



wwPDB X-ray Structure Validation Summary Report

Oct 1, 2023 – 02:19 PM EDT

PDB ID : 4O9Y
Title : Crystal Structure of TcdA1
Authors : Meusch, D.; Gatsogiannis, C.; Efremov, R.G.; Lang, A.E.; Hofnagel, O.; Vetter, I.R.; Aktories, K.; Raunser, S.
Deposited on : 2014-01-03
Resolution : 3.50 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 : 4.02b-467
Xtriage (Phenix) : 1.13
EDS : 2.35.1
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.35.1

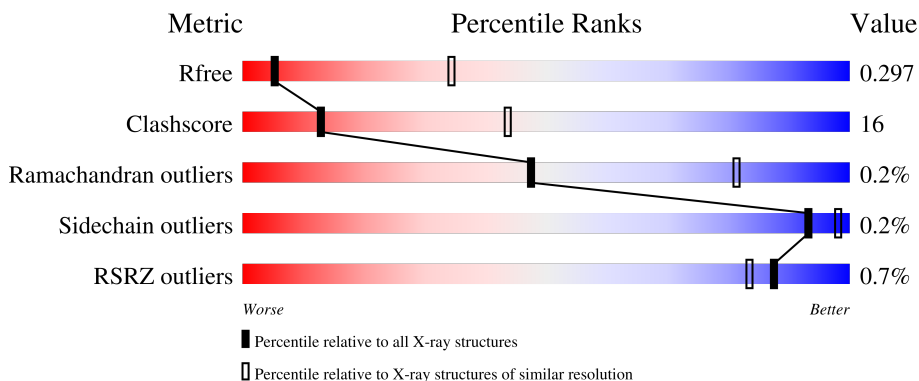
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.50 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}	130704	1659 (3.60-3.40)
Clashscore	141614	1036 (3.58-3.42)
Ramachandran outliers	138981	1005 (3.58-3.42)
Sidechain outliers	138945	1006 (3.58-3.42)
RSRZ outliers	127900	1559 (3.60-3.40)

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	2516	 63% 35% .
1	B	2516	 64% 35% .
1	C	2516	 64% 35% .
1	D	2516	 65% 34% .
1	E	2516	 64% 34% .

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Mol	Chain	Length	Quality of chain
1	F	2516	 <p>% 64% 35% .</p>
1	G	2516	 <p>% 65% 33% .</p>
1	H	2516	 <p>% 66% 33% .</p>
1	I	2516	 <p>% 64% 35% .</p>
1	J	2516	 <p>% 63% 35% .</p>

2 Entry composition [i](#)

There is only 1 type of molecule in this entry. The entry contains 197663 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.

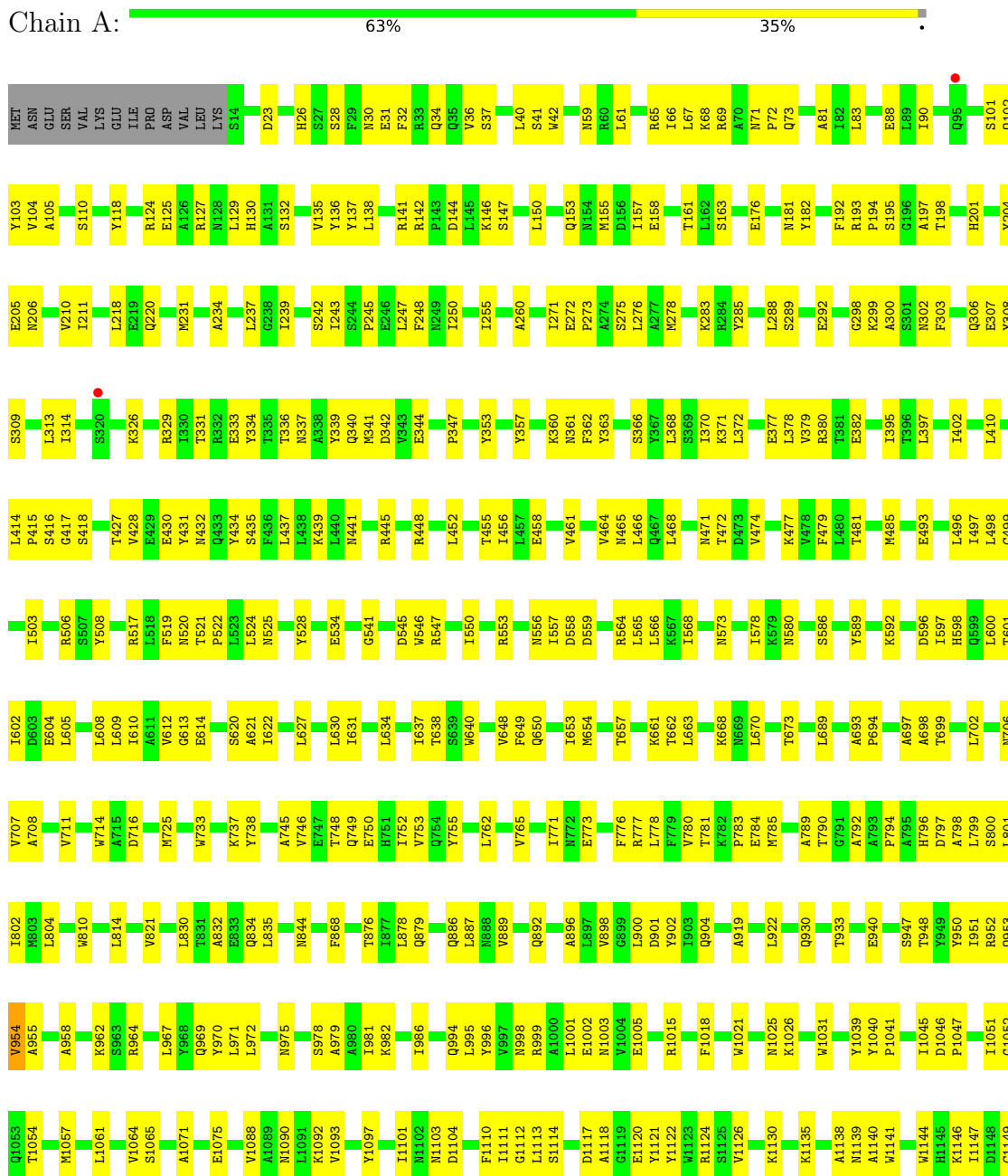
- Molecule 1 is a protein called TcdA1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	2490	19768	12508	3364	3833	63	0	0	0
1	B	2490	19768	12508	3364	3833	63	0	0	0
1	C	2490	19768	12508	3364	3833	63	0	0	0
1	D	2490	19768	12508	3364	3833	63	0	0	0
1	E	2490	19768	12508	3364	3833	63	0	0	0
1	F	2490	19768	12508	3364	3833	63	0	0	0
1	G	2488	19751	12499	3359	3830	63	0	0	0
1	H	2490	19768	12508	3364	3833	63	0	0	0
1	I	2490	19768	12508	3364	3833	63	0	0	0
1	J	2490	19768	12508	3364	3833	63	0	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: TcdA1

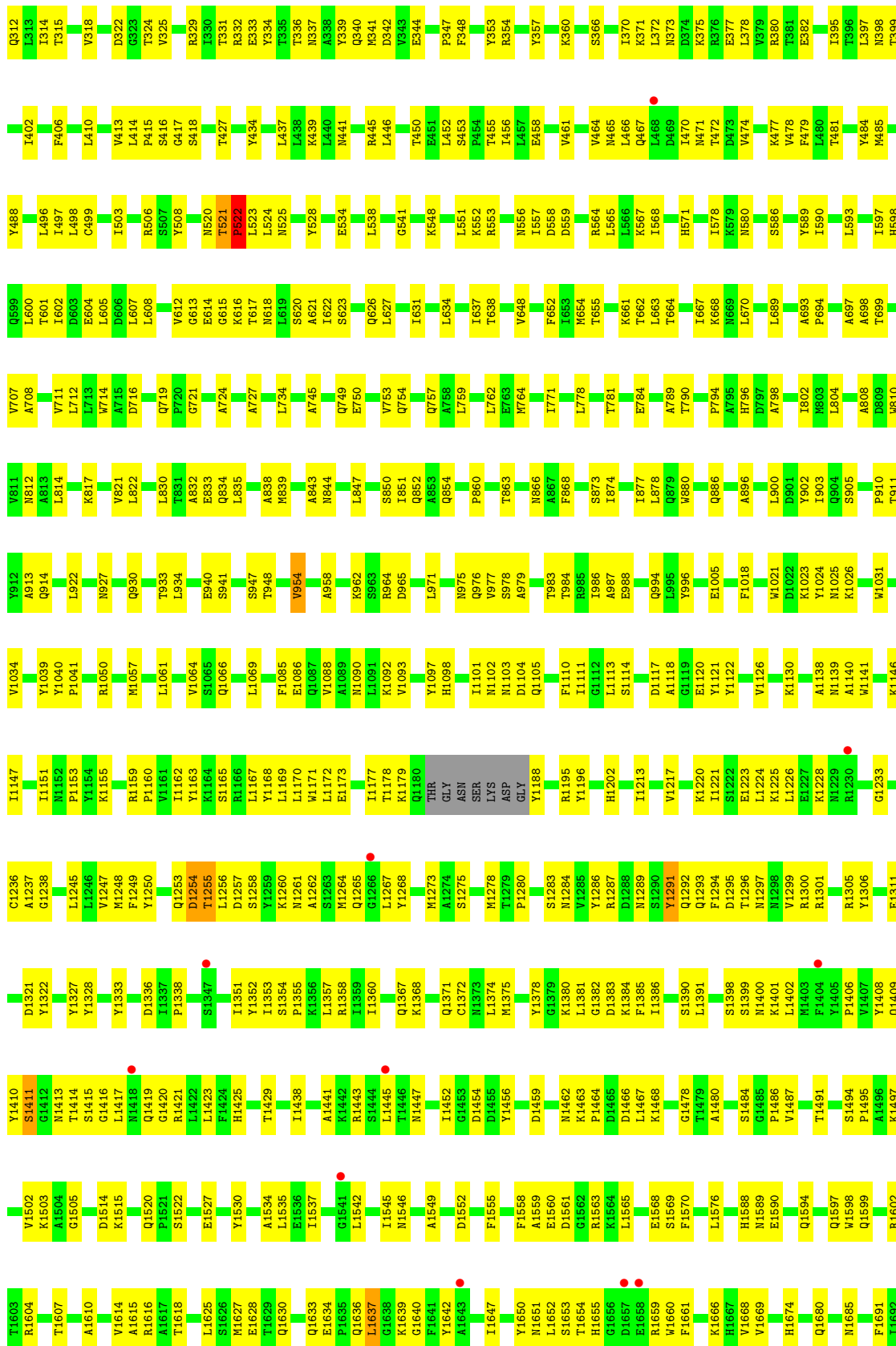


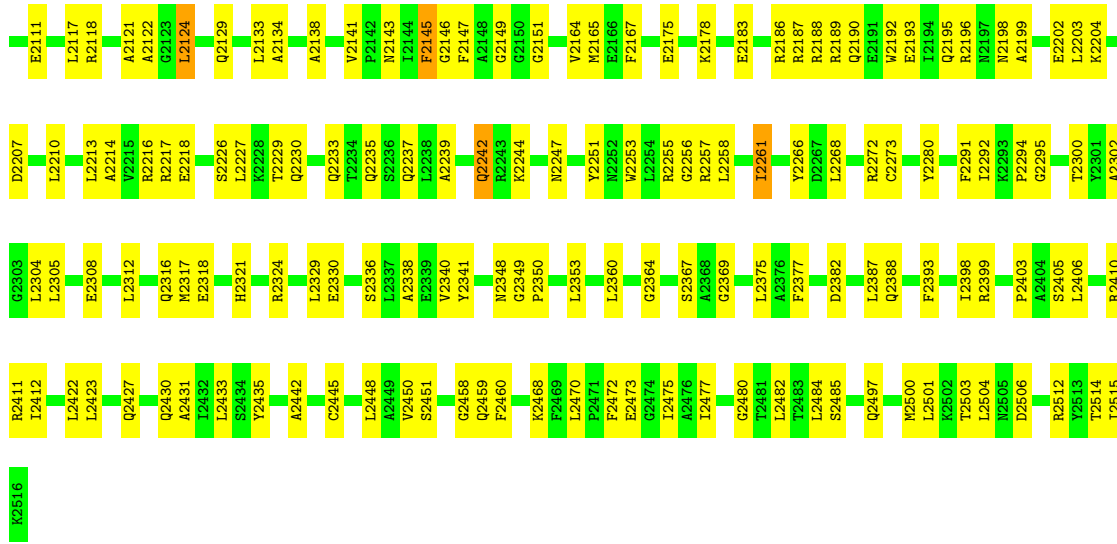
D2466	G2364	L2258	W2154	A1918	Y1805	K1713	I1621	K1515	G1416	D1321	A1237	P1150
G2467	S2365	I2261	W2164	H1919	I1806	S1714	I1624	S1522	L1417	D1326	G1238	I1151
K2468	G2366	I2266	M2165	D1920	V1807	P1715	L1625	S1523	M1418	D1326	G1238	N1152
F2472	G2369	Y2266	M2166	S1921	V1807	P1716	L1625	S1523	Q1419	D1326	G1238	P1153
E2473	L2375	R2272	M2172	I1923	Q1810	G1718	Q1630	E1527	R1420	D1336	M1248	T1157
G2474	A2376	C2273	E2175	V1924	Q1812	T1719	Q1633	Y1530	L1422	F1249	F1249	I1158
I2475	F2377	R2280	A2176	A1925	Q1813	W1720	E1634	Y1530	L1423	F1249	Y1250	R1159
A2476	D2382	R2281	A2177	R1927	Q1814	W1721	Q1634	A1534	F1424	F1249	M1251	P1160
L2482	E2183	A2289	E2183	P1931	Q1815	F1725	Q1635	L1535	T1428	I1351	Q1262	Y1163
T2483	R2186	R2290	R2186	PRO	Q1816	D1728	L1637	E1536	T1429	I1352	D1264	R1166
L2484	F2393	F2291	R2187	ALA	Q1819	D1729	K1639	L1542	Y1430	I1353	D1265	L1167
M2491	L2396	L2292	R2188	PRO	P1820	G1731	G1640	L1542	V1434	P1355	D1266	Y1169
Q2497	K2397	P2294	R2189	LEU	L1821	W1733	F1641	N1547	W1437	K1356	G1266	L1170
M2500	L2398	G2295	Q2190	SER	L1822	I1733	Y1642	N1547	W1438	R1357	L1267	W1171
L2501	R2399	A2296	E2191	LEU	S1829	E1755	P1648	D1582	P1439	I1359	Y1268	L1172
T2502	W2297	W2297	E2192	R1939	D1830	E1756	P1649	D1582	G1440	I1360	S1263	L1172
T2503	L2068	L2068	L2193	I1952	D1831	P1737	Y1650	F1585	A1441	G1363	M1273	K1179
L2504	K2073	K2073	L2194	N1953	D1836	K1738	M1651	A1559	L1445	G1363	A1274	Q1180
M2505	L2078	L2078	V1955	E1954	D1839	S1739	S1653	E1560	L1445	R1369	G1266	THR
D2506	L2063	L2063	V1955	V1955	V1840	S1755	T1654	D1561	I1452	N1370	L1267	GLY
R2512	L2203	K2087	M1958	M1958	V1840	E1756	H1655	G1582	G1453	Q1371	Y1268	ASN
L2515	L2304	Y2099	Y1959	Y1959	P1845	F1760	H1656	R1583	Y1456	M1375	M1273	SER
K2516	K2204	Y2099	W1960	W1960	P1845	S1761	D1657	K1584	Y1456	M1375	A1274	LYS
	D2207	G2101	Q1961	Q1961	Y1848	G1762	E1658	L1585	D1459	K1330	S1275	GLY
	L2214	L2102	T1962	L1963	K1849	A1763	M1659	L1576	D1459	L1381	M1278	Y1196
	V2215	L2102	L1963	L1963	S1765	W1764	M1660	L1576	M1462	G1382	P1279	
	R2216	E2105	V1967	V1967	R1855	R1766	K1666	L1584		D1383	P1280	
	L2227	N2106	L1970	L1970	L1857	L1766	M1671	L1574	D1465	L1384	E1281	K1199
	K2228	I2107	R1971	R1971	D1858	F1768	M1671	T1575	D1466	F1385	Q1282	L1200
	T2229	N2108	H1972	H1972	V1858	W1769	L1681	L1576	L1467	S1283	S1283	A1201
	Q2233	E2111	N1973	N1973	Y1868	E1770	H1682	L1584	K1468	W1284	H1202	H1202
	Q2237	L2117	L1974	L1974	L1871	Y1774	D1683	L1585	D1475	S1390	V1285	I1203
	A2238	A2121	I1975	I1975	L1876	L1778	T1684	L1586	G1478	N1394	Y1286	R1204
	F2240	A2122	Y1982	Y1982	L1876	L1778	L1690	L1586	T1479	P1395	R1287	Y1205
	R2244	T2126	V1986	V1986	K1893	R1782	F1691	H1587	S1484	N1396	Y1291	W1209
	S2246	A2127	P1991	P1991	P1894	L1783	I1692	H1587		N1397	Q1292	N1210
	N2247	Q2129	K1993	K1993	L1896	L1784	P1693	Y1594	P1495	S1398	Q1293	T1211
	L2250	Q2129	A1994	A1994	L1898	E1786	D1695	M1596		S1399	F1294	P1212
	I2144	Q2129	V2000	V2000	L1898	E1786	D1695	W1598		N1400	D1295	I1213
	Y2251	F2145	Q2004	Q2004	T1901	E1791	L1699			K1401	M1297	V1217
	W2252	G2147	K2008	K2008	P1905	N1793	L1699	R1602		L1402	R1300	K1220
	L2254	A2146	L2009	L2009	R1906	R1794	D1702	T1603		F1404	R1301	I1221
	R2255	G2149	R2018	R2018	P1906	R1794	D1702	R1604		Y1405	R1301	I1221
	R2257	G2151			R1907	R1794	K1706	V1502		R1305	R1305	K1226
					L1908	K1797	W1707	K1503		Q1409	R1305	K1226
					A1911	Y1798	Y1708	A1504		Y1310	R1305	K1226
						W1799	W1709	G1505		E1411	R1305	K1226
						W1800	F1710	F1511		G1412	I1312	R1230
						S1801	F1711	F1512		P1313	P1313	G1233
						P1802	K1712	D1514		K1320	K1320	C1236

● Molecule 1: TcdA1

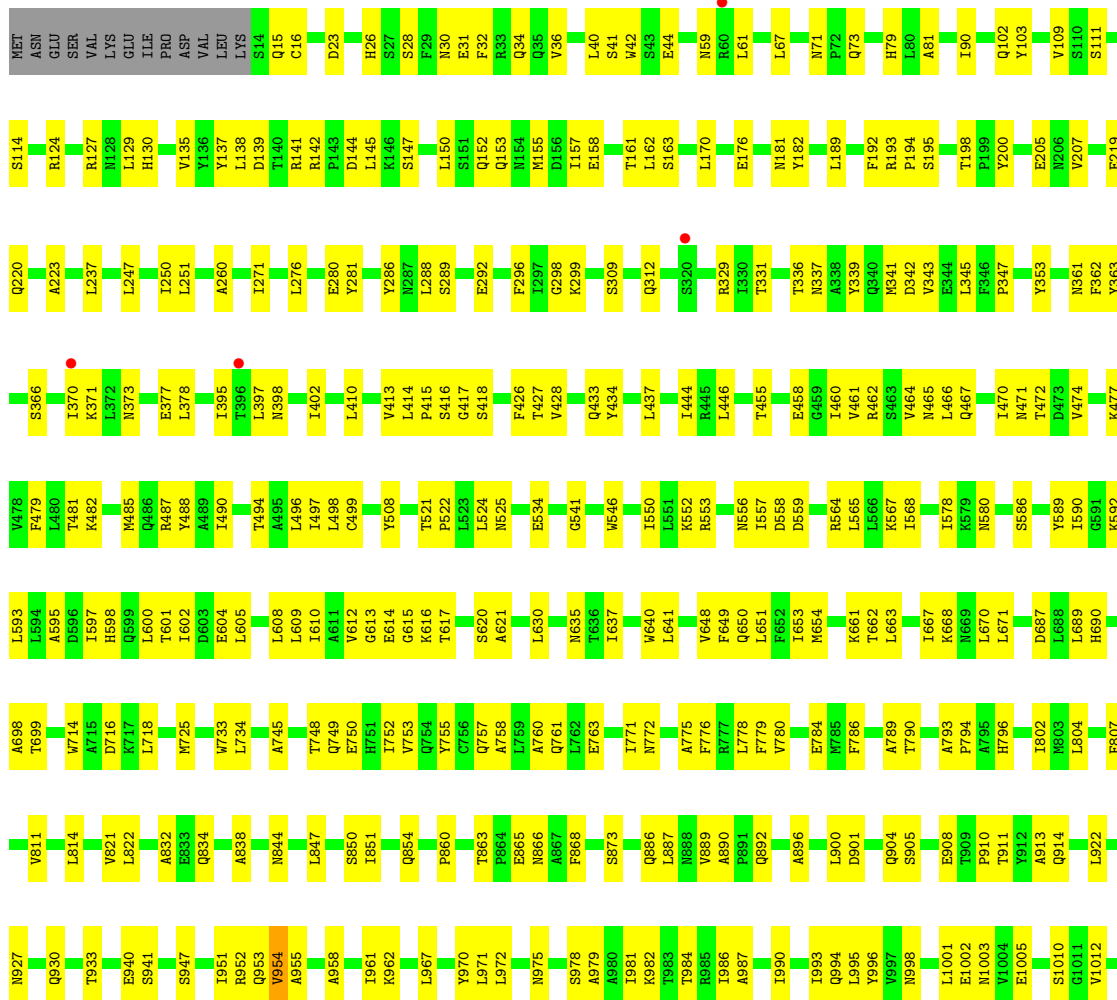
Chain B: 64% 35%

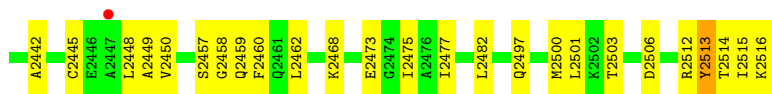
MET	ASN	GLU	SER	VAL	LVS	GLU	LLE	PRO	ASP	VAL	LEU	LVS	S144	Q15	G17	H26	F29	N30	E31	F32	R33	Q34	Q35	V36	L40	S41	W42	S43	E44	Y49	L57	K57	L61	Q73	A81	I90	Q95	R99	A100	S101	Y103	V104	T108	R124	E125																																																																																																																																																																																																																																																																																																																												
A126	R127	H130	V135	Y136	L137	L138	R141	R142	P143	K146	S147	L150	Q153	N154	M155	D156	E158	L159	S160	T161	L162	S163	L170	E176	M181	Y182	V185	L189	F192	R193	P194	S195	G196	A197	T198	H201	S201	Q204	E205	Y204	S205	R208	E209	V210	I211	E219	Q220	A223	S224	W231	H232	Q233	N319	G323	T324	V325	R329	I330	T331	T336	N337	A338	Y339	Q340	D342	P347	F348	Y353	R354	N361	F362	Y363	S366	I370	K371	N373	Y281	L282	K283	R284	Y285	L288	S289	E292	F296	I297	G298	K299	A300	Q306	E307	Y308	S309	P415	S416	C417	S418	T427	L538	N539	S540	G541	S542	K548	T549	L550	L551	K552	R553	M556	L557	D558	D559	R564	L565	L566	K567	L568	N573	L578	K579	N580	S586	Y589	L590	K591	K592	L702	N706	V707	L713	W714	M725	W733	L734	K737	Y738	T739	P740	A745	W746	L747	E748	Q749	E750	V753	Y754	Y755	A758	L759	W761	L762	E763	W764	W765	T769	G770	I771	N772	E773	F776	R777	L778	F779	W780	T781	K782	F783	E784	Q930	T933	L934	W934	E940	S947	T948	Y949	Y950	L951	R952	Q953	W954	A955	A958	K962	S963	R964	D965	Y968	Q969	L970	N844	L971	N975	Q976	Q977	K852	A853	Q854	P860	F868	T984	R985	A987	Q994	L995	Y996	Y997	A896	L897	W898	G899	L900	I903	E908	N927	Q930	F1017	F1018	W1021	Y1024	M1025	K1026	V1034	L1061	L1069	A955	A958	K962	S963	R964	D965	Y1097	H1098	I1101	N1102	L1103	D1104	I1111	G1112	D1117	A1118	Y1121	W1122	W1123	R1124	S1125	V1126	K1130	A1137	A1138	M1139	A1140	W1141	S1142	E1143	W1144	H1145	K1146	I1147	I1151	M1152	P1153	T1157	H1158	R1159	P1160	Y1163	R1166	L1167	Y1168	W1171	L1172	I1177	T1178	K1179	Q1180	THR	GLY	ASN	SER	LVS	ASP	GLY	Y1188	Y1196	H1202	I1203	R1204	Q1292	Q1293	F1294	D1295	T1296	M1297	R1301	V1302	M1303	N1304	R1305	Y1306	Y1310	E1311	I1312	P1313	D1321	Y1322	D1326	Y1327	Y1328	L1329	V1332	Y1333	G1420	R1421	L1422	L1423	F1424	H1425	R1426	D1427	T1428	I1429	Y1430	I1452	Y1456	A1457	T1458	D1459	M1462	D1466	L1467	K1468	Q1469	M1375	M1376	L1471	F1472	M1473	T1474	L1381	G1382	R1285	G1286	Y1287	I1288	M1273	A1274	S1275	T1279	P1280	F1281	Q1282	S1283	M1284	Y1285	L1286	R1287	D1288	N1289	Y1291



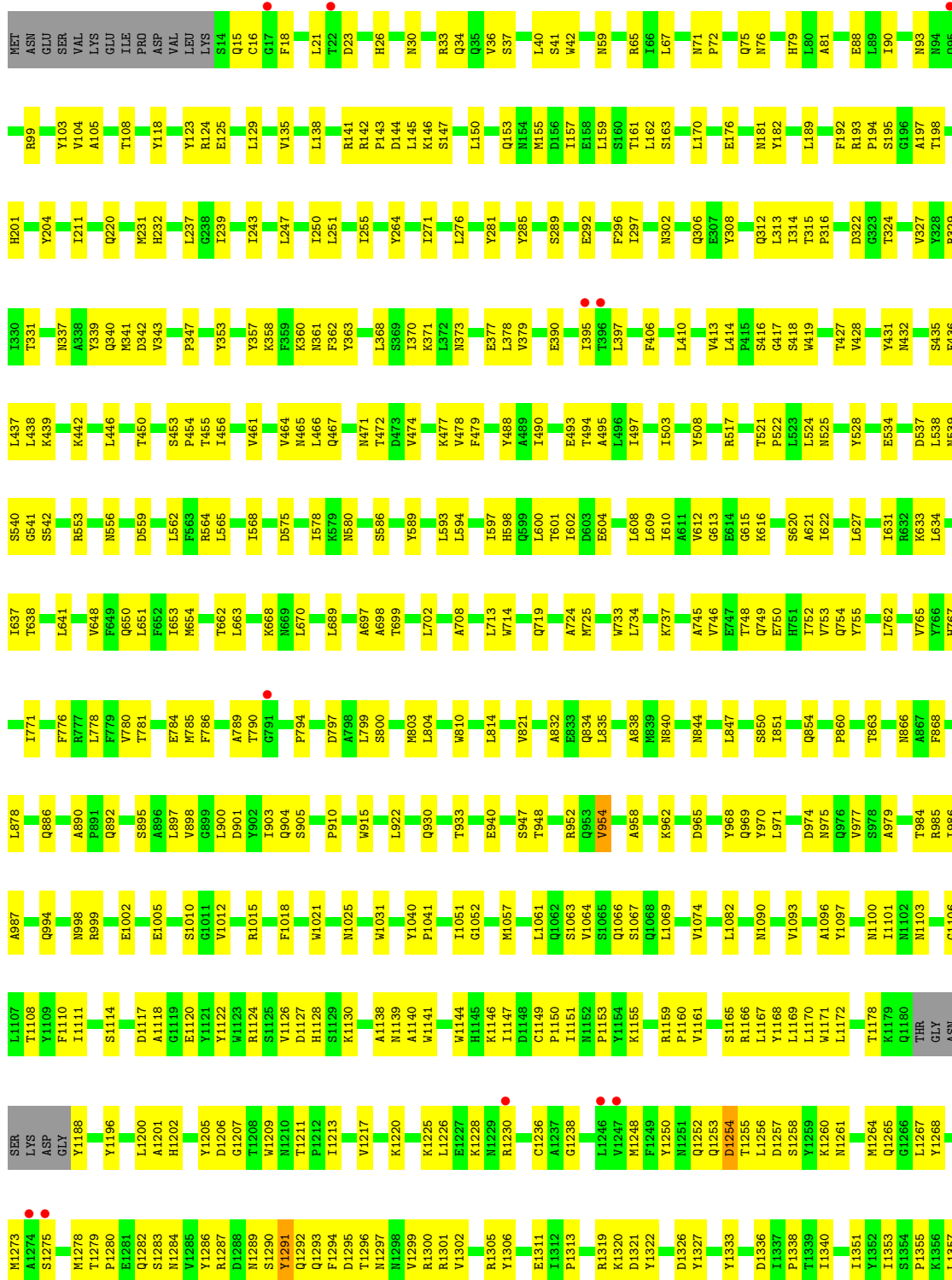


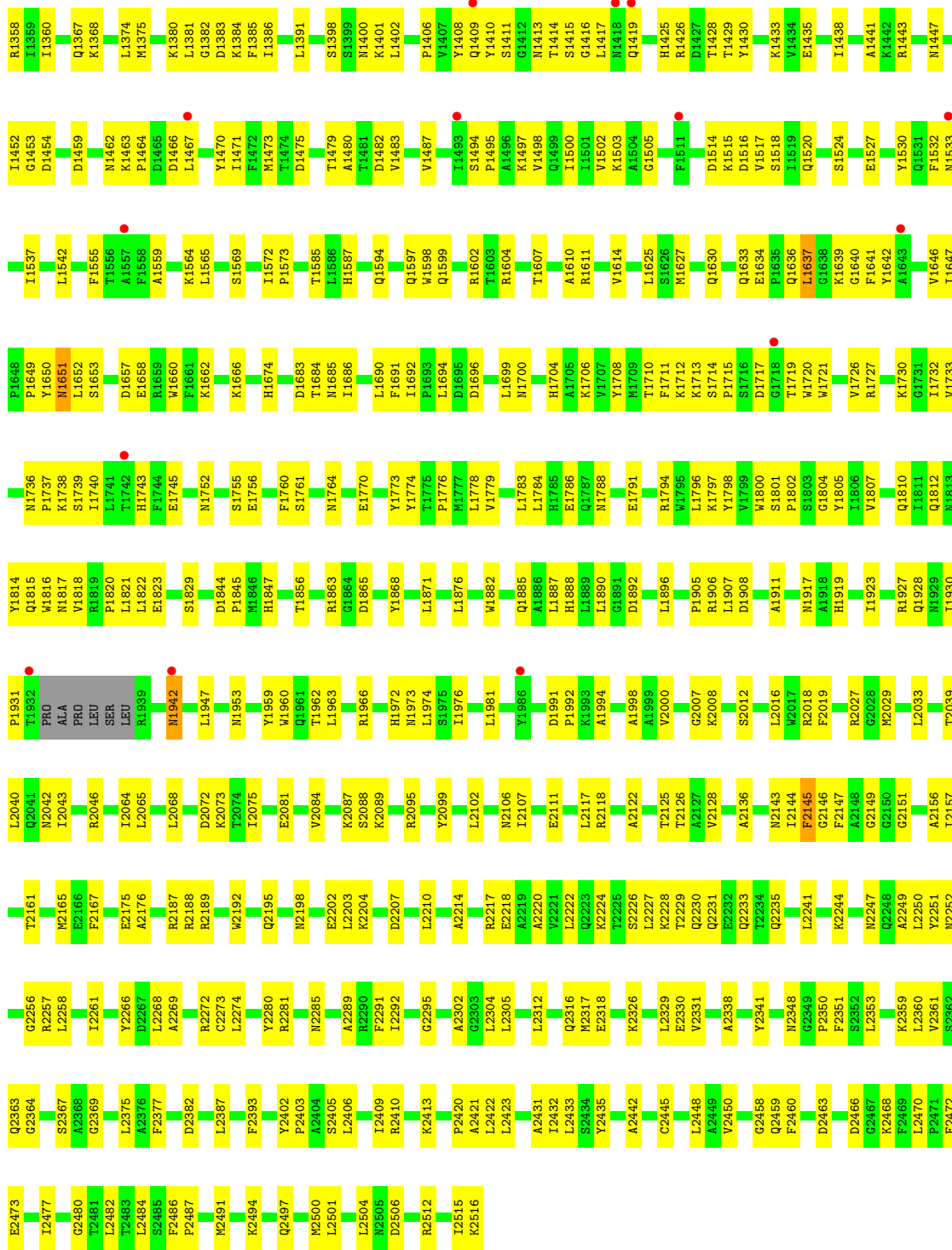
• Molecule 1: TcdA1





● Molecule 1: TcdA1

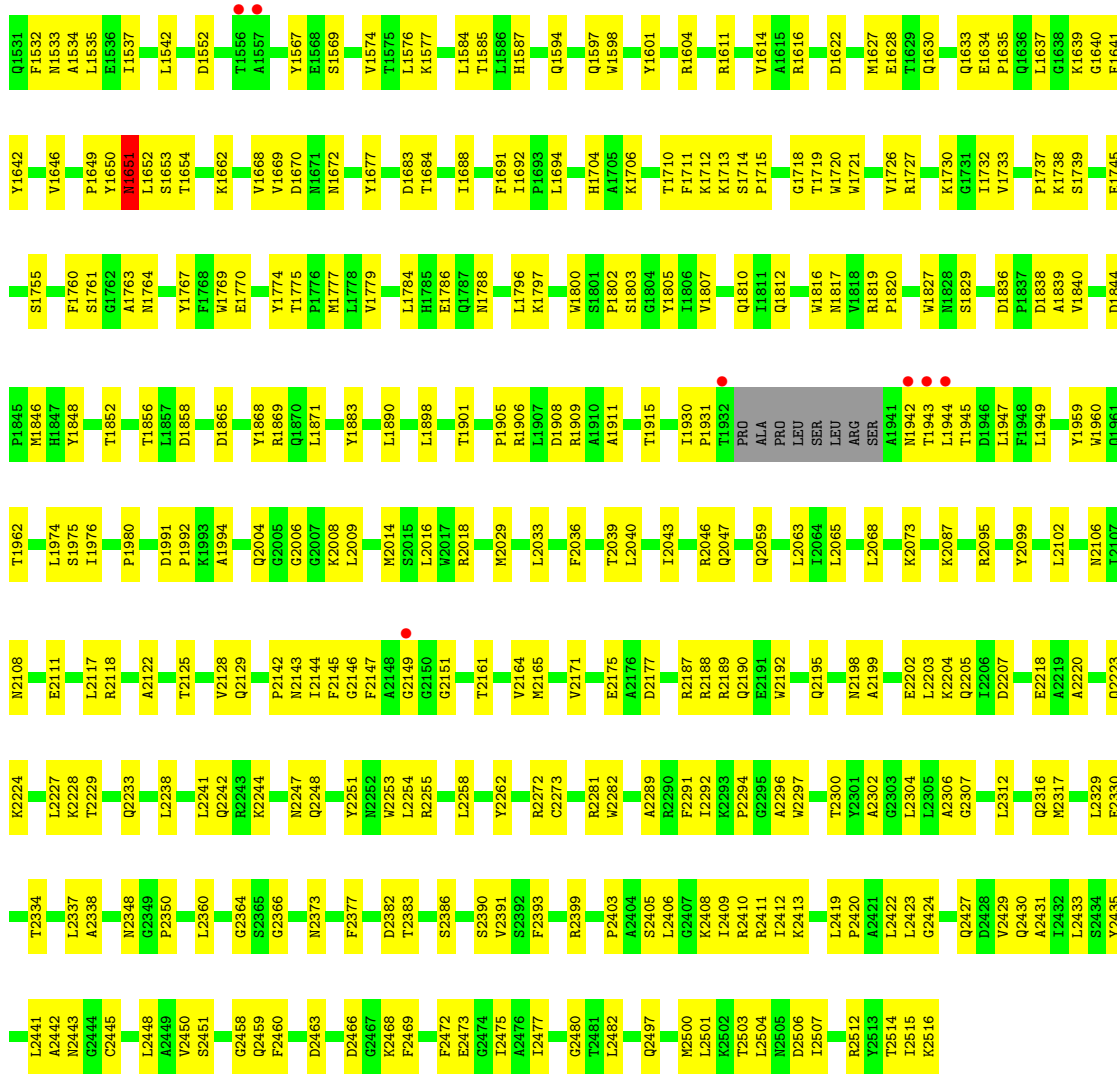




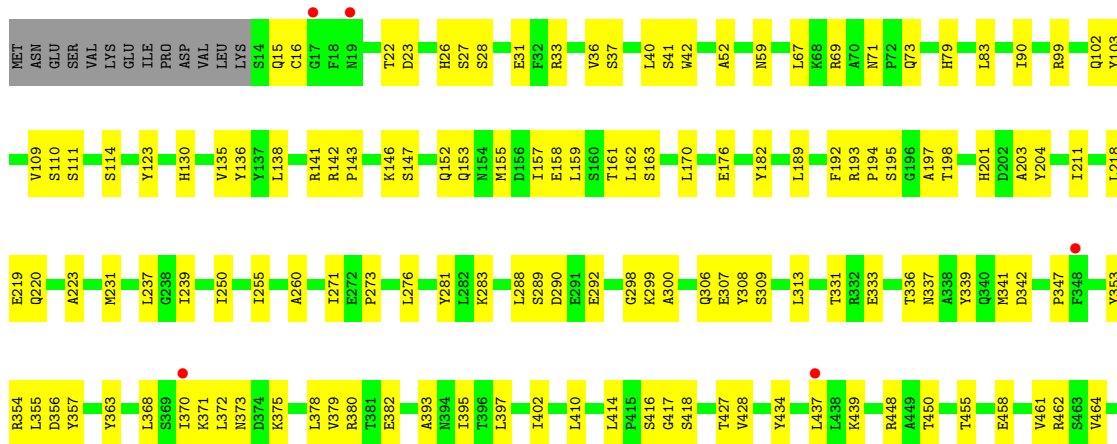
• Molecule 1: TcdA1



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L1445	P1355	K1260	Y1168	A1088	K982	W880	V765	S639	E534	L437	T315	L218	S111
T1446	R1357	L1267	L1169	V1089	I986	W881	T769	N640	G541	K439	N319	L219	F113
N1447	R1358	Y1268	W1171	M1090	I990	G670	G770	L641	S542	T450	S321	Q220	M112
A1451	I1360	A1271	L1172	L1091	I992	I771	I771	F649	R553	E451	S322	A223	S114
I1452	H1361	D1272	T1178	K1092	A991	N888	N772	Q650	R556	L452	R329	A223	R124
G1453	G1362	M1273	K1179	V1093	Q994	V889	E773	L651	N556	S453	R329	H232	E125
D1454	D1363	A1274	Q1180	Y1087	N988	Q992	L778	L653	N557	L456	T331	H232	R124
D1455	R1368	S1275	THR	Y1087	N988	Q992	F779	H654	D558	L457	T331	L237	E125
Y1456	R1369	GLY	GLY	I1101	E1002	A896	V780	S659	D559	E456	N337	L237	S132
D1459	Q1370	ASN	ASN	M1102	E1002	L897	K782	R564	R564	V461	A338	G236	V135
M1462	M1375	SER	M1103	M1103	E1005	L900	K782	T662	R564	V461	Y339	I239	Y136
K1463	M1375	ASP	D1104	D1104	D901	L900	E784	L663	L578	V464	Q340	P245	L138
P1464	M1375	GLY	L1107	L1107	N1007	Y902	E784	L663	L578	V464	K341	E246	D139
Y1378	Y1378	Y1188	F1110	F1110	A1008	I903	A789	L667	N580	Q467	D342	L247	T140
G1379	G1379	Y1196	I1111	I1111	V1012	Q904	T790	K668	N581	N471	Y353	R249	R141
L1380	K1380	Y1196	G1112	G1112	R1015	S905	P794	N669	L582	T472	N361	T250	K146
L1381	L1287	L1200	L1113	L1113	R1015	T911	A795	L670	L582	T472	F362	L251	S147
G1382	D1288	A1201	S1114	S1114	F1018	Y912	H796	D687	S586	D473	Y363	I255	L150
K1384	S1290	HL202	D1117	D1117	W1021	A913	N803	H690	Y589	K477	N364	N287	S151
F1385	Y1291	Y1205	A1118	A1118	W1021	Q914	L804	R690	N590	V478	A365	N287	Q152
I1386	Q1292	Y1205	G1119	G1119	Y1024	L922	N812	A693	G591	F479	L370	E272	Q152
S1390	F1293	T1211	I1120	I1120	M1025	L922	N812	P694	K592	L480	K371	Q153	M154
L1391	F1293	P1212	Y1121	Y1121	K1026	Q930	A813	A697	L593	L481	L372	A274	M155
K1400	M1297	I1213	Y1122	Y1122	R1027	T933	L814	A698	A595	N485	N373	S275	D156
L1402	K1225	I1221	W1123	W1123	Y1030	Y933	B821	A698	D596	Q486	L378	A277	E158
M1403	S1125	R1124	R1124	R1124	T1030	E940	L822	T699	N597	R487	V379	M278	L162
F1404	V1126	V1126	V1126	V1126	V1034	Y940	L830	N706	G599	Y488	R380	Y281	T161
Y1408	K1130	E1227	K1130	K1130	Y1034	S947	T833	A708	L600	L496	E382	L282	L162
Q1409	A1138	R1230	A1138	A1138	Y1039	T948	A832	H709	T601	L497	G383	K283	S163
Y1410	M1139	G1233	M1139	M1139	I1045	I951	E633	Q834	E604	L498	A384	R284	L170
S1411	A1140	G1233	A1140	A1140	D1046	R952	Q834	L835	L605	C499	Y285	Y285	E176
G1412	W1141	W1141	W1141	W1141	P1047	Q953	L835	A836	D606	I503	T396	L288	M181
N1413	S1142	C1236	S1142	S1142	Q1050	V954	A836	N725	L607	R506	L397	L288	Y182
T1414	E1143	A1237	E1143	E1143	R1050	A958	N844	N725	L609	R506	N398	S289	M181
S1415	W1144	G1238	W1144	W1144	I1051	I958	L845	W733	L610	Q514	T402	E292	L189
G1416	H1146	Y1239	H1146	H1146	G1052	K962	L846	L734	A611	F515	L410	G298	F192
L1417	I1147	E1242	I1147	I1147	M1057	K962	L847	A745	V612	G298	L410	G298	R193
N1418	I1147	E1242	I1147	I1147	M1057	S963	T851	A745	G613	D516	L414	K299	R193
Q1419	I1151	L1245	I1151	I1151	L1060	D964	Q852	T748	E614	R517	L414	A300	P194
G1420	M1152	L1246	M1152	M1152	L1061	D965	Q852	Q749	K616	N520	F415	S301	S195
L1421	P1153	V1247	P1153	P1153	L1061	L967	P860	Q749	T617	T521	G417	R302	P194
L1422	T1157	M1248	T1157	T1157	V1064	L967	P860	Q749	T617	P522	S418	N302	S195
L1423	I1158	F1249	I1158	I1158	Q1066	L971	T863	L752	S620	L524	G304	G196	G196
R1426	I1158	Y1250	I1158	I1158	Q1066	L971	T863	L752	S620	L524	T427	Q305	A197
D1427	R1159	N1251	R1159	R1159	L1069	N975	N866	V755	L622	N525	T427	Q305	T198
T1428	P1160	Q1252	P1160	P1160	L1070	Q976	A967	V755	L622	N525	N432	S309	H201
Y1352	D1254	D1254	D1254	D1254	A1071	S978	F868	Q757	Q626	Y528	Q433	Q312	Y204

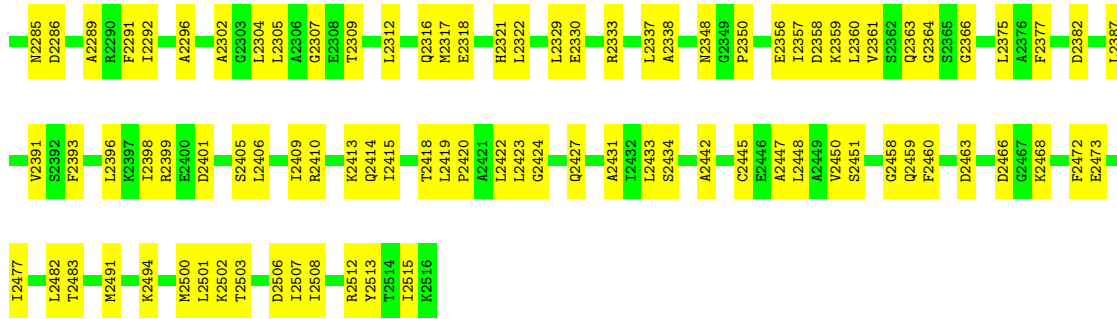


• Molecule 1: TcdA1

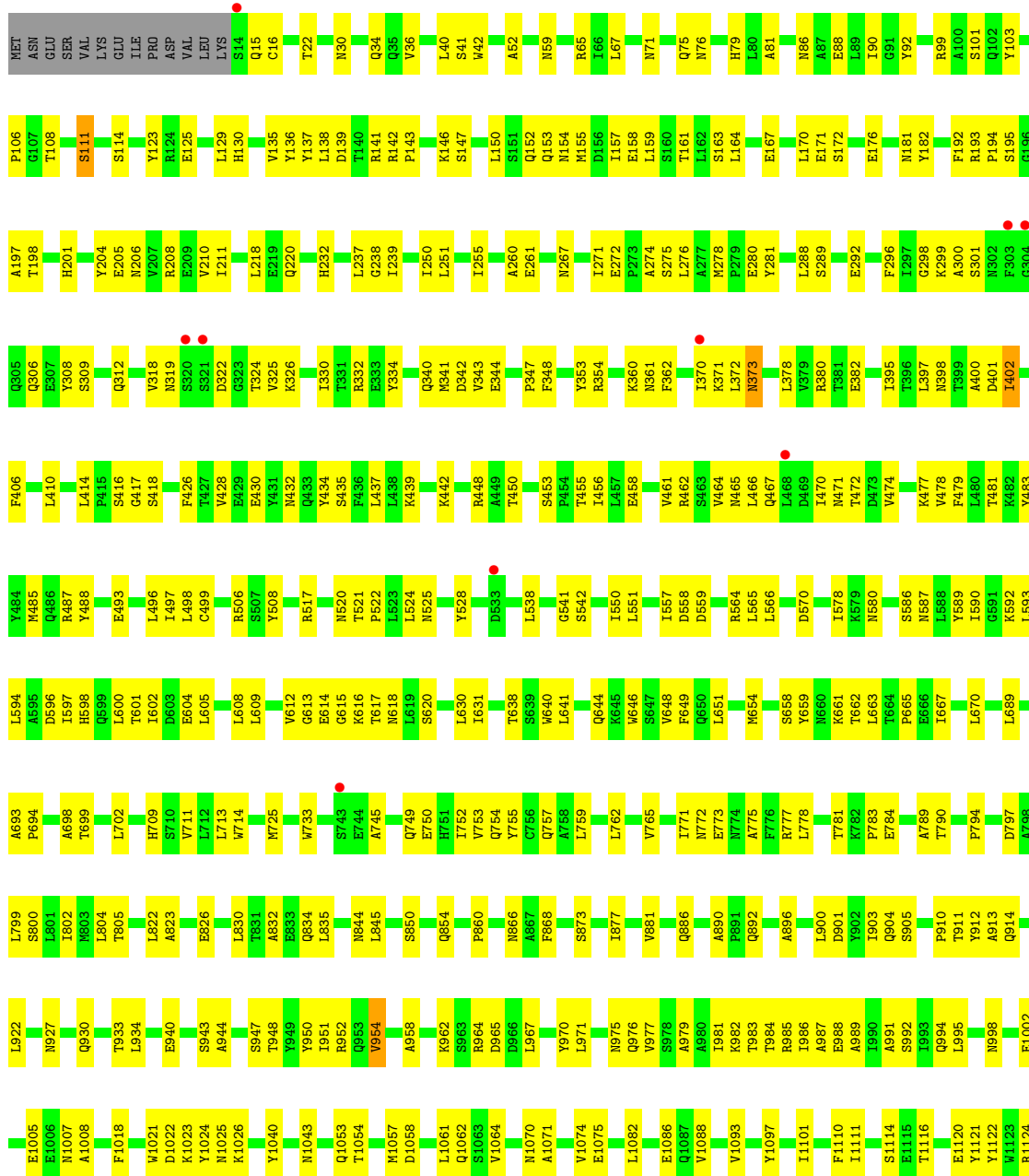


P1837	R1727	K1639	E1527	S1444	P1355	L1267	THR	A1096	Q976	L830	W114	I590	Q467
D1838	K1730	G1640	Y1530	L1445	K1356	Y1268	GLY	H1097	V977	T831	A715	L593	N471
V1840	G1731	T1446	Q1531	N1447	R1358	Y1268	ASN	Y1098	S978	A832	D716	L593	T472
Q1842	I1732	P1648	F1532	N1452	I1359	S1275	SER	A979	A980	Q834	M725	D596	D473
H1843	V1733	P1648	N1533	I1456	L1360	M1278	LYS	N1102	A981	L835	T726	I597	V474
P1844	P1737	Y1650	A1534	Y1456	H1361	M1279	ASP	N1103	K982	M844	A727	H598	K477
P1845	K1738	M1651	E1536	Y1456	H1362	P1280	GLY	N1104	T983	L600	W733	L600	V478
H1846	I1537	D1459	I1537	D1459	K1368	Q1281	Y1196	I1111	T984	L847	L734	I602	F479
H1847	H1743	L1652	S1540	M1462	E1197	E1282	E1197	G1112	I986	R885	K737	L605	Y483
Y1848	L1750	T1654	K1463	K1463	L1198	S1283	L1198	L1113	I993	S850	A745	L609	R487
V1850	L1750	H1655	P1464	P1464	K1199	M1284	K1199	S1114	Q994	L881	V746	L609	Y488
S1851	S1755	D1465	D1465	D1465	L1200	V1285	L1200	E1115	N998	Q854	A745	L609	I497
L1852	E1756	D1466	D1466	D1466	A1201	Y1286	A1201	T1116	N998	E747	V746	L609	I498
F1853	S1761	D1467	L1467	L1467	I1203	R1287	I1203	D1117	P860	P860	T748	V612	C499
L1857	S1761	K1468	K1468	K1468	R1204	M1289	R1204	G1119	I877	I877	Q749	G613	M500
L1858	Y1767	F1555	F1556	Q1469	I1204	S1290	I1204	E1120	M1007	W880	H751	E614	
L1859	Y1767	A1557	A1557	Q1469	T1208	Y1291	T1208	Y1121	A1008	Q886	I752	L619	I503
R1863	E1770	F1558	F1558	M1473	W1209	Q1292	W1209	Y1122	A1008	S620	I752	L619	S506
G1864	Y1774	K1384	Q1293	T1474	M1210	F1294	M1210	R1123	A1008	A621	Q749	L619	S507
D1865	T1775	F1385	F1294	D1475	T1211	F1294	T1211	R1124	Q886	A621	Q754	L619	Y508
Y1868	P1776	I1386	D1295	T1296	P1212	D1295	P1212	S1125	W1021	A890	H755	L622	
L1871	M1777	S1390	T1296	M1297	F1215	M1297	F1215	V1126	M1035	F891	Q761	S633	
L1876	L1778	M1298	M1298	M1298	K1130	K1130	K1130	K1130	K1026	Q892	V765	D624	
W1882	W1795	M1394	R1301	S1484	I1221	R1301	I1221	A1138	G1033	A896	I771	L627	
L1885	L1796	P1395	F1302	P1485	L1224	F1302	L1224	M1139	G1033	L897	T771	A628	
L1886	L1796	M1396	M1303	P1485	L1224	M1303	L1224	A1140	Y1039	T629	N772	T629	
L1887	W1795	M1397	M1303	E1488	L1226	M1304	L1226	W1141	Y1040	Q899	E773	L630	
L1888	W1795	S1398	M1304	E1488	E1227	R1305	E1227	W1141	P1041	G899	L778	L630	
L1889	L1801	S1399	R1305	E1488	E1227	Y1306	K1228	W1144	Y1044	L900	L778	L631	
L1890	P1802	M1400	Y1306	M1490	K1228	Y1306	K1228	W1144	Y1044	L900	L778	L631	
L1896	G1803	K1401	Y1310	E1491	R1229	Y1310	N1229	K1146	E784	L922	E784	K632	
T1901	S1804	L1402	E1311	E1491	R1230	E1311	N1229	K1146	E784	L922	E784	K632	
W1902	Y1806	L1402	E1311	E1491	R1230	E1311	N1229	K1146	E784	L922	E784	K632	
R1906	Q1807	F1404	I1312	E1491	G1233	I1312	G1233	I1151	A789	T933	A789	V648	
L1907	Q1810	Y1405	S1317	E1491	L1234	S1317	L1234	P1153	T1054	E940	T790	M654	
D1908	I1811	Y1405	S1317	E1491	L1234	S1317	L1234	P1153	T1054	E940	T790	M654	
S1921	W1816	Y1405	S1317	E1491	L1234	S1317	L1234	P1153	T1054	E940	T790	M654	
V1924	N1817	Y1405	S1317	E1491	L1234	S1317	L1234	P1153	T1054	E940	T790	M654	
A1925	V1818	Y1405	S1317	E1491	L1234	S1317	L1234	P1153	T1054	E940	T790	M654	
L1926	V1818	Y1405	S1317	E1491	L1234	S1317	L1234	P1153	T1054	E940	T790	M654	
R1927	V1818	Y1405	S1317	E1491	L1234	S1317	L1234	P1153	T1054	E940	T790	M654	
I1930	S1829	Y1405	S1317	E1491	L1234	S1317	L1234	P1153	T1054	E940	T790	M654	
P1931	D1836	Y1405	S1317	E1491	L1234	S1317	L1234	P1153	T1054	E940	T790	M654	
T1932	P1831	Y1405	S1317	E1491	L1234	S1317	L1234	P1153	T1054	E940	T790	M654	
PRO	D1836	Y1405	S1317	E1491	L1234	S1317	L1234	P1153	T1054	E940	T790	M654	

E2183	E2045	T1900	Y1774	L1652	F1555	L1461	K1368	A1274	ASP	S1114	W1009	Q904	T790
R2186	R2046	T1901	L1778	S1653	A1559	M1462	R1369	S1275	GLY	D1117	S1010	S905	P794
R2187	Q2059	R1906	T1654	T1655	E1560	P1464	Q1371	K1276	Y1188	E1120	G1011	P910	L799
R2188	L2063	L1907	R1782	H1655	D1561	Y1470	L1374	M1279	E1191	Y1121	R1015	Q930	L802
R2189	L2064	D1908	M1788	W1660	G1562	L1471	M1375	T1279	R1195	Y1122	W1021	T933	L803
Q2190	L2065	R1927	F1789	K1666	R1563	F1472	L1381	N1284	Y1196	W1123	W1021	L804	L804
L2068	Q2068	Q1928	D1790	Q1680	K1564	M1473	V1286	V1285	L1200	Y1024	Y1024	E940	L814
L2069	L2068	N1929	D1790	L1681	L1565	D1475	D1383	G1382	A1201	S1125	N1025	L814	L814
K2073	K2073	T1932	K1797	T1682	S1569	G1478	F1384	R1287	H1202	D1127	K1026	A944	W821
K2087	K2087	P80	M1685	T1684	P1573	T1479	F1385	D1288	W1209	H1128	W1031	S947	L822
R2095	R2095	ALA	P1802	M1691	L1576	A1480	L1391	S1290	M1210	K1130	W1031	T949	F825
Y2099	Y2099	LEU	S1803	F1691	K1577	Y1483	N1394	Q1293	P1212	K1135	V1034	F825	F825
G2100	G2100	LEU	Y1805	M1692	Y1584	V1487	Q1293	Q1293	I1213	N1043	N1043	R952	L830
K2101	K2101	R1939	T1806	P1693	L1585	Y1487	F1294	F1294	I1213	A1138	D1046	Q953	T831
L2102	L2102	F1948	V1807	D1694	T1585	M1490	S1398	D1295	M1218	M1139	D1046	U954	A832
N2106	N2106	L1949	Q1812	D1695	Q1584	T1491	S1399	T1296	K1219	A1140	P1047	E833	E833
T2107	T2107	L1952	Y1814	D1696	W1598	A1492	N1400	N1297	K1220	W1141	T1048	A958	Q834
N2108	N2108	N1953	Q1815	H1705	W1598	I1493	K1401	N1297	I1221	S1142	M1049	L835	L835
E2111	E2111	Y1959	M1816	A1706	R1604	S1494	L1402	R1300	S1222	E1143	R1050	K962	N840
N2112	N2112	Y1959	K1706	K1706	Y1607	S1494	P1406	R1301	L1224	W1144	Q1053	R964	L841
L1962	L1962	L1962	F1711	F1711	T1607	K1497	Y1407	R1305	L1225	H1145	T1054	L967	N844
L1963	L1963	L1963	K1712	K1712	A1610	V1498	Y1408	Y1306	K1147	I1147	K1055	L967	N844
I1976	I1976	I1976	M1611	M1611	R1611	A1502	Q1409	A1307	R1230	M1148	M1056	Y968	L845
L1970	L1970	L1970	V1614	V1614	A1617	A1503	Y1410	A1308	G1233	C1149	M1057	Y970	L846
N1973	N1973	N1973	A1616	A1616	D1516	A1504	G1412	E1311	C1236	I1151	D1058	L971	S850
L1974	L1974	L1974	A1616	A1616	G1505	G1505	L1413	I1312	I1152	L1312	L1061	L972	L851
S1975	S1975	S1975	A1617	A1617	A1513	D1514	T1414	P1313	A1237	P1153	Q1062	Y973	K852
I1976	I1976	I1976	T1618	T1618	K1515	D1514	G1416	D1321	G1238	I1158	S1063	D974	A853
P1980	P1980	P1980	M1627	M1627	D1516	D1516	L4117	Y1322	L1245	R1159	V1064	O976	Q854
L1981	L1981	L1981	E1628	E1628	V1517	V1517	Q1419	Y1327	M1248	V1161	M1069	S976	P860
L2016	L2016	L2016	T1629	T1629	Q1520	Q1520	Y1328	Y1328	F1249	I1162	M1070	A979	V862
W2017	W2017	W2017	Q1630	Q1630	P1523	P1523	L1423	D1336	Y1250	Y1163	E1075	A980	N866
R2018	R2018	R2018	E1634	E1634	S1524	S1524	F1424	H1425	M1251	K1164	E1075	Y981	N866
F2019	F2019	F2019	P1635	P1635	F1525	F1525	R1426	I1337	Q1252	S1165	M1090	K982	A867
N2025	N2025	N2025	Q1636	Q1636	E1527	E1527	D1427	P1338	Q1253	R1166	L1091	T984	F868
A2026	A2026	A2026	L1637	L1637	D1526	D1526	T1428	K1350	D1254	L1167	L1091	T984	F868
G2027	G2027	G2027	G1638	G1638	E1530	E1530	E1435	I1351	L1255	Y1168	K1092	R985	S873
M2029	M2029	M2029	K1639	K1639	Q1531	Q1531	T1438	Y1352	D1257	L1170	V1093	A987	W850
L2033	L2033	L2033	G1640	G1640	F1532	F1532	P1439	S1354	Y1259	W1171	Y1097	Q994	Q886
T2039	T2039	T2039	F1641	F1641	E1536	E1536	G1440	P1355	K1260	I1101	I1101	N998	A890
L2040	L2040	L2040	Y1642	Y1642	I1537	I1537	A1441	L1357	M1261	M1102	M1102	N998	A890
Q2041	Q2041	Q2041	F1645	F1645	L1542	L1542	L1445	H1360	Q1265	T1178	M1103	R999	P891
N2042	N2042	N2042	P1648	P1648	M1543	M1543	I1452	H1361	G1266	K1179	D1104	Q892	Q892
I2043	I2043	I2043	Y1650	Y1650	F1544	F1544	G1453	M1362	I1267	THR	T1108	E1002	L897
L2044	L2044	L2044	N1651	N1651	A1549	A1549	S11460	G1363	I1268	GLY	T1108	E1005	L897
										ASN	I1111	E1006	D901
										SER	G1112	M1007	Y902
										LYS	L1113	A1008	I903



● Molecule 1: TcdA1



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	303.25Å 320.73Å 667.62Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 3.50 73.11 – 3.50	Depositor EDS
% Data completeness (in resolution range)	78.3 (20.00-3.50) 78.4 (73.11-3.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.39	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.40 (at 3.49Å)	Xtrriage
Refinement program	PHENIX 1.8.1_1168	Depositor
R, R_{free}	0.243 , 0.295 0.245 , 0.297	Depositor DCC
R_{free} test set	19006 reflections (3.00%)	wwPDB-VP
Wilson B-factor (Å ²)	54.4	Xtrriage
Anisotropy	0.030	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 14.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.35$, $\langle L^2 \rangle = 0.19$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.78	EDS
Total number of atoms	197663	wwPDB-VP
Average B, all atoms (Å ²)	69.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.05% 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 [i](#)

5.1 Standard geometry [i](#)

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	0.41	0/20194	0.66	4/27427 (0.0%)
1	B	0.41	0/20194	0.66	5/27427 (0.0%)
1	C	0.40	0/20194	0.65	7/27427 (0.0%)
1	D	0.41	0/20194	0.66	3/27427 (0.0%)
1	E	0.41	0/20194	0.67	5/27427 (0.0%)
1	F	0.38	0/20194	0.63	4/27427 (0.0%)
1	G	0.39	0/20177	0.64	2/27405 (0.0%)
1	H	0.38	0/20194	0.64	3/27427 (0.0%)
1	I	0.39	0/20194	0.64	3/27427 (0.0%)
1	J	0.39	0/20194	0.64	3/27427 (0.0%)
All	All	0.40	0/201923	0.65	39/274248 (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	1
1	C	0	2
1	D	0	1
1	F	0	1
1	G	0	1
1	H	0	1
1	I	0	1
All	All	0	8

There are no bond length outliers.

The worst 5 of 39 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	521	THR	C-N-CD	-7.83	103.37	120.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	1461	LEU	CA-CB-CG	7.83	133.30	115.30
1	I	1291	TYR	N-CA-C	-7.48	90.79	111.00
1	F	1291	TYR	N-CA-C	-6.93	92.28	111.00
1	H	1291	TYR	N-CA-C	-6.20	94.25	111.00

There are no chirality outliers.

5 of 8 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1730	LYS	Peptide
1	C	1730	LYS	Peptide
1	C	521	THR	Peptide
1	D	1730	LYS	Peptide
1	F	1730	LYS	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	19768	0	19307	696	0
1	B	19768	0	19307	693	0
1	C	19768	0	19307	705	0
1	D	19768	0	19307	704	0
1	E	19768	0	19307	705	0
1	F	19768	0	19307	694	0
1	G	19751	0	19289	663	0
1	H	19768	0	19307	654	0
1	I	19768	0	19307	706	0
1	J	19768	0	19307	702	0
All	All	197663	0	193052	6448	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 16.

The worst 5 of 6448 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:1653:SER:H	1:A:1713:LYS:HE3	1.13	1.09
1:J:1653:SER:H	1:J:1713:LYS:HE3	1.22	1.04
1:C:1117:ASP:H	1:D:1211:THR:HG21	1.21	1.03
1:J:1250:TYR:HE2	1:J:1294:PHE:HB3	1.20	1.03
1:E:1250:TYR:HE2	1:E:1294:PHE:HB3	1.26	1.01

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	2484/2516 (99%)	2384 (96%)	94 (4%)	6 (0%)	47	81
1	B	2484/2516 (99%)	2397 (96%)	82 (3%)	5 (0%)	47	81
1	C	2484/2516 (99%)	2394 (96%)	85 (3%)	5 (0%)	47	81
1	D	2484/2516 (99%)	2390 (96%)	90 (4%)	4 (0%)	47	81
1	E	2484/2516 (99%)	2387 (96%)	92 (4%)	5 (0%)	47	81
1	F	2484/2516 (99%)	2389 (96%)	90 (4%)	5 (0%)	47	81
1	G	2482/2516 (99%)	2393 (96%)	84 (3%)	5 (0%)	47	81
1	H	2484/2516 (99%)	2393 (96%)	86 (4%)	5 (0%)	47	81
1	I	2484/2516 (99%)	2393 (96%)	86 (4%)	5 (0%)	47	81
1	J	2484/2516 (99%)	2395 (96%)	84 (3%)	5 (0%)	47	81
All	All	24838/25160 (99%)	23915 (96%)	873 (4%)	50 (0%)	47	81

5 of 50 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1651	ASN
1	C	522	PRO
1	D	954	VAL

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Mol	Chain	Res	Type
1	F	954	VAL
1	F	1651	ASN

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	2134/2157 (99%)	2131 (100%)	3 (0%)	93 98
1	B	2134/2157 (99%)	2129 (100%)	5 (0%)	93 98
1	C	2134/2157 (99%)	2130 (100%)	4 (0%)	93 98
1	D	2134/2157 (99%)	2128 (100%)	6 (0%)	92 97
1	E	2134/2157 (99%)	2126 (100%)	8 (0%)	91 96
1	F	2134/2157 (99%)	2131 (100%)	3 (0%)	93 98
1	G	2132/2157 (99%)	2129 (100%)	3 (0%)	93 98
1	H	2134/2157 (99%)	2130 (100%)	4 (0%)	93 98
1	I	2134/2157 (99%)	2123 (100%)	11 (0%)	88 94
1	J	2134/2157 (99%)	2128 (100%)	6 (0%)	92 97
All	All	21338/21570 (99%)	21285 (100%)	53 (0%)	93 98

5 of 53 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	F	2145	PHE
1	H	2261	ILE
1	J	658	SER
1	G	658	SER
1	H	1102	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 132 such sidechains are listed below:

Mol	Chain	Res	Type
1	I	2059	GLN

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Mol	Chain	Res	Type
1	J	26	HIS
1	J	2057	GLN
1	D	1704	HIS
1	D	1597	GLN

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 monosaccharides 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	2490/2516 (98%)	-0.12	8 (0%) 94 91	11, 61, 112, 209	0
1	B	2490/2516 (98%)	-0.11	9 (0%) 92 90	19, 63, 114, 190	0
1	C	2490/2516 (98%)	-0.09	13 (0%) 91 88	14, 67, 116, 184	0
1	D	2490/2516 (98%)	-0.10	12 (0%) 91 88	10, 64, 115, 186	0
1	E	2490/2516 (98%)	-0.13	13 (0%) 91 88	11, 58, 112, 186	0
1	F	2490/2516 (98%)	-0.04	25 (1%) 82 77	8, 71, 134, 210	0
1	G	2488/2516 (98%)	-0.06	24 (0%) 82 77	6, 67, 128, 210	0
1	H	2490/2516 (98%)	-0.04	29 (1%) 79 73	13, 68, 128, 194	0
1	I	2490/2516 (98%)	-0.05	22 (0%) 84 79	10, 68, 127, 195	0
1	J	2490/2516 (98%)	-0.04	30 (1%) 79 73	8, 69, 130, 197	0
All	All	24898/25160 (98%)	-0.08	185 (0%) 87 83	6, 65, 123, 210	0

The worst 5 of 185 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	1932	THR	7.2
1	F	1718	GLY	7.1
1	C	1932	THR	6.8
1	H	1932	THR	6.1
1	J	320	SER	5.5

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

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

6.3 Carbohydrates [i](#)

There are no monosaccharides 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.