wwPDB X-ray Structure Validation Summary Report (i)

Mar 13, 2024 – 04:35 PM JST

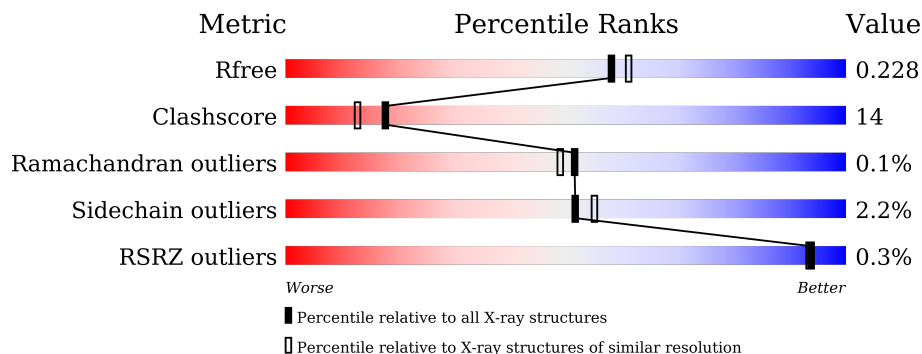|		
PDB ID	:	5EWS
Title	:	Sugar binding protein - human galectin-2
Authors	:	Su, J.Y.; Si, Y.L.
Deposited on	:	2015-11-21
Resolution	:	2.00 Å(reported)

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 2.00 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	Percentile Ranks	Value
Rfree		0.228
Clashscore		14
Ramachandran outliers		0.1%
Sidechain outliers		2.2%
RSRZ outliers		0.3%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution
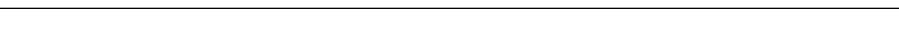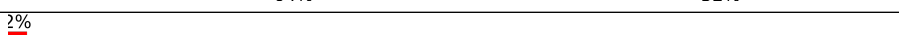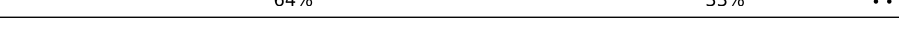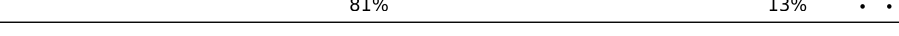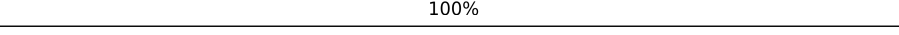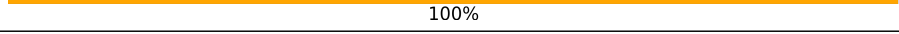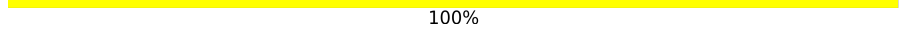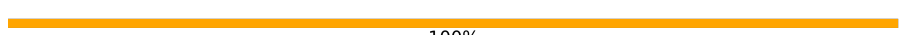
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

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 <=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	134	68% 28% ··
1	B	134	78% 19% ··
1	C	134	63% 33% ··
1	D	134	73% 23% ··
1	E	134	72% 25% ··
1	F	134	72% 25% ··

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Mol	Chain	Length	Quality of chain
1	G	134	72% 25%
1	H	134	73% 23%
1	I	134	74% 23%
1	J	134	71% 27%
1	K	134	76% 20%
1	L	134	69% 27%
1	M	134	70% 26%
1	N	134	64% 32%
1	O	134	64% 33%
1	P	134	81% 13%
2	Q	2	100%
2	R	2	100%
2	S	2	100%
2	T	2	100%
2	U	2	100%
2	V	2	100%
2	W	2	100%
2	X	2	100%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	BGC	W	1	-	-	X	-

2 Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 16873 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 Galectin-2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	B	131	Total	C	N	O	S	0	0	0
			1012	637	173	196	6			
1	A	131	Total	C	N	O	S	0	0	0
			1017	640	175	196	6			
1	C	131	Total	C	N	O	S	0	0	0
			1017	640	175	196	6			
1	D	131	Total	C	N	O	S	0	0	0
			1014	639	175	194	6			
1	E	131	Total	C	N	O	S	0	0	0
			1017	640	175	196	6			
1	F	131	Total	C	N	O	S	0	0	0
			1017	640	175	196	6			
1	G	131	Total	C	N	O	S	0	0	0
			1017	640	175	196	6			
1	H	131	Total	C	N	O	S	0	0	0
			1017	640	175	196	6			
1	I	131	Total	C	N	O	S	0	0	0
			1017	640	175	196	6			
1	J	131	Total	C	N	O	S	0	0	0
			1017	640	175	196	6			
1	K	131	Total	C	N	O	S	0	0	0
			1017	640	175	196	6			
1	L	131	Total	C	N	O	S	0	0	0
			1017	640	175	196	6			
1	M	131	Total	C	N	O	S	0	0	0
			1017	640	175	196	6			
1	N	131	Total	C	N	O	S	0	0	0
			1017	640	175	196	6			
1	O	131	Total	C	N	O	S	0	0	0
			1017	640	175	196	6			
1	P	131	Total	C	N	O	S	0	0	0
			1017	640	175	196	6			

There are 48 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	1	GLY	-	expression tag	UNP P05162
B	2	SER	-	expression tag	UNP P05162
B	3	HIS	-	expression tag	UNP P05162
A	1	GLY	-	expression tag	UNP P05162
A	2	SER	-	expression tag	UNP P05162
A	3	HIS	-	expression tag	UNP P05162
C	1	GLY	-	expression tag	UNP P05162
C	2	SER	-	expression tag	UNP P05162
C	3	HIS	-	expression tag	UNP P05162
D	1	GLY	-	expression tag	UNP P05162
D	2	SER	-	expression tag	UNP P05162
D	3	HIS	-	expression tag	UNP P05162
E	1	GLY	-	expression tag	UNP P05162
E	2	SER	-	expression tag	UNP P05162
E	3	HIS	-	expression tag	UNP P05162
F	1	GLY	-	expression tag	UNP P05162
F	2	SER	-	expression tag	UNP P05162
F	3	HIS	-	expression tag	UNP P05162
G	1	GLY	-	expression tag	UNP P05162
G	2	SER	-	expression tag	UNP P05162
G	3	HIS	-	expression tag	UNP P05162
H	1	GLY	-	expression tag	UNP P05162
H	2	SER	-	expression tag	UNP P05162
H	3	HIS	-	expression tag	UNP P05162
I	1	GLY	-	expression tag	UNP P05162
I	2	SER	-	expression tag	UNP P05162
I	3	HIS	-	expression tag	UNP P05162
J	1	GLY	-	expression tag	UNP P05162
J	2	SER	-	expression tag	UNP P05162
J	3	HIS	-	expression tag	UNP P05162
K	1	GLY	-	expression tag	UNP P05162
K	2	SER	-	expression tag	UNP P05162
K	3	HIS	-	expression tag	UNP P05162
L	1	GLY	-	expression tag	UNP P05162
L	2	SER	-	expression tag	UNP P05162
L	3	HIS	-	expression tag	UNP P05162
M	1	GLY	-	expression tag	UNP P05162
M	2	SER	-	expression tag	UNP P05162
M	3	HIS	-	expression tag	UNP P05162
N	1	GLY	-	expression tag	UNP P05162
N	2	SER	-	expression tag	UNP P05162
N	3	HIS	-	expression tag	UNP P05162

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Chain	Residue	Modelled	Actual	Comment	Reference
O	1	GLY	-	expression tag	UNP P05162
O	2	SER	-	expression tag	UNP P05162
O	3	HIS	-	expression tag	UNP P05162
P	1	GLY	-	expression tag	UNP P05162
P	2	SER	-	expression tag	UNP P05162
P	3	HIS	-	expression tag	UNP P05162

• Molecule 2 is an oligosaccharide called beta-D-galactopyranose-(1-4)-beta-D-glucopyranose.

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
2	Q	2	Total 23	C 12	O 11	0	0	0
2	R	2	Total 23	C 12	O 11	0	0	0
2	S	2	Total 23	C 12	O 11	0	0	0
2	T	2	Total 23	C 12	O 11	0	0	0
2	U	2	Total 23	C 12	O 11	0	0	0
2	V	2	Total 23	C 12	O 11	0	0	0
2	W	2	Total 23	C 12	O 11	0	0	0
2	X	2	Total 23	C 12	O 11	0	0	0

• Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	22	Total 22	O 22	0	0
3	A	29	Total 29	O 29	0	0
3	C	24	Total 24	O 24	0	0
3	D	28	Total 28	O 28	0	0

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	E	29	Total 29	O 29	0	0
3	F	16	Total 16	O 16	0	0
3	G	25	Total 25	O 25	0	0
3	H	27	Total 27	O 27	0	0
3	I	40	Total 40	O 40	0	0
3	J	32	Total 32	O 32	0	0
3	K	24	Total 24	O 24	0	0
3	L	21	Total 21	O 21	0	0
3	M	36	Total 36	O 36	0	0
3	N	34	Total 34	O 34	0	0
3	O	23	Total 23	O 23	0	0
3	P	15	Total 15	O 15	0	0

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.
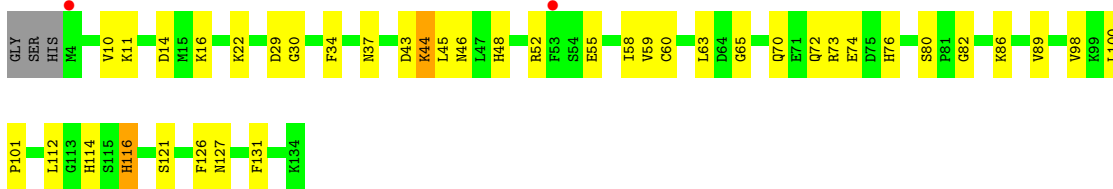
• Molecule 1: Galectin-2

Chain B:

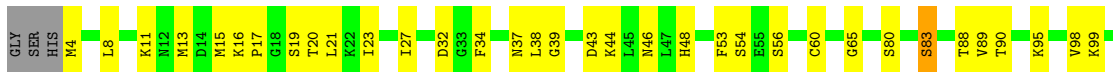• Molecule 1: Galectin-2

Chain A:

• Molecule 1: Galectin-2

Chain C:

• Molecule 1: Galectin-2

Chain D:

• Molecule 1: Galectin-2

Chain E:

GLY SER HIS M4 E9 V10 K11 N12 M13 K16 P17 G18 S19 T20 L21 K22 I36 N37 L45 H48 F49 N50 P51 R52 C60 N61 S62 Q72 R73 E74 D75 H76 K86 V89 S93 D94 K95 F96 K97 V98 D102 T107 N110 R111 L112 H116

S121 V122 R123 N127 K134

- Molecule 1: Galectin-2

Chain F:

GLY SER HIS M4 M15 D29 F34 N37 L38 G39 Q40 L45 N46 L47 H48 F49 N50 E55 I58 V59 C60 Q70 E71 Q72 R73 E74 D75 P81 T88 V89 T90 K97 V98 K99 L100 P101 D102 G103 H104 E105 H114 S115 H116 F126 S130 F131

K134

- Molecule 1: Galectin-2

Chain G:

GLY SER HIS M4 T5 L8 E9 V10 M13 D14 M15 K16 P17 I23 T24 N37 Q40 D43 K44 L45 N46 R52 G65 F79 K86 T90 D94 K97 F108 P109 L112 H116 L117 S118 Y119 L120 S121 V122 R123 M128 F131 F132

L133 K134

- Molecule 1: Galectin-2

Chain H:

GLY SER HIS M4 L8 M13 D14 M15 K16 P17 G18 S19 T20 L21 K22 I23 L38 G39 D43 H48 F49 N50 P51 R52 E55 S56 V59 C60 W68 G69 Q70 R73 F91 K97 V98 K99 E105 N110 R111 L112 G113 L117 S118 M128

F131 K132 L133 K134

- Molecule 1: Galectin-2

Chain I:

GLY SER HIS M4 V10 D14 M15 K16 S19 T20 L21 D32 V35 L38 G39 L45 H48 C60 L63 Q70 E71 Q72 R73 T88 V89 T90 D94 K97 V98 K99 R111 H116 L117 L120 R123 F131 K132 L133 K134

- Molecule 1: Galectin-2

Chain J:

GLY SER HIS M4 M15 K16 L21 K22 I23 S26 V35 L38 G39 Q40 K44 L45 H48 F49 N50 P51 R52 F53 S54 C60 L63 D64 N67 L77 C78 F79 S80 P81 T88 V89 S93 K99 L100 P101 D102 N110 G113 H116 L117

R123 M128 K134

• Molecule 1: Galectin-2

Chain K:

.%

76%   20%   ...

GLY SER HIS M4 T5 E9 M13 D14 L21 I36 N37 L38 H48 F49 E55 I58 V59 C60 E71 Q72 R73 E74 D75 H76 V89 F96 K97 V98 D102 E105 L106 T107 H114 S115 H116 L117 S121 V122 R123 S130 K134

• Molecule 1: Galectin-2

Chain L:

69%   27%   ..

GLY SER HIS M4 E7 K11 M15 K22 I23 D29 D32 V35 I36 N37 L38 L45 N46 L47 H48 F49 N50 F53 S54 I58 V59 C60 E71 Q72 R73 E74 C78 P81 G82 K86 V89 D94 K95 V98 L106 N110

H114 S115 R123 N127 S130 F131 K134

• Molecule 1: Galectin-2

Chain M:

70%   26%   ..

GLY SER HIS M4 T5 G6 E7 L8 E9 V10 M15 K16 P17 K22 I23 S26 I27 A28 D29 G30 T31 L38 G39 K44 H48 R52 F53 S54 D64 E71 Q72 C78 T88 V89 T90 F91 E92 S93 D94 K95 F96 K97 V98 K99 T107 H116 L117

L120 N127 M128 K132 L133 K134

• Molecule 1: Galectin-2

Chain N:

64%   32%   ..

GLY SER HIS M4 T5 G6 E7 L8 M15 K16 T20 L21 K22 I23 T24 V35 I36 N37 L38 G39 Q40 D43 K44 L45 H48 C60 L63 D64 G65 H76 K86 V89 T90 F91 K97 V98 K99 L100 P101 D102 E105 N110 R111 L112 G113 H114 S115

H116 L117 S121 V122 R123 F126 N127 M128 F131 K132 L133 K134

• Molecule 1: Galectin-2

Chain O:

2%

64%   33%   ..

GLY SER HIS M4 E7 L8 D14 M15 K16 K22 D29 D32 V35 I36 N37 L38 L45 N46 L47 H48 F49 N50 P51 R52 F53 V59 C60 H76 L77 C78 G82 K86 V89 T90 S93 D94 K95 F96 K97 V98 K99 L100 P101 D102 F108 P109

N110 H114 L117 S121 V122 R123 F126 S129 S130 K134

• Molecule 1: Galectin-2

Chain P:

• Molecule 2: beta-D-galactopyranose-(1-4)-beta-D-glucopyranose

Chain Q:

• Molecule 2: beta-D-galactopyranose-(1-4)-beta-D-glucopyranose

Chain R:

• Molecule 2: beta-D-galactopyranose-(1-4)-beta-D-glucopyranose

Chain S:

• Molecule 2: beta-D-galactopyranose-(1-4)-beta-D-glucopyranose

Chain T:

• Molecule 2: beta-D-galactopyranose-(1-4)-beta-D-glucopyranose

Chain U:

• Molecule 2: beta-D-galactopyranose-(1-4)-beta-D-glucopyranose

Chain V:
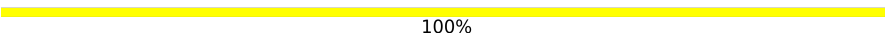

• Molecule 2: beta-D-galactopyranose-(1-4)-beta-D-glucopyranose

Chain W:

BGC1
GAL2

• Molecule 2: beta-D-galactopyranose-(1-4)-beta-D-glucopyranose

Chain X:

100%

BGC1
GAL2

4   Data and refinement statistics   (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	38.40Å 106.94Å 121.57Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.95 – 2.00 48.95 – 2.00	Depositor EDS
% Data completeness (in resolution range)	97.6 (48.95-2.00) 92.7 (48.95-2.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.19 (at 2.00Å)	Xtriage
Refinement program	PHENIX 1.10.1_2155	Depositor
R, R_{free}	0.214 , 0.249 0.201 , 0.228	Depositor DCC
R_{free} test set	1993 reflections (1.56%)	wwPDB-VP
Wilson B-factor (Å^2)	24.9	Xtriage
Anisotropy	0.514	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.39 , 32.8	EDS
L-test for twinning[2]	$< |L| > = 0.44, < L^2 > = 0.27$	Xtriage
Estimated twinning fraction	0.469 for h,-k,-l 0.459 for -h,k,-l 0.458 for -h,-k,l	Xtriage
Reported twinning fraction	0.490 for -h,-k,l	Depositor
Outliers	0 of 127534 reflections	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	16873	wwPDB-VP
Average B, all atoms (Å^2)	31.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 33.95 % 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 7.3770e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ 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: BGC, GAL

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	0.33	0/1039	0.58	0/1395
1	B	0.26	0/1033	0.50	0/1387
1	C	0.29	0/1039	0.56	0/1395
1	D	0.30	0/1036	0.54	0/1391
1	E	0.30	0/1039	0.60	1/1395 (0.1%)
1	F	0.31	0/1039	0.55	0/1395
1	G	0.27	0/1039	0.52	0/1395
1	H	0.30	0/1039	0.57	2/1395 (0.1%)
1	I	0.28	0/1039	0.54	0/1395
1	J	0.33	0/1039	0.54	0/1395
1	K	0.26	0/1039	0.56	0/1395
1	L	0.28	0/1039	0.54	0/1395
1	M	0.31	0/1039	0.55	0/1395
1	N	0.34	0/1039	0.56	0/1395
1	O	0.27	0/1039	0.53	0/1395
1	P	0.27	0/1039	0.60	1/1395 (0.1%)
All	All	0.30	0/16615	0.55	4/22308 (0.0%)

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	K	0	1
1	P	0	1
All	All	0	2

There are no bond length outliers.

All (4) bond angle outliers are listed below:

W O R L D W I D E
wwPDB
PROTEIN DATA BANK

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	P	112	LEU	CB-CG-CD2	-8.56	96.44	111.00
1	E	112	LEU	CB-CG-CD2	-8.01	97.38	111.00
1	H	15	MET	C-N-CA	5.61	135.74	121.70
1	H	43	ASP	CB-CG-OD1	-5.09	113.72	118.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	K	114	HIS	Peptide
1	P	114	HIS	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	1017	0	988	42	0
1	B	1012	0	983	23	0
1	C	1017	0	988	38	0
1	D	1014	0	986	24	0
1	E	1017	0	988	28	0
1	F	1017	0	988	25	0
1	G	1017	0	988	22	0
1	H	1017	0	988	26	0
1	I	1017	0	988	24	0
1	J	1017	0	988	21	0
1	K	1017	0	988	33	0
1	L	1017	0	988	29	0
1	M	1017	0	988	31	0
1	N	1017	0	988	46	0
1	O	1017	0	988	33	0
1	P	1017	0	988	20	0
2	Q	23	0	20	1	0
2	R	23	0	20	3	0
2	S	23	0	20	0	0
2	T	23	0	20	5	0
2	U	23	0	20	1	0
2	V	23	0	20	5	0

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W O R L D W I D E
wwPDB
PROTEIN DATA BANK

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	W	23	0	20	9	0
2	X	23	0	20	3	0
3	A	29	0	0	15	0
3	B	22	0	0	7	0
3	C	24	0	0	5	0
3	D	28	0	0	4	0
3	E	29	0	0	13	0
3	F	16	0	0	6	0
3	G	25	0	0	4	0
3	H	27	0	0	2	0
3	I	40	0	0	7	0
3	J	32	0	0	5	0
3	K	24	0	0	8	0
3	L	21	0	0	9	1
3	M	36	0	0	8	0
3	N	34	0	0	7	1
3	O	23	0	0	10	0
3	P	15	0	0	4	0
All	All	16873	0	15961	442	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 14.

The worst 5 of 442 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:O:93:SER:HB2	1:O:114:HIS:HB2	1.44	0.98
1:A:43:ASP:OD2	1:A:44:LYS:HE3	1.65	0.94
1:I:132:LYS:HG2	1:O:130:SER:HB2	1.54	0.89
1:A:55:GLU:HG2	2:R:1:BGC:H6C2	1.58	0.84
1:M:52:ARG:NH2	2:W:2:GAL:O4	2.10	0.83

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:L:212:HOH:O	3:N:311:HOH:O[1_454]	1.76	0.44

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	129/134 (96%)	125 (97%)	4 (3%)	0	100	100
1	B	129/134 (96%)	126 (98%)	3 (2%)	0	100	100
1	C	129/134 (96%)	127 (98%)	2 (2%)	0	100	100
1	D	129/134 (96%)	127 (98%)	2 (2%)	0	100	100
1	E	129/134 (96%)	124 (96%)	4 (3%)	1 (1%)	19	13
1	F	129/134 (96%)	127 (98%)	2 (2%)	0	100	100
1	G	129/134 (96%)	127 (98%)	2 (2%)	0	100	100
1	H	129/134 (96%)	128 (99%)	1 (1%)	0	100	100
1	I	129/134 (96%)	127 (98%)	2 (2%)	0	100	100
1	J	129/134 (96%)	126 (98%)	3 (2%)	0	100	100
1	K	129/134 (96%)	123 (95%)	4 (3%)	2 (2%)	9	4
1	L	129/134 (96%)	127 (98%)	2 (2%)	0	100	100
1	M	129/134 (96%)	126 (98%)	3 (2%)	0	100	100
1	N	129/134 (96%)	127 (98%)	2 (2%)	0	100	100
1	O	129/134 (96%)	128 (99%)	1 (1%)	0	100	100
1	P	129/134 (96%)	126 (98%)	3 (2%)	0	100	100
All	All	2064/2144 (96%)	2021 (98%)	40 (2%)	3 (0%)	51	49

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	K	114	HIS
1	E	116	HIS
1	K	115	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	116/118 (98%)	113 (97%)	3 (3%)	46	48
1	B	115/118 (98%)	114 (99%)	1 (1%)	78	83
1	C	116/118 (98%)	112 (97%)	4 (3%)	37	36
1	D	115/118 (98%)	113 (98%)	2 (2%)	60	65
1	E	116/118 (98%)	116 (100%)	0	100	100
1	F	116/118 (98%)	112 (97%)	4 (3%)	37	36
1	G	116/118 (98%)	114 (98%)	2 (2%)	60	65
1	H	116/118 (98%)	114 (98%)	2 (2%)	60	65
1	I	116/118 (98%)	113 (97%)	3 (3%)	46	48
1	J	116/118 (98%)	115 (99%)	1 (1%)	78	83
1	K	116/118 (98%)	116 (100%)	0	100	100
1	L	116/118 (98%)	112 (97%)	4 (3%)	37	36
1	M	116/118 (98%)	113 (97%)	3 (3%)	46	48
1	N	116/118 (98%)	113 (97%)	3 (3%)	46	48
1	O	116/118 (98%)	112 (97%)	4 (3%)	37	36
1	P	116/118 (98%)	112 (97%)	4 (3%)	37	36
All	All	1854/1888 (98%)	1814 (98%)	40 (2%)	52	55

5 of 40 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	M	116	HIS
1	O	114	HIS
1	N	5	THR
1	O	50	ASN
1	P	19	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 47 such sidechains are listed below:

Mol	Chain	Res	Type
1	K	76	HIS
1	M	76	HIS
1	K	116	HIS
1	M	12	ASN
1	N	76	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

16 monosaccharides 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	$\#|Z| > 2$
2	BGC	Q	1	2	12,12,12	2.36	6 (50%)	17,17,17	0.83	1 (5%)
2	GAL	Q	2	2	11,11,12	1.70	3 (27%)	15,15,17	3.52	6 (40%)
2	BGC	R	1	2	12,12,12	2.34	5 (41%)	17,17,17	1.00	1 (5%)
2	GAL	R	2	2	11,11,12	1.64	2 (18%)	15,15,17	2.73	7 (46%)
2	BGC	S	1	2	12,12,12	2.29	6 (50%)	17,17,17	0.69	0
2	GAL	S	2	2	11,11,12	1.64	3 (27%)	15,15,17	1.24	1 (6%)
2	BGC	T	1	2	12,12,12	2.25	6 (50%)	17,17,17	1.10	2 (11%)
2	GAL	T	2	2	11,11,12	1.61	2 (18%)	15,15,17	2.90	6 (40%)
2	BGC	U	1	2	12,12,12	2.28	5 (41%)	17,17,17	0.84	0
2	GAL	U	2	2	11,11,12	1.61	2 (18%)	15,15,17	3.36	6 (40%)
2	BGC	V	1	2	12,12,12	2.34	5 (41%)	17,17,17	0.92	1 (5%)
2	GAL	V	2	2	11,11,12	1.67	3 (27%)	15,15,17	2.78	7 (46%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
2	BGC	W	1	2	12,12,12	2.00	4 (33%)	17,17,17	1.58	4 (23%)
2	GAL	W	2	2	11,11,12	2.01	3 (27%)	15,15,17	3.11	6 (40%)
2	BGC	X	1	2	12,12,12	2.32	5 (41%)	17,17,17	0.95	1 (5%)
2	GAL	X	2	2	11,11,12	1.60	2 (18%)	15,15,17	2.83	7 (46%)

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
2	BGC	Q	1	2	-	2/2/22/22	0/1/1/1
2	GAL	Q	2	2	-	0/2/19/22	0/1/1/1
2	BGC	R	1	2	-	2/2/22/22	0/1/1/1
2	GAL	R	2	2	-	0/2/19/22	0/1/1/1
2	BGC	S	1	2	-	0/2/22/22	0/1/1/1
2	GAL	S	2	2	-	0/2/19/22	0/1/1/1
2	BGC	T	1	2	-	0/2/22/22	0/1/1/1
2	GAL	T	2	2	-	2/2/19/22	0/1/1/1
2	BGC	U	1	2	-	0/2/22/22	0/1/1/1
2	GAL	U	2	2	-	0/2/19/22	0/1/1/1
2	BGC	V	1	2	-	2/2/22/22	0/1/1/1
2	GAL	V	2	2	-	2/2/19/22	0/1/1/1
2	BGC	W	1	2	-	2/2/22/22	0/1/1/1
2	GAL	W	2	2	-	1/2/19/22	0/1/1/1
2	BGC	X	1	2	-	2/2/22/22	0/1/1/1
2	GAL	X	2	2	-	1/2/19/22	0/1/1/1

The worst 5 of 62 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	W	2	GAL	C2-C3	-4.53	1.45	1.52
2	Q	1	BGC	O5-C1	4.39	1.53	1.42
2	R	1	BGC	O5-C1	4.27	1.53	1.42
2	V	1	BGC	O5-C1	4.24	1.53	1.42
2	X	1	BGC	O4-C4	4.22	1.52	1.43

The worst 5 of 56 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	W	2	GAL	C1-C2-C3	9.47	121.31	109.67
2	Q	2	GAL	C1-C2-C3	9.42	121.25	109.67
2	U	2	GAL	C1-C2-C3	8.22	119.78	109.67
2	X	2	GAL	C1-C2-C3	7.37	118.73	109.67
2	R	2	GAL	C1-C2-C3	7.14	118.44	109.67

There are no chirality outliers.

5 of 16 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	R	1	BGC	O5-C5-C6-O6
2	V	2	GAL	C4-C5-C6-O6
2	R	1	BGC	C4-C5-C6-O6
2	W	1	BGC	C4-C5-C6-O6
2	T	2	GAL	O5-C5-C6-O6

There are no ring outliers.

14 monomers are involved in 27 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	W	2	GAL	4	0
2	T	1	BGC	1	0
2	W	1	BGC	6	0
2	Q	1	BGC	1	0
2	V	2	GAL	3	0
2	X	1	BGC	2	0
2	T	2	GAL	4	0
2	U	1	BGC	1	0
2	Q	2	GAL	1	0
2	R	1	BGC	3	0
2	U	2	GAL	1	0
2	R	2	GAL	2	0
2	X	2	GAL	3	0
2	V	1	BGC	3	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

Oligosaccharide Chain Q

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain R

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain S

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain T

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain U

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain V

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain W

Bond lengths

Bond angles

Torsions

Rings

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 ⓘ

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(Å²)	Q<0.9
1	A	131/134 (97%)	-0.20	2 (1%)	73	72	19, 34, 48, 60	0
1	B	131/134 (97%)	-0.28	0	100	100	16, 31, 41, 47	0
1	C	131/134 (97%)	-0.39	0	100	100	17, 30, 43, 49	0
1	D	131/134 (97%)	-0.27	0	100	100	20, 32, 43, 54	0
1	E	131/134 (97%)	-0.35	0	100	100	16, 28, 41, 60	0
1	F	131/134 (97%)	-0.13	1 (0%)	86	85	17, 35, 48, 52	0
1	G	131/134 (97%)	-0.26	0	100	100	20, 31, 44, 59	0
1	H	131/134 (97%)	-0.38	0	100	100	19, 30, 42, 50	0
1	I	131/134 (97%)	-0.34	0	100	100	18, 29, 39, 47	0
1	J	131/134 (97%)	-0.32	0	100	100	20, 32, 45, 52	0
1	K	131/134 (97%)	-0.36	1 (0%)	86	85	14, 28, 40, 60	0
1	L	131/134 (97%)	-0.08	0	100	100	18, 36, 50, 53	0
1	M	131/134 (97%)	-0.38	0	100	100	18, 29, 40, 45	0
1	N	131/134 (97%)	-0.27	0	100	100	21, 32, 45, 53	0
1	O	131/134 (97%)	-0.18	3 (2%)	60	59	19, 34, 49, 59	0
1	P	131/134 (97%)	-0.28	0	100	100	16, 31, 43, 51	0
All	All	2096/2144 (97%)	-0.28	7 (0%)	94	93	14, 31, 46, 60	0

The worst 5 of 7 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	O	53	PHE	2.8
1	O	114	HIS	2.7
1	A	53	PHE	2.7
1	F	114	HIS	2.5
1	K	5	THR	2.4

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

There are no non-standard protein/DNA/RNA residues in this entry.

6.3   Carbohydrates ⓘ

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
2	BGC	T	1	12/12	0.79	0.14	38,43,46,47	0
2	GAL	T	2	11/12	0.81	0.24	38,42,46,50	0
2	BGC	V	1	12/12	0.81	0.22	40,47,49,52	0
2	BGC	X	1	12/12	0.81	0.18	42,50,55,59	0
2	BGC	W	1	12/12	0.82	0.19	37,44,51,54	0
2	GAL	W	2	11/12	0.85	0.14	21,35,40,40	0
2	BGC	R	1	12/12	0.86	0.16	34,40,47,49	0
2	GAL	R	2	11/12	0.86	0.16	29,36,43,45	0
2	GAL	V	2	11/12	0.87	0.18	33,37,44,47	0
2	GAL	X	2	11/12	0.89	0.21	33,40,47,48	0
2	BGC	U	1	12/12	0.93	0.12	29,34,37,38	0
2	GAL	U	2	11/12	0.93	0.11	25,28,31,32	0
2	GAL	Q	2	11/12	0.93	0.09	23,27,32,33	0
2	GAL	S	2	11/12	0.93	0.10	14,17,21,25	0
2	BGC	S	1	12/12	0.95	0.11	19,29,34,41	0
2	BGC	Q	1	12/12	0.96	0.09	24,32,35,36	0

The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.
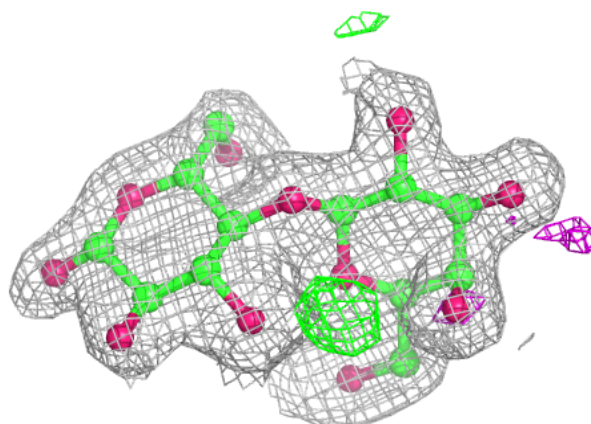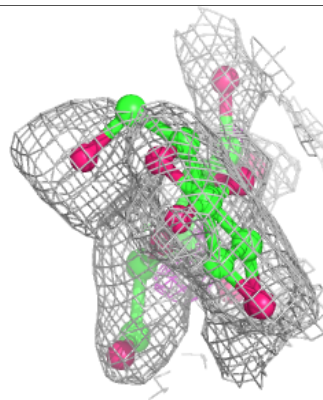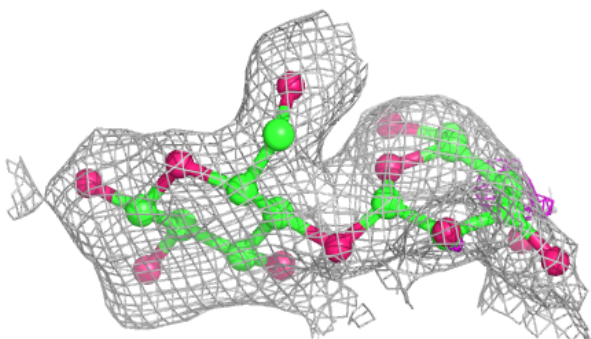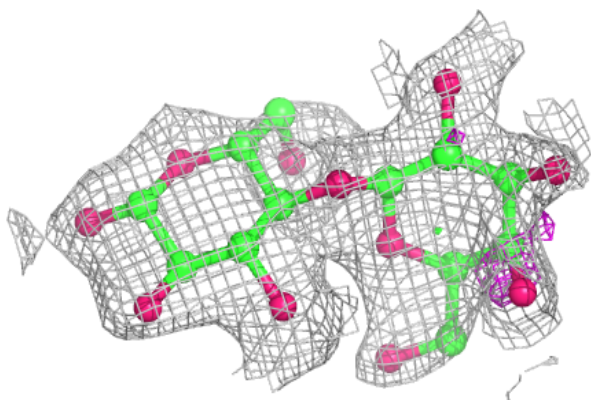
Electron density around Chain Q:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
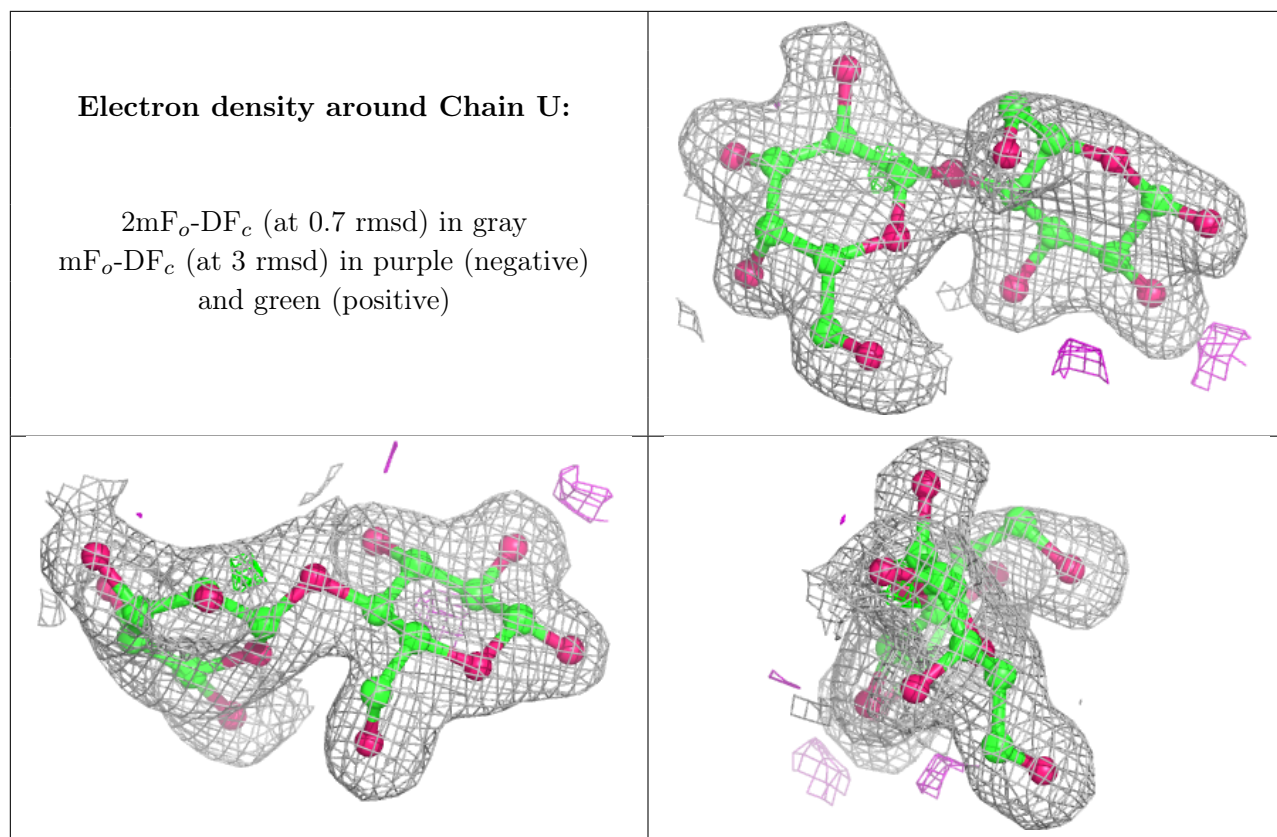mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
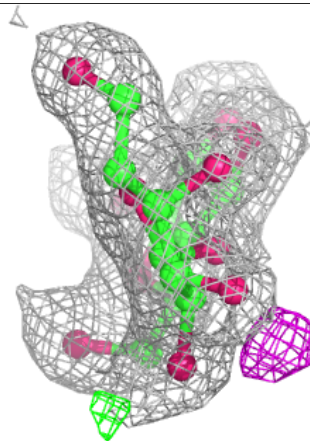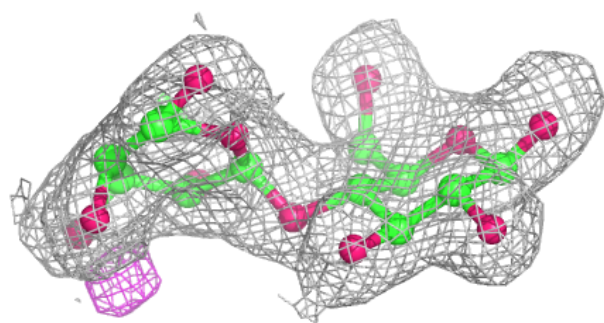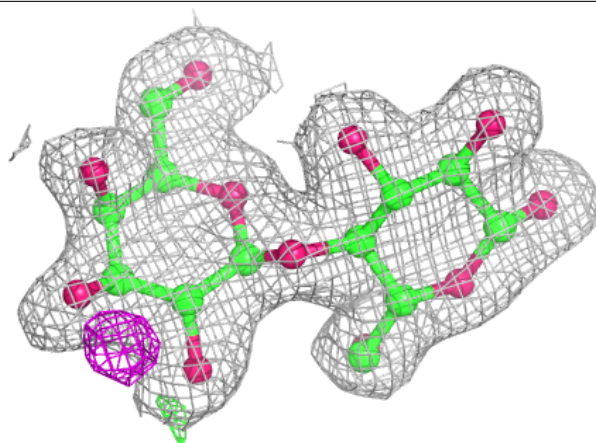
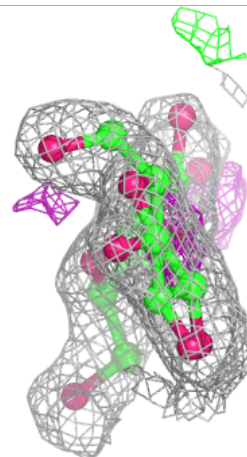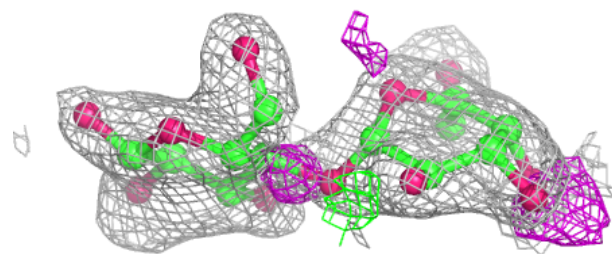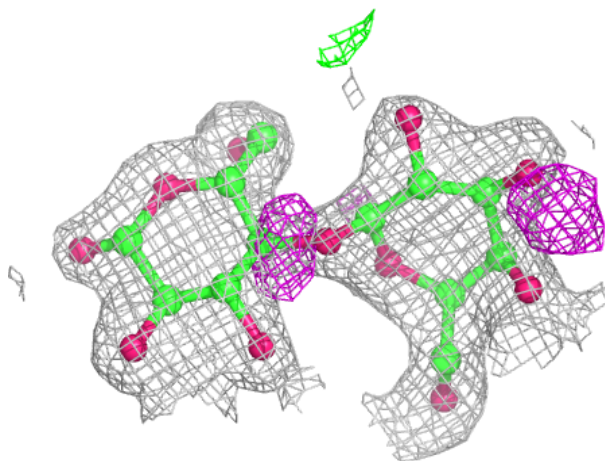**Electron density around Chain R:**

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
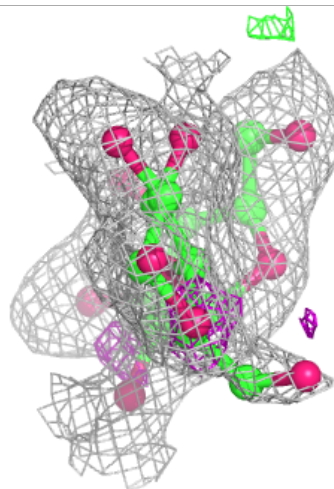$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
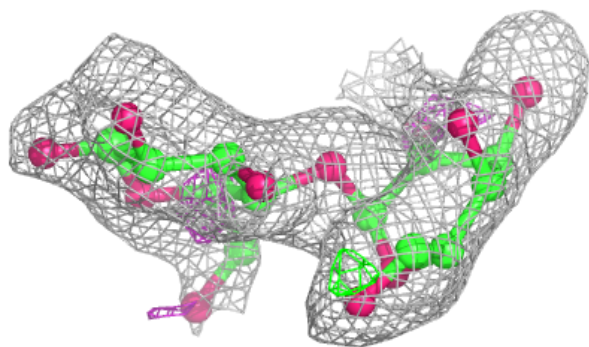and green (positive)
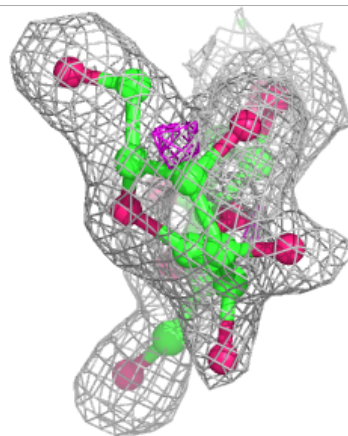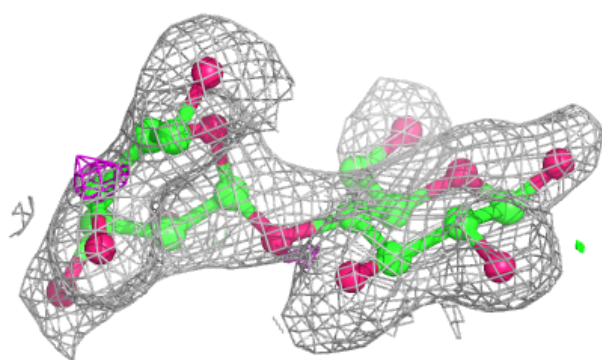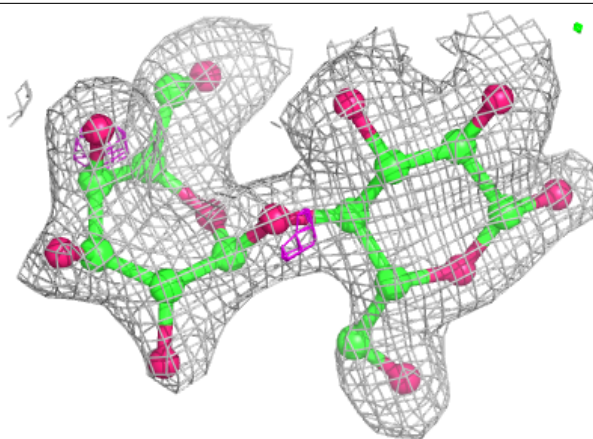
Electron density around Chain S:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
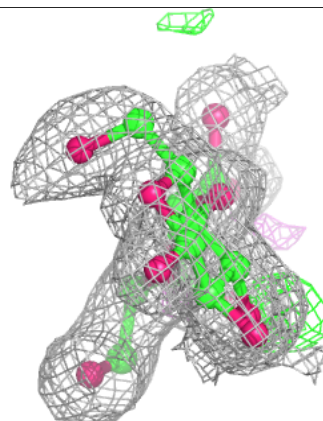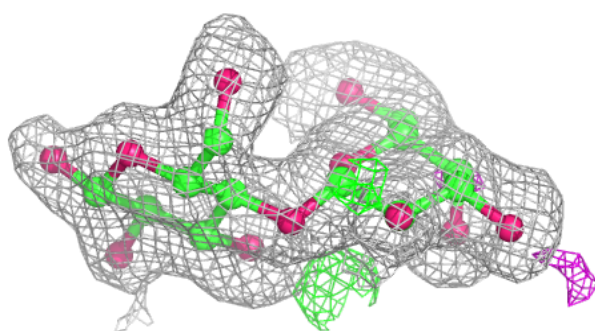
Electron density around Chain T:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around Chain U:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
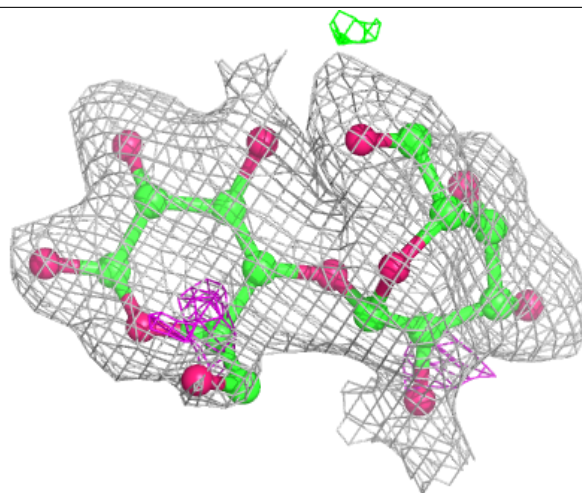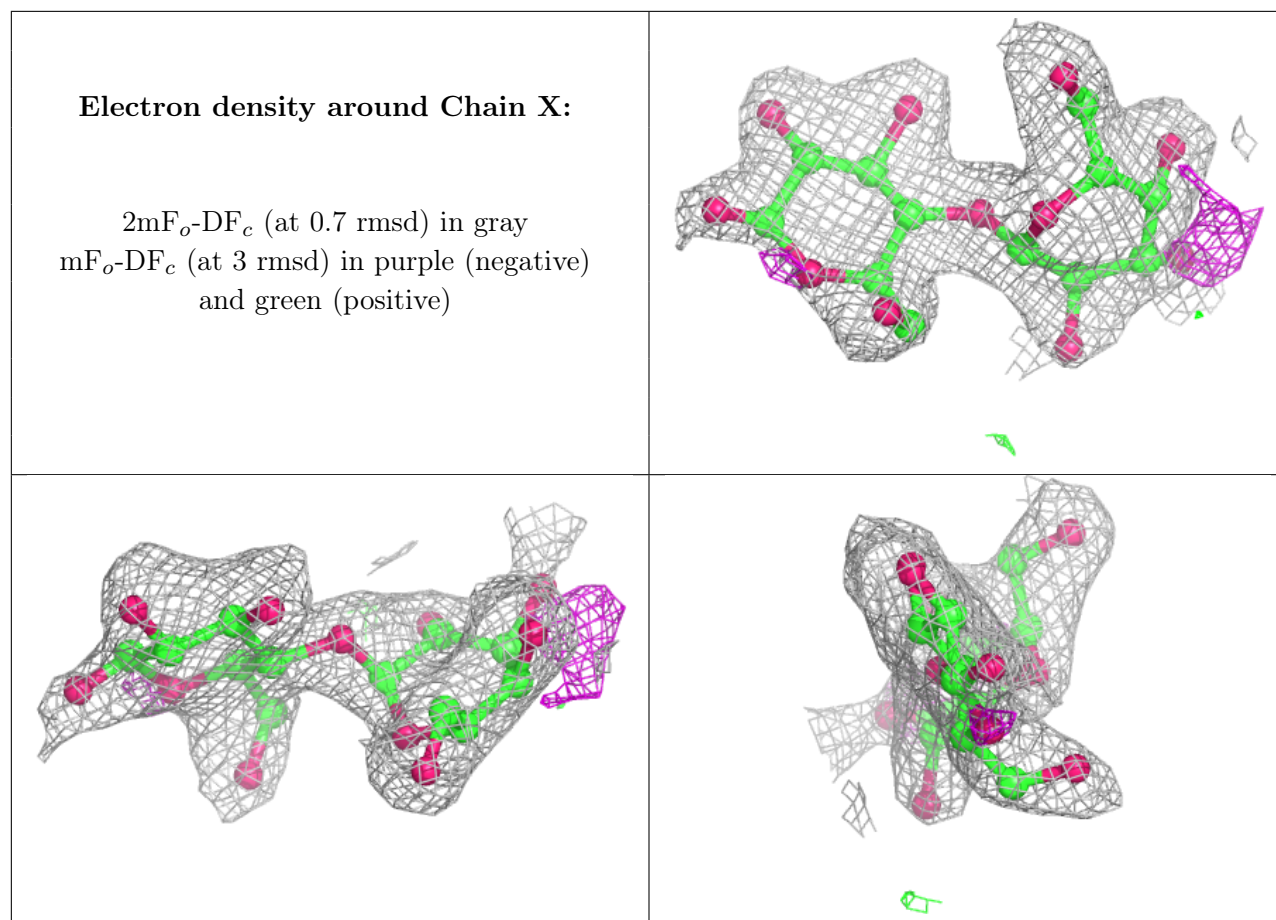and green (positive)

Electron density around Chain V:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around Chain W:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around Chain X:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative) and green (positive)

6.4 Ligands ⓘ

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.