



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 9, 2026 – 08:39 AM UTC

PDB ID : 1LDK / pdb_00001ldk
Title : Structure of the Cul1-Rbx1-Skp1-F boxSkp2 SCF Ubiquitin Ligase Complex
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Chu, C.; Koepp, D.M.; Elledge, S.J.; Pagano, M.; Conaway, R.C.; Conaway,
J.W.; Harper, J.W.; Pavletich, N.P.
Deposited on : 2002-04-08
Resolution : 3.10 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 : 4-5-2 with Phenix2.0
Xtrriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

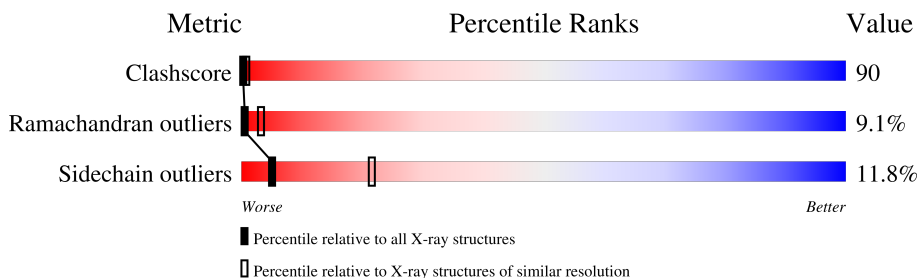
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.10 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	190562	1539 (3.10-3.10)
Ramachandran outliers	187476	1467 (3.10-3.10)
Sidechain outliers	187428	1467 (3.10-3.10)

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	A	396	12% 46% 26% 6% 10%
2	B	366	18% 55% 22% 5%
3	C	90	56% 38% . .
4	D	133	17% 50% 17% 5% 11%
5	E	41	17% 59% 17% 7%

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 7922 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 CULLIN HOMOLOG.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	358	2950	1870	508	558	14	0	0	0

- Molecule 2 is a protein called CULLIN HOMOLOG.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	366	2981	1894	503	569	15	0	0	0

- Molecule 3 is a protein called ring-box protein 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	88	731	464	133	125	9	574	0	0

- Molecule 4 is a protein called CYCLIN A/CDK2-ASSOCIATED PROTEIN P19.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	D	118	926	594	149	178	5	0	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	?	-	ASP	deletion	UNP P63208
D	?	-	ASP	deletion	UNP P63208
D	?	-	GLU	deletion	UNP P63208
D	?	-	GLY	deletion	UNP P63208
D	?	-	ASP	deletion	UNP P63208
D	?	-	ASP	deletion	UNP P63208

- Molecule 5 is a protein called SKP2-like protein type gamma.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
5	E	41	331	218	52	58	3	0	0	0

- Molecule 6 is ZINC ION (CCD ID: ZN) (formula: Zn).

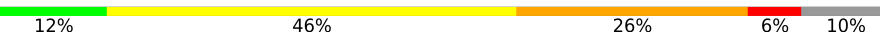
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	C	3	Total	Zn	0	0
			3	3		

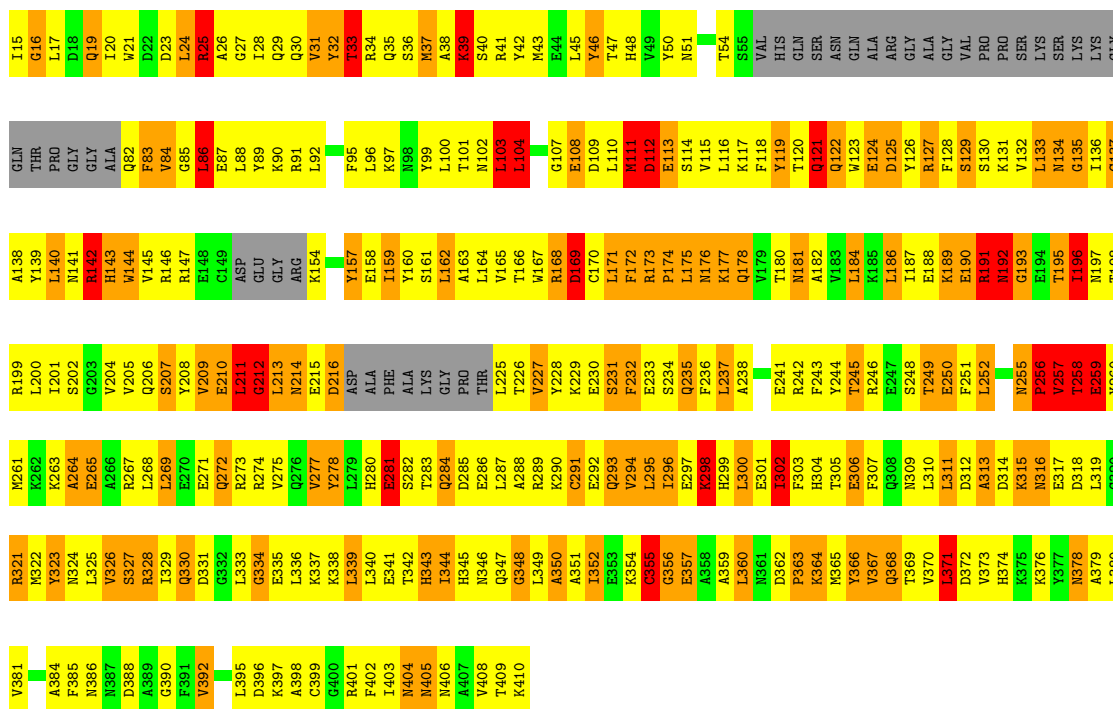
3 Residue-property plots

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.

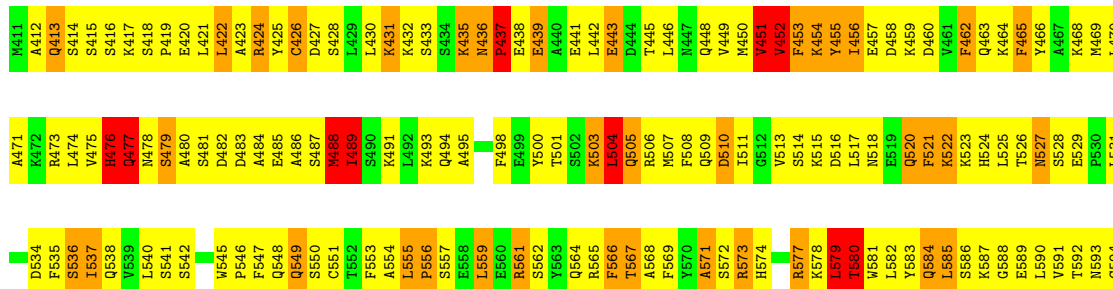
- Molecule 1: CULLIN HOMOLOG

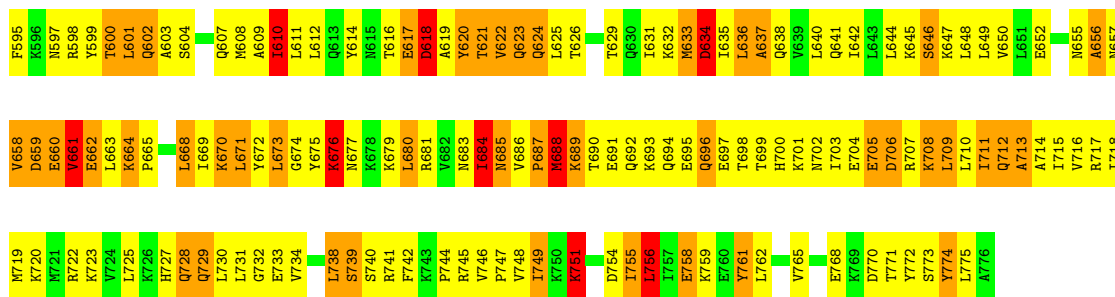
Chain A: 



- Molecule 2: CULLIN HOMOLOG

Chain B: 

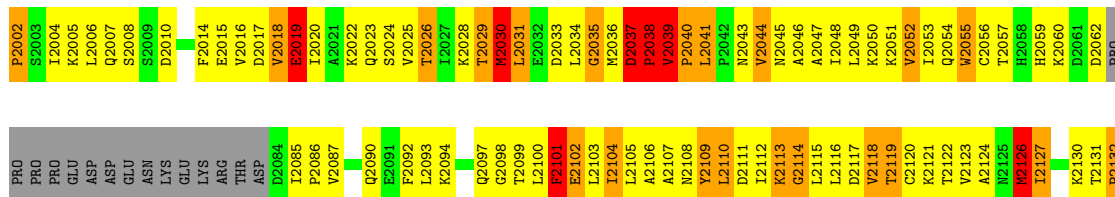
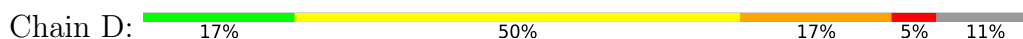




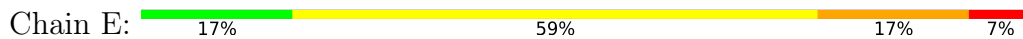
• Molecule 3: ring-box protein 1



• Molecule 4: CYCLIN A/CDK2-ASSOCIATED PROTEIN P19



• Molecule 5: SKP2-like protein type gamma



4 Data and refinement statistics

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

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	219.38Å 50.53Å 158.61Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 3.10	Depositor
% Data completeness (in resolution range)	(Not available) (20.00-3.10)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.289 , 0.331	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	7922	wwPDB-VP
Average B, all atoms (Å ²)	77.0	wwPDB-VP

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	1.09	25/2999 (0.8%)	1.90	109/4039 (2.7%)
2	B	1.16	35/3027 (1.2%)	1.80	113/4069 (2.8%)
3	C	0.39	0/752	0.96	3/1020 (0.3%)
4	D	1.29	9/940 (1.0%)	1.73	28/1271 (2.2%)
5	E	0.99	3/340 (0.9%)	1.65	7/461 (1.5%)
All	All	1.10	72/8058 (0.9%)	1.76	260/10860 (2.4%)

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	5
2	B	0	3
4	D	0	1
All	All	0	9

The worst 5 of 72 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	2102	GLU	N-CA	28.38	1.82	1.46
2	B	453	PHE	N-CA	15.62	1.65	1.46
2	B	489	ILE	N-CA	15.25	1.65	1.46
2	B	443	GLU	C-N	15.12	1.53	1.33
1	A	210	GLU	N-CA	13.22	1.63	1.46

The worst 5 of 260 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	E	3146	GLU	N-CA-C	-22.34	79.08	108.34
4	D	2102	GLU	N-CA-C	20.95	139.58	112.34
4	D	2110	LEU	N-CA-C	-20.85	85.37	113.30
1	A	212	GLY	CA-C-N	-20.45	92.19	122.65
1	A	212	GLY	C-N-CA	-20.45	92.19	122.65

There are no chirality outliers.

5 of 9 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	111	MET	Mainchain
1	A	112	ASP	Mainchain,Peptide
1	A	113	GLU	Mainchain
1	A	323	TYR	Sidechain
2	B	443	GLU	Mainchain

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	2950	0	2915	571	1
2	B	2981	0	3049	573	3
3	C	731	0	689	28	1
4	D	926	0	944	175	0
5	E	331	0	331	44	0
6	C	3	0	0	0	0
All	All	7922	0	7928	1320	4

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 90.

The worst 5 of 1320 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:409:THR:CG2	2:B:415:SER:HA	1.32	1.58
2:B:555:LEU:CD2	2:B:559:LEU:HD22	1.11	1.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:296:ILE:CD1	1:A:296:ILE:CG1	1.85	1.55
2:B:553:PHE:CD1	2:B:631:ILE:HG12	1.37	1.53
4:D:2002:PRO:CB	4:D:2018:VAL:HG13	1.41	1.47

All (4) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:199:ARG:NH2	1:A:305:THR:OG1[3_546]	1.76	0.44
2:B:597:ASN:OD1	2:B:659:ASP:OD2[3_547]	2.00	0.20
2:B:572:SER:O	3:C:1061:ALA:CB[1_545]	2.04	0.16
2:B:660:GLU:OE1	2:B:676:LYS:CB[3_557]	2.04	0.16

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	350/396 (88%)	236 (67%)	92 (26%)	22 (6%)	1	6
2	B	364/366 (100%)	261 (72%)	75 (21%)	28 (8%)	1	4
3	C	86/90 (96%)	44 (51%)	24 (28%)	18 (21%)	0	0
4	D	114/133 (86%)	68 (60%)	31 (27%)	15 (13%)	0	1
5	E	39/41 (95%)	26 (67%)	9 (23%)	4 (10%)	0	2
All	All	953/1026 (93%)	635 (67%)	231 (24%)	87 (9%)	0	3

5 of 87 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	83	PHE
1	A	174	PRO
1	A	176	ASN

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Mol	Chain	Res	Type
1	A	192	ASN
1	A	193	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 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	321/347 (92%)	271 (84%)	50 (16%)	2 12
2	B	338/338 (100%)	299 (88%)	39 (12%)	5 23
3	C	78/79 (99%)	71 (91%)	7 (9%)	9 33
4	D	105/122 (86%)	101 (96%)	4 (4%)	29 60
5	E	37/38 (97%)	33 (89%)	4 (11%)	6 25
All	All	879/924 (95%)	775 (88%)	104 (12%)	5 21

5 of 104 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	488	MET
2	B	617	GLU
4	D	2039	VAL
2	B	522	LYS
2	B	577	ARG

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

Mol	Chain	Res	Type
2	B	630	GLN
4	D	2023	GLN
2	B	657	ASN
2	B	696	GLN
4	D	2059	HIS

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 3 ligands modelled in this entry, 3 are 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.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.