



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 5, 2023 – 01:06 AM EDT

PDB ID : 6UEX  
Title : Crystal structure of *S. aureus* LcpA in complex with octaprenyl-pyrophosphate-GlcNAc  
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Deposited on : 2019-09-23  
Resolution : 1.90 Å(reported)

This is a Full wwPDB X-ray Structure Validation 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

<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>.

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

MolProbity : **FAILED**  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtrriage (Phenix) : 1.13  
EDS : **FAILED**  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.35.1

## 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 1.90 Å.

There are no overall percentile quality scores available for this entry.

MolProbity and EDS failed to run properly - the sequence quality summary graphics cannot be shown.

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 2063 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 Regulatory protein MsrR.

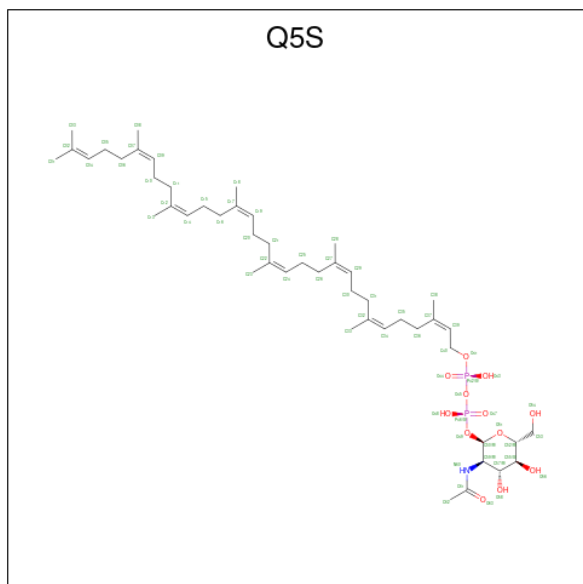
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	247	1896	1194	328	364	10	0	0	0

There are 25 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	55	MET	-	initiating methionine	UNP Q99Q02
A	56	GLY	-	expression tag	UNP Q99Q02
A	57	SER	-	expression tag	UNP Q99Q02
A	58	SER	-	expression tag	UNP Q99Q02
A	59	HIS	-	expression tag	UNP Q99Q02
A	60	HIS	-	expression tag	UNP Q99Q02
A	61	HIS	-	expression tag	UNP Q99Q02
A	62	HIS	-	expression tag	UNP Q99Q02
A	63	HIS	-	expression tag	UNP Q99Q02
A	64	HIS	-	expression tag	UNP Q99Q02
A	65	HIS	-	expression tag	UNP Q99Q02
A	66	HIS	-	expression tag	UNP Q99Q02
A	67	HIS	-	expression tag	UNP Q99Q02
A	68	HIS	-	expression tag	UNP Q99Q02
A	69	SER	-	expression tag	UNP Q99Q02
A	70	SER	-	expression tag	UNP Q99Q02
A	71	GLY	-	expression tag	UNP Q99Q02
A	72	LEU	-	expression tag	UNP Q99Q02
A	73	VAL	-	expression tag	UNP Q99Q02
A	74	PRO	-	expression tag	UNP Q99Q02
A	75	ARG	-	expression tag	UNP Q99Q02
A	76	GLY	-	expression tag	UNP Q99Q02
A	77	SER	-	expression tag	UNP Q99Q02
A	78	HIS	-	expression tag	UNP Q99Q02
A	79	MET	-	expression tag	UNP Q99Q02

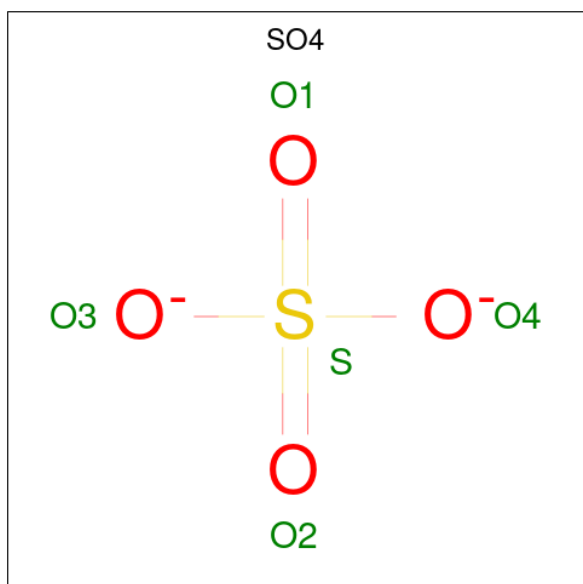
- Molecule 2 is 2-(acetylamino)-2-deoxy-1-O-[(S)-hydroxy]{[(S)-hydroxy]{[(2Z,6Z,10Z,14Z,18Z

,22Z,26Z)-3,7,11,15,19,23,27,31-octamethyldotriaconta-2,6,10,14,18,22,26,30-octaen-1-yl]oxy}phosphoryl]oxy}phosphoryl]-alpha-D-glucopyranose (three-letter code: Q5S) (formula: C<sub>48</sub>H<sub>81</sub>NO<sub>12</sub>P<sub>2</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	63	48	1	12	2	0	0

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



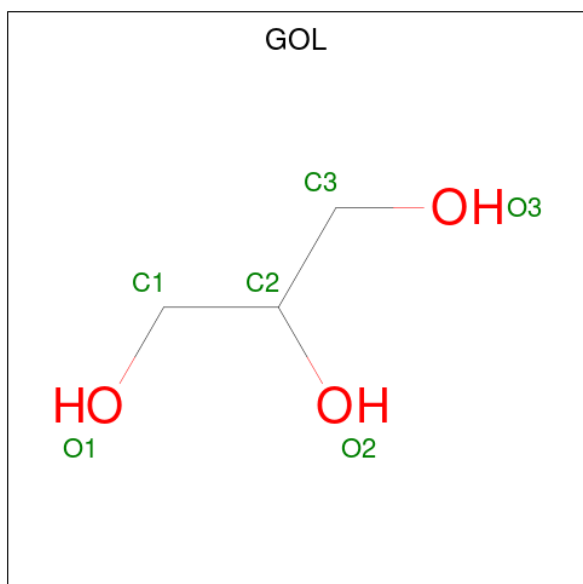
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	S		
3	A	1	5	4	1	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			6	3	3		
4	A	1	Total	C	O	0	0
			6	3	3		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	57	Total	O	0	0
			57	57		

MolProbity and EDS failed to run properly - this section is therefore empty.

### 3 Data and refinement statistics i

EDS failed to run properly - this section is therefore incomplete.

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	89.25Å 90.54Å 94.75Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.38 – 1.90	Depositor
% Data completeness (in resolution range)	99.8 (47.38-1.90)	Depositor
$R_{merge}$	0.05	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.63 (at 1.90Å)	Xtrriage
Refinement program	PHENIX 1.13_2998	Depositor
R, $R_{free}$	0.192 , 0.226	Depositor
Wilson B-factor (Å <sup>2</sup> )	45.8	Xtrriage
Anisotropy	0.515	Xtrriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.028 for -k,-h,-l	Xtrriage
Total number of atoms	2063	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	67.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.88% 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, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 4 Model quality [i](#)

### 4.1 Standard geometry [i](#)

MolProbity failed to run properly - this section is therefore empty.

### 4.2 Too-close contacts [i](#)

MolProbity failed to run properly - this section is therefore empty.

### 4.3 Torsion angles [i](#)

#### 4.3.1 Protein backbone [i](#)

MolProbity failed to run properly - this section is therefore empty.

#### 4.3.2 Protein sidechains [i](#)

MolProbity failed to run properly - this section is therefore empty.

#### 4.3.3 RNA [i](#)

MolProbity failed to run properly - this section is therefore empty.

### 4.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

### 4.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 4.6 Ligand geometry [i](#)

10 ligands 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
3	SO4	A	408	-	4,4,4	0.16	0	6,6,6	0.14	0
2	Q5S	A	401	-	60,63,63	1.52	8 (13%)	77,83,83	1.72	20 (25%)
3	SO4	A	406	-	4,4,4	0.13	0	6,6,6	0.07	0
3	SO4	A	407	-	4,4,4	0.13	0	6,6,6	0.10	0
3	SO4	A	403	-	4,4,4	0.14	0	6,6,6	0.13	0
4	GOL	A	409	-	5,5,5	0.55	0	5,5,5	0.59	0
4	GOL	A	410	-	5,5,5	0.49	0	5,5,5	0.32	0
3	SO4	A	404	-	4,4,4	0.14	0	6,6,6	0.09	0
3	SO4	A	402	-	4,4,4	0.14	0	6,6,6	0.08	0
3	SO4	A	405	-	4,4,4	0.14	0	6,6,6	0.17	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
4	GOL	A	409	-	-	3/4/4/4	-
4	GOL	A	410	-	-	4/4/4/4	-
2	Q5S	A	401	-	-	11/65/86/86	0/1/1/1

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	401	Q5S	O63-C61	7.36	1.39	1.23
2	A	401	Q5S	C57-C59	-2.80	1.47	1.53
2	A	401	Q5S	C61-N60	-2.37	1.26	1.34
2	A	401	Q5S	P46-O49	2.32	1.66	1.60
2	A	401	Q5S	C06-C07	2.19	1.55	1.51
2	A	401	Q5S	C31-C32	2.05	1.55	1.51
2	A	401	Q5S	P42-O41	2.05	1.67	1.59
2	A	401	Q5S	C62-C61	2.03	1.54	1.50

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	401	Q5S	C35-C34-C32	-4.49	116.84	127.66

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	401	Q5S	O45-P46-O49	3.75	110.05	102.48
2	A	401	Q5S	C08-C07-C06	3.71	121.52	115.27
2	A	401	Q5S	C40-C39-C37	-3.46	120.06	126.04
2	A	401	Q5S	P46-O45-P42	-3.35	121.35	132.83
2	A	401	Q5S	O51-C50-O49	-3.28	107.08	111.36
2	A	401	Q5S	C38-C37-C36	3.03	120.36	115.27
2	A	401	Q5S	C15-C14-C12	-2.84	120.83	127.66
2	A	401	Q5S	C20-C19-C17	-2.82	120.88	127.66
2	A	401	Q5S	C13-C12-C11	2.68	119.78	115.27
2	A	401	Q5S	C08-C07-C09	-2.65	116.87	123.68
2	A	401	Q5S	C33-C32-C31	2.60	119.65	115.27
2	A	401	Q5S	C18-C17-C16	2.58	119.62	115.27
2	A	401	Q5S	C62-C61-N60	2.58	120.47	116.10
2	A	401	Q5S	C55-C57-C59	2.51	114.02	110.34
2	A	401	Q5S	C25-C24-C22	-2.31	122.09	127.66
2	A	401	Q5S	C03-C02-C01	2.22	119.50	114.60
2	A	401	Q5S	C10-C09-C07	-2.16	122.45	127.66
2	A	401	Q5S	C23-C22-C21	2.13	118.85	115.27
2	A	401	Q5S	C23-C22-C24	-2.06	118.39	123.68

There are no chirality outliers.

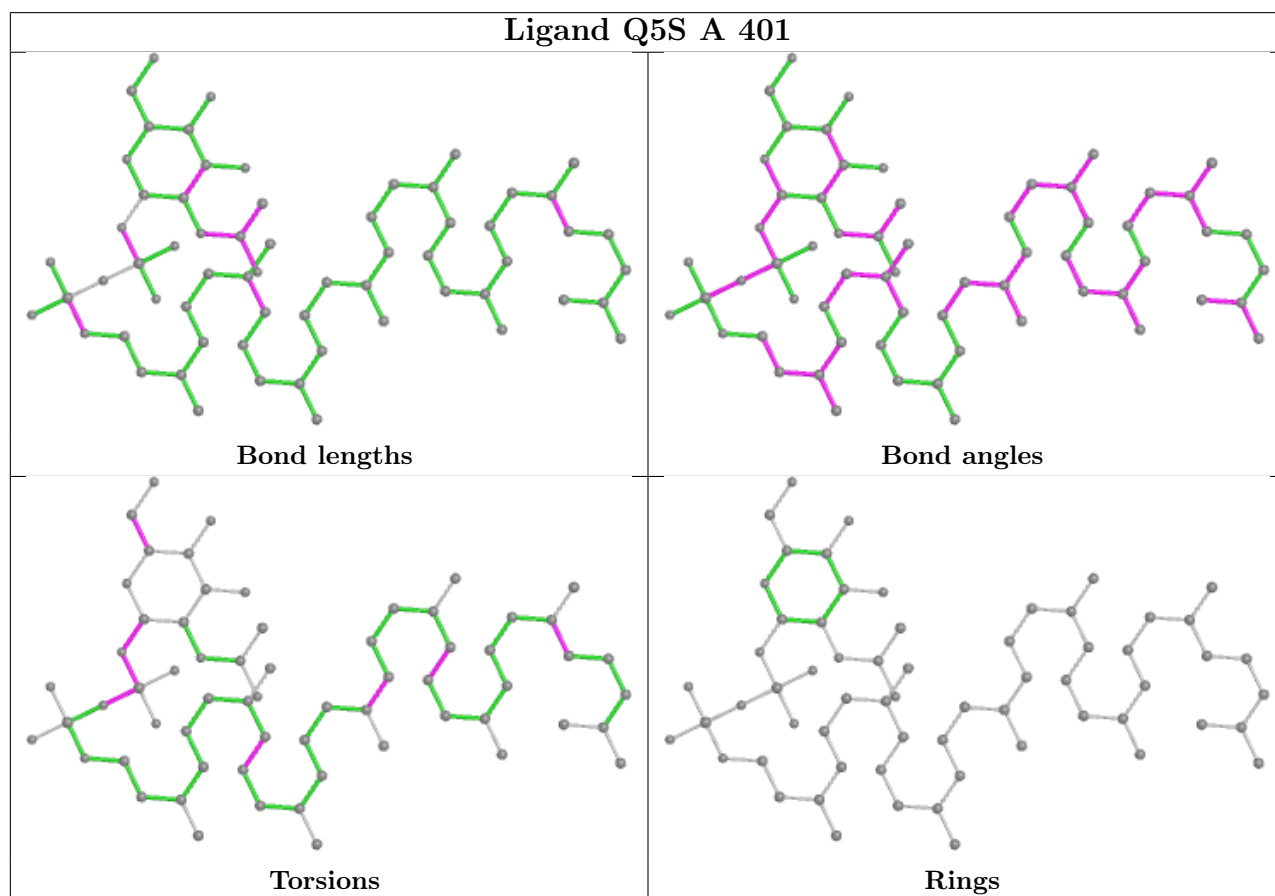
All (18) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	401	Q5S	C05-C06-C07-C08
4	A	409	GOL	C1-C2-C3-O3
4	A	410	GOL	C1-C2-C3-O3
2	A	401	Q5S	C20-C21-C22-C23
2	A	401	Q5S	C05-C06-C07-C09
2	A	401	Q5S	C55-C52-C53-O54
2	A	401	Q5S	O51-C52-C53-O54
2	A	401	Q5S	C20-C21-C22-C24
4	A	410	GOL	O1-C1-C2-C3
4	A	409	GOL	O2-C2-C3-O3
4	A	410	GOL	O2-C2-C3-O3
2	A	401	Q5S	C50-O49-P46-O45
4	A	410	GOL	O1-C1-C2-O2
2	A	401	Q5S	C14-C15-C16-C17
2	A	401	Q5S	C29-C30-C31-C32
2	A	401	Q5S	P42-O45-P46-O49
2	A	401	Q5S	O51-C50-O49-P46
4	A	409	GOL	O1-C1-C2-C3

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



#### 4.7 Other polymers [\(i\)](#)

There are no such residues in this entry.

## 4.8 Polymer linkage issues

There are no chain breaks in this entry.

## 5 Fit of model and data

### 5.1 Protein, DNA and RNA chains

EDS failed to run properly - this section is therefore empty.

### 5.2 Non-standard residues in protein, DNA, RNA chains

EDS failed to run properly - this section is therefore empty.

### 5.3 Carbohydrates

EDS failed to run properly - this section is therefore empty.

### 5.4 Ligands

EDS failed to run properly - this section is therefore empty.

### 5.5 Other polymers

EDS failed to run properly - this section is therefore empty.