wwPDB EM Validation Summary Report

Jul 16, 2025 – 10:42 AM JST

PDB ID	:	8ISI / pdb_00008isi
EMDB ID	:	EMD-35691
Title	:	Photochromobilin-free form of Arabidopsis thaliana phytochrome A - apo-AtphyA
Authors	:	Zhang, Y.; Ma, C.; Zhao, J.; Gao, N.; Wang, J.
Deposited on	:	2023-03-20
Resolution	:	3.77 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:

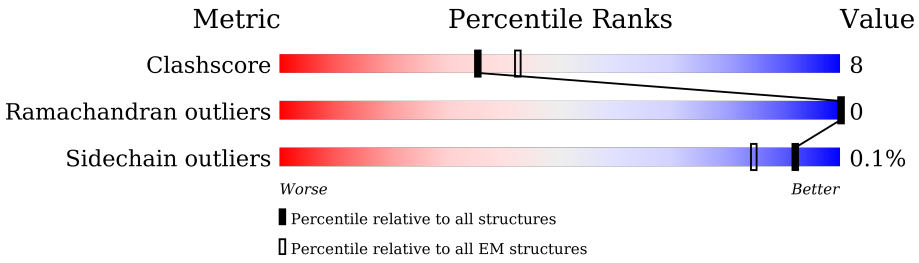
EMDB validation analysis	:	FAILED
MolProbity	:	4-5-2 with Phenix2.0rc1
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.44

1 Overall quality at a glance

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 3.77 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	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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 <=5%

Mol	Chain	Length	Quality of chain
1	A	1126	63% 12% 25%
1	B	1126	59% 15% 26%

2 Entry composition (i)

There is only 1 type of molecule in this entry. The entry contains 13095 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 Phytochrome A.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	842	Total 6581	C 4182	N 1124	O 1224	S 51	0	0
1	B	833	Total 6514	C 4137	N 1112	O 1214	S 51	0	0

There are 8 discrepancies between the modelled and reference sequences:

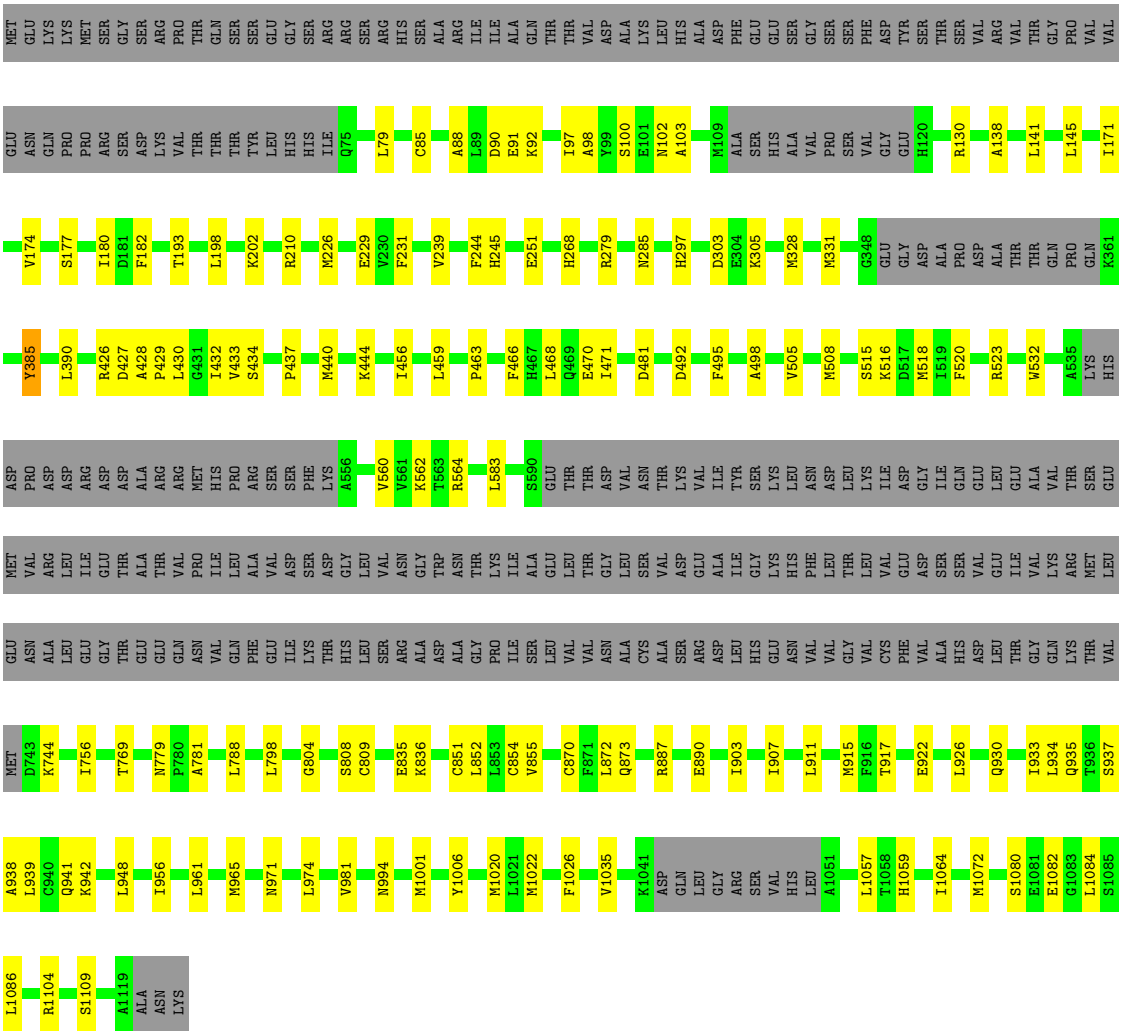
Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	MET	-	initiating methionine	UNP P14712
A	-2	GLU	-	expression tag	UNP P14712
A	-1	LYS	-	expression tag	UNP P14712
A	0	LYS	-	expression tag	UNP P14712
B	-3	MET	-	initiating methionine	UNP P14712
B	-2	GLU	-	expression tag	UNP P14712
B	-1	LYS	-	expression tag	UNP P14712
B	0	LYS	-	expression tag	UNP P14712

3 Residue-property plots (i)

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.

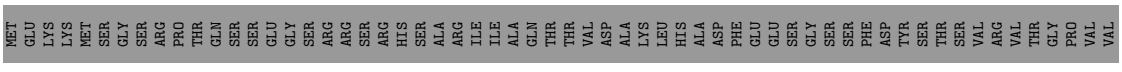
- Molecule 1: Phytochrome A

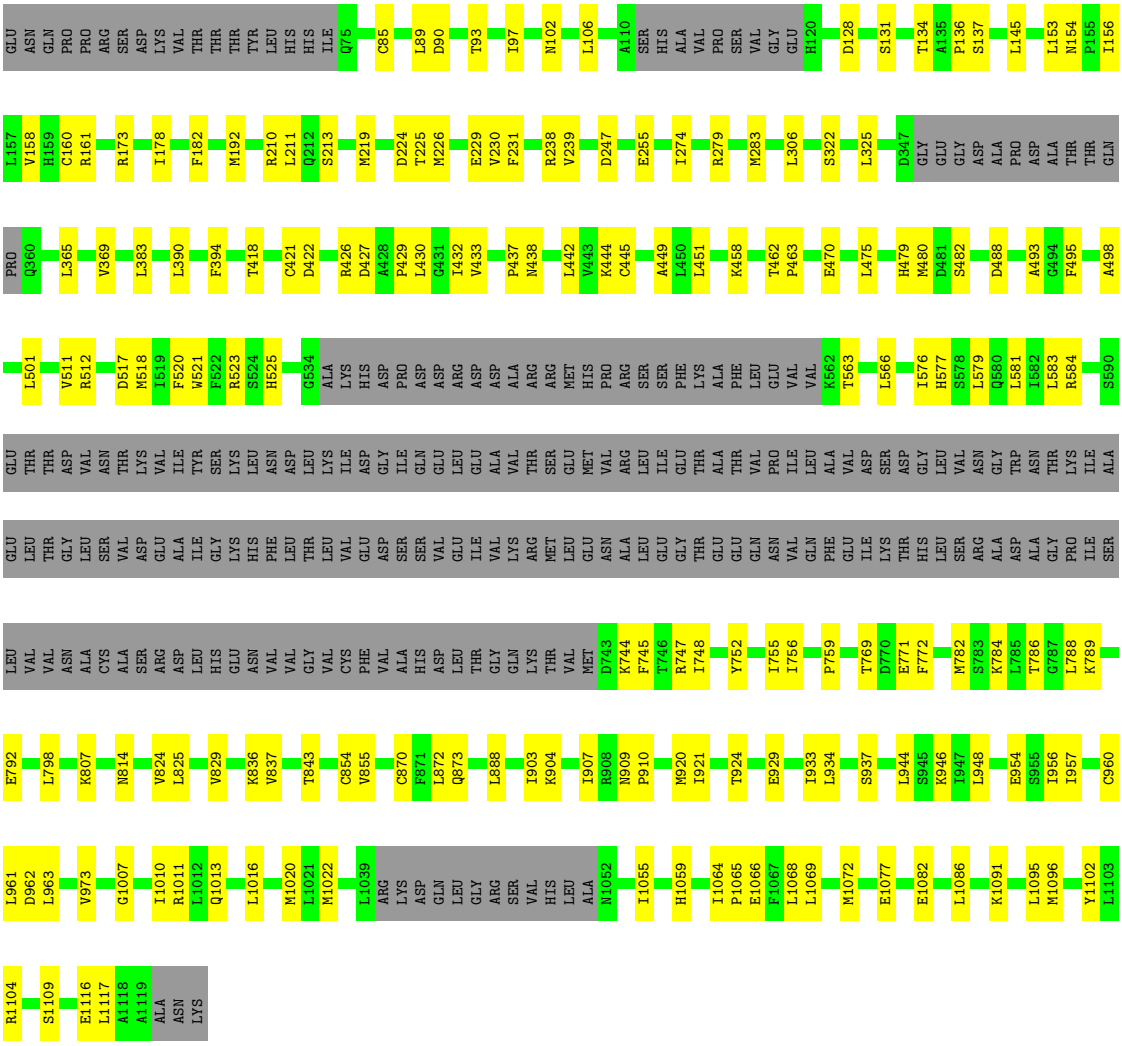
Chain A:



- Molecule 1: Phytochrome A

Chain B:




GLU ASN GLN PRO PRO ARG SER ASP LYS VAL THR THR TYR LEU HIS HIS ILE Q75 C85 L89 D90 T93 I97 N102 L106 A110 SER HIS ALA VAL PRO SER VAL GLY GLU H120 D128 S131 T134 A135 P136 S137 L145 L153 N154 P155 I156
L157 V158 H159 C160 R161 R173 I178 F182 M192 R210 L211 Q212 S213 M219 D224 T225 M226 E229 V230 F231 R238 V239 D247 E255 I274 R279 M283 L306 S322 L325 D347 GLY GLU GLY ASP ALA PRO ASP ALA THR THR GLN
PRO Q360 L365 V369 L383 L390 F394 T418 C421 D422 R426 D427 A428 P429 L430 G431 I432 V433 P437 N438 L442 V443 K444 C445 A449 L450 L451 K458 T462 P463 E470 L475 H479 M480 D481 S482 D488 A493 G494 F495 A498
L501 V511 R512 D517 M518 I519 F520 W521 F522 R523 S524 H525 G534 ALA LYS HIS ASP PRO ASP ARG ASP ASP ALA ARG MET HIS PRO ARG SER SER PHE LYS ALA PHE LEU GLU VAL VAL K562 T563 L566 I576 H577 S578 L579 Q580 L581 I582 L583 R584 S590
GLU THR THR ASP VAL ASN THR LYS VAL ILE TYR SER LYS LEU ASN ASP LEU LYS ILE ASP GLY ILE GLN GLU LEU GLU ALA VAL THR SER GLU MET VAL ARG LEU ILE GLU THR ALA THR VAL PRO ILE LEU ALA VAL ASP SER ASP GLY LEU VAL ASN GLY TRP ASN THR LYS ILE ALA
GLU LEU THR GLY LEU SER VAL ASP GLU ALA ILE GLY LYS HIS PHE LEU THR LEU VAL GLU ASP SER SER VAL GLU ILE VAL LYS ARG MET LEU GLU ASN ALA ALA LEU LEU GLU GLY THR GLU GLU GLN ASN VAL GLN PHE GLU ILE LYS THR HIS LEU SER ARG ALA ASP ALA GLY PRO ILE SER
LEU VAL VAL ASN ALA CYS ALA SER ARG ASP LEU HIS GLU ASN VAL VAL GLY VAL CYS PHE VAL ALA HIS ASP LEU THR GLY GLN LYS THR VAL MET D743 K744 F745 T746 R747 I748 Y752 I755 I756 P759 T769 D770 E771 F772 M782 S783 K784 L785 T786 G787 L788 K789
E792 L798 K807 N814 V824 L825 V829 K836 V837 T843 C854 V855 C870 F871 L872 Q873 L888 I903 K904 I907 R908 N909 P910 M920 I921 T924 E929 I933 L934 S937 L944 S945 K946 I947 L948 E954 S955 I956 I957 C960
L961 D962 L963 V973 G1007 I1010 R1011 L1012 Q1013 L1016 M1020 L1021 M1022 L1039 ARG LYS ASP GLN LEU GLY ARG SER VAL HIS LEU ALA N1052 I1055 H1059 I1064 P1065 E1066 F1067 L1068 L1069 M1072 E1077 E1082 L1086 K1091 L1095 M1096 Y1102 L1103
R1104 S1109 E1116 L1117 A1118 A1119 ALA ASN LYS

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	873442	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	50	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

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	0.15	0/6698	0.34	0/9042
1	B	0.15	0/6630	0.33	0/8951
All	All	0.15	0/13328	0.33	0/17993

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

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	6581	0	6668	91	0
1	B	6514	0	6593	119	0
All	All	13095	0	13261	204	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 8.

The worst 5 of 204 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:432:ILE:HD11	1:A:583:LEU:HD21	1.61	0.83
1:B:495:PHE:HB3	1:B:498:ALA:HB2	1.69	0.75

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:440:MET:HE2	1:A:459:LEU:HB3	1.72	0.72
1:A:88:ALA:HB3	1:A:98:ALA:HB3	1.71	0.71
1:B:525:HIS:HA	1:B:563:THR:HG21	1.71	0.71

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	830/1126 (74%)	798 (96%)	32 (4%)	0	100	100
1	B	821/1126 (73%)	789 (96%)	32 (4%)	0	100	100
All	All	1651/2252 (73%)	1587 (96%)	64 (4%)	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	727/974 (75%)	726 (100%)	1 (0%)	92	96
1	B	721/974 (74%)	721 (100%)	0	100	100
All	All	1448/1948 (74%)	1447 (100%)	1 (0%)	92	96

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

Mol	Chain	Res	Type
1	A	385	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 16 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	980	GLN
1	B	873	GLN
1	B	75	GLN
1	B	826	ASN
1	A	1059	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)

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.