



wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 12, 2024 – 04:45 AM EDT

PDB ID : 1UAA
Title : E. COLI REP HELICASE/DNA COMPLEX
Authors : Korolev, S.; Waksman, G.
Deposited on : 1997-06-30
Resolution : 3.00 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
Xtrriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
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) : 2.36.2

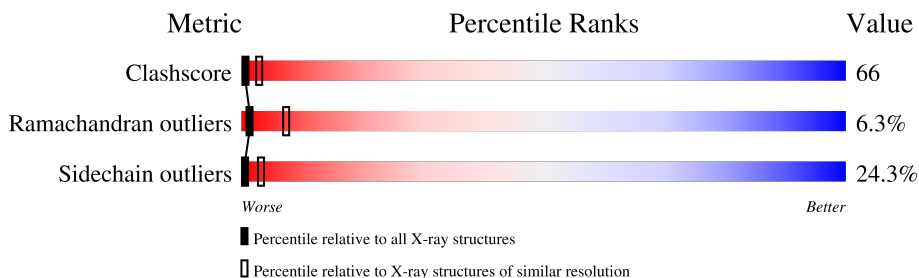
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 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	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	2416 (3.00-3.00)
Ramachandran outliers	138981	2333 (3.00-3.00)
Sidechain outliers	138945	2336 (3.00-3.00)

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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	C	16	
2	A	673	
2	B	673	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 10404 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 DNA chain called DNA (5'-D(*TP*TP*TP*TP*TP*TP*TP*TP*TP*TP*TP*TP*TP*TP*TP*TP*TP*TP*T)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
1	C	16	317	160	32	110	15	0	0	0

- Molecule 2 is a protein called PROTEIN (ATP-DEPENDENT DNA HELICASE REP.).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	A	636	5032	3186	881	942	23	0	0	0
2	B	633	5055	3203	886	945	21	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. 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.

Note EDS was not executed.

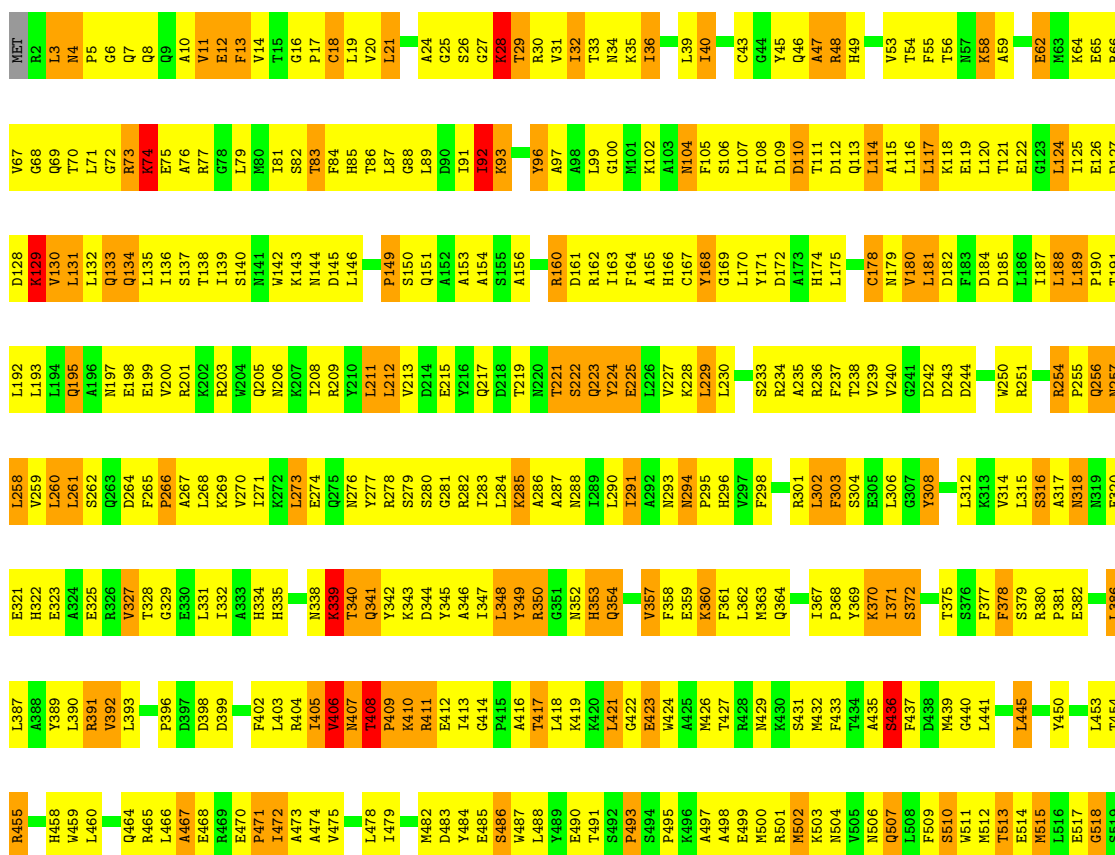
- Molecule 1: DNA (5'-D(*TP*TP*TP*TP*TP*TP*TP*TP*TP*TP*TP*TP*TP*T)-3')

Chain C:  6% 94%

T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
T13
T14
T15
T16

- Molecule 2: PROTEIN (ATP-DEPENDENT DNA HELICASE REP.)

Chain A:  24% 51% 18% 5%



ES20	Q681	SER
LS21	S682	ALA
D522	L3	GLU
E523	S683	GLU
P524	L564	ARG
M525	D685	ARG
TS26	E566	MET
LS27	D687	GLN
TS28	M688	LYS
Q529	L589	GLY
V530	A10	GLN
V531	E591	SER
TS32	E592	HIS
R533	R593	LEU
F534	R594	ALA
F534	L595	ASN
TS35	A596	LEU
L536	E597	LYS
R537	F598	ALA
D538	G599	MET
M539	I600	MET
M540	T601	ALA
E541	R602	ALA
R542	A603	LYS
GLY	Q604	ARG
GLY	K605	GLY
SER	E606	LYS
E546	L607	LYS
E547	T608	LYS
D650	F609	LYS
Q551	T610	LYS
V552	L611	GLY
Q553	G612	LYS
M554	K613	LYS
M555	R616	LYS
T556	V622	LYS
L557	R623	LYS
H558	P624	LYS
A559		
S560	S627	LYS
K561	R628	LYS
G562	F629	LYS
L563	L630	LYS
F564	L631	LYS
F565	E632	LYS
P566	Q635	LYS
Y567	D636	LYS
V568	D637	LYS
Y569	M570	LYS
M571	V571	LYS
G572	L638	LYS
M573	I639	LYS
E574	W640	LYS
E575	GLU	LYS
G576	GLN	LYS
F577	GLU	LYS
L578	ARG	LYS
P579	VAL	LYS
H580	VAL	LYS

• Molecule 2: PROTEIN (ATP-DEPENDENT DNA HELICASE REP.)

Chain B: 24% 51% 17% 6%

MET	V67	K129	P190	P255	R391	A461	TS26	L595	LYS
R2	G68	V130	T191	Q266	V392	E462	LS27	A596	GLY
L3	Q69	L131	L192	Q266	T393	E463	TS28	F598	GLN
M4	R70	L132	L193	L268	T394	Q464	Q529	F599	SER
P5	L71	L133	L194	L269	N395	R465	V530	I600	HIS
G6	G72	Q133	Q195	L269	L330	R466	V531	T601	LEU
Q7	R73	Q134	Q196	L261	E332	A467	TS32	T602	ALA
Q8	K74	L135	M197	S262	A333	E468	R533	R602	ASN
E75	Q75	S137	V200	Q263	R334	R469	R534	A603	LEU
A10	A76	T138	R201	Q264	H335	E470	TS35	L536	LYS
SER	R77	I139	K201	F265	F336	A401	L536	K605	ALA
HIS	E78	G78	K202	F266	V337	F402	R537	E606	MET
LEU	F13	L79	R203	P266	N338	L403	D538	L607	MET
ALA	R533	A604	R204		K339	R404	MET	T608	ALA
ASN	F534	A596	Q205	K269	K340	R404		F609	ALA
LEU	S82	K143	N206	V270	Q341	V475	GLU	T610	ALA
LYS	F84	R144	M206	I271	Q341	R476	GLU	F610	LYS
ALA	L19	D145	K207	K272	Y345	D477	ARG	L611	ARG
MET	V20	F84	I208	L273	I347	L478	GLY	C612	GLY
MET	L21	H85	R209	R282	A346	I479	GLU	K613	GLY
ALA	A22	T86	Y210	R282	I348	H480	SER	R614	SER
ALA	L87	L87	L211	N276	L347	K410	GLU	E615	GLU
ALA	G88	G88	L212	Y277	Y349	R411		E547	
LYS	L89	Q151	L213	R278	R350	I413		E548	
ARG	D90	A152	D214	S280	G351	I413		L549	
GLY	T29	R89	A153	R280	N352	T417		L550	
GLY	R30	I91	A154	G281	H353	L418		Q551	
LYS	V31	I92	S155	R282	Q354	K419		V552	
LYS	L607	R93	A156	L283	Q355	K420		Q553	
LYS	F609	R94	I157	L284	R356	L421		R623	
LYS	A603	E95	E159	T289	V357	G422		M555	
ARG	Q604	Y96	R160	L290	F358	S492		P624	
ARG	K605	A87	D161	L291	E359	P493		E625	
GLY	E606	A88	D161	I291	R360	S494		A559	
LYS	L607	H38	R162	Q222	K360	S494		S627	
LYS	T608	A37	L163	Q223	F361	R428		E564	
LYS	F609	R38	L163	Y224	N294	P495		E564	
LYS	A603	H38	L164	E225	R295	R496		F629	
LYS	L611	I40	L164	L226	M363	A497		L630	
GLY	G612	R41	A165	L226	K363	A498		L631	
GLY	K613	G42	H166	V227	Q364	A498		L632	
LYS	R623	C43	M104	K228	N365	E499		E632	
LYS	P624	G44	F105	L229	R366	M500		L633	
LYS	F609	Y45	S106	L230	I367	R501		F634	
LYS	F609	A47	L107	V231	P368	M502		E575	
LYS	F609	A47	F108	G232	Y369	K503		G576	
LYS	F609	R48	D109	S233	K370	N504		F577	
LYS	F609	H49	D110	R234	L371	V505		F579	
LYS	F609	I50	T111	A235	M438			H580	
LYS	F609	A51	D112	R236	T375	L508		Q581	
LYS	F609	A52	Q113	F237	S376	F509		Q581	
LYS	F609	V53	L114	T238	F377	S510		Q642	
LYS	F609	T54	A115	A177	R380	M511		GLU	
LYS	F609	F55	L116	C178	P381	M512		ARG	
LYS	F609	T56	L117	M179	E382	T513		LYS	
LYS	F609	M57	K118	V180	R380	L584		ARG	
LYS	F609	A60	E119	L181	P381	D685		LYS	
LYS	F609	R61	D182	D244	I383	E586		VAL	
LYS	F609	E62	F183	S246	K384	D587		VAL	
LYS	F609	M63	D184	S246	R385	N588		VAL	
LYS	F609	E65	D185	S249	N319	E520		ALA	
LYS	F609	R64	L186	W250	R387	L521		ALA	
LYS	F609	E65	L187	R251	L386	L521		GLU	
LYS	F609	R66	L188	E251	L387	E591		GLU	
LYS	F609	R66	L189	R254	A388	B522		GLU	
LYS	F609	R66	L189	R254	A388	E523		ARG	
LYS	F609	R66	L189	R254	A388	P524		ARG	
LYS	F609	R66	L189	R254	A388	M525		GLN	

4 Data and refinement statistics

Xtrriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	141.80Å 141.80Å 284.80Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	15.00 – 3.00	Depositor
% Data completeness (in resolution range)	88.0 (15.00-3.00)	Depositor
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR 3.1	Depositor
R, R_{free}	0.228 , 0.328	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	10404	wwPDB-VP
Average B, all atoms (Å ²)	43.0	wwPDB-VP

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	C	1.08	0/348	1.07	0/536
2	A	0.83	0/5127	0.96	7/6932 (0.1%)
2	B	0.92	4/5151 (0.1%)	0.97	7/6961 (0.1%)
All	All	0.88	4/10626 (0.0%)	0.97	14/14429 (0.1%)

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
2	A	0	2

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	18	CYS	CB-SG	-6.21	1.71	1.82
2	B	612	CYS	CB-SG	-6.15	1.71	1.82
2	B	337	VAL	CB-CG1	-6.13	1.40	1.52
2	B	65	GLU	CG-CD	5.24	1.59	1.51

The worst 5 of 14 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	410	LYS	N-CA-C	8.50	133.94	111.00
2	B	411	ARG	NE-CZ-NH2	7.69	124.14	120.30
2	A	3	LEU	N-CA-C	-5.65	95.74	111.00
2	B	266	PRO	CB-CA-C	-5.52	98.21	112.00
2	B	149	PRO	N-CA-CB	5.52	109.92	103.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	A	308	TYR	Sidechain
2	A	569	TYR	Sidechain

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	C	317	0	194	68	0
2	A	5032	0	4953	650	0
2	B	5055	0	5014	660	0
All	All	10404	0	10161	1353	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 66.

The worst 5 of 1353 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:C:10:DT:H5'	1:C:10:DT:C6	1.73	1.24
1:C:10:DT:OP1	1:C:10:DT:H3'	1.41	1.20
1:C:4:DT:H2''	1:C:5:DT:C5'	1.79	1.12
1:C:11:DT:H2'	1:C:11:DT:OP2	1.49	1.11
1:C:10:DT:H6	1:C:10:DT:C5'	1.66	1.09

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	
2	A	632/673 (94%)	449 (71%)	142 (22%)	41 (6%)	1	7
2	B	629/673 (94%)	443 (70%)	148 (24%)	38 (6%)	1	9
All	All	1261/1346 (94%)	892 (71%)	290 (23%)	79 (6%)	1	7

5 of 79 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	A	127	ASP
2	A	341	GLN
2	A	357	VAL
2	A	372	SER
2	A	375	THR

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	
2	A	528/580 (91%)	402 (76%)	126 (24%)	0	3
2	B	536/580 (92%)	403 (75%)	133 (25%)	0	3
All	All	1064/1160 (92%)	805 (76%)	259 (24%)	0	3

5 of 259 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	499	GLU
2	B	529	GLN
2	A	472	ILE
2	A	445	LEU
2	B	578	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 44 such sidechains are listed below:

Mol	Chain	Res	Type
2	B	206	ASN

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Mol	Chain	Res	Type
2	B	354	GLN
2	B	217	GLN
2	B	263	GLN
2	B	365	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 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](#)

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates [i](#)

EDS was not executed - this section is therefore empty.

6.4 Ligands [i](#)

EDS was not executed - this section is therefore empty.

6.5 Other polymers [i](#)

EDS was not executed - this section is therefore empty.