



# wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 1, 2016 – 01:41 PM GMT

PDB ID : 3UKL  
Title : Crystal structure of UDP-galactopyranose mutase from *Aspergillus fumigatus* in complex with UDP  
Authors : Van Straaten, K.E.; Sanders, D.A.R.  
Deposited on : 2011-11-09  
Resolution : 2.63 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](mailto:validation@mail.wwpdb.org)  
A user guide is available at  
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20026688  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk26865

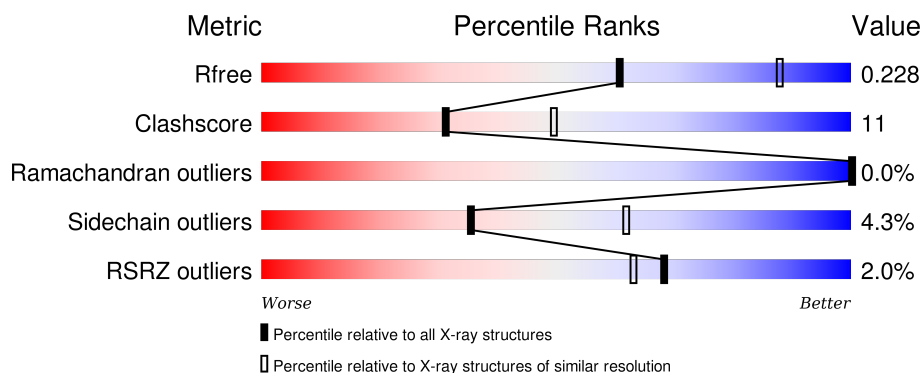
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.63 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))
$R_{free}$	91344	3377 (2.68-2.60)
Clashscore	102246	3781 (2.68-2.60)
Ramachandran outliers	100387	3722 (2.68-2.60)
Sidechain outliers	100360	3722 (2.68-2.60)
RSRZ outliers	91569	3388 (2.68-2.60)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	510	<div> <div>2%</div> <div>77%</div> <div>22%</div> <div>.</div> </div>
1	B	510	<div> <div>%</div> <div>79%</div> <div>19%</div> <div>.</div> </div>
1	C	510	<div> <div>2%</div> <div>78%</div> <div>20%</div> <div>.</div> </div>
1	D	510	<div> <div>2%</div> <div>77%</div> <div>21%</div> <div>.</div> </div>
1	E	510	<div> <div>2%</div> <div>78%</div> <div>20%</div> <div>.</div> </div>

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Mol	Chain	Length	Quality of chain
1	F	510	<div><div><div>3%</div><div>75%</div><div>23%</div></div><div></div></div>
1	G	510	<div><div><div>%</div><div>75%</div><div>23%</div></div><div></div></div>
1	H	510	<div><div><div>3%</div><div>78%</div><div>21%</div></div><div></div></div>

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 33747 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.

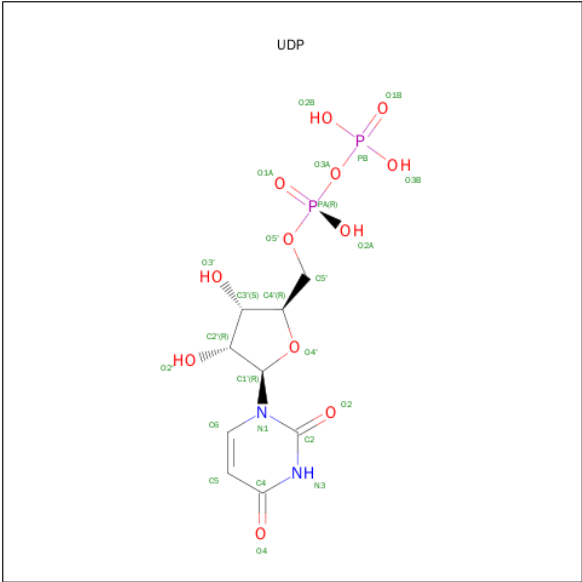
- Molecule 1 is a protein called UDP-galactopyranose mutase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	510	Total	C	N	O	S	0	0	0
			4004	2540	687	756	21			
1	B	510	Total	C	N	O	S	0	1	0
			4015	2549	688	757	21			
1	C	510	Total	C	N	O	S	0	1	0
			4015	2546	691	757	21			
1	D	510	Total	C	N	O	S	0	0	0
			4004	2540	687	756	21			
1	E	510	Total	C	N	O	S	0	1	0
			4015	2549	688	757	21			
1	F	510	Total	C	N	O	S	0	0	0
			4004	2540	687	756	21			
1	G	510	Total	C	N	O	S	0	0	0
			4004	2540	687	756	21			
1	H	510	Total	C	N	O	S	0	1	0
			4015	2546	691	757	21			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	511	LEU	-	EXPRESSION TAG	UNP Q4W1X2
B	511	LEU	-	EXPRESSION TAG	UNP Q4W1X2
C	511	LEU	-	EXPRESSION TAG	UNP Q4W1X2
D	511	LEU	-	EXPRESSION TAG	UNP Q4W1X2
E	511	LEU	-	EXPRESSION TAG	UNP Q4W1X2
F	511	LEU	-	EXPRESSION TAG	UNP Q4W1X2
G	511	LEU	-	EXPRESSION TAG	UNP Q4W1X2
H	511	LEU	-	EXPRESSION TAG	UNP Q4W1X2

- Molecule 2 is URIDINE-5'-DIPHOSPHATE (three-letter code: UDP) (formula: C<sub>9</sub>H<sub>14</sub>N<sub>2</sub>O<sub>12</sub>P<sub>2</sub>).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			25	9	2	12	2		
2	B	1	Total	C	N	O	P	0	0
			25	9	2	12	2		
2	C	1	Total	C	N	O	P	0	0
			25	9	2	12	2		
2	D	1	Total	C	N	O	P	0	0
			25	9	2	12	2		
2	E	1	Total	C	N	O	P	0	0
			25	9	2	12	2		
2	F	1	Total	C	N	O	P	0	0
			25	9	2	12	2		
2	G	1	Total	C	N	O	P	0	0
			25	9	2	12	2		
2	H	1	Total	C	N	O	P	0	0
			25	9	2	12	2		

- Molecule 3 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula:  $C_{27}H_{33}N_9O_{15}P_2$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
3	B	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
3	C	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
3	D	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
3	E	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
3	F	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
3	G	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
3	H	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 4 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	E	1	Total	Cl	0	0
			1	1		
4	H	1	Total	Cl	0	0
			1	1		
4	B	1	Total	Cl	0	0
			1	1		
4	C	1	Total	Cl	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	2	Total	Cl	0	0
			2	2		
4	F	2	Total	Cl	0	0
			2	2		

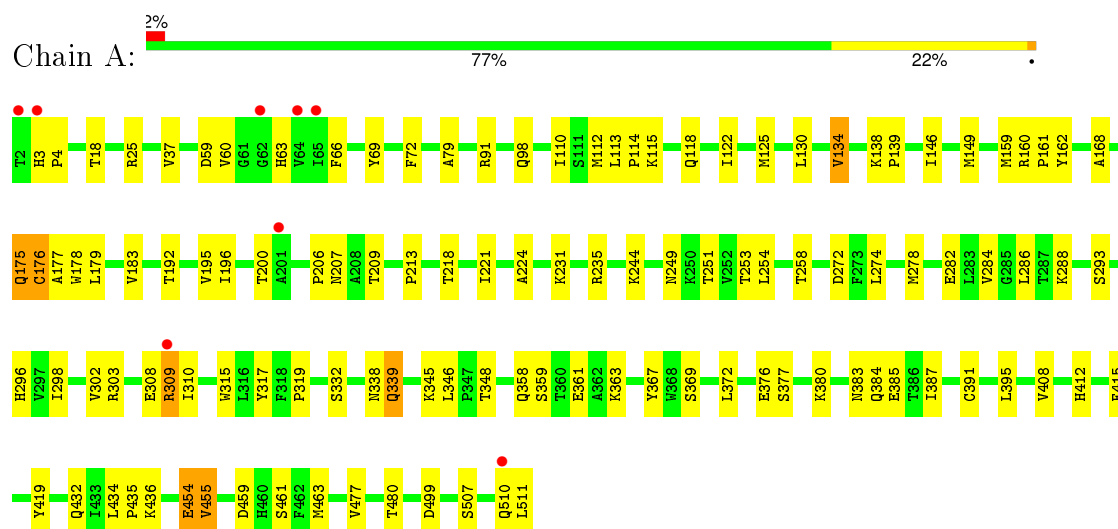
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	148	Total	O	0	0
			148	148		
5	B	151	Total	O	0	0
			151	151		
5	C	155	Total	O	0	0
			155	155		
5	D	140	Total	O	0	0
			140	140		
5	E	125	Total	O	0	0
			125	125		
5	F	122	Total	O	0	0
			122	122		
5	G	100	Total	O	0	0
			100	100		
5	H	98	Total	O	0	0
			98	98		

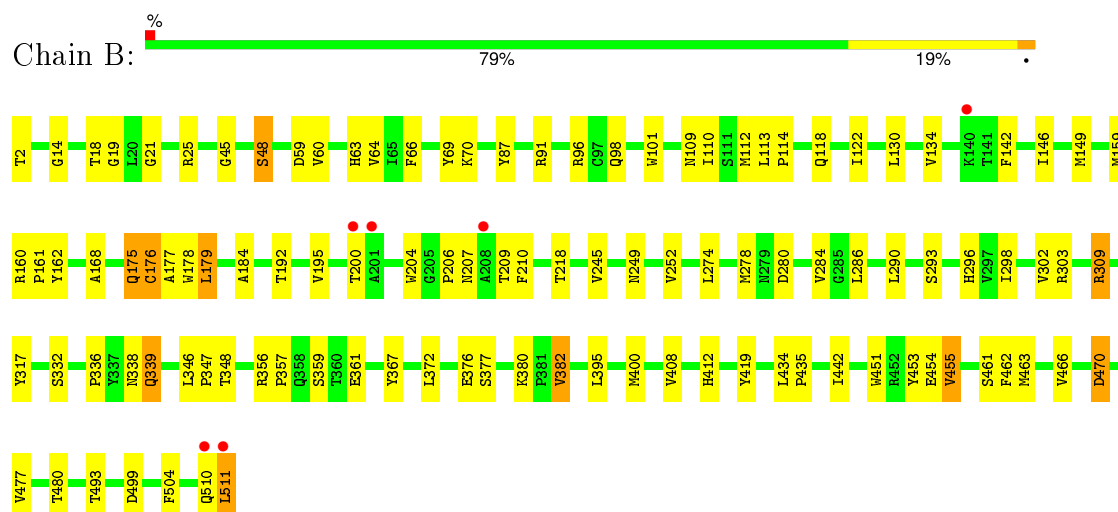
### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

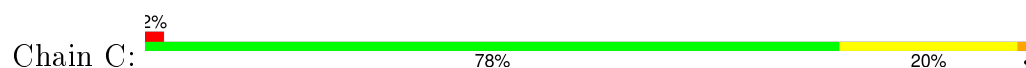
#### • Molecule 1: UDP-galactopyranose mutase



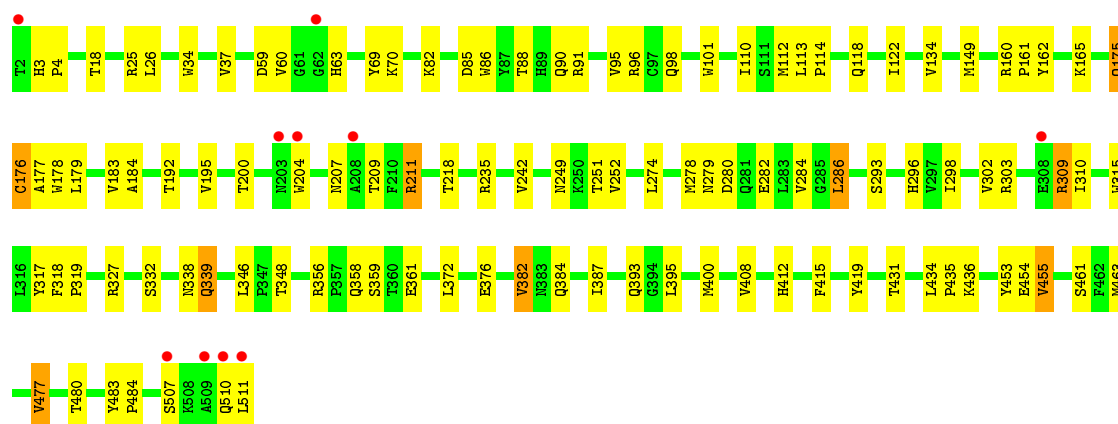
#### • Molecule 1: UDP-galactopyranose mutase



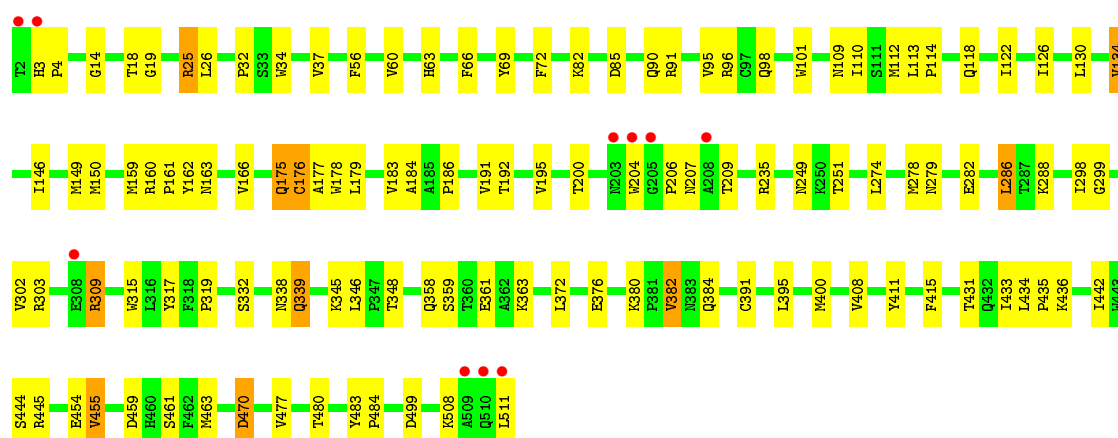
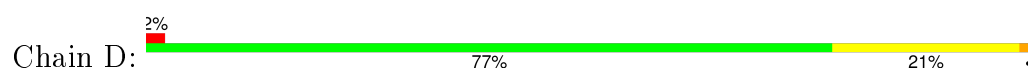
#### • Molecule 1: UDP-galactopyranose mutase



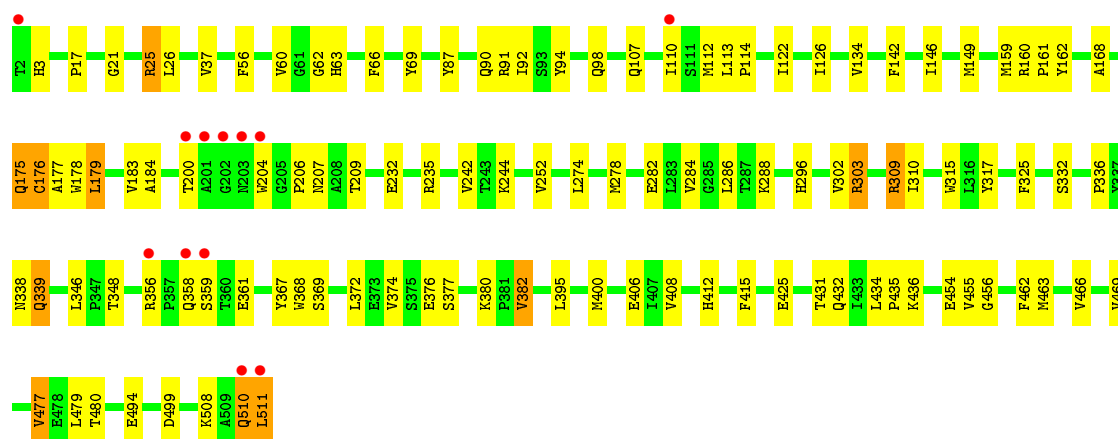
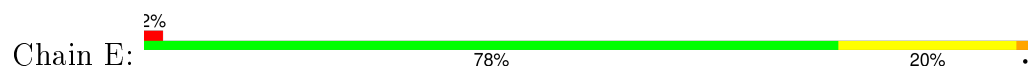




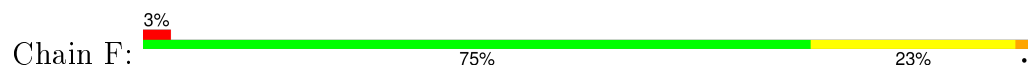
• Molecule 1: UDP-galactopyranose mutase

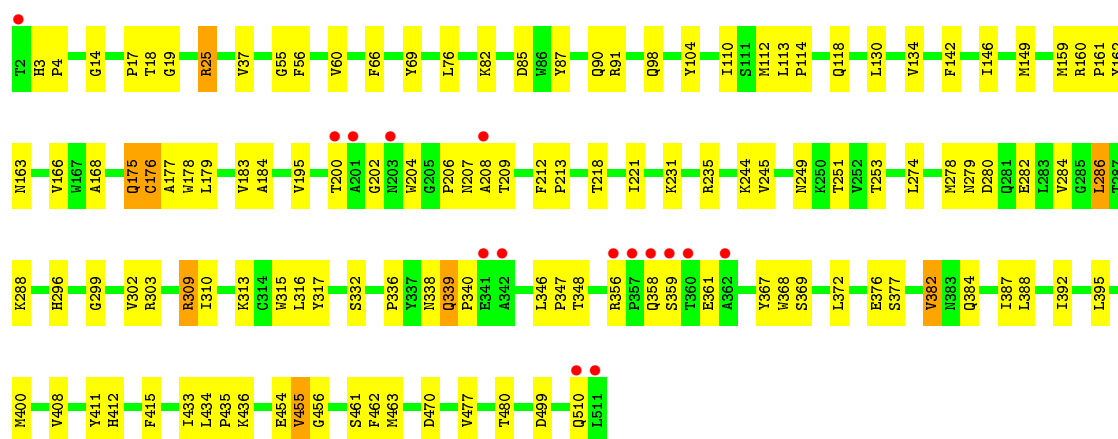


• Molecule 1: UDP-galactopyranose mutase

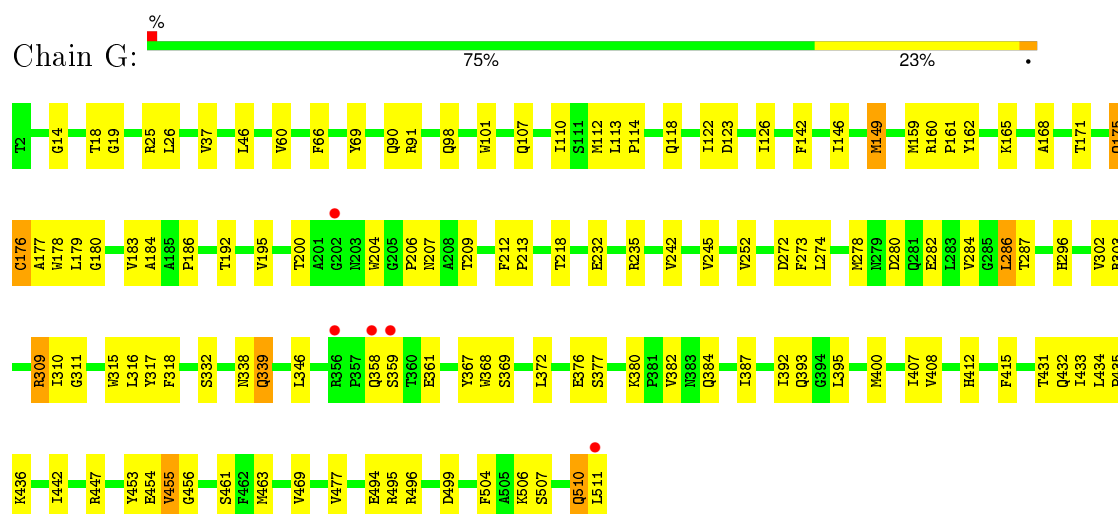


• Molecule 1: UDP-galactopyranose mutase

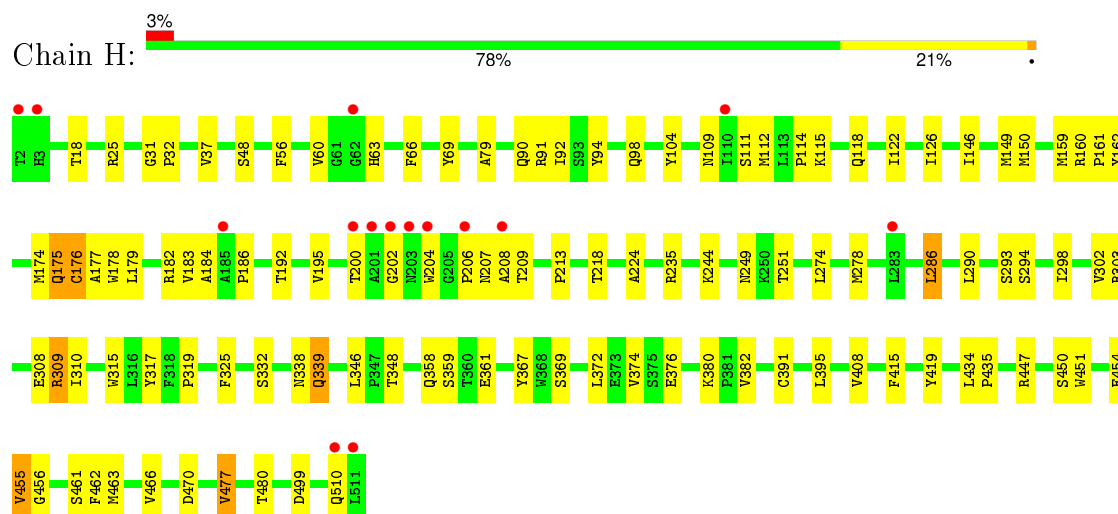




• Molecule 1: UDP-galactopyranose mutase



• Molecule 1: UDP-galactopyranose mutase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	71.44Å 129.20Å 172.82Å 90.07° 84.22° 82.24°	Depositor
Resolution (Å)	48.00 – 2.63 48.03 – 2.63	Depositor EDS
% Data completeness (in resolution range)	91.3 (48.00-2.63) 90.9 (48.03-2.63)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	0.07	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.36 (at 2.61Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.7.1_743)	Depositor
R, $R_{free}$	0.185 , 0.231 0.185 , 0.228	Depositor DCC
$R_{free}$ test set	8265 reflections (5.26%)	DCC
Wilson B-factor (Å <sup>2</sup> )	38.8	Xtriage
Anisotropy	0.130	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 41.7	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	0 of 165289 reflections	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	33747	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	46.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.36% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 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: UDP, FAD, CL

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	0.25	0/4103	0.43	0/5576
1	B	0.26	0/4115	0.44	0/5592
1	C	0.26	0/4114	0.44	0/5590
1	D	0.25	0/4103	0.43	0/5576
1	E	0.26	0/4115	0.43	0/5592
1	F	0.26	0/4103	0.43	0/5576
1	G	0.25	0/4103	0.43	0/5576
1	H	0.26	0/4114	0.43	0/5590
All	All	0.26	0/32870	0.43	0/44668

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	E	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	E	303	ARG	Sidechain

## 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	4004	0	3925	86	0
1	B	4015	0	3933	83	0
1	C	4015	0	3937	84	0
1	D	4004	0	3925	89	0
1	E	4015	0	3933	95	0
1	F	4004	0	3925	92	0
1	G	4004	0	3925	97	0
1	H	4015	0	3937	79	0
2	A	25	0	11	1	0
2	B	25	0	11	0	0
2	C	25	0	11	2	0
2	D	25	0	11	1	0
2	E	25	0	11	1	0
2	F	25	0	11	1	0
2	G	25	0	11	1	0
2	H	25	0	11	1	0
3	A	53	0	30	1	0
3	B	53	0	30	1	0
3	C	53	0	30	1	0
3	D	53	0	30	1	0
3	E	53	0	30	1	0
3	F	53	0	30	0	0
3	G	53	0	30	1	0
3	H	53	0	30	2	0
4	A	2	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	E	1	0	0	0	0
4	F	2	0	0	0	0
4	H	1	0	0	0	0
5	A	148	0	0	3	0
5	B	151	0	0	5	0
5	C	155	0	0	5	0
5	D	140	0	0	6	0
5	E	125	0	0	5	0
5	F	122	0	0	3	0
5	G	100	0	0	6	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	H	98	0	0	7	0
All	All	33747	0	31768	693	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 11.

The worst 5 of 693 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:F:296:HIS:HD2	1:F:412:HIS:HE1	1.15	0.91
1:C:332:SER:HA	1:C:339:GLN:NE2	1.91	0.85
1:E:296:HIS:HD2	1:E:412:HIS:HE1	1.23	0.85
1:H:174:MET:SD	5:H:577:HOH:O	2.35	0.84
1:C:86:TRP:CG	1:C:211[A]:ARG:NH2	2.47	0.82

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	508/510 (100%)	491 (97%)	17 (3%)	0	100	100
1	B	509/510 (100%)	491 (96%)	18 (4%)	0	100	100
1	C	509/510 (100%)	490 (96%)	19 (4%)	0	100	100
1	D	508/510 (100%)	488 (96%)	20 (4%)	0	100	100
1	E	509/510 (100%)	494 (97%)	15 (3%)	0	100	100
1	F	508/510 (100%)	490 (96%)	17 (3%)	1 (0%)	52	76
1	G	508/510 (100%)	487 (96%)	21 (4%)	0	100	100
1	H	509/510 (100%)	489 (96%)	19 (4%)	1 (0%)	52	76
All	All	4068/4080 (100%)	3920 (96%)	146 (4%)	2 (0%)	100	100

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	F	208	ALA
1	H	208	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	432/432 (100%)	415 (96%)	17 (4%)	39	66
1	B	433/432 (100%)	416 (96%)	17 (4%)	39	66
1	C	433/432 (100%)	413 (95%)	20 (5%)	33	59
1	D	432/432 (100%)	413 (96%)	19 (4%)	35	61
1	E	433/432 (100%)	414 (96%)	19 (4%)	35	61
1	F	432/432 (100%)	412 (95%)	20 (5%)	33	59
1	G	432/432 (100%)	415 (96%)	17 (4%)	39	66
1	H	433/432 (100%)	414 (96%)	19 (4%)	35	61
All	All	3460/3456 (100%)	3312 (96%)	148 (4%)	35	62

5 of 148 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	309	ARG
1	E	286	LEU
1	H	244	LYS
1	D	358	GLN
1	E	90	GLN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 32 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	339	GLN
1	E	175	GLN
1	H	98	GLN

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Mol	Chain	Res	Type
1	E	98	GLN
1	E	296	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 ⓘ

There are no carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

Of 24 ligands modelled in this entry, 8 are monoatomic - leaving 16 for Mogul analysis.

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$
3	FAD	A	602	-	48,58,58	2.33	14 (29%)	54,89,89	2.35	18 (33%)
2	UDP	A	800	-	18,26,26	1.18	1 (5%)	26,40,40	1.45	2 (7%)
3	FAD	B	604	-	48,58,58	2.26	14 (29%)	54,89,89	2.29	17 (31%)
2	UDP	B	800	-	18,26,26	1.18	1 (5%)	26,40,40	1.59	3 (11%)
3	FAD	C	600	-	48,58,58	2.35	15 (31%)	54,89,89	2.29	16 (29%)
2	UDP	C	800	-	18,26,26	1.17	1 (5%)	26,40,40	1.47	3 (11%)
3	FAD	D	601	-	48,58,58	2.35	13 (27%)	54,89,89	2.25	15 (27%)
2	UDP	D	800	-	18,26,26	1.21	1 (5%)	26,40,40	1.49	2 (7%)
3	FAD	E	606	-	48,58,58	2.31	14 (29%)	54,89,89	2.18	16 (29%)



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	UDP	E	800	-	18,26,26	1.20	1 (5%)	26,40,40	1.61	2 (7%)
3	FAD	F	603	-	48,58,58	2.30	14 (29%)	54,89,89	2.24	16 (29%)
2	UDP	F	800	-	18,26,26	1.18	1 (5%)	26,40,40	1.53	2 (7%)
3	FAD	G	607	-	48,58,58	2.34	14 (29%)	54,89,89	2.27	16 (29%)
2	UDP	G	800	-	18,26,26	1.17	1 (5%)	26,40,40	1.51	3 (11%)
3	FAD	H	605	-	48,58,58	2.35	13 (27%)	54,89,89	2.49	16 (29%)
2	UDP	H	800	-	18,26,26	1.18	1 (5%)	26,40,40	1.53	3 (11%)

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
3	FAD	A	602	-	-	0/30/50/50	0/6/6/6
2	UDP	A	800	-	-	0/12/32/32	0/2/2/2
3	FAD	B	604	-	-	0/30/50/50	0/6/6/6
2	UDP	B	800	-	-	0/12/32/32	0/2/2/2
3	FAD	C	600	-	-	0/30/50/50	0/6/6/6
2	UDP	C	800	-	-	0/12/32/32	0/2/2/2
3	FAD	D	601	-	-	0/30/50/50	0/6/6/6
2	UDP	D	800	-	-	0/12/32/32	0/2/2/2
3	FAD	E	606	-	-	0/30/50/50	0/6/6/6
2	UDP	E	800	-	-	0/12/32/32	0/2/2/2
3	FAD	F	603	-	-	0/30/50/50	0/6/6/6
2	UDP	F	800	-	-	0/12/32/32	0/2/2/2
3	FAD	G	607	-	-	0/30/50/50	0/6/6/6
2	UDP	G	800	-	-	0/12/32/32	0/2/2/2
3	FAD	H	605	-	-	0/30/50/50	0/6/6/6
2	UDP	H	800	-	-	0/12/32/32	0/2/2/2

The worst 5 of 119 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	G	607	FAD	O2'-C2'	-7.88	1.25	1.43
3	D	601	FAD	O2'-C2'	-7.77	1.25	1.43
3	C	600	FAD	O2'-C2'	-7.75	1.26	1.43
3	E	606	FAD	O2'-C2'	-7.71	1.26	1.43
3	B	604	FAD	O2'-C2'	-7.65	1.26	1.43

The worst 5 of 150 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	602	FAD	N3A-C2A-N1A	-9.13	121.91	128.89
3	C	600	FAD	N3A-C2A-N1A	-8.90	122.08	128.89
3	H	605	FAD	N3A-C2A-N1A	-8.86	122.11	128.89
3	B	604	FAD	N3A-C2A-N1A	-8.86	122.11	128.89
3	D	601	FAD	N3A-C2A-N1A	-8.76	122.19	128.89

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

14 monomers are involved in 16 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	602	FAD	1	0
2	A	800	UDP	1	0
3	B	604	FAD	1	0
3	C	600	FAD	1	0
2	C	800	UDP	2	0
3	D	601	FAD	1	0
2	D	800	UDP	1	0
3	E	606	FAD	1	0
2	E	800	UDP	1	0
2	F	800	UDP	1	0
3	G	607	FAD	1	0
2	G	800	UDP	1	0
3	H	605	FAD	2	0
2	H	800	UDP	1	0

## 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	510/510 (100%)	-0.22	8 (1%) 74 70	21, 41, 77, 114	0
1	B	510/510 (100%)	-0.13	6 (1%) 81 78	22, 40, 77, 114	0
1	C	510/510 (100%)	-0.25	10 (1%) 68 63	22, 41, 77, 118	0
1	D	510/510 (100%)	-0.19	10 (1%) 68 63	23, 43, 79, 119	0
1	E	510/510 (100%)	-0.20	12 (2%) 62 56	21, 43, 77, 118	0
1	F	510/510 (100%)	-0.07	15 (2%) 55 49	22, 44, 79, 119	0
1	G	510/510 (100%)	-0.26	5 (0%) 84 81	25, 44, 79, 116	0
1	H	510/510 (100%)	-0.09	15 (2%) 55 49	25, 45, 80, 117	0
All	All	4080/4080 (100%)	-0.18	81 (1%) 68 63	21, 43, 79, 119	0

The worst 5 of 81 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	H	201	ALA	5.1
1	B	511	LEU	5.0
1	F	208	ALA	4.7
1	E	358	GLN	4.7
1	C	510	GLN	4.5

### 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 ⓘ

There are no carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95<sup>th</sup> 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	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
2	UDP	D	800	25/25	0.92	0.21	1.08	41,86,121,130	0
2	UDP	A	800	25/25	0.91	0.19	0.83	53,74,109,122	0
3	FAD	F	603	53/53	0.98	0.20	0.74	19,39,52,67	0
3	FAD	G	607	53/53	0.96	0.16	0.68	22,39,53,62	0
2	UDP	G	800	25/25	0.94	0.18	0.35	45,69,97,117	0
3	FAD	D	601	53/53	0.96	0.18	0.29	23,37,50,57	0
3	FAD	H	605	53/53	0.95	0.17	0.28	27,44,64,69	0
2	UDP	F	800	25/25	0.93	0.17	0.28	47,68,104,116	0
2	UDP	C	800	25/25	0.95	0.18	0.26	43,61,94,104	0
3	FAD	C	600	53/53	0.96	0.17	0.15	11,33,48,54	0
3	FAD	E	606	53/53	0.98	0.16	-0.10	19,31,47,59	0
3	FAD	A	602	53/53	0.97	0.17	-0.12	16,33,53,70	0
3	FAD	B	604	53/53	0.97	0.18	-0.13	18,35,47,51	0
2	UDP	H	800	25/25	0.93	0.17	-0.21	50,80,110,113	0
2	UDP	B	800	25/25	0.96	0.13	-1.09	30,50,91,101	0
4	CL	F	1	1/1	0.80	0.24	-1.13	85,85,85,85	0
4	CL	C	1	1/1	0.93	0.14	-1.20	58,58,58,58	0
2	UDP	E	800	25/25	0.96	0.12	-1.24	32,63,96,107	0
4	CL	H	1	1/1	0.93	0.13	-1.53	66,66,66,66	0
4	CL	A	1	1/1	0.94	0.10	-2.26	62,62,62,62	0
4	CL	E	1	1/1	0.86	0.14	-	75,75,75,75	0
4	CL	F	512	1/1	0.68	0.33	-	81,81,81,81	0
4	CL	A	512	1/1	0.89	0.20	-	79,79,79,79	0
4	CL	B	1	1/1	0.95	0.12	-	63,63,63,63	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.