



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 5, 2026 – 05:14 PM UTC

PDB ID : 3OT4 / pdb_00003ot4
Title : Structure and Catalytic Mechanism of Bordetella bronchiseptica nicF
Authors : Rowlett, R.S.; Snider, M.J.
Deposited on : 2010-09-10
Resolution : 2.40 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

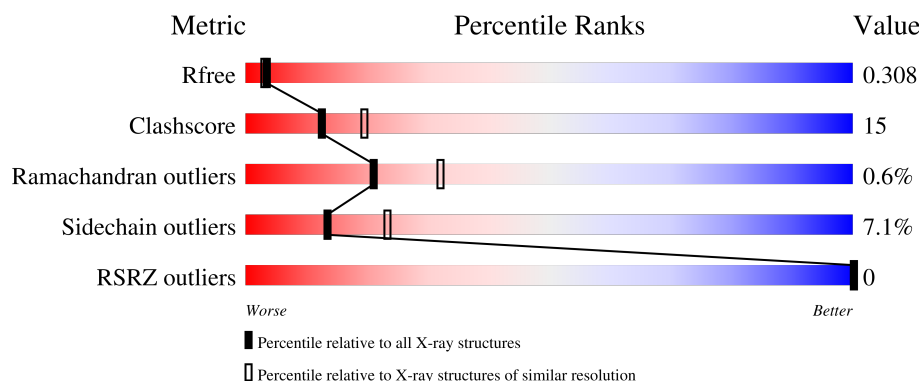
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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	4912 (2.40-2.40)
Clashscore	190562	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (2.40-2.40)
RSRZ outliers	180081	4916 (2.40-2.40)

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	236	
1	B	236	
1	C	236	
1	D	236	
1	E	236	

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Mol	Chain	Length	Quality of chain
1	F	236	 60% 20% • 17%
1	G	236	 64% 16% • 17%
1	H	236	 57% 23% • 16%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 12175 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 Putative isochorismatase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	198	Total	C	N	O	S	0	0	0
			1463	927	257	272	7			
1	B	198	Total	C	N	O	S	0	0	0
			1463	927	257	272	7			
1	C	198	Total	C	N	O	S	0	0	0
			1469	932	259	271	7			
1	D	198	Total	C	N	O	S	0	0	0
			1469	932	259	271	7			
1	E	201	Total	C	N	O	S	0	0	0
			1487	943	262	275	7			
1	F	197	Total	C	N	O	S	0	0	0
			1461	926	257	271	7			
1	G	197	Total	C	N	O	S	0	0	0
			1461	926	257	271	7			
1	H	198	Total	C	N	O	S	0	0	0
			1467	929	258	273	7			

There are 248 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-21	GLY	-	expression tag	UNP Q7TTE5
A	-20	SER	-	expression tag	UNP Q7TTE5
A	-19	ASP	-	expression tag	UNP Q7TTE5
A	-18	LYS	-	expression tag	UNP Q7TTE5
A	-17	ILE	-	expression tag	UNP Q7TTE5
A	-16	HIS	-	expression tag	UNP Q7TTE5
A	-15	HIS	-	expression tag	UNP Q7TTE5
A	-14	HIS	-	expression tag	UNP Q7TTE5
A	-13	HIS	-	expression tag	UNP Q7TTE5
A	-12	HIS	-	expression tag	UNP Q7TTE5
A	-11	HIS	-	expression tag	UNP Q7TTE5
A	-10	SER	-	expression tag	UNP Q7TTE5
A	-9	SER	-	expression tag	UNP Q7TTE5

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-8	GLY	-	expression tag	UNP Q7TTE5
A	-7	GLU	-	expression tag	UNP Q7TTE5
A	-6	ASN	-	expression tag	UNP Q7TTE5
A	-5	LEU	-	expression tag	UNP Q7TTE5
A	-4	TYR	-	expression tag	UNP Q7TTE5
A	-3	PHE	-	expression tag	UNP Q7TTE5
A	-2	GLN	-	expression tag	UNP Q7TTE5
A	-1	GLY	-	expression tag	UNP Q7TTE5
A	0	HIS	-	expression tag	UNP Q7TTE5
A	206	GLY	-	expression tag	UNP Q7TTE5
A	207	LEU	-	expression tag	UNP Q7TTE5
A	208	GLU	-	expression tag	UNP Q7TTE5
A	209	HIS	-	expression tag	UNP Q7TTE5
A	210	HIS	-	expression tag	UNP Q7TTE5
A	211	HIS	-	expression tag	UNP Q7TTE5
A	212	HIS	-	expression tag	UNP Q7TTE5
A	213	HIS	-	expression tag	UNP Q7TTE5
A	214	HIS	-	expression tag	UNP Q7TTE5
B	-21	GLY	-	expression tag	UNP Q7TTE5
B	-20	SER	-	expression tag	UNP Q7TTE5
B	-19	ASP	-	expression tag	UNP Q7TTE5
B	-18	LYS	-	expression tag	UNP Q7TTE5
B	-17	ILE	-	expression tag	UNP Q7TTE5
B	-16	HIS	-	expression tag	UNP Q7TTE5
B	-15	HIS	-	expression tag	UNP Q7TTE5
B	-14	HIS	-	expression tag	UNP Q7TTE5
B	-13	HIS	-	expression tag	UNP Q7TTE5
B	-12	HIS	-	expression tag	UNP Q7TTE5
B	-11	HIS	-	expression tag	UNP Q7TTE5
B	-10	SER	-	expression tag	UNP Q7TTE5
B	-9	SER	-	expression tag	UNP Q7TTE5
B	-8	GLY	-	expression tag	UNP Q7TTE5
B	-7	GLU	-	expression tag	UNP Q7TTE5
B	-6	ASN	-	expression tag	UNP Q7TTE5
B	-5	LEU	-	expression tag	UNP Q7TTE5
B	-4	TYR	-	expression tag	UNP Q7TTE5
B	-3	PHE	-	expression tag	UNP Q7TTE5
B	-2	GLN	-	expression tag	UNP Q7TTE5
B	-1	GLY	-	expression tag	UNP Q7TTE5
B	0	HIS	-	expression tag	UNP Q7TTE5
B	206	GLY	-	expression tag	UNP Q7TTE5
B	207	LEU	-	expression tag	UNP Q7TTE5

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Chain	Residue	Modelled	Actual	Comment	Reference
B	208	GLU	-	expression tag	UNP Q7TTE5
B	209	HIS	-	expression tag	UNP Q7TTE5
B	210	HIS	-	expression tag	UNP Q7TTE5
B	211	HIS	-	expression tag	UNP Q7TTE5
B	212	HIS	-	expression tag	UNP Q7TTE5
B	213	HIS	-	expression tag	UNP Q7TTE5
B	214	HIS	-	expression tag	UNP Q7TTE5
C	-21	GLY	-	expression tag	UNP Q7TTE5
C	-20	SER	-	expression tag	UNP Q7TTE5
C	-19	ASP	-	expression tag	UNP Q7TTE5
C	-18	LYS	-	expression tag	UNP Q7TTE5
C	-17	ILE	-	expression tag	UNP Q7TTE5
C	-16	HIS	-	expression tag	UNP Q7TTE5
C	-15	HIS	-	expression tag	UNP Q7TTE5
C	-14	HIS	-	expression tag	UNP Q7TTE5
C	-13	HIS	-	expression tag	UNP Q7TTE5
C	-12	HIS	-	expression tag	UNP Q7TTE5
C	-11	HIS	-	expression tag	UNP Q7TTE5
C	-10	SER	-	expression tag	UNP Q7TTE5
C	-9	SER	-	expression tag	UNP Q7TTE5
C	-8	GLY	-	expression tag	UNP Q7TTE5
C	-7	GLU	-	expression tag	UNP Q7TTE5
C	-6	ASN	-	expression tag	UNP Q7TTE5
C	-5	LEU	-	expression tag	UNP Q7TTE5
C	-4	TYR	-	expression tag	UNP Q7TTE5
C	-3	PHE	-	expression tag	UNP Q7TTE5
C	-2	GLN	-	expression tag	UNP Q7TTE5
C	-1	GLY	-	expression tag	UNP Q7TTE5
C	0	HIS	-	expression tag	UNP Q7TTE5
C	206	GLY	-	expression tag	UNP Q7TTE5
C	207	LEU	-	expression tag	UNP Q7TTE5
C	208	GLU	-	expression tag	UNP Q7TTE5
C	209	HIS	-	expression tag	UNP Q7TTE5
C	210	HIS	-	expression tag	UNP Q7TTE5
C	211	HIS	-	expression tag	UNP Q7TTE5
C	212	HIS	-	expression tag	UNP Q7TTE5
C	213	HIS	-	expression tag	UNP Q7TTE5
C	214	HIS	-	expression tag	UNP Q7TTE5
D	-21	GLY	-	expression tag	UNP Q7TTE5
D	-20	SER	-	expression tag	UNP Q7TTE5
D	-19	ASP	-	expression tag	UNP Q7TTE5
D	-18	LYS	-	expression tag	UNP Q7TTE5

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Chain	Residue	Modelled	Actual	Comment	Reference
D	-17	ILE	-	expression tag	UNP Q7TTE5
D	-16	HIS	-	expression tag	UNP Q7TTE5
D	-15	HIS	-	expression tag	UNP Q7TTE5
D	-14	HIS	-	expression tag	UNP Q7TTE5
D	-13	HIS	-	expression tag	UNP Q7TTE5
D	-12	HIS	-	expression tag	UNP Q7TTE5
D	-11	HIS	-	expression tag	UNP Q7TTE5
D	-10	SER	-	expression tag	UNP Q7TTE5
D	-9	SER	-	expression tag	UNP Q7TTE5
D	-8	GLY	-	expression tag	UNP Q7TTE5
D	-7	GLU	-	expression tag	UNP Q7TTE5
D	-6	ASN	-	expression tag	UNP Q7TTE5
D	-5	LEU	-	expression tag	UNP Q7TTE5
D	-4	TYR	-	expression tag	UNP Q7TTE5
D	-3	PHE	-	expression tag	UNP Q7TTE5
D	-2	GLN	-	expression tag	UNP Q7TTE5
D	-1	GLY	-	expression tag	UNP Q7TTE5
D	0	HIS	-	expression tag	UNP Q7TTE5
D	206	GLY	-	expression tag	UNP Q7TTE5
D	207	LEU	-	expression tag	UNP Q7TTE5
D	208	GLU	-	expression tag	UNP Q7TTE5
D	209	HIS	-	expression tag	UNP Q7TTE5
D	210	HIS	-	expression tag	UNP Q7TTE5
D	211	HIS	-	expression tag	UNP Q7TTE5
D	212	HIS	-	expression tag	UNP Q7TTE5
D	213	HIS	-	expression tag	UNP Q7TTE5
D	214	HIS	-	expression tag	UNP Q7TTE5
E	-21	GLY	-	expression tag	UNP Q7TTE5
E	-20	SER	-	expression tag	UNP Q7TTE5
E	-19	ASP	-	expression tag	UNP Q7TTE5
E	-18	LYS	-	expression tag	UNP Q7TTE5
E	-17	ILE	-	expression tag	UNP Q7TTE5
E	-16	HIS	-	expression tag	UNP Q7TTE5
E	-15	HIS	-	expression tag	UNP Q7TTE5
E	-14	HIS	-	expression tag	UNP Q7TTE5
E	-13	HIS	-	expression tag	UNP Q7TTE5
E	-12	HIS	-	expression tag	UNP Q7TTE5
E	-11	HIS	-	expression tag	UNP Q7TTE5
E	-10	SER	-	expression tag	UNP Q7TTE5
E	-9	SER	-	expression tag	UNP Q7TTE5
E	-8	GLY	-	expression tag	UNP Q7TTE5
E	-7	GLU	-	expression tag	UNP Q7TTE5

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-6	ASN	-	expression tag	UNP Q7TTE5
E	-5	LEU	-	expression tag	UNP Q7TTE5
E	-4	TYR	-	expression tag	UNP Q7TTE5
E	-3	PHE	-	expression tag	UNP Q7TTE5
E	-2	GLN	-	expression tag	UNP Q7TTE5
E	-1	GLY	-	expression tag	UNP Q7TTE5
E	0	HIS	-	expression tag	UNP Q7TTE5
E	206	GLY	-	expression tag	UNP Q7TTE5
E	207	LEU	-	expression tag	UNP Q7TTE5
E	208	GLU	-	expression tag	UNP Q7TTE5
E	209	HIS	-	expression tag	UNP Q7TTE5
E	210	HIS	-	expression tag	UNP Q7TTE5
E	211	HIS	-	expression tag	UNP Q7TTE5
E	212	HIS	-	expression tag	UNP Q7TTE5
E	213	HIS	-	expression tag	UNP Q7TTE5
E	214	HIS	-	expression tag	UNP Q7TTE5
F	-21	GLY	-	expression tag	UNP Q7TTE5
F	-20	SER	-	expression tag	UNP Q7TTE5
F	-19	ASP	-	expression tag	UNP Q7TTE5
F	-18	LYS	-	expression tag	UNP Q7TTE5
F	-17	ILE	-	expression tag	UNP Q7TTE5
F	-16	HIS	-	expression tag	UNP Q7TTE5
F	-15	HIS	-	expression tag	UNP Q7TTE5
F	-14	HIS	-	expression tag	UNP Q7TTE5
F	-13	HIS	-	expression tag	UNP Q7TTE5
F	-12	HIS	-	expression tag	UNP Q7TTE5
F	-11	HIS	-	expression tag	UNP Q7TTE5
F	-10	SER	-	expression tag	UNP Q7TTE5
F	-9	SER	-	expression tag	UNP Q7TTE5
F	-8	GLY	-	expression tag	UNP Q7TTE5
F	-7	GLU	-	expression tag	UNP Q7TTE5
F	-6	ASN	-	expression tag	UNP Q7TTE5
F	-5	LEU	-	expression tag	UNP Q7TTE5
F	-4	TYR	-	expression tag	UNP Q7TTE5
F	-3	PHE	-	expression tag	UNP Q7TTE5
F	-2	GLN	-	expression tag	UNP Q7TTE5
F	-1	GLY	-	expression tag	UNP Q7TTE5
F	0	HIS	-	expression tag	UNP Q7TTE5
F	206	GLY	-	expression tag	UNP Q7TTE5
F	207	LEU	-	expression tag	UNP Q7TTE5
F	208	GLU	-	expression tag	UNP Q7TTE5
F	209	HIS	-	expression tag	UNP Q7TTE5

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Chain	Residue	Modelled	Actual	Comment	Reference
F	210	HIS	-	expression tag	UNP Q7TTE5
F	211	HIS	-	expression tag	UNP Q7TTE5
F	212	HIS	-	expression tag	UNP Q7TTE5
F	213	HIS	-	expression tag	UNP Q7TTE5
F	214	HIS	-	expression tag	UNP Q7TTE5
G	-21	GLY	-	expression tag	UNP Q7TTE5
G	-20	SER	-	expression tag	UNP Q7TTE5
G	-19	ASP	-	expression tag	UNP Q7TTE5
G	-18	LYS	-	expression tag	UNP Q7TTE5
G	-17	ILE	-	expression tag	UNP Q7TTE5
G	-16	HIS	-	expression tag	UNP Q7TTE5
G	-15	HIS	-	expression tag	UNP Q7TTE5
G	-14	HIS	-	expression tag	UNP Q7TTE5
G	-13	HIS	-	expression tag	UNP Q7TTE5
G	-12	HIS	-	expression tag	UNP Q7TTE5
G	-11	HIS	-	expression tag	UNP Q7TTE5
G	-10	SER	-	expression tag	UNP Q7TTE5
G	-9	SER	-	expression tag	UNP Q7TTE5
G	-8	GLY	-	expression tag	UNP Q7TTE5
G	-7	GLU	-	expression tag	UNP Q7TTE5
G	-6	ASN	-	expression tag	UNP Q7TTE5
G	-5	LEU	-	expression tag	UNP Q7TTE5
G	-4	TYR	-	expression tag	UNP Q7TTE5
G	-3	PHE	-	expression tag	UNP Q7TTE5
G	-2	GLN	-	expression tag	UNP Q7TTE5
G	-1	GLY	-	expression tag	UNP Q7TTE5
G	0	HIS	-	expression tag	UNP Q7TTE5
G	206	GLY	-	expression tag	UNP Q7TTE5
G	207	LEU	-	expression tag	UNP Q7TTE5
G	208	GLU	-	expression tag	UNP Q7TTE5
G	209	HIS	-	expression tag	UNP Q7TTE5
G	210	HIS	-	expression tag	UNP Q7TTE5
G	211	HIS	-	expression tag	UNP Q7TTE5
G	212	HIS	-	expression tag	UNP Q7TTE5
G	213	HIS	-	expression tag	UNP Q7TTE5
G	214	HIS	-	expression tag	UNP Q7TTE5
H	-21	GLY	-	expression tag	UNP Q7TTE5
H	-20	SER	-	expression tag	UNP Q7TTE5
H	-19	ASP	-	expression tag	UNP Q7TTE5
H	-18	LYS	-	expression tag	UNP Q7TTE5
H	-17	ILE	-	expression tag	UNP Q7TTE5
H	-16	HIS	-	expression tag	UNP Q7TTE5

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Chain	Residue	Modelled	Actual	Comment	Reference
H	-15	HIS	-	expression tag	UNP Q7TTE5
H	-14	HIS	-	expression tag	UNP Q7TTE5
H	-13	HIS	-	expression tag	UNP Q7TTE5
H	-12	HIS	-	expression tag	UNP Q7TTE5
H	-11	HIS	-	expression tag	UNP Q7TTE5
H	-10	SER	-	expression tag	UNP Q7TTE5
H	-9	SER	-	expression tag	UNP Q7TTE5
H	-8	GLY	-	expression tag	UNP Q7TTE5
H	-7	GLU	-	expression tag	UNP Q7TTE5
H	-6	ASN	-	expression tag	UNP Q7TTE5
H	-5	LEU	-	expression tag	UNP Q7TTE5
H	-4	TYR	-	expression tag	UNP Q7TTE5
H	-3	PHE	-	expression tag	UNP Q7TTE5
H	-2	GLN	-	expression tag	UNP Q7TTE5
H	-1	GLY	-	expression tag	UNP Q7TTE5
H	0	HIS	-	expression tag	UNP Q7TTE5
H	206	GLY	-	expression tag	UNP Q7TTE5
H	207	LEU	-	expression tag	UNP Q7TTE5
H	208	GLU	-	expression tag	UNP Q7TTE5
H	209	HIS	-	expression tag	UNP Q7TTE5
H	210	HIS	-	expression tag	UNP Q7TTE5
H	211	HIS	-	expression tag	UNP Q7TTE5
H	212	HIS	-	expression tag	UNP Q7TTE5
H	213	HIS	-	expression tag	UNP Q7TTE5
H	214	HIS	-	expression tag	UNP Q7TTE5

- Molecule 2 is water.

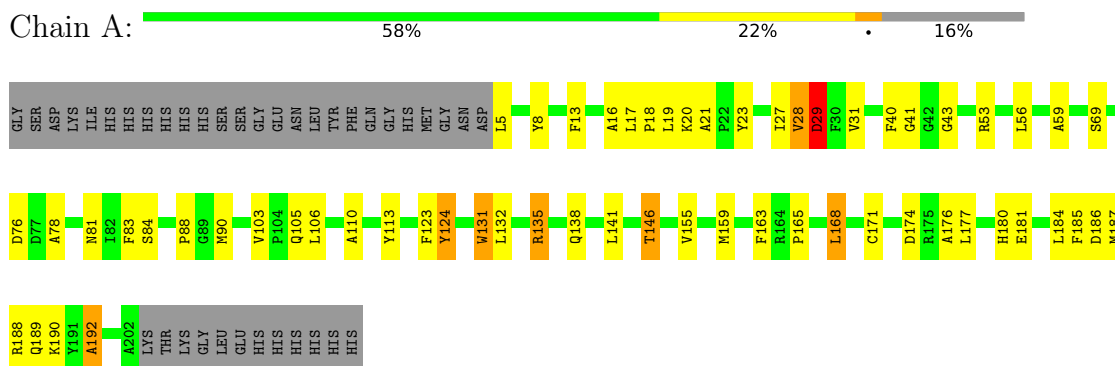
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	37	Total O 37 37	0	0
2	B	46	Total O 46 46	0	0
2	C	63	Total O 63 63	0	0
2	D	69	Total O 69 69	0	0
2	E	82	Total O 82 82	0	0
2	F	38	Total O 38 38	0	0
2	G	37	Total O 37 37	0	0

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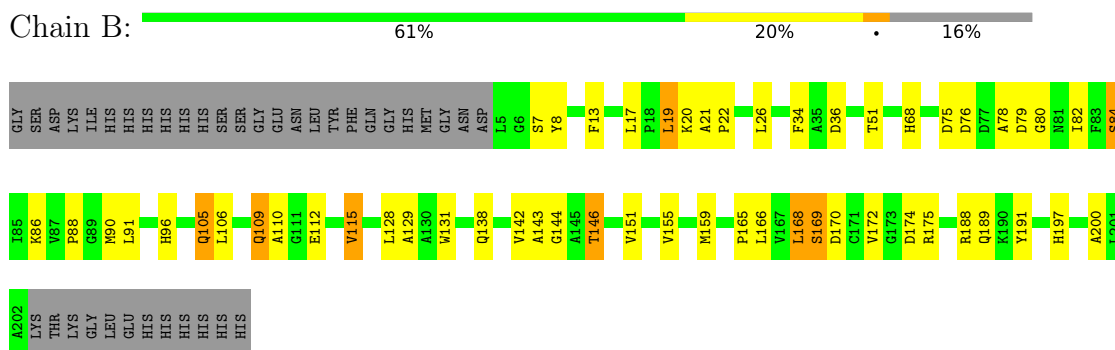
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	H	63	Total	O	0	0
			63	63		

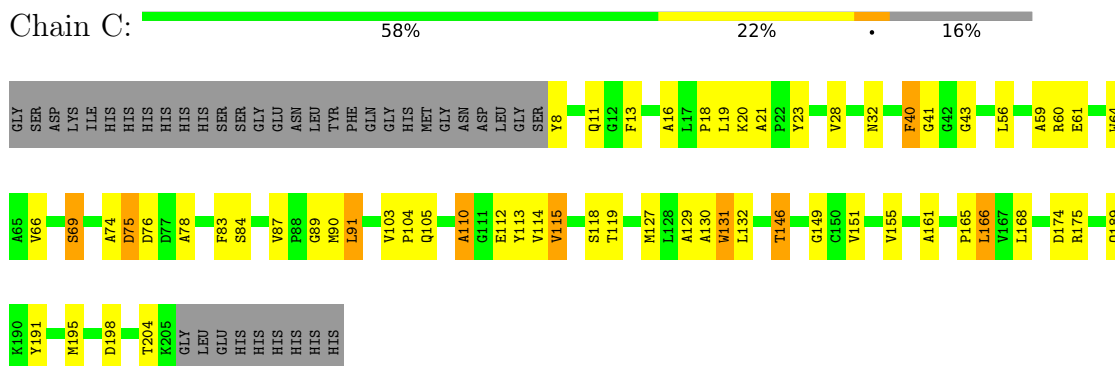
- Molecule 1: Putative isochorismatase



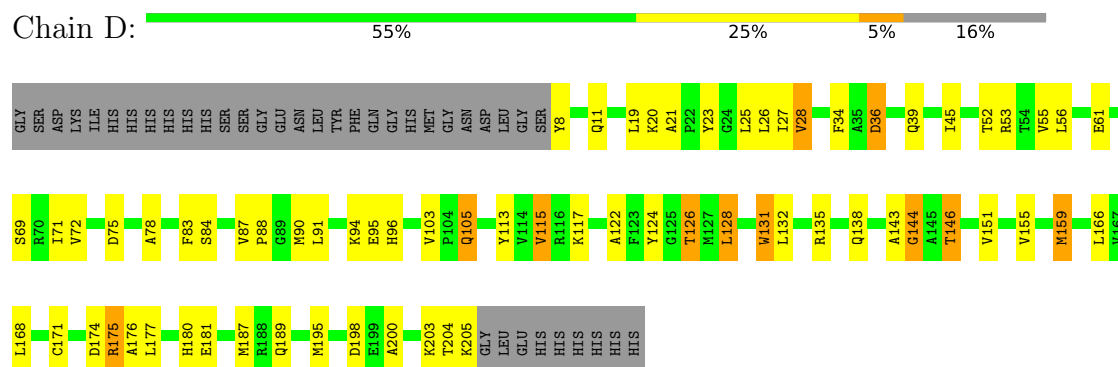
- Molecule 1: Putative isochorismatase



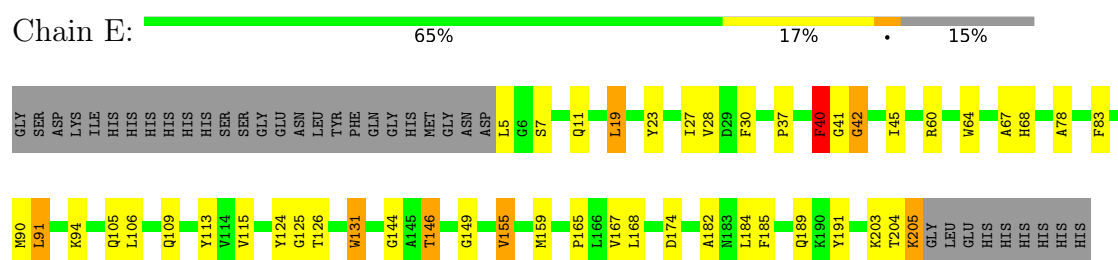
- Molecule 1: Putative isochorismatase



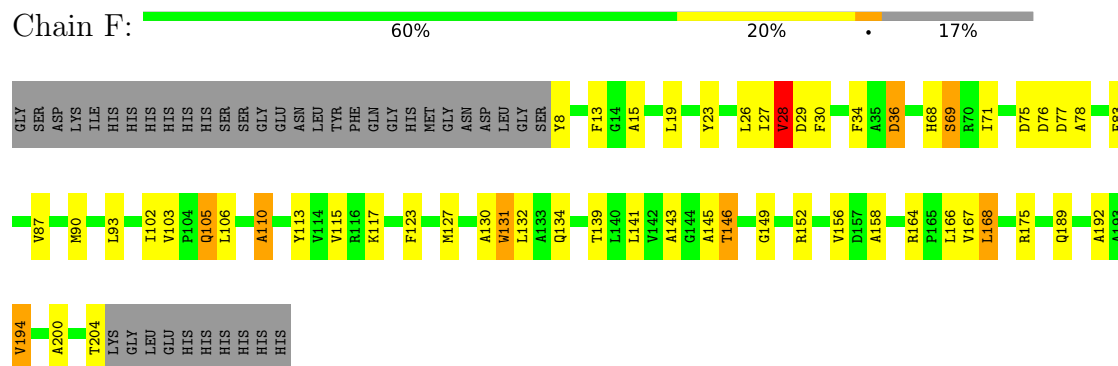
- Molecule 1: Putative isochorismatase



- Molecule 1: Putative isochorismatase



- Molecule 1: Putative isochorismatase



- Molecule 1: Putative isochorismatase



- Molecule 1: Putative isochorismatase





4 Data and refinement statistics

Property	Value	Source
Space group	H 3	Depositor
Cell constants a, b, c, α , β , γ	157.56Å 157.56Å 198.48Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	12.01 – 2.40 12.01 – 2.40	Depositor EDS
% Data completeness (in resolution range)	98.1 (12.01-2.40) 98.1 (12.01-2.40)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.09	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.67 (at 2.40Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, R_{free}	0.241 , 0.311 0.241 , 0.308	Depositor DCC
R_{free} test set	1400 reflections (1.96%)	wwPDB-VP
Wilson B-factor (Å ²)	18.9	Xtriage
Anisotropy	0.046	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.42 , 3.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.40$, $\langle L^2 \rangle = 0.23$	Xtriage
Estimated twinning fraction	0.105 for $-2/3^*h-1/3^*k+2/3^*l, -1/3^*h-2/3^*k-2/3^*l, 2/3^*h-2/3^*k+1/3^*l$ 0.095 for $-h, 1/3^*h-1/3^*k+2/3^*l, 2/3^*h+4/3^*k+1/3^*l$ 0.095 for $-1/3^*h+1/3^*k-2/3^*l, -k, -4/3^*h-2/3^*k+1/3^*l$ 0.094 for $-h, 2/3^*h+1/3^*k-2/3^*l, -2/3^*h-4/3^*k-1/3^*l$ 0.096 for $1/3^*h+2/3^*k+2/3^*l, -k, 4/3^*h+2/3^*k-1/3^*l$ 0.105 for $-1/3^*h-2/3^*k-2/3^*l, -2/3^*h-1/3^*k+2/3^*l, -2/3^*h+2/3^*k-1/3^*l$ 0.380 for $h, -h-k, -l$	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	12175	wwPDB-VP
Average B, all atoms (Å ²)	14.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.22% 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: CSO

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	0.90	0/1486	1.04	3/2021 (0.1%)
1	B	0.95	0/1486	1.03	2/2021 (0.1%)
1	C	0.91	0/1492	1.06	3/2028 (0.1%)
1	D	0.92	0/1492	1.04	5/2028 (0.2%)
1	E	0.96	0/1510	1.02	2/2052 (0.1%)
1	F	0.95	1/1484 (0.1%)	1.11	6/2018 (0.3%)
1	G	0.86	1/1484 (0.1%)	1.00	0/2018
1	H	0.95	0/1490	1.04	2/2026 (0.1%)
All	All	0.92	2/11924 (0.0%)	1.04	23/16212 (0.1%)

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	B	0	1
1	C	0	1
1	E	0	2
1	G	0	1
1	H	0	1
All	All	0	6

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	F	28	VAL	CA-CB	6.53	1.61	1.53
1	G	28	VAL	CA-CB	5.10	1.60	1.54

The worst 5 of 23 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	126	THR	N-CA-C	7.01	119.59	109.14
1	D	159	MET	N-CA-C	-6.41	103.91	111.03
1	F	103	VAL	CA-C-N	5.85	125.72	119.28
1	F	103	VAL	C-N-CA	5.85	125.72	119.28
1	C	110	ALA	N-CA-C	5.71	117.99	111.02

There are no chirality outliers.

5 of 6 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	109	GLN	Peptide
1	C	40	PHE	Peptide
1	E	125	GLY	Peptide
1	E	40	PHE	Peptide
1	G	109	GLN	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	1463	0	1452	61	0
1	B	1463	0	1452	39	0
1	C	1469	0	1466	52	0
1	D	1469	0	1466	69	0
1	E	1487	0	1485	44	0
1	F	1461	0	1453	42	0
1	G	1461	0	1453	41	0
1	H	1467	0	1458	61	0
2	A	37	0	0	1	0
2	B	46	0	0	4	0
2	C	63	0	0	3	0
2	D	69	0	0	6	0
2	E	82	0	0	2	0
2	F	38	0	0	3	0
2	G	37	0	0	0	0
2	H	63	0	0	1	0
All	All	12175	0	11685	359	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 15.

The worst 5 of 359 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:D:159:MET:HE2	1:G:83:PHE:HA	1.16	1.10
1:D:159:MET:CE	1:G:83:PHE:HA	1.84	1.06
1:D:159:MET:HE2	1:G:83:PHE:CA	1.91	0.99
1:F:105:GLN:H	1:F:105:GLN:HE21	1.12	0.96
1:C:84:SER:HB2	1:C:91:LEU:HD12	1.49	0.93

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	195/236 (83%)	179 (92%)	14 (7%)	2 (1%)	12	20
1	B	195/236 (83%)	183 (94%)	10 (5%)	2 (1%)	12	20
1	C	195/236 (83%)	185 (95%)	9 (5%)	1 (0%)	24	37
1	D	195/236 (83%)	185 (95%)	9 (5%)	1 (0%)	24	37
1	E	198/236 (84%)	192 (97%)	5 (2%)	1 (0%)	24	37
1	F	194/236 (82%)	184 (95%)	9 (5%)	1 (0%)	24	37
1	G	194/236 (82%)	181 (93%)	12 (6%)	1 (0%)	24	37
1	H	195/236 (83%)	191 (98%)	4 (2%)	0	100	100
All	All	1561/1888 (83%)	1480 (95%)	72 (5%)	9 (1%)	21	32

5 of 9 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	29	ASP

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Mol	Chain	Res	Type
1	D	175	ARG
1	F	110	ALA
1	C	75	ASP
1	B	7	SER

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	143/176 (81%)	137 (96%)	6 (4%)	26	45
1	B	143/176 (81%)	132 (92%)	11 (8%)	12	20
1	C	144/176 (82%)	132 (92%)	12 (8%)	10	17
1	D	144/176 (82%)	133 (92%)	11 (8%)	12	21
1	E	146/176 (83%)	136 (93%)	10 (7%)	14	25
1	F	143/176 (81%)	133 (93%)	10 (7%)	14	24
1	G	143/176 (81%)	134 (94%)	9 (6%)	16	29
1	H	144/176 (82%)	131 (91%)	13 (9%)	9	15
All	All	1150/1408 (82%)	1068 (93%)	82 (7%)	13	23

5 of 82 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	F	168	LEU
1	H	39	GLN
1	F	194	VAL
1	G	131	TRP
1	H	131	TRP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 29 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	138	GLN

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Mol	Chain	Res	Type
1	H	180	HIS
1	E	68	HIS
1	G	138	GLN
1	E	32	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

8 non-standard protein/DNA/RNA residues are 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	$\# Z > 2$
1	CSO	A	150	1	3,6,7	0.58	0	1,6,8	0.35	0
1	CSO	B	150	1	3,6,7	0.55	0	1,6,8	0.70	0
1	CSO	G	150	1	3,6,7	0.93	0	1,6,8	0.35	0
1	CSO	H	150	1	3,6,7	0.62	0	1,6,8	0.42	0
1	CSO	F	150	1	3,6,7	0.78	0	1,6,8	0.42	0
1	CSO	C	150	1	3,6,7	0.87	0	1,6,8	0.78	0
1	CSO	E	150	1	3,6,7	0.70	0	1,6,8	0.71	0
1	CSO	D	150	1	3,6,7	0.69	0	1,6,8	0.04	0

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
1	CSO	A	150	1	-	0/1/5/7	-
1	CSO	B	150	1	-	0/1/5/7	-
1	CSO	G	150	1	-	0/1/5/7	-
1	CSO	H	150	1	-	0/1/5/7	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	CSO	F	150	1	-	1/1/5/7	-
1	CSO	C	150	1	-	0/1/5/7	-
1	CSO	E	150	1	-	0/1/5/7	-
1	CSO	D	150	1	-	0/1/5/7	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	F	150	CSO	N-CA-CB-SG

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	G	150	CSO	1	0

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	197/236 (83%)	-1.88	0 100 100	7, 15, 27, 37	0
1	B	197/236 (83%)	-1.88	0 100 100	7, 13, 24, 33	0
1	C	197/236 (83%)	-1.89	0 100 100	6, 14, 24, 30	0
1	D	197/236 (83%)	-1.88	0 100 100	7, 13, 25, 39	0
1	E	200/236 (84%)	-1.89	0 100 100	6, 12, 24, 41	0
1	F	196/236 (83%)	-1.90	0 100 100	6, 12, 21, 32	0
1	G	196/236 (83%)	-1.85	0 100 100	11, 18, 28, 38	0
1	H	197/236 (83%)	-1.87	0 100 100	6, 12, 23, 42	0
All	All	1577/1888 (83%)	-1.88	0 100 100	6, 14, 25, 42	0

There are no RSRZ outliers to report.

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
1	CSO	A	150	7/8	1.00	0.02	7,9,11,11	0
1	CSO	B	150	7/8	1.00	0.01	6,7,8,16	0
1	CSO	C	150	7/8	1.00	0.02	11,11,11,12	0
1	CSO	D	150	7/8	1.00	0.01	9,10,11,14	0
1	CSO	E	150	7/8	1.00	0.02	8,9,10,15	0
1	CSO	F	150	7/8	1.00	0.01	9,9,14,14	0
1	CSO	G	150	7/8	1.00	0.01	15,16,18,21	0
1	CSO	H	150	7/8	1.00	0.01	13,13,17,22	0

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.