



wwPDB EM Validation Summary Report ⓘ

Mar 20, 2026 – 01:47 AM UTC

PDB ID : 7DBH / pdb_00007dbh
EMDB ID : EMD-30631
Title : The mouse nucleosome structure containing H3mm18
Authors : Hirai, S.; Takizawa, Y.; Kujirai, T.; Kurumizaka, H.
Deposited on : 2020-10-20
Resolution : 3.60 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 : 0.0.1.dev132
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : **NOT EXECUTED**
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

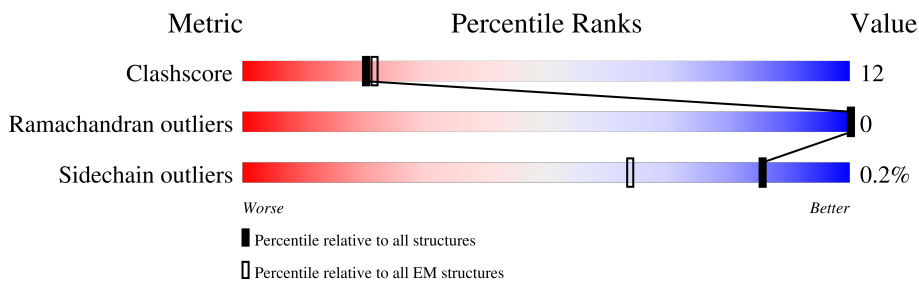
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.60 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	229148	23984
Ramachandran outliers	224038	23583
Sidechain outliers	223484	23102

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	139	42% 14% 44%
1	E	139	49% 12% 39%
2	B	106	61% 16% 23%
2	F	106	53% 19% 27%
3	C	133	59% 12% 29%
3	G	133	59% 14% 28%
4	D	129	53% 18% 29%
4	H	129	56% 16% 28%
5	I	145	42% 45% 13%

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Mol	Chain	Length	Quality of chain
6	J	145	52% 35% 13%

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 10631 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 Histone H3mm18.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	78	Total	C	N	O	S	0	0
			612	391	104	113	4		
1	E	85	Total	C	N	O	S	0	0
			677	432	117	124	4		

- Molecule 2 is a protein called Histone H4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	82	Total	C	N	O	S	0	0
			657	416	128	112	1		
2	F	77	Total	C	N	O	S	0	0
			614	389	119	105	1		

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-3	GLY	-	expression tag	UNP P62806
B	-2	SER	-	expression tag	UNP P62806
B	-1	HIS	-	expression tag	UNP P62806
F	-3	GLY	-	expression tag	UNP P62806
F	-2	SER	-	expression tag	UNP P62806
F	-1	HIS	-	expression tag	UNP P62806

- Molecule 3 is a protein called Histone H2A type 1-B.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
3	C	94	Total	C	N	O	0	0
			726	456	143	127		
3	G	96	Total	C	N	O	0	0
			740	465	146	129		

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-3	GLY	-	expression tag	UNP C0HKE1
C	-2	SER	-	expression tag	UNP C0HKE1
C	-1	HIS	-	expression tag	UNP C0HKE1
G	-3	GLY	-	expression tag	UNP C0HKE1
G	-2	SER	-	expression tag	UNP C0HKE1
G	-1	HIS	-	expression tag	UNP C0HKE1

- Molecule 4 is a protein called Histone H2B type 3-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	92	Total	C	N	O	S	0	0
			721	453	129	137	2		
4	H	93	Total	C	N	O	S	0	0
			724	455	130	137	2		

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	-3	GLY	-	expression tag	UNP Q9D2U9
D	-2	SER	-	expression tag	UNP Q9D2U9
D	-1	HIS	-	expression tag	UNP Q9D2U9
H	-3	GLY	-	expression tag	UNP Q9D2U9
H	-2	SER	-	expression tag	UNP Q9D2U9
H	-1	HIS	-	expression tag	UNP Q9D2U9

- Molecule 5 is a DNA chain called DNA (126-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
5	I	126	Total	C	N	O	P	0	0
			2563	1217	466	755	125		

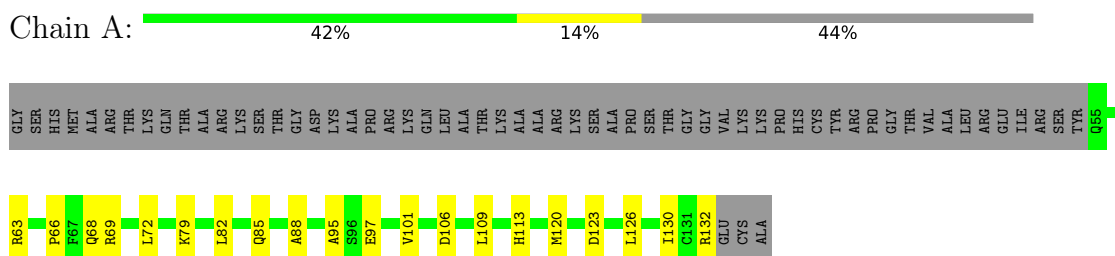
- Molecule 6 is a DNA chain called DNA (126-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
6	J	126	Total	C	N	O	P	0	0
			2597	1228	491	753	125		

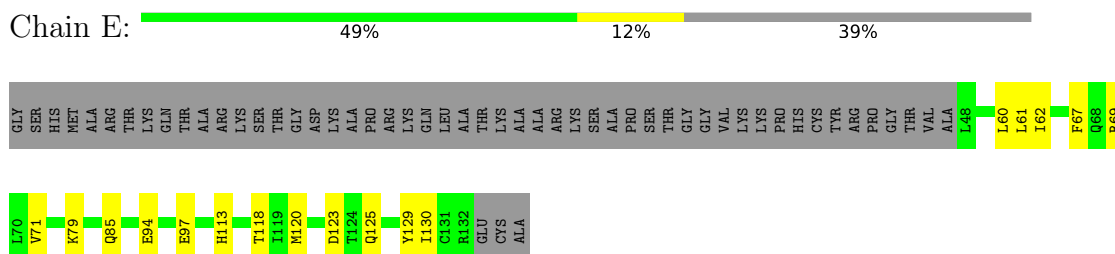
3 Residue-property plots

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.

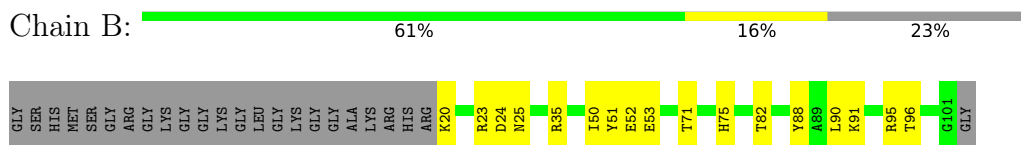
- Molecule 1: Histone H3mm18



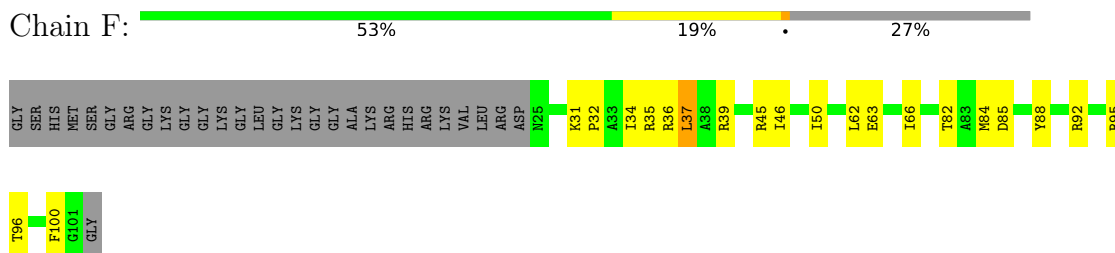
- Molecule 1: Histone H3mm18



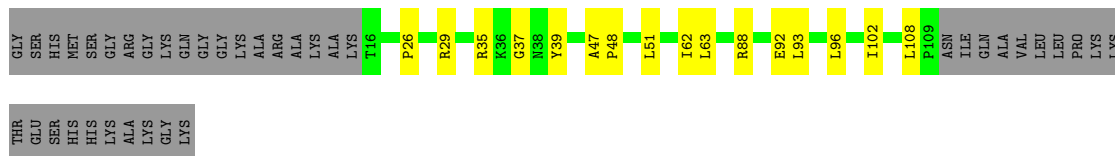
- Molecule 2: Histone H4



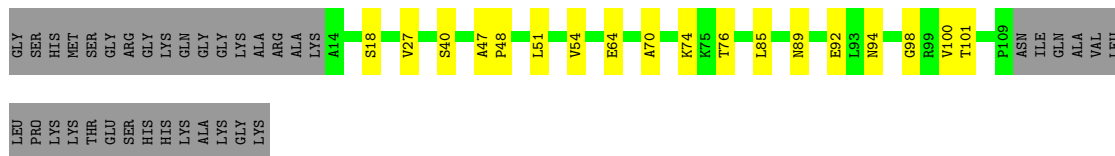
- Molecule 2: Histone H4



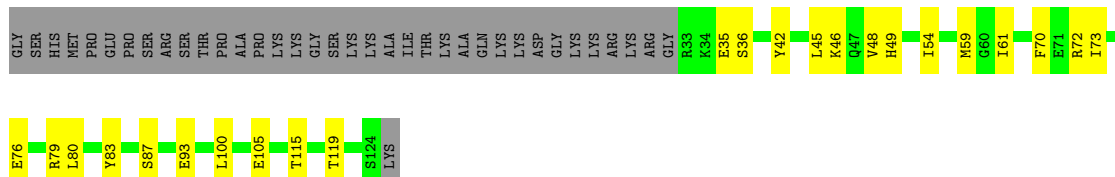
- Molecule 3: Histone H2A type 1-B



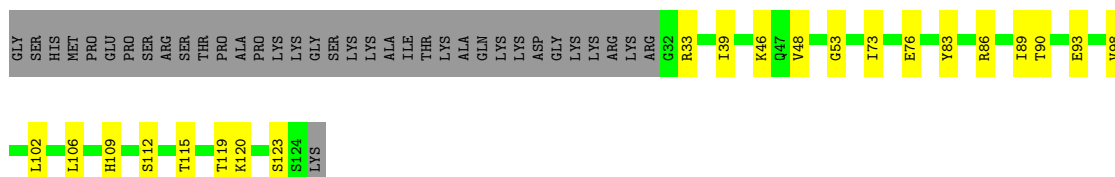
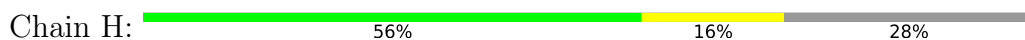
• Molecule 3: Histone H2A type 1-B



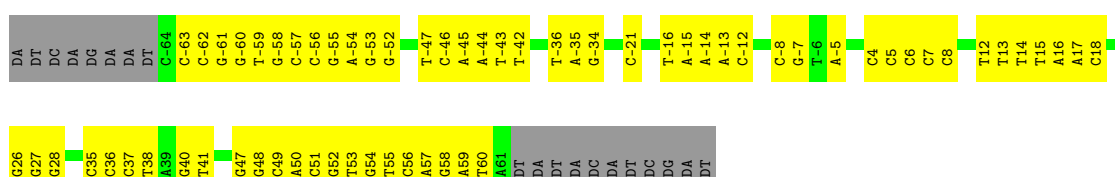
• Molecule 4: Histone H2B type 3-A



• Molecule 4: Histone H2B type 3-A

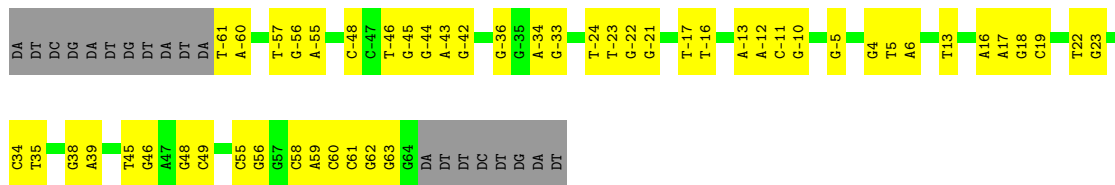


• Molecule 5: DNA (126-MER)



• Molecule 6: DNA (126-MER)

Chain J:  52% 35% 13%



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	274546	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	56.6	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

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	0/620	0.52	0/835
1	E	0.47	0/686	0.61	0/923
2	B	0.41	0/664	0.50	0/889
2	F	0.44	0/621	0.53	0/832
3	C	0.40	0/735	0.52	0/992
3	G	0.36	0/749	0.44	0/1010
4	D	0.41	0/732	0.53	0/985
4	H	0.43	0/735	0.54	0/989
5	I	0.32	0/2871	0.48	0/4425
6	J	0.31	0/2917	0.45	0/4505
All	All	0.37	0/11330	0.49	0/16385

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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	612	0	631	19	0
1	E	677	0	699	21	0
2	B	657	0	706	18	0
2	F	614	0	656	26	0
3	C	726	0	767	13	0
3	G	740	0	785	13	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	D	721	0	740	22	0
4	H	724	0	743	18	0
5	I	2563	0	1414	79	0
6	J	2597	0	1413	45	0
All	All	10631	0	8554	216	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 12.

The worst 5 of 216 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:E:61:LEU:HD12	2:F:37:LEU:HD13	1.50	0.93
2:F:37:LEU:HD22	2:F:37:LEU:H	1.45	0.80
5:I:58:DG:N2	6:J:-57:DT:O2	2.20	0.74
5:I:-60:DG:N2	6:J:61:DC:O2	2.21	0.73
5:I:-63:DC:O2	6:J:63:DG:N2	2.24	0.70

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 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	76/139 (55%)	74 (97%)	2 (3%)	0	100	100
1	E	83/139 (60%)	78 (94%)	5 (6%)	0	100	100
2	B	80/106 (76%)	77 (96%)	3 (4%)	0	100	100
2	F	75/106 (71%)	72 (96%)	3 (4%)	0	100	100
3	C	92/133 (69%)	90 (98%)	2 (2%)	0	100	100
3	G	94/133 (71%)	91 (97%)	3 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
4	D	90/129 (70%)	88 (98%)	2 (2%)	0	100	100
4	H	91/129 (70%)	89 (98%)	2 (2%)	0	100	100
All	All	681/1014 (67%)	659 (97%)	22 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	66/113 (58%)	66 (100%)	0	100	100
1	E	73/113 (65%)	73 (100%)	0	100	100
2	B	68/81 (84%)	68 (100%)	0	100	100
2	F	63/81 (78%)	62 (98%)	1 (2%)	55	69
3	C	74/102 (72%)	74 (100%)	0	100	100
3	G	75/102 (74%)	75 (100%)	0	100	100
4	D	80/110 (73%)	80 (100%)	0	100	100
4	H	80/110 (73%)	80 (100%)	0	100	100
All	All	579/812 (71%)	578 (100%)	1 (0%)	85	85

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	F	37	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 7 such sidechains are listed below:

Mol	Chain	Res	Type
4	D	47	GLN
4	D	109	HIS
3	G	94	ASN

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Mol	Chain	Res	Type
1	E	93	GLN
3	C	94	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](#)

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 Map visualisation

This section contains visualisations of the EMDB entry EMD-30631. These allow visual inspection of the internal detail of the map and identification of artifacts.

No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections

This section was not generated.

6.2 Central slices

This section was not generated.

6.3 Largest variance slices

This section was not generated.

6.4 Orthogonal standard-deviation projections (False-color)

This section was not generated.

6.5 Orthogonal surface views

This section was not generated.

6.6 Mask visualisation

This section was not generated. No masks/segmentation were deposited.

7 Map analysis

This section contains the results of statistical analysis of the map.

7.1 Map-value distribution

This section was not generated.

7.2 Volume estimate versus contour level

This section was not generated.

7.3 Rotationally averaged power spectrum

This section was not generated. The rotationally averaged power spectrum had issues being displayed.

8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit

This section was not generated.