



wwPDB EM Validation Summary Report ⓘ

Jul 16, 2025 – 10:52 AM JST

PDB ID : 8JB5 / pdb_00008jb5
EMDB ID : EMD-36141
Title : The cryo-EM structure of Paeniclostridium sordellii lethal toxin (TcsL)
Authors : Zhan, X.; Tao, L.
Deposited on : 2023-05-08
Resolution : 2.90 Å(reported)

This is a wwPDB EM 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/EMValidationReportHelp>

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:

EMDB validation analysis : **FAILED**
MolProbity : 4-5-2 with Phenix2.0rc1
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.44

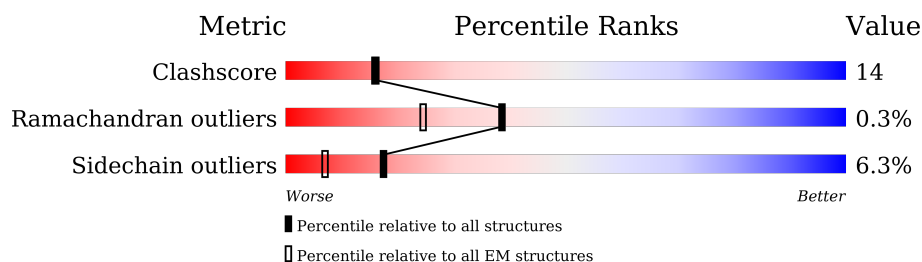
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.90 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)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	A	2372	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 19027 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 Cytotoxin-L.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	2355	Total	C	N	O	S	0	0
			19026	12183	3022	3774	47		

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	2365	HIS	-	expression tag	UNP T0D3N5
A	2366	HIS	-	expression tag	UNP T0D3N5
A	2367	HIS	-	expression tag	UNP T0D3N5
A	2368	HIS	-	expression tag	UNP T0D3N5
A	2369	HIS	-	expression tag	UNP T0D3N5
A	2370	HIS	-	expression tag	UNP T0D3N5
A	2371	HIS	-	expression tag	UNP T0D3N5
A	2372	HIS	-	expression tag	UNP T0D3N5

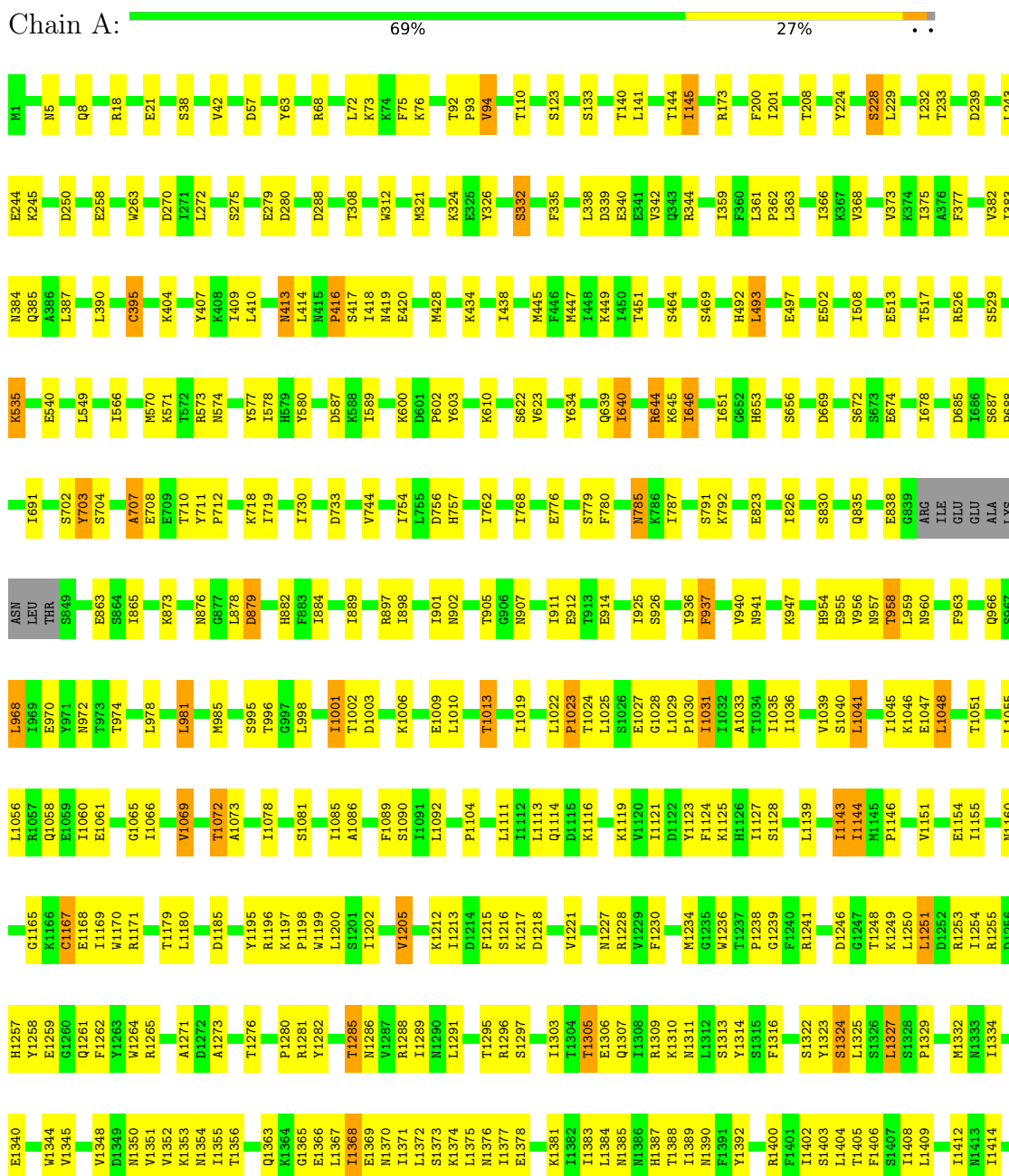
- Molecule 2 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
2	A	1	Total	Zn	0
			1	1	

3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. 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. 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: Cytotoxin-L



L2324	Y2230	Y2142	I2011	A1946	D1779	D1629	K1533	I1418
K2329	K2231	Y2151	E2012	V1947	D1787	P1634	D1534	D1419
E2336	N2234	Y2161	V2013	E1948	Y1635	F1636	D1535	V1421
Y2337	V2235	L2157	K2016	K1950	V1791	Y1649	S1539	Y1425
I2338	K2240	I2160	Y2017	L1951	K1795	V1650	L1540	L1426
A2339	Y2241	G2161	F2020	L1952	I1796	G1651	S1541	S1427
A2340	Y2242	V2162	G2021	E1955	I1797	R1652	F1542	I1427
T2341	F2243	V2162	G2024	Y1956	S1798	R1653	T1543	C1433
G2342	D2244	P2166	E2025	Y1957	T1799	L1656	D1546	I1437
F2353	M2249	D2167	R2026	Y1958	F1800	Y1662	T1547	I1437
D2354	R2250	K2170	F2037	Y1959	S1801	H1663	M1548	S1440
P2355	L2253	Y2171	K2043	M1960	A1804	L1664	T1549	K1446
L2360	T2254	F2172	T2049	T1963	D1807	G1668	I1550	K1446
V2361	S2255	A2173	E2050	E1965	Y1812	I1669	K1551	I1447
V2362	F2256	P2174	E2051	A1966	E1813	I1670	M1553	D1448
S2363	M2259	T2177	G2052	L1967	F1814	S1671	Y1556	H1449
E2364	N2260	V2178	G1969	L1970	Y1814	D1686	L1557	I1450
HIS	Y2261	I2181	L2054	H1971	M1821	R1687	G1561	G1451
HIS	F2263	I2182	N2058	Q1972	M1831	Y1692	T1452	F1452
HIS	N2264	Q2185	T2072	T1973	M1840	L1698	T1465	N1453
HIS	E2265	A2186	V2078	M1976	T1870	I1714	L1469	Q1457
HIS	G2267	K2188	T2088	D1981	K1871	I1719	F1585	K1458
HIS	Y2273	S2190	Y2089	D1982	S1872	D1722	S1588	I1459
HIS	I2276	G2191	Y2090	G1984	I1880	I1726	L1591	I1460
HIS	K2277	V2193	D2092	I1985	L1895	L1737	M1598	P1461
HIS	M2280	R2194	T2095	M1986	T1900	S1738	L1599	Y1462
HIS	F2281	V2195	A2096	Q1987	N1901	V1742	M1602	S1463
HIS	Y2282	N2196	C2099	G1989	T1902	N1745	I1603	Y1464
HIS	K2285	V2199	Y2111	T1991	L1906	I1751	E1604	I1466
HIS	M2289	Y2200	F2112	T1992	F1909	S1756	F1605	T1469
HIS	Y2293	F2202	D2113	I1993	T1914	Q1761	L1505	K1470
HIS	G2299	Y2206	T2117	M1994	F1926	P1762	F1506	R1495
HIS	F2300	I2208	K2118	D1995	I1927	Q1763	T1609	I1496
HIS	A2304	N2215	Q2119	K1996	G1928	R1767	M1610	I1497
HIS	L2309	E2216	T2123	V1997	K1929	V1771	F1611	Y1498
HIS	F2313	T2217	N2128	F1998	L1930	F1772	I1612	P1500
HIS	A2314	D2218	T2129	Y1999	T1936	D1775	I1613	D1501
HIS	G2315	K2219	F2130	N2001	Y1937	T1776	S1618	S1502
HIS	F2316	D2223	Y2131	N2002	Q2006	K1628	D1512	L1505
HIS	S2317	T2226	F2132	V2005	Q2007	E1623	L1513	F1506
HIS	Y2320	K2228	S2135	M2006	V2008	L1624	K1514	I1507
HIS		A2229		Q2008			D1515	
HIS							I1516	
HIS							K1521	
HIS							G1522	

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	229156	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section:
ZN

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	0.43	1/19409 (0.0%)	0.61	4/26261 (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	A	0	2

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	409	ILE	C-O	6.21	1.31	1.24

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	416	PRO	CA-N-CD	-13.11	93.65	112.00
1	A	1947	VAL	CA-C-N	5.88	132.77	121.54
1	A	1947	VAL	C-N-CA	5.88	132.77	121.54
1	A	1069	VAL	N-CA-C	-5.28	107.22	111.91

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1028	GLY	Peptide
1	A	1452	PHE	Peptide

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	19026	0	18584	534	0
2	A	1	0	0	0	0
All	All	19027	0	18584	534	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 14.

The worst 5 of 534 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:A:1023:PRO:HG3	1:A:1649:TYR:CZ	1.49	1.48
1:A:1956:THR:HG23	1:A:1986:MET:N	1.21	1.45
1:A:1956:THR:CG2	1:A:1986:MET:N	1.86	1.38
1:A:1023:PRO:CG	1:A:1649:TYR:CZ	2.18	1.26
1:A:1180:LEU:HD21	1:A:1185:ASP:OD1	1.34	1.22

There are no symmetry-related clashes.

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 PDB entries followed by that with respect to all EM entries.

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	2351/2372 (99%)	2210 (94%)	135 (6%)	6 (0%)	37 66

5 of 6 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	707	ALA
1	A	1948	GLU
1	A	1029	LEU
1	A	1762	PRO
1	A	2342	GLY

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 PDB entries followed by that with respect to all EM entries.

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	2130/2146 (99%)	1995 (94%)	135 (6%)	15 42

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

Mol	Chain	Res	Type
1	A	1870	THR
1	A	1927	ILE
1	A	2181	ASN
1	A	897	ARG
1	A	884	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 41 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1520	ASN
1	A	1763	GLN
1	A	1553	ASN
1	A	1731	ASN
1	A	2058	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.