



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 2, 2026 – 03:13 AM UTC

PDB ID : 6HGC / pdb_00006hgc
Title : Structure of Calypso in complex with DEUBAD of ASX
Authors : De, I.; Chittock, E.C.; Groetsch, H.; Miller, T.C.R.; McCarthy, A.A.; Mueller, C.W.
Deposited on : 2018-08-23
Resolution : 3.02 Å(reported)

This is a Full wwPDB X-ray Structure Validation 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
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

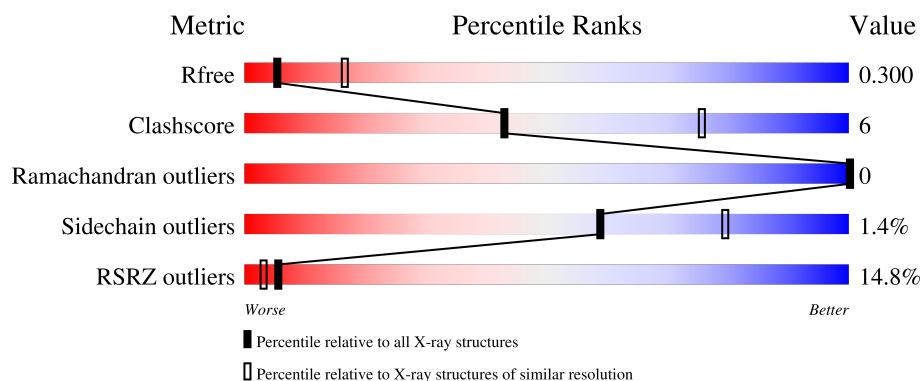
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.02 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}	180053	3131 (3.04-3.00)
Clashscore	190562	3444 (3.04-3.00)
Ramachandran outliers	187476	3319 (3.04-3.00)
Sidechain outliers	187428	3322 (3.04-3.00)
RSRZ outliers	180081	3130 (3.04-3.00)

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 $\leq 5\%$. 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	341	9% 79% 9% 11%
2	C	110	12% 68% 17% 13%
3	B	310	17% 69% 11% 20%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 5208 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 Ubiquitin carboxyl-terminal hydrolase calypso, Ubiquitin carboxyl-terminal hydrolase calypso.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	304	Total	C	N	O	S	0	3	0
			2454	1555	434	451	14			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	307	GLY	-	linker	UNP Q7K5N4
A	329	SER	-	linker	UNP Q7K5N4
A	330	GLY	-	linker	UNP Q7K5N4
A	331	SER	-	linker	UNP Q7K5N4
A	332	GLY	-	linker	UNP Q7K5N4
A	333	SER	-	linker	UNP Q7K5N4

- Molecule 2 is a protein called Polycomb protein Asx.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	96	Total	C	N	O	S	0	0	0
			778	490	133	153	2			

- Molecule 3 is a protein called Ubiquitin carboxyl-terminal hydrolase calypso, Ubiquitin carboxyl-terminal hydrolase calypso.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	B	248	Total	C	N	O	S	4	0	0
			1976	1255	348	362	11			

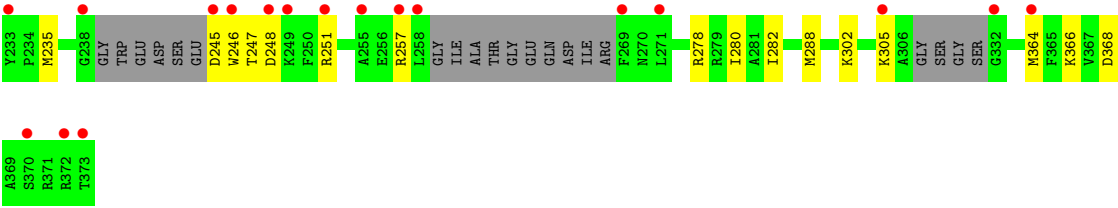
There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	328	GLY	-	linker	UNP Q7K5N4
B	329	SER	-	linker	UNP Q7K5N4

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
B	330	GLY	-	linker	UNP Q7K5N4
B	331	SER	-	linker	UNP Q7K5N4
B	332	GLY	-	linker	UNP Q7K5N4
B	333	SER	-	linker	UNP Q7K5N4



4 Data and refinement statistics

Property	Value	Source
Space group	P 61 2 2	Depositor
Cell constants a, b, c, α , β , γ	119.50Å 119.50Å 408.90Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	72.73 – 3.02 72.73 – 3.02	Depositor EDS
% Data completeness (in resolution range)	89.1 (72.73-3.02) 83.5 (72.73-3.02)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.50 (at 3.01Å)	Xtriage
Refinement program	PHENIX 1.12_2829	Depositor
R, R_{free}	0.268 , 0.292 0.278 , 0.300	Depositor DCC
R_{free} test set	2000 reflections (6.40%)	wwPDB-VP
Wilson B-factor (Å ²)	64.1	Xtriage
Anisotropy	0.024	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 51.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.86	EDS
Total number of atoms	5208	wwPDB-VP
Average B, all atoms (Å ²)	72.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.31% 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	0.13	0/2506	0.33	0/3380
2	C	0.15	0/789	0.36	0/1065
3	B	0.15	0/2012	0.33	0/2711
All	All	0.14	0/5307	0.33	0/7156

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	2454	0	2419	27	0
2	C	778	0	779	13	0
3	B	1976	0	1969	30	0
All	All	5208	0	5167	64	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 6.

All (64) 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)
3:B:248:ASP:HA	3:B:251:ARG:HD3	1.65	0.78

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:B:248:ASP:OD1	3:B:251:ARG:NH2	2.21	0.73
1:A:60:LEU:HD11	1:A:136:LEU:HD22	1.72	0.71
1:A:386:MET:HE3	2:C:240:TYR:HB3	1.73	0.71
3:B:76:LEU:HD13	3:B:77:GLN:HB2	1.72	0.71
1:A:340:LEU:HD13	3:B:288:MET:HE3	1.75	0.68
1:A:110:PHE:HD2	1:A:233:TYR:HB2	1.60	0.66
3:B:83:PRO:HG2	3:B:246:TRP:HZ3	1.60	0.66
3:B:247:THR:O	3:B:251:ARG:HG3	1.97	0.65
1:A:388:ALA:O	2:C:209:LYS:NZ	2.33	0.61
1:A:224:LEU:H	1:A:238:GLY:HA3	1.67	0.59
3:B:245:ASP:OD1	3:B:246:TRP:N	2.35	0.59
3:B:226:GLU:OE2	3:B:257:ARG:NH1	2.32	0.57
1:A:109:ILE:HD12	1:A:237:HIS:HB3	1.86	0.57
3:B:127:VAL:HG21	3:B:174:GLY:HA3	1.86	0.57
2:C:214:THR:HG22	2:C:216:ASP:H	1.69	0.56
2:C:277:SER:HB3	2:C:280:CYS:HB2	1.87	0.56
3:B:219:PRO:HB3	3:B:246:TRP:CD1	2.41	0.56
1:A:188:MET:HG2	1:A:372:ARG:HG2	1.87	0.56
1:A:126:VAL:HG21	1:A:171:LEU:HD12	1.88	0.55
1:A:361:ARG:O	1:A:364[A]:MET:HG2	2.06	0.55
1:A:364[A]:MET:HA	1:A:367:VAL:HG12	1.87	0.55
2:C:303:THR:OG1	2:C:305:GLU:OE1	2.25	0.55
3:B:84:TYR:HB3	3:B:143:CYS:SG	2.47	0.55
3:B:77:GLN:CD	3:B:251:ARG:HG2	2.33	0.54
1:A:146:ASN:OD1	1:A:147:ASN:N	2.42	0.53
3:B:226:GLU:HB3	3:B:235:MET:HB2	1.91	0.53
1:A:384:LEU:HD13	2:C:219:LEU:HD13	1.90	0.52
3:B:83:PRO:HG2	3:B:246:TRP:CZ3	2.42	0.52
1:A:237:HIS:CE1	1:A:253:VAL:HG11	2.46	0.51
3:B:364:MET:O	3:B:368:ASP:HB2	2.11	0.51
1:A:161:THR:HB	1:A:169:LYS:HG2	1.93	0.49
3:B:121:PHE:HZ	3:B:173:ILE:HD11	1.77	0.48
3:B:219:PRO:HD3	3:B:246:TRP:CZ2	2.49	0.48
2:C:308:LEU:O	2:C:312:THR:HG23	2.14	0.47
3:B:302:LYS:HG3	3:B:305:LYS:NZ	2.29	0.47
1:A:240:TRP:CD1	1:A:245:ASP:HB3	2.51	0.46
3:B:110:PHE:HE1	3:B:235:MET:HE3	1.80	0.46
1:A:383:PHE:CE1	2:C:236:LEU:HD11	2.50	0.46
3:B:245:ASP:N	3:B:248:ASP:HB3	2.30	0.46
2:C:303:THR:HG23	2:C:306:ASN:H	1.80	0.46
3:B:50:GLU:OE1	3:B:50:GLU:N	2.49	0.46

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:B:248:ASP:HA	3:B:251:ARG:HH21	1.82	0.45
3:B:62:ASP:OD2	3:B:186:HIS:NE2	2.43	0.45
1:A:238:GLY:HA2	1:A:249:LYS:HE2	2.00	0.44
3:B:302:LYS:HG3	3:B:305:LYS:HZ2	1.82	0.44
1:A:164:MET:O	1:A:169:LYS:HE3	2.17	0.43
1:A:60:LEU:HD21	1:A:136:LEU:HB3	1.99	0.43
1:A:110:PHE:CZ	1:A:235:MET:HE2	2.53	0.43
1:A:120:ILE:HD12	1:A:120:ILE:HA	1.81	0.43
3:B:141:LEU:O	3:B:158:LYS:HE3	2.19	0.43
1:A:364[B]:MET:HA	1:A:367:VAL:HG12	2.00	0.43
2:C:309:LYS:HB2	2:C:309:LYS:HE3	1.85	0.43
2:C:224:LEU:HD12	2:C:294:ARG:HB2	2.02	0.42
1:A:231:LYS:HD3	1:A:235:MET:HE3	2.01	0.42
3:B:251:ARG:HB2	3:B:251:ARG:CZ	2.50	0.42
1:A:336:ASP:HB3	3:B:288:MET:HE1	2.01	0.42
2:C:233:PHE:CE1	2:C:244:LEU:HD23	2.55	0.42
2:C:311:LYS:HD3	2:C:311:LYS:HA	1.66	0.41
3:B:278:ARG:O	3:B:282:ILE:HG12	2.20	0.41
3:B:77:GLN:OE1	3:B:251:ARG:HG2	2.21	0.41
3:B:157:LEU:HD12	3:B:157:LEU:HA	1.94	0.41
1:A:120:ILE:O	1:A:169:LYS:NZ	2.54	0.40
1:A:161:THR:O	1:A:169:LYS:HE2	2.22	0.40

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	295/341 (86%)	290 (98%)	5 (2%)	0	100	100
2	C	92/110 (84%)	88 (96%)	4 (4%)	0	100	100
3	B	236/310 (76%)	232 (98%)	4 (2%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	623/761 (82%)	610 (98%)	13 (2%)	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	269/293 (92%)	268 (100%)	1 (0%)	84	89
2	C	87/98 (89%)	83 (95%)	4 (5%)	24	57
3	B	218/265 (82%)	215 (99%)	3 (1%)	59	79
All	All	574/656 (88%)	566 (99%)	8 (1%)	59	79

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	147	ASN
2	C	213	GLU
2	C	246	GLN
2	C	306	ASN
2	C	311	LYS
3	B	76	LEU
3	B	280	ILE
3	B	366	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	236	ASN
1	A	353	GLN
2	C	246	GLN
2	C	283	ASN
3	B	147	ASN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
3	B	168	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 Fit of model and data

6.1 Protein, DNA and RNA chains

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	304/341 (89%)	0.61	30 (9%) 13 7	29, 59, 107, 125	5 (1%)
2	C	96/110 (87%)	0.74	13 (13%) 7 4	33, 66, 130, 146	1 (1%)
3	B	248/310 (80%)	1.13	53 (21%) 2 1	29, 77, 125, 149	3 (1%)
All	All	648/761 (85%)	0.83	96 (14%) 5 3	29, 67, 118, 149	9 (1%)

All (96) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	B	258	LEU	8.0
3	B	109	ILE	7.0
3	B	212	PHE	5.8
1	A	43	ALA	5.1
1	A	110	PHE	5.0
3	B	91	ARG	4.8
3	B	248	ASP	4.7
1	A	109	ILE	4.7
3	B	51	SER	4.7
1	A	213[A]	HIS	4.7
3	B	75	ASP	4.6
3	B	50	GLU	4.6
3	B	269	PHE	4.6
3	B	245	ASP	4.5
3	B	76	LEU	4.4
3	B	373	THR	4.4
3	B	78	LYS	4.3
1	A	307	GLY	4.1
3	B	188	MET	4.1
3	B	79	PRO	3.9
3	B	77	GLN	3.9
3	B	332	GLY	3.7
3	B	184	ASN	3.6

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
3	B	163	GLY	3.5
3	B	249	LYS	3.4
3	B	90	PHE	3.4
1	A	195	LEU	3.4
3	B	162	LYS	3.4
2	C	313	GLU	3.4
3	B	82	SER	3.3
1	A	364[A]	MET	3.2
3	B	55	LEU	3.1
2	C	317	GLU	3.1
1	A	245	ASP	3.1
2	C	209	LYS	2.9
3	B	251	ARG	2.9
3	B	88	PHE	2.9
3	B	238	GLY	2.8
1	A	44	ASP	2.7
3	B	45	GLY	2.7
2	C	210	ILE	2.7
3	B	114	GLU	2.7
3	B	370	SER	2.7
3	B	74	TYR	2.7
1	A	265	GLN	2.6
3	B	186	HIS	2.6
3	B	147	ASN	2.6
2	C	250	SER	2.6
3	B	80	ILE	2.6
1	A	45	GLY	2.6
3	B	246	TRP	2.5
1	A	79	PRO	2.5
3	B	116	ALA	2.5
1	A	81	GLU	2.5
2	C	308	LEU	2.5
1	A	76	LEU	2.5
1	A	196	GLU	2.4
1	A	146	ASN	2.4
3	B	144	ASN	2.4
1	A	331	SER	2.4
3	B	181	CYS	2.4
2	C	312	THR	2.3
3	B	372	ARG	2.3
3	B	217	PHE	2.3
2	C	257	GLU	2.3

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
2	C	309	LYS	2.3
1	A	145	GLU	2.3
3	B	257	ARG	2.3
3	B	53	PRO	2.2
3	B	110	PHE	2.2
1	A	301	GLN	2.2
3	B	119	SER	2.2
3	B	155	SER	2.2
3	B	364	MET	2.2
1	A	162	LYS	2.2
1	A	94	GLU	2.2
1	A	77	GLN	2.2
1	A	122	PHE	2.2
1	A	50	GLU	2.1
3	B	71	GLU	2.1
1	A	67	ASP	2.1
1	A	151	GLY	2.1
2	C	304	PRO	2.1
2	C	279	SER	2.1
2	C	316	ARG	2.1
1	A	241	GLU	2.1
3	B	305	LYS	2.1
2	C	234	SER	2.0
3	B	168	ASN	2.0
3	B	271	LEU	2.0
3	B	255	ALA	2.0
1	A	66	HIS	2.0
3	B	233	TYR	2.0
1	A	222	GLY	2.0
3	B	72	GLU	2.0
1	A	91	ARG	2.0

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 oligosaccharides 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.