



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 20, 2026 – 02:31 AM UTC

PDB ID : 5H9E / pdb_00005h9e
Title : Crystal structure of E. coli Cascade bound to a PAM-containing dsDNA target (32-nt spacer) at 3.20 angstrom resolution.
Authors : Hayes, R.P.; Xiao, Y.; Ding, F.; van Erp, P.B.G.; Rajashankar, K.; Bailey, S.; Wiedenheft, B.; Ke, A.
Deposited on : 2015-12-28
Resolution : 3.21 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
Mogul : 2022.3.0, CSD as543be (2022)
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

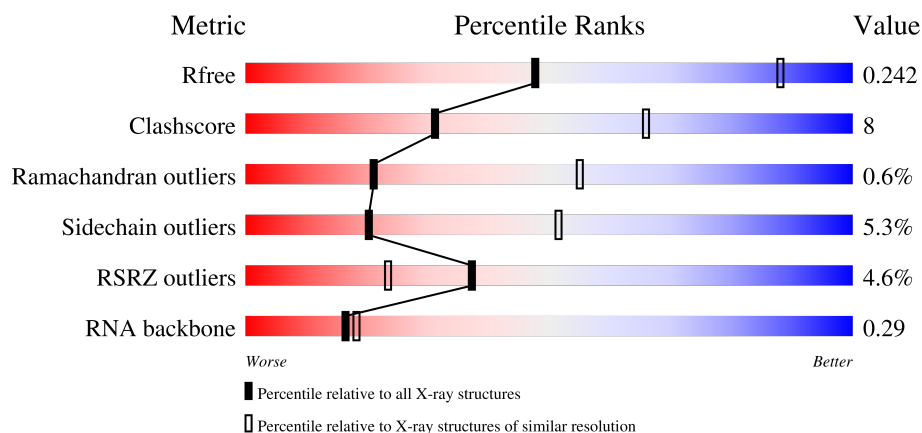
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.21 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	1768 (3.24-3.20)
Clashscore	190562	1879 (3.24-3.20)
Ramachandran outliers	187476	1844 (3.24-3.20)
Sidechain outliers	187428	1843 (3.24-3.20)
RSRZ outliers	180081	1768 (3.24-3.20)
RNA backbone	3983	1055 (3.50-2.94)

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	502	3% 75% 20% .
2	B	182	3% 69% 13% . 17%
2	C	182	2% 67% 14% . 18%
3	D	363	4% 66% 18% . 12%

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Mol	Chain	Length	Quality of chain
3	E	363	
3	F	363	
3	G	363	
3	H	363	
3	I	363	
4	J	224	
5	L	61	
6	M	47	
7	N	47	
8	K	199	

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 27217 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 CRISPR system Cascade subunit CasA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	481	Total	C	N	O	S	0	0	0
			3728	2379	656	674	19			

- Molecule 2 is a protein called CRISPR system Cascade subunit CasB.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	151	Total	C	N	O	S	0	0	0
			1216	765	234	210	7			
2	C	150	Total	C	N	O	S	0	0	0
			1219	767	230	215	7			

There are 44 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-21	MET	-	expression tag	UNP P76632
B	-20	ALA	-	expression tag	UNP P76632
B	-19	SER	-	expression tag	UNP P76632
B	-18	HIS	-	expression tag	UNP P76632
B	-17	HIS	-	expression tag	UNP P76632
B	-16	HIS	-	expression tag	UNP P76632
B	-15	HIS	-	expression tag	UNP P76632
B	-14	HIS	-	expression tag	UNP P76632
B	-13	HIS	-	expression tag	UNP P76632
B	-12	GLY	-	expression tag	UNP P76632
B	-11	ALA	-	expression tag	UNP P76632
B	-10	LEU	-	expression tag	UNP P76632
B	-9	GLU	-	expression tag	UNP P76632
B	-8	VAL	-	expression tag	UNP P76632
B	-7	LEU	-	expression tag	UNP P76632
B	-6	PHE	-	expression tag	UNP P76632
B	-5	GLN	-	expression tag	UNP P76632
B	-4	GLY	-	expression tag	UNP P76632

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-3	PRO	-	expression tag	UNP P76632
B	-2	GLY	-	expression tag	UNP P76632
B	-1	TYR	-	expression tag	UNP P76632
B	0	GLN	-	expression tag	UNP P76632
C	-21	MET	-	expression tag	UNP P76632
C	-20	ALA	-	expression tag	UNP P76632
C	-19	SER	-	expression tag	UNP P76632
C	-18	HIS	-	expression tag	UNP P76632
C	-17	HIS	-	expression tag	UNP P76632
C	-16	HIS	-	expression tag	UNP P76632
C	-15	HIS	-	expression tag	UNP P76632
C	-14	HIS	-	expression tag	UNP P76632
C	-13	HIS	-	expression tag	UNP P76632
C	-12	GLY	-	expression tag	UNP P76632
C	-11	ALA	-	expression tag	UNP P76632
C	-10	LEU	-	expression tag	UNP P76632
C	-9	GLU	-	expression tag	UNP P76632
C	-8	VAL	-	expression tag	UNP P76632
C	-7	LEU	-	expression tag	UNP P76632
C	-6	PHE	-	expression tag	UNP P76632
C	-5	GLN	-	expression tag	UNP P76632
C	-4	GLY	-	expression tag	UNP P76632
C	-3	PRO	-	expression tag	UNP P76632
C	-2	GLY	-	expression tag	UNP P76632
C	-1	TYR	-	expression tag	UNP P76632
C	0	GLN	-	expression tag	UNP P76632

- Molecule 3 is a protein called CRISPR system Cascade subunit CasC.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	D	318	Total	C	N	O	S	0	0	0
			2356	1476	427	439	14			
3	E	354	Total	C	N	O	S	0	0	0
			2694	1685	479	515	15			
3	F	361	Total	C	N	O	S	0	0	0
			2755	1721	490	529	15			
3	G	354	Total	C	N	O	S	0	0	0
			2713	1698	484	516	15			
3	H	352	Total	C	N	O	S	0	0	0
			2691	1681	479	516	15			
3	I	351	Total	C	N	O	S	0	0	0
			2671	1669	474	513	15			

- Molecule 4 is a protein called CRISPR system Cascade subunit CasD.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	J	219	Total	C	N	O	S	0	0	0
			1731	1097	308	317	9			

- Molecule 5 is a RNA chain called crRNA (61-MER).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	L	61	Total	C	N	O	P	0	0	0
			1300	580	233	426	61			

- Molecule 6 is a DNA chain called DNA (47-MER) Non-target.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
6	M	19	Total	C	N	O	P	0	0	0
			387	188	58	122	19			

- Molecule 7 is a DNA chain called DNA (47-MER) Target.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
7	N	40	Total	C	N	O	P	0	0	0
			820	389	154	237	40			

- Molecule 8 is a protein called CRISPR system Cascade subunit CasE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
8	K	139	Total	C	N	O	S	0	0	0
			935	597	156	176	6			

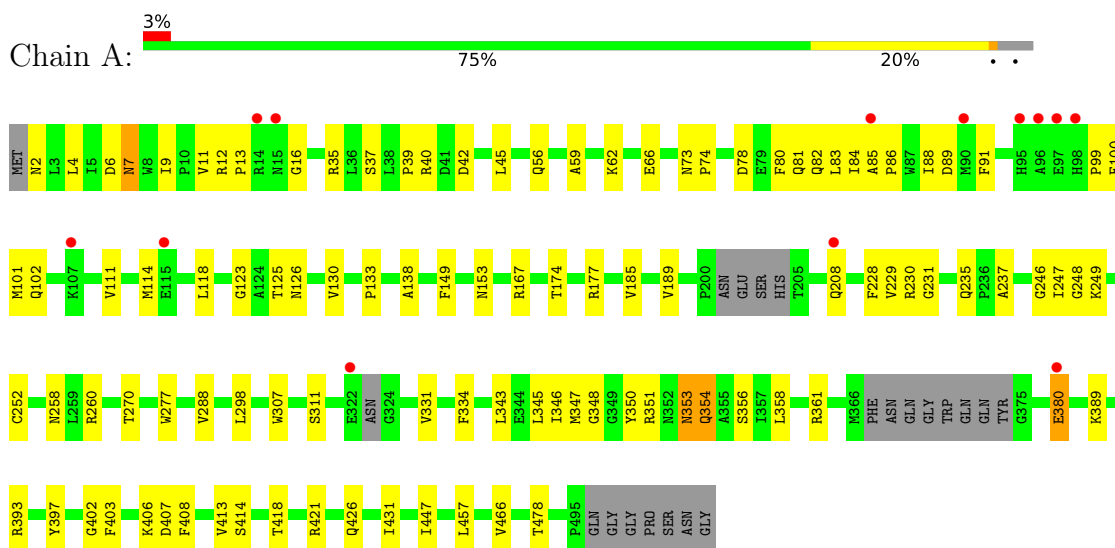
- Molecule 9 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	1	Total	Zn	0	0
			1	1		

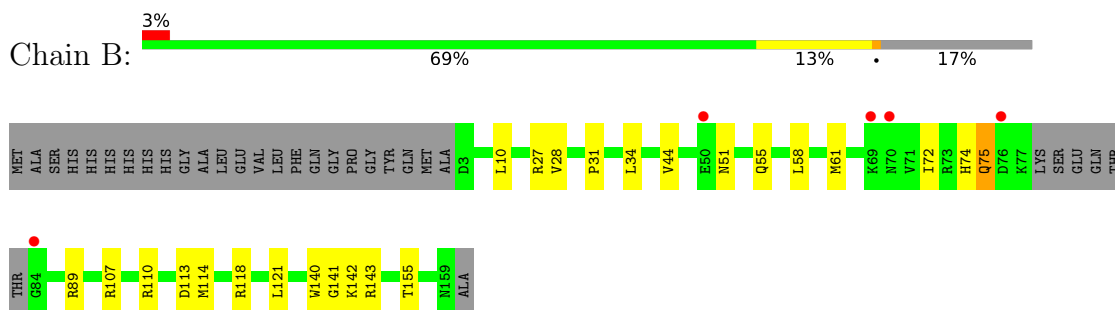
3 Residue-property plots

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.

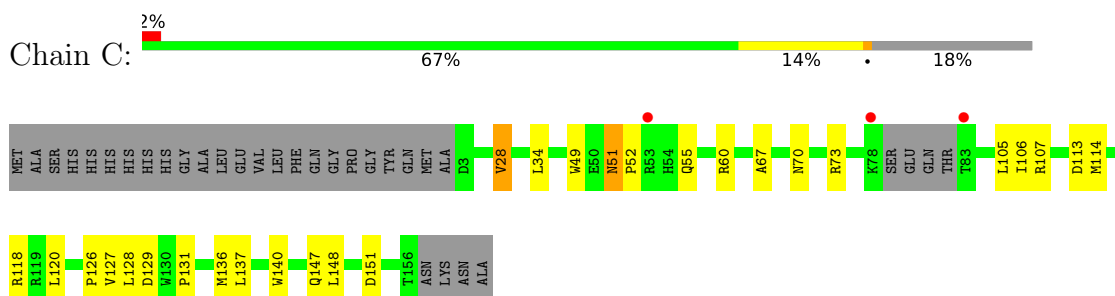
• Molecule 1: CRISPR system Cascade subunit CasA



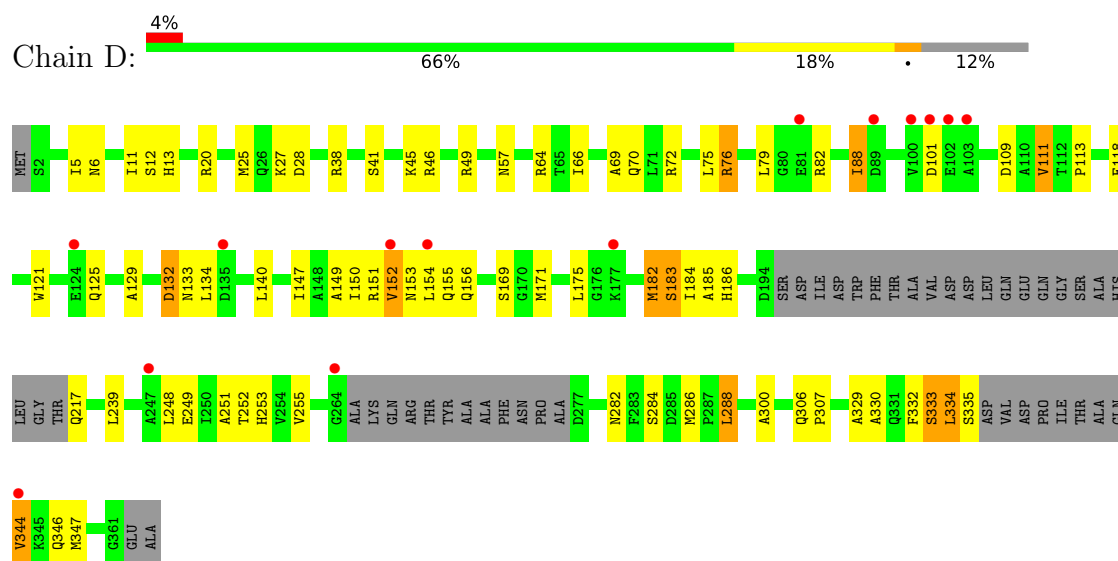
• Molecule 2: CRISPR system Cascade subunit CasB



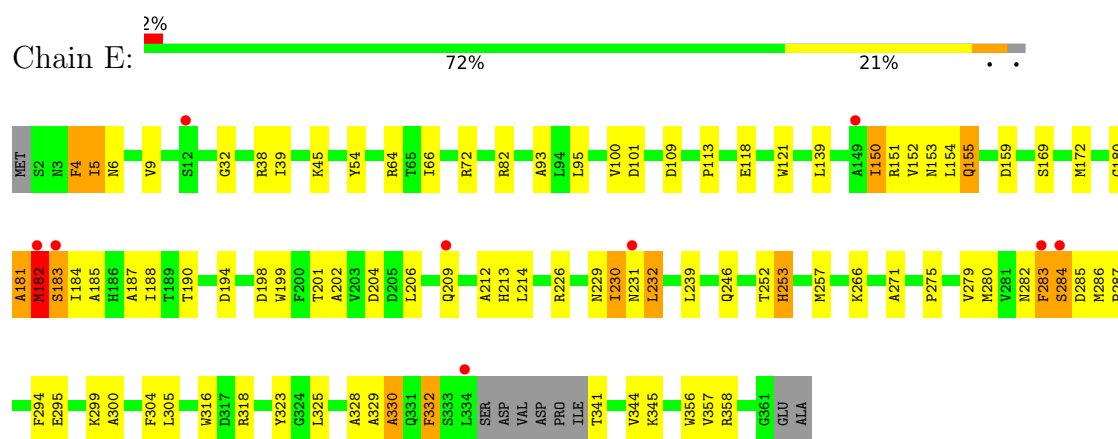
• Molecule 2: CRISPR system Cascade subunit CasB



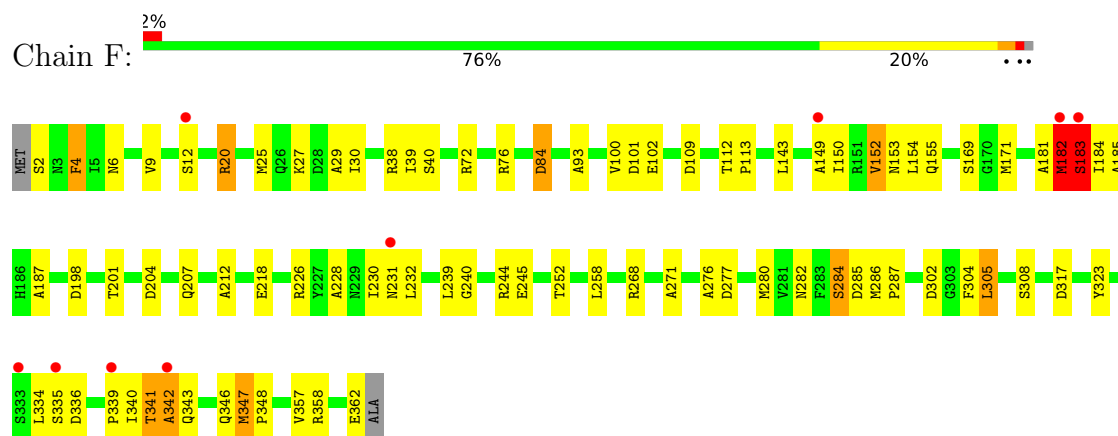
• Molecule 3: CRISPR system Cascade subunit CasC



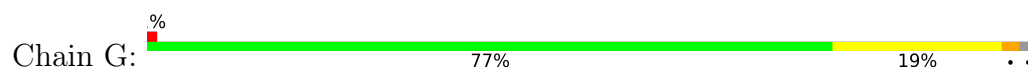
• Molecule 3: CRISPR system Cascade subunit CasC

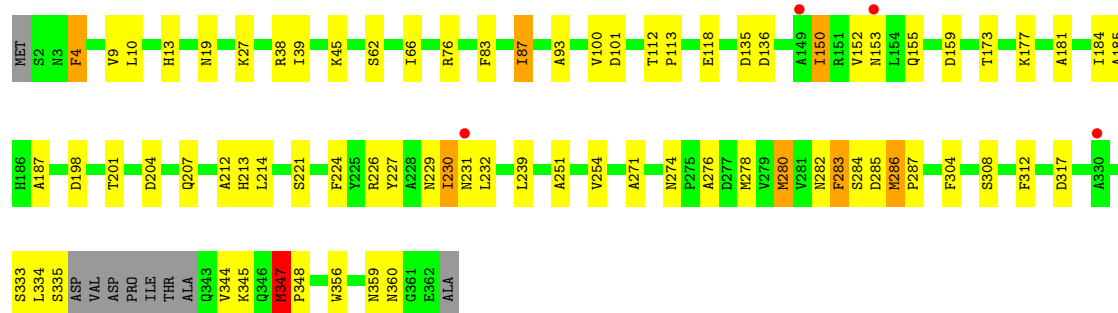


• Molecule 3: CRISPR system Cascade subunit CasC

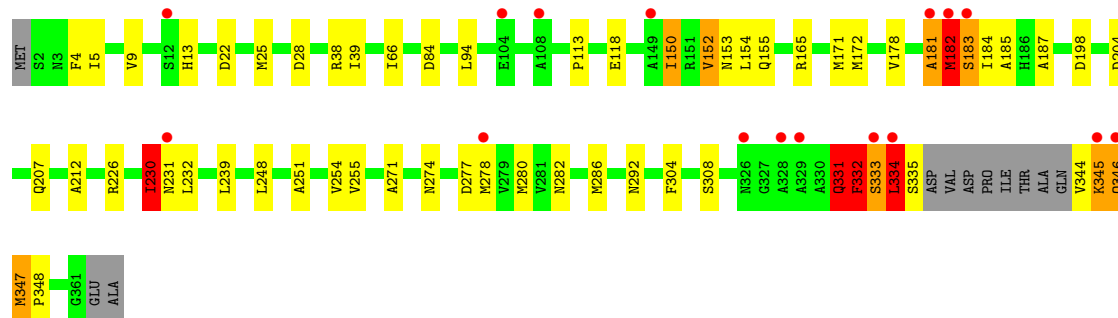
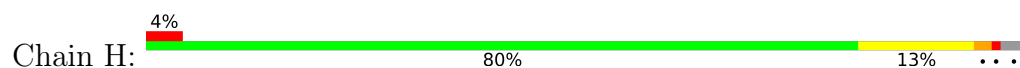


• Molecule 3: CRISPR system Cascade subunit CasC

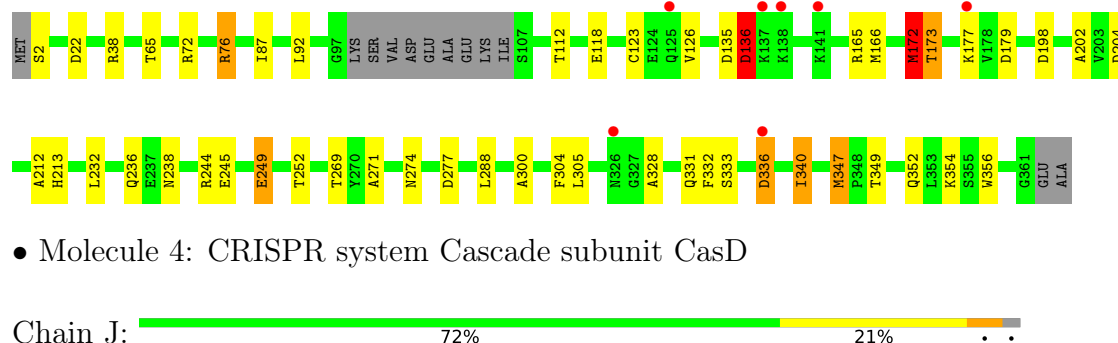
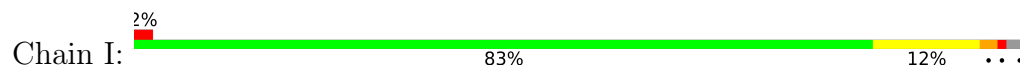




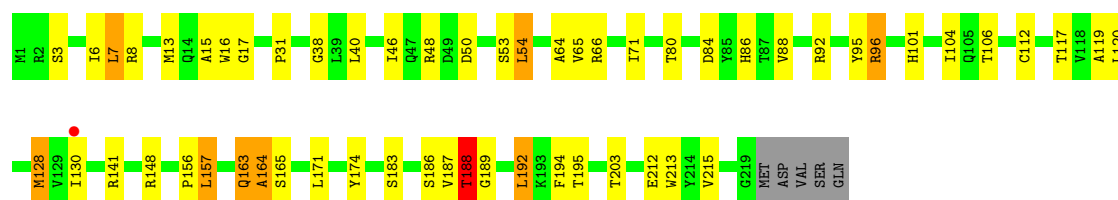
• Molecule 3: CRISPR system Cascade subunit CasC



• Molecule 3: CRISPR system Cascade subunit CasC



• Molecule 4: CRISPR system Cascade subunit CasD

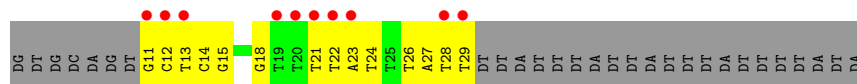


• Molecule 5: crRNA (61-MER)

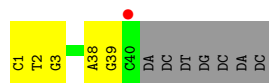
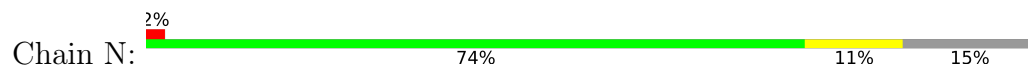




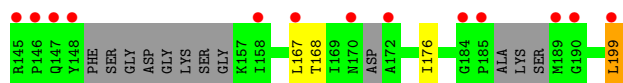
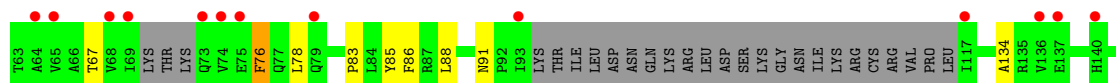
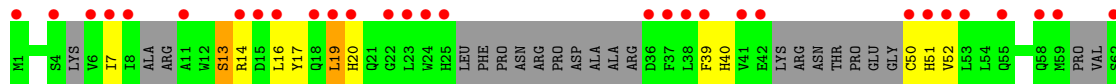
• Molecule 6: DNA (47-MER) Non-target



• Molecule 7: DNA (47-MER) Target



• Molecule 8: CRISPR system Cascade subunit CasE



4 Data and refinement statistics

Property	Value	Source
Space group	P 2 ₁ 2 ₁ 2 ₁	Depositor
Cell constants a, b, c, α , β , γ	92.81Å 149.82Å 404.10Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.09 – 3.21 50.09 – 3.21	Depositor EDS
% Data completeness (in resolution range)	97.2 (50.09-3.21) 91.1 (50.09-3.21)	Depositor EDS
R_{merge}	0.27	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.41 (at 3.19Å)	Xtriage
Refinement program	PHENIX 1.8.4_1496	Depositor
R, R_{free}	0.209 , 0.247 0.211 , 0.242	Depositor DCC
R_{free} test set	2000 reflections (2.22%)	wwPDB-VP
Wilson B-factor (Å ²)	50.8	Xtriage
Anisotropy	0.599	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 49.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	27217	wwPDB-VP
Average B, all atoms (Å ²)	62.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.44% 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: ZN, 23G

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	0.37	0/3811	0.79	5/5177 (0.1%)
2	B	0.41	0/1240	0.79	2/1679 (0.1%)
2	C	0.40	0/1243	0.78	2/1682 (0.1%)
3	D	0.34	0/2390	0.74	1/3235 (0.0%)
3	E	0.44	2/2737 (0.1%)	0.84	14/3702 (0.4%)
3	F	0.44	1/2800 (0.0%)	0.93	11/3790 (0.3%)
3	G	0.45	0/2756	0.78	6/3721 (0.2%)
3	H	0.60	6/2734 (0.2%)	1.08	29/3697 (0.8%)
3	I	0.40	0/2715	0.76	6/3676 (0.2%)
4	J	0.47	0/1773	0.82	3/2407 (0.1%)
5	L	0.21	0/1423	0.45	0/2216
6	M	0.46	1/430 (0.2%)	0.60	0/662
7	N	0.25	0/920	0.40	0/1417
8	K	0.30	0/940	0.83	0/1278
All	All	0.42	10/27912 (0.0%)	0.81	79/38339 (0.2%)

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
3	E	0	1
3	H	0	2
All	All	0	3

The worst 5 of 10 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	H	345	LYS	C-O	9.22	1.35	1.23
3	H	333	SER	C-O	7.53	1.33	1.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	H	346	GLN	N-CA	-7.36	1.37	1.46
3	F	182	MET	CA-C	6.18	1.61	1.52
3	E	182	MET	CA-C	6.08	1.60	1.52

The worst 5 of 79 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	F	347	MET	CA-C-N	16.89	136.53	118.97
3	F	347	MET	C-N-CA	16.89	136.53	118.97
3	H	346	GLN	CA-C-N	-13.40	105.89	122.64
3	H	346	GLN	C-N-CA	-13.40	105.89	122.64
3	H	332	PHE	CA-C-N	-11.31	103.10	122.67

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	E	181	ALA	Peptide
3	H	331	GLN	Peptide
3	H	332	PHE	Peptide

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	3728	0	3704	58	0
2	B	1216	0	1194	10	0
2	C	1219	0	1203	17	0
3	D	2356	0	2270	45	0
3	E	2694	0	2629	58	0
3	F	2755	0	2692	61	0
3	G	2713	0	2674	44	0
3	H	2691	0	2627	44	0
3	I	2671	0	2595	41	0
4	J	1731	0	1723	43	0
5	L	1300	0	659	28	0
6	M	387	0	221	19	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	N	820	0	449	4	0
8	K	935	0	832	13	0
9	A	1	0	0	0	0
All	All	27217	0	25472	431	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 8.

The worst 5 of 431 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)
3:I:172:MET:CE	4:J:96:ARG:HB3	1.60	1.32
8:K:13:SER:HG	8:K:50:CYS:N	1.34	1.25
3:H:182:MET:HA	3:H:230:ILE:HA	1.29	1.14
5:L:52:G:N7	5:L:55:A:N6	2.00	1.09
3:I:172:MET:HE1	4:J:96:ARG:CB	1.83	1.07

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	473/502 (94%)	446 (94%)	26 (6%)	1 (0%)	43	73
2	B	147/182 (81%)	137 (93%)	8 (5%)	2 (1%)	9	37
2	C	146/182 (80%)	141 (97%)	5 (3%)	0	100	100
3	D	310/363 (85%)	286 (92%)	21 (7%)	3 (1%)	12	44
3	E	350/363 (96%)	324 (93%)	21 (6%)	5 (1%)	9	37
3	F	359/363 (99%)	340 (95%)	17 (5%)	2 (1%)	21	55
3	G	350/363 (96%)	334 (95%)	16 (5%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	H	348/363 (96%)	332 (95%)	14 (4%)	2 (1%)	21	55
3	I	347/363 (96%)	334 (96%)	13 (4%)	0	100	100
4	J	217/224 (97%)	207 (95%)	9 (4%)	1 (0%)	24	58
8	K	117/199 (59%)	107 (92%)	7 (6%)	3 (3%)	4	25
All	All	3164/3467 (91%)	2988 (94%)	157 (5%)	19 (1%)	21	55

5 of 19 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	354	GLN
2	B	142	LYS
3	D	182	MET
3	D	183	SER
3	D	330	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	399/426 (94%)	382 (96%)	17 (4%)	26	57
2	B	123/155 (79%)	118 (96%)	5 (4%)	27	58
2	C	126/155 (81%)	124 (98%)	2 (2%)	55	73
3	D	234/298 (78%)	211 (90%)	23 (10%)	7	30
3	E	278/298 (93%)	265 (95%)	13 (5%)	23	55
3	F	287/298 (96%)	271 (94%)	16 (6%)	19	50
3	G	283/298 (95%)	265 (94%)	18 (6%)	16	46
3	H	280/298 (94%)	269 (96%)	11 (4%)	28	60
3	I	277/298 (93%)	267 (96%)	10 (4%)	31	61
4	J	186/192 (97%)	175 (94%)	11 (6%)	18	48
8	K	82/170 (48%)	73 (89%)	9 (11%)	6	25
All	All	2555/2886 (88%)	2420 (95%)	135 (5%)	20	51

5 of 135 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	J	7	LEU
4	J	128	MET
8	K	52	VAL
3	E	82	ARG
3	E	5	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 36 such sidechains are listed below:

Mol	Chain	Res	Type
3	I	331	GLN
8	K	170	ASN
3	I	346	GLN
4	J	105	GLN
3	F	246	GLN

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
5	L	60/61 (98%)	20 (33%)	1 (1%)

5 of 20 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
5	L	8	G
5	L	9	A
5	L	15	U
5	L	21	A
5	L	22	G

All (1) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
5	L	54	C

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

1 non-standard protein/DNA/RNA residue is modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul

statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
5	23G	L	61	5	24,29,30	1.42	4 (16%)	34,45,48	2.25	11 (32%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	23G	L	61	5	-	0/7/35/36	0/4/4/4

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	L	61	23G	C6-N1	-3.10	1.33	1.38
5	L	61	23G	C4-N9	-2.80	1.30	1.38
5	L	61	23G	C5-C4	2.70	1.46	1.38
5	L	61	23G	C5-N7	-2.34	1.34	1.39

The worst 5 of 11 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	L	61	23G	C5-C4-N3	-5.14	120.20	128.39
5	L	61	23G	C6-C5-N7	4.47	138.42	130.29
5	L	61	23G	C2-N3-C4	4.34	119.77	112.30
5	L	61	23G	O4'-C1'-N9	4.19	117.84	108.36
5	L	61	23G	C4-C5-N7	-3.89	104.51	110.67

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	L	61	23G	4	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

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 [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	481/502 (95%)	0.23	13 (2%) 56 37	30, 53, 87, 112	0
2	B	151/182 (82%)	0.31	5 (3%) 49 31	39, 70, 102, 128	0
2	C	150/182 (82%)	-0.04	3 (2%) 65 45	26, 43, 65, 94	0
3	D	318/363 (87%)	0.70	14 (4%) 39 24	66, 86, 118, 142	0
3	E	354/363 (97%)	0.32	9 (2%) 58 39	41, 61, 88, 110	0
3	F	361/363 (99%)	0.22	9 (2%) 58 39	35, 56, 84, 108	0
3	G	354/363 (97%)	-0.01	4 (1%) 78 60	30, 45, 67, 86	0
3	H	352/363 (96%)	0.18	16 (4%) 38 24	27, 46, 86, 109	0
3	I	351/363 (96%)	0.11	7 (1%) 65 45	24, 44, 86, 114	0
4	J	219/224 (97%)	-0.03	1 (0%) 87 76	27, 44, 72, 103	0
5	L	60/61 (98%)	0.45	5 (8%) 17 11	30, 51, 179, 191	0
6	M	19/47 (40%)	1.82	10 (52%) 0 1	59, 113, 169, 185	0
7	N	40/47 (85%)	0.13	1 (2%) 58 39	33, 43, 160, 202	0
8	K	139/199 (69%)	1.79	56 (40%) 0 1	82, 117, 153, 166	0
All	All	3349/3622 (92%)	0.29	153 (4%) 37 23	24, 55, 110, 202	0

The worst 5 of 153 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
8	K	185	PRO	5.9
8	K	4	SER	5.9
3	H	333	SER	5.1
8	K	25	HIS	4.8
8	K	69	ILE	4.8

6.2 Non-standard residues in protein, DNA, RNA chains [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(Å ²)	Q<0.9
5	23G	L	61	26/27	0.62	0.18	86,134,211,233	0

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(Å ²)	Q<0.9
9	ZN	A	601	1/1	1.00	0.03	61,61,61,61	0

6.5 Other polymers [i](#)

There are no such residues in this entry.