



# wwPDB X-ray Structure Validation Summary Report

Feb 28, 2014 – 06:23 PM GMT

PDB ID : 1DPS  
Title : THE CRYSTAL STRUCTURE OF DPS, A FERRITIN HOMOLOG THAT BINDS AND PROTECTS DNA  
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Deposited on : 1998-02-23  
Resolution : 1.60 Å(reported)

This is a wwPDB validation summary report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at <http://wwpdb.org/ValidationPDFNotes.html>

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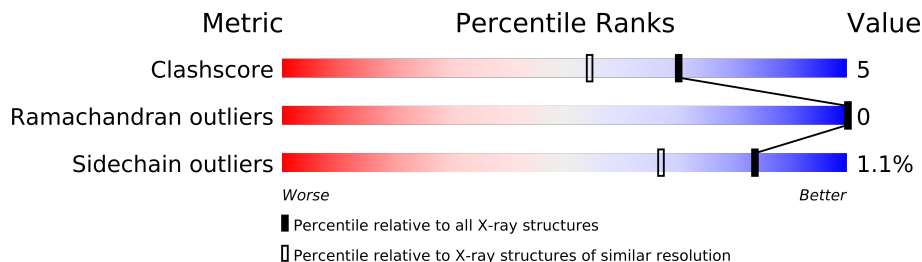
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.15 2013  
Xtriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 21963  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)  
Validation Pipeline (wwPDB-VP) : stable22683

# 1 Overall quality at a glance

The reported resolution of this entry is 1.60 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)	Similar resolution (#Entries, resolution range(Å))
Clashscore	79885	2199 (1.60-1.60)
Ramachandran outliers	78287	2126 (1.60-1.60)
Sidechain outliers	78261	2125 (1.60-1.60)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	167	
1	B	167	
1	C	167	
1	D	167	
1	E	167	
1	F	167	
1	G	167	
1	H	167	
1	I	167	
1	J	167	
1	K	167	
1	L	167	

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 16107 atoms, of which 0 are hydrogen and 0 are deuterium.

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 DPS.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	159	Total	C	N	O	S	0	0	0
			1252	785	219	244	4			
1	B	154	Total	C	N	O	S	7	0	0
			1221	768	213	236	4			
1	C	154	Total	C	N	O	S	3	0	0
			1221	768	213	236	4			
1	D	156	Total	C	N	O	S	0	0	0
			1236	776	216	240	4			
1	E	154	Total	C	N	O	S	2	0	0
			1221	768	213	236	4			
1	F	154	Total	C	N	O	S	2	0	0
			1221	768	213	236	4			
1	G	154	Total	C	N	O	S	4	0	0
			1221	768	213	236	4			
1	H	154	Total	C	N	O	S	2	0	0
			1221	768	213	236	4			
1	I	154	Total	C	N	O	S	5	0	0
			1221	768	213	236	4			
1	J	154	Total	C	N	O	S	1	0	0
			1221	768	213	236	4			
1	K	154	Total	C	N	O	S	0	0	0
			1221	768	213	236	4			
1	L	154	Total	C	N	O	S	4	0	0
			1221	768	213	236	4			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	164	CYS	SER	ENGINEERED	UNP P0ABT2
B	164	CYS	SER	ENGINEERED	UNP P0ABT2
C	164	CYS	SER	ENGINEERED	UNP P0ABT2
D	164	CYS	SER	ENGINEERED	UNP P0ABT2
E	164	CYS	SER	ENGINEERED	UNP P0ABT2

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Chain	Residue	Modelled	Actual	Comment	Reference
F	164	CYS	SER	ENGINEERED	UNP P0ABT2
G	164	CYS	SER	ENGINEERED	UNP P0ABT2
H	164	CYS	SER	ENGINEERED	UNP P0ABT2
I	164	CYS	SER	ENGINEERED	UNP P0ABT2
J	164	CYS	SER	ENGINEERED	UNP P0ABT2
K	164	CYS	SER	ENGINEERED	UNP P0ABT2
L	164	CYS	SER	ENGINEERED	UNP P0ABT2

- Molecule 2 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	G	1	Total Na 1 1	0	0
2	J	1	Total Na 1 1	0	0
2	D	1	Total Na 1 1	0	0
2	K	1	Total Na 1 1	0	0
2	E	1	Total Na 1 1	0	0
2	H	1	Total Na 1 1	0	0
2	B	1	Total Na 1 1	0	0
2	I	1	Total Na 1 1	0	0
2	C	1	Total Na 1 1	0	0
2	A	1	Total Na 1 1	0	0
2	L	1	Total Na 1 1	0	0
2	F	1	Total Na 1 1	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	114	Total O 114 114	0	0
3	B	115	Total O 115 115	0	0

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	C	114	Total 114	O 114	0	0
3	D	110	Total 110	O 110	0	0
3	E	112	Total 112	O 112	0	0
3	F	127	Total 127	O 127	0	0
3	G	112	Total 112	O 112	0	0
3	H	125	Total 125	O 125	0	0
3	I	120	Total 120	O 120	0	0
3	J	116	Total 116	O 116	0	0
3	K	119	Total 119	O 119	0	0
3	L	113	Total 113	O 113	0	0



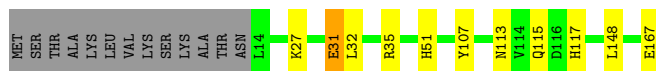
- Molecule 1: DPS

Chain G: 



- Molecule 1: DPS

Chain H: 



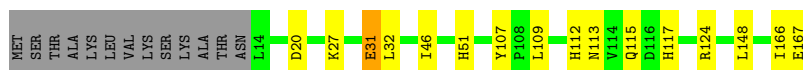
- Molecule 1: DPS

Chain I: 



- Molecule 1: DPS

Chain J: 



- Molecule 1: DPS

Chain K: 



- Molecule 1: DPS

Chain L: 



## 4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section will therefore be incomplete.

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	134.41Å 139.65Å 118.11Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 1.60	Depositor
% Data completeness (in resolution range)	76.3 (20.00-1.60)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.05	Depositor
Refinement program	X-PLOR 3.851	Depositor
R, $R_{free}$	0.188 , 0.220	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	16107	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	18.0	wwPDB-VP

## 5 Model quality ⓘ

### 5.1 Standard geometry ⓘ

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

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	0.78	0/1270	0.70	0/1720
1	B	0.77	0/1239	0.71	0/1677
1	C	0.76	0/1239	0.76	0/1677
1	D	0.79	0/1254	0.74	0/1698
1	E	0.77	1/1239 (0.1%)	0.73	0/1677
1	F	0.77	0/1239	0.73	0/1677
1	G	0.81	1/1239 (0.1%)	0.73	0/1677
1	H	0.79	1/1239 (0.1%)	0.74	1/1677 (0.1%)
1	I	0.77	1/1239 (0.1%)	0.73	0/1677
1	J	0.80	2/1239 (0.2%)	0.71	0/1677
1	K	0.78	1/1239 (0.1%)	0.73	0/1677
1	L	0.78	2/1239 (0.2%)	0.72	1/1677 (0.1%)
All	All	0.78	9/14914 (0.1%)	0.73	2/20188 (0.0%)

The worst 5 of 9 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	L	31	GLU	CG-CD	6.63	1.61	1.51
1	I	31	GLU	CG-CD	6.42	1.61	1.51
1	H	31	GLU	CD-OE2	6.00	1.32	1.25
1	G	31	GLU	CG-CD	5.83	1.60	1.51
1	J	31	GLU	CD-OE2	5.82	1.32	1.25

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	L	35	ARG	NE-CZ-NH1	5.83	123.22	120.30
1	H	35	ARG	NE-CZ-NH1	5.53	123.06	120.30

There are no chirality outliers.

There are no planarity outliers.

## 5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1252	0	1244	12	0
1	B	1221	0	1219	12	0
1	C	1221	0	1219	14	0
1	D	1236	0	1232	15	0
1	E	1221	0	1219	10	0
1	F	1221	0	1219	7	0
1	G	1221	0	1219	12	0
1	H	1221	0	1219	8	0
1	I	1221	0	1219	14	0
1	J	1221	0	1219	13	0
1	K	1221	0	1219	17	0
1	L	1221	0	1219	13	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
2	E	1	0	0	0	0
2	F	1	0	0	0	0
2	G	1	0	0	0	0
2	H	1	0	0	0	0
2	I	1	0	0	0	0
2	J	1	0	0	0	0
2	K	1	0	0	0	0
2	L	1	0	0	0	0
3	A	114	0	0	2	0
3	B	115	0	0	1	0
3	C	114	0	0	0	0
3	D	110	0	0	2	0
3	E	112	0	0	0	0
3	F	127	0	0	0	0
3	G	112	0	0	1	0
3	H	125	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	I	120	0	0	0	0
3	J	116	0	0	1	0
3	K	119	0	0	1	0
3	L	113	0	0	0	0
All	All	16107	0	14666	135	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 5.

The worst 5 of 135 close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:J:20:ASP:HB2	3:J:271:HOH:O	1.78	0.82
1:C:113:ASN:ND2	1:C:115:GLN:H	1.86	0.73
1:C:27:LYS:O	1:C:31:GLU:HG2	1.89	0.72
3:A:263:HOH:O	1:C:95:THR:HG23	1.88	0.72
1:C:113:ASN:HD22	1:C:115:GLN:H	1.39	0.71

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 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	157/167 (94%)	155 (99%)	2 (1%)	0	100	100
1	B	152/167 (91%)	150 (99%)	2 (1%)	0	100	100
1	C	152/167 (91%)	150 (99%)	2 (1%)	0	100	100
1	D	154/167 (92%)	153 (99%)	1 (1%)	0	100	100
1	E	152/167 (91%)	150 (99%)	2 (1%)	0	100	100
1	F	152/167 (91%)	151 (99%)	1 (1%)	0	100	100
1	G	152/167 (91%)	150 (99%)	2 (1%)	0	100	100
1	H	152/167 (91%)	150 (99%)	2 (1%)	0	100	100
1	I	152/167 (91%)	150 (99%)	2 (1%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	J	152/167 (91%)	150 (99%)	2 (1%)	0	100	100
1	K	152/167 (91%)	151 (99%)	1 (1%)	0	100	100
1	L	152/167 (91%)	150 (99%)	2 (1%)	0	100	100
All	All	1831/2004 (91%)	1810 (99%)	21 (1%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains ⓘ

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	135/143 (94%)	134 (99%)	1 (1%)	91	81
1	B	132/143 (92%)	131 (99%)	1 (1%)	89	78
1	C	132/143 (92%)	129 (98%)	3 (2%)	63	32
1	D	134/143 (94%)	133 (99%)	1 (1%)	91	81
1	E	132/143 (92%)	131 (99%)	1 (1%)	89	78
1	F	132/143 (92%)	131 (99%)	1 (1%)	89	78
1	G	132/143 (92%)	130 (98%)	2 (2%)	76	53
1	H	132/143 (92%)	131 (99%)	1 (1%)	89	78
1	I	132/143 (92%)	130 (98%)	2 (2%)	76	53
1	J	132/143 (92%)	131 (99%)	1 (1%)	89	78
1	K	132/143 (92%)	130 (98%)	2 (2%)	76	53
1	L	132/143 (92%)	130 (98%)	2 (2%)	76	53
All	All	1589/1716 (93%)	1571 (99%)	18 (1%)	84	67

5 of 18 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	G	51	HIS
1	G	100	SER
1	K	51	HIS
1	E	51	HIS

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Mol	Chain	Res	Type
1	F	51	HIS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 46 such sidechains are listed below:

Mol	Chain	Res	Type
1	F	117	HIS
1	H	112	HIS
1	L	112	HIS
1	G	112	HIS
1	G	115	GLN

### 5.3.3 RNA ⓘ

There are no RNA chains in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

## 5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

Of 12 ligands modelled in this entry, 12 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.

## 5.7 Other polymers ⓘ

There are no such residues in this entry.

## 5.8 Polymer linkage issues

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 will therefore be empty.

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

EDS was not executed - this section will therefore be empty.

### 6.3 Carbohydrates

EDS was not executed - this section will therefore be empty.

### 6.4 Ligands

EDS was not executed - this section will therefore be empty.

### 6.5 Other polymers

EDS was not executed - this section will therefore be empty.