	1567	68	0
1	C	1649	0	1540	59	0
1	D	1634	0	1524	57	0
1	E	1663	0	1544	59	0
1	F	1674	0	1578	58	0
1	G	1663	0	1574	41	1
1	H	1658	0	1544	55	0
2	I	453	0	243	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	K	453	0	243	8	0
2	M	453	0	243	12	1
2	O	453	0	243	15	1
3	J	449	0	244	7	0
3	L	449	0	244	11	0
3	N	449	0	244	14	0
3	P	449	0	244	11	0
4	A	74	0	0	4	0
4	B	79	0	0	7	0
4	C	30	0	0	1	0
4	D	28	0	0	3	0
4	E	43	0	0	8	0
4	F	46	0	0	4	0
4	G	66	0	0	0	0
4	H	40	0	0	1	0
4	I	8	0	0	0	0
4	J	8	0	0	0	0
4	K	15	0	0	1	0
4	L	8	0	0	0	0
4	M	8	0	0	0	0
4	N	12	0	0	0	0
4	O	15	0	0	2	0
4	P	13	0	0	4	0
All	All	17406	0	14397	411	2

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.

The worst 5 of 411 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:E:2:HIS:HB2	1:E:3:ASN:HA	1.18	1.17
1:E:121:CYS:HB2	4:E:408:HOH:O	1.45	1.15
1:C:87:GLN:HB3	1:C:88:SER:CA	1.82	1.09
1:A:140:THR:HG21	1:H:140:THR:HG22	1.39	1.05
1:H:104:ARG:HH11	1:H:104:ARG:HG2	1.21	1.03

All (2) 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)
2:M:1:DC:OP1	2:O:21:DG:OP2[1_556]	1.97	0.23
1:A:133:THR:OG1	1:G:61:ASP:OD1[2_656]	2.05	0.15

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	211/235 (90%)	194 (92%)	11 (5%)	6 (3%)	4 6
1	B	211/235 (90%)	197 (93%)	8 (4%)	6 (3%)	4 6
1	C	206/235 (88%)	189 (92%)	12 (6%)	5 (2%)	4 8
1	D	206/235 (88%)	188 (91%)	13 (6%)	5 (2%)	4 8
1	E	209/235 (89%)	189 (90%)	13 (6%)	7 (3%)	3 4
1	F	208/235 (88%)	192 (92%)	12 (6%)	4 (2%)	6 11
1	G	206/235 (88%)	191 (93%)	12 (6%)	3 (2%)	8 16
1	H	207/235 (88%)	187 (90%)	17 (8%)	3 (1%)	9 17
All	All	1664/1880 (88%)	1527 (92%)	98 (6%)	39 (2%)	5 8

5 of 39 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	89	ARG
1	A	93	HIS
1	B	4	LYS
1	B	95	THR
1	C	88	SER

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	170/201 (85%)	154 (91%)	16 (9%)	8	18
1	B	170/201 (85%)	155 (91%)	15 (9%)	9	20
1	C	167/201 (83%)	151 (90%)	16 (10%)	8	17
1	D	165/201 (82%)	151 (92%)	14 (8%)	10	22
1	E	164/201 (82%)	147 (90%)	17 (10%)	7	14
1	F	172/201 (86%)	153 (89%)	19 (11%)	6	13
1	G	171/201 (85%)	149 (87%)	22 (13%)	4	9
1	H	168/201 (84%)	150 (89%)	18 (11%)	6	13
All	All	1347/1608 (84%)	1210 (90%)	137 (10%)	7	15

5 of 137 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	G	179	VAL
1	H	2	HIS
1	H	172	GLN
1	D	16	ASP
1	D	8	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 61 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	162	ASN
1	H	44	GLN
1	E	67	ASN
1	H	35	HIS
1	H	162	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](#)

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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	213/235 (90%)	0.02	10 (4%) 36 32	27, 42, 96, 111	0
1	B	213/235 (90%)	-0.06	11 (5%) 33 29	28, 42, 92, 109	0
1	C	208/235 (88%)	0.12	7 (3%) 48 43	35, 56, 92, 118	0
1	D	208/235 (88%)	0.17	6 (2%) 53 49	34, 54, 91, 111	0
1	E	211/235 (89%)	0.00	9 (4%) 40 35	29, 46, 97, 130	0
1	F	210/235 (89%)	-0.02	6 (2%) 53 49	30, 48, 86, 107	0
1	G	208/235 (88%)	-0.10	4 (1%) 66 62	27, 44, 85, 108	0
1	H	209/235 (88%)	0.16	12 (5%) 29 26	33, 52, 98, 133	0
2	I	22/22 (100%)	0.43	3 (13%) 7 5	31, 74, 142, 183	0
2	K	22/22 (100%)	0.51	0 100 100	30, 73, 133, 155	0
2	M	22/22 (100%)	0.23	1 (4%) 38 33	32, 65, 124, 142	0
2	O	22/22 (100%)	0.26	0 100 100	29, 66, 118, 126	0
3	J	22/22 (100%)	0.38	1 (4%) 38 33	33, 77, 129, 149	0
3	L	22/22 (100%)	0.59	3 (13%) 7 5	30, 80, 144, 156	0
3	N	22/22 (100%)	0.25	2 (9%) 15 13	28, 72, 130, 172	0
3	P	22/22 (100%)	0.33	0 100 100	27, 71, 119, 132	0
All	All	1856/2056 (90%)	0.07	75 (4%) 42 38	27, 49, 104, 183	0

The worst 5 of 75 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	214	THR	6.2
1	H	90	ILE	5.1
1	A	93	HIS	4.7
1	B	91	SER	4.7
1	B	214	THR	4.7

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.