Full wwPDB NMR Structure Validation Report (i)

Jun 12, 2024 – 02:52 PM EDT

PDB ID	:	1GM0
BMRB ID	:	6313
Title	:	A Form of the Pheromone-Binding Protein from Bombyx mori
Authors	:	Horst, R.; Damberger, F.; Guntert, P.; Luginbuhl, P.; Nikonova, L.; Peng, G.; Leal, W.S.; Wuthrich, K.
Deposited on	:	2001-09-05

This is a Full wwPDB NMR 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/NMRValidationReportHelp
with specific help available everywhere you see the (i) 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 (i)) were used in the production of this report:

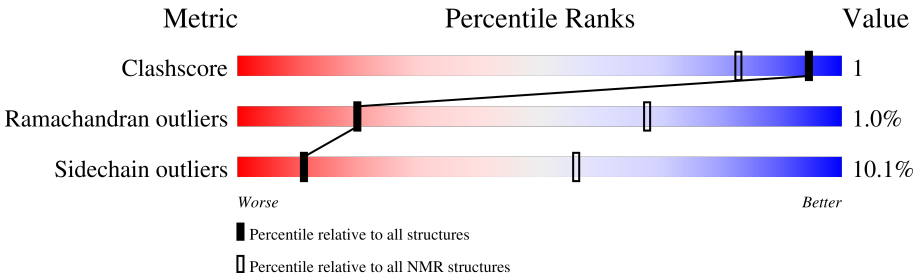
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
wwPDB-RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
wwPDB-ShiftChecker	:	v1.2
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
SOLUTION NMR

The overall completeness of chemical shifts assignment was not calculated.

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)	NMR archive (#Entries)
Clashscore	158937	12864
Ramachandran outliers	154571	11451
Sidechain outliers	154315	11428

The table below summarises the geometric issues observed across the polymeric chains and their fit to the experimental data. The red, orange, yellow and green segments indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria. A cyan segment indicates the fraction of residues that are not part of the well-defined cores, and 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	142	90% 5% 5%

2 Ensemble composition and analysis (i)

This entry contains 20 models. Model 1 is the overall representative, medoid model (most similar to other models).

The following residues are included in the computation of the global validation metrics.

Well-defined (core) protein residues			
Well-defined core	**Residue range (total)**	**Backbone RMSD (Å)**	**Medoid model**
1	A:8-A:142 (135)	0.62	1

Ill-defined regions of proteins are excluded from the global statistics.

Ligands and non-protein polymers are included in the analysis.

The models can be grouped into 4 clusters and 1 single-model cluster was found.

Cluster number	Models
1	1, 2, 3, 6, 7, 10, 16, 18
2	4, 5, 8, 9, 11, 12, 19
3	17, 20
4	13, 14
Single-model clusters	15

3 Entry composition (i)

There is only 1 type of molecule in this entry. The entry contains 2175 atoms, of which 1069 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called PHEROMONE-BINDING PROTEIN.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	142	2175	693	1069	184	216	13	0

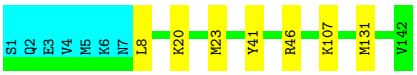
4 Residue-property plots (i)

4.1 Average score per residue in the NMR ensemble

These plots are provided for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic is the same as shown in the summary in section 1 of this report. The second graphic shows the sequence where residues are colour-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 outliers are shown as green connectors. Residues which are classified as ill-defined in the NMR ensemble, are shown in cyan with an underline colour-coded according to the previous scheme. Residues which were present in the experimental sample, but not modelled in the final structure are shown in grey.

• Molecule 1: PHEROMONE-BINDING PROTEIN

Chain A:



4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1 (medoid)

• Molecule 1: PHEROMONE-BINDING PROTEIN

Chain A:

4.2.2 Score per residue for model 2

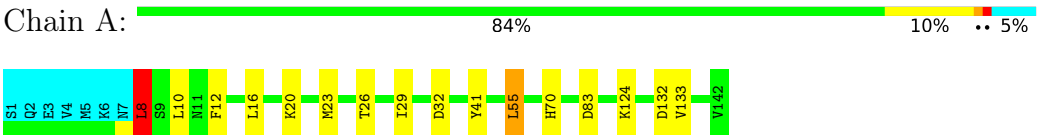
• Molecule 1: PHEROMONE-BINDING PROTEIN

Chain A:

4.2.3 Score per residue for model 3

- Molecule 1: PHEROMONE-BINDING PROTEIN

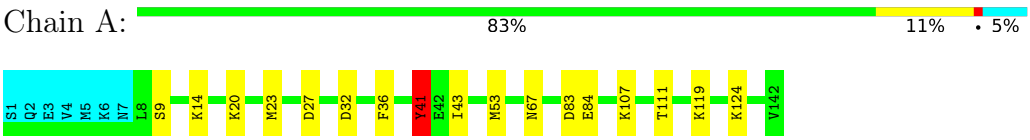
Chain A:



4.2.4 Score per residue for model 4

- Molecule 1: PHEROMONE-BINDING PROTEIN

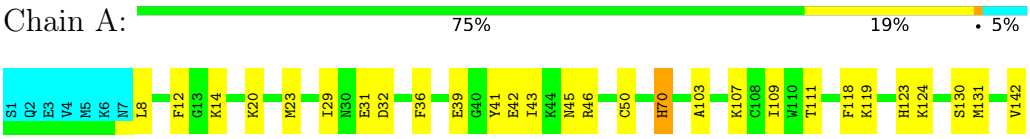
Chain A:



4.2.5 Score per residue for model 5

- Molecule 1: PHEROMONE-BINDING PROTEIN

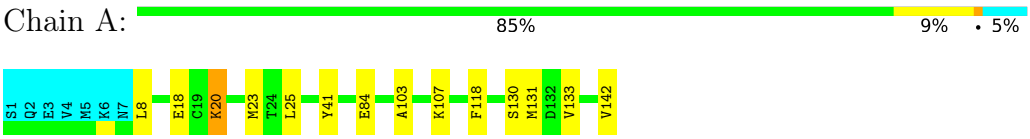
Chain A:



4.2.6 Score per residue for model 6

- Molecule 1: PHEROMONE-BINDING PROTEIN

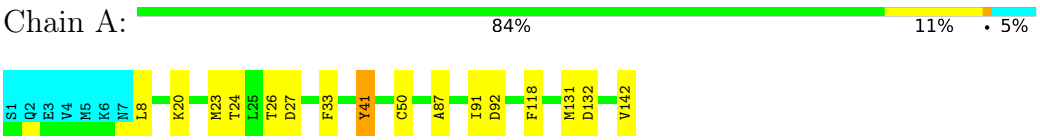
Chain A:



4.2.7 Score per residue for model 7

- Molecule 1: PHEROMONE-BINDING PROTEIN

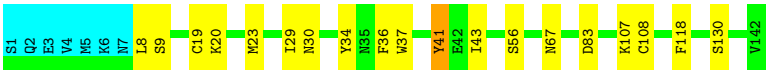
Chain A:



4.2.8 Score per residue for model 8

- Molecule 1: PHEROMONE-BINDING PROTEIN

Chain A: 82% 13% • 5%



4.2.9 Score per residue for model 9

- Molecule 1: PHEROMONE-BINDING PROTEIN

Chain A: 88% 6% • 5%

4.2.10 Score per residue for model 10

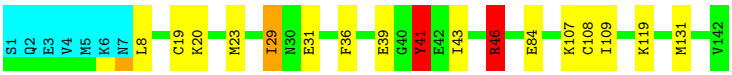
- Molecule 1: PHEROMONE-BINDING PROTEIN

Chain A: 88% 6% • 5%

4.2.11 Score per residue for model 11

- Molecule 1: PHEROMONE-BINDING PROTEIN

Chain A: 83% 10% •• 5%



4.2.12 Score per residue for model 12

- Molecule 1: PHEROMONE-BINDING PROTEIN

Chain A: 85% 9% •• 5%

4.2.13 Score per residue for model 13

• Molecule 1: PHEROMONE-BINDING PROTEIN

Chain A: 85% 10% 5%

S1 Q2 E3 V4 M5 K6 N7 L8 K14 K20 L25 T26 I29 N30 Y41 D63 D92 K107 C108 H123 D132 V142

4.2.14 Score per residue for model 14

• Molecule 1: PHEROMONE-BINDING PROTEIN

Chain A: 84% 11% • 5%

S1 Q2 E3 V4 M5 K6 N7 L8 S9 K14 K20 M23 W37 Y41 R46 D63 F76 E84 D105 D106 K107 K119 M131 V142

4.2.15 Score per residue for model 15

• Molecule 1: PHEROMONE-BINDING PROTEIN

Chain A: 82% 12% • 5%

S1 Q2 E3 V4 M5 K6 N7 L8 S9 K14 K20 M23 F36 W37 Y41 E42 I43 T48 G49 C50 M53 D63 N67 T85 D92 K107 T111 S130 V142

4.2.16 Score per residue for model 16

• Molecule 1: PHEROMONE-BINDING PROTEIN

Chain A: 85% 10% 5%

S1 Q2 E3 V4 M5 K6 N7 L8 S9 K20 M23 N45 R46 C50 K78 A103 F118 K119 H123 K124 M131 D132 V142

4.2.17 Score per residue for model 17

• Molecule 1: PHEROMONE-BINDING PROTEIN

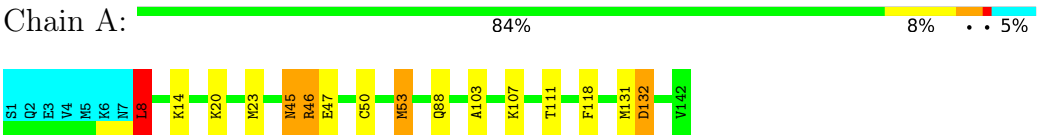
Chain A: 86% 8% • 5%

S1 Q2 E3 V4 M5 K6 N7 L8 K14 K20 M23 D32 E39 G40 Y41 N45 R46 S56 Q88 K107 D132 V142

4.2.18 Score per residue for model 18

- Molecule 1: PHEROMONE-BINDING PROTEIN

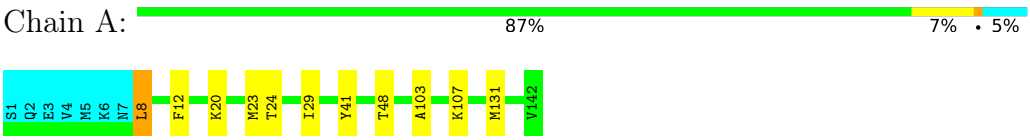
Chain A:



4.2.19 Score per residue for model 19

- Molecule 1: PHEROMONE-BINDING PROTEIN

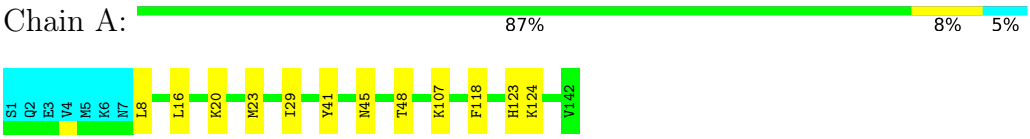
Chain A:



4.2.20 Score per residue for model 20

- Molecule 1: PHEROMONE-BINDING PROTEIN

Chain A:



5 Refinement protocol and experimental data overview (i)

Of the ? calculated structures, 20 were deposited, based on the following criterion: *?*.

The following table shows the software used for structure solution, optimisation and refinement.

Software name	Classification	Version
OPAL	refinement	
C	structure solution	
ID/DYANA	structure solution	

No chemical shift data was provided.

6 Model quality (i)

6.1 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 (average) 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	0.56±0.01	0±0/1070 (0.0± 0.0%)	0.99±0.02	1±1/1443 (0.0± 0.0%)
All	All	0.56	0/21400 (0.0%)	0.99	11/28860 (0.0%)

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	Planarity
1	A	0.0±0.0	0.8±0.9
All	All	0	16

There are no bond-length outliers.

All unique angle outliers are listed below. They are sorted according to the Z-score of the worst occurrence in the ensemble.

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})	Models	
								Worst	Total
1	A	41	TYR	CB-CG-CD2	-6.44	117.14	121.00	12	5
1	A	63	ASP	CB-CG-OD2	-6.05	112.85	118.30	15	1
1	A	63	ASP	CB-CG-OD1	5.64	123.38	118.30	1	1
1	A	8	LEU	CB-CA-C	5.51	120.67	110.20	12	2
1	A	46	ARG	NE-CZ-NH2	-5.29	117.65	120.30	16	1
1	A	70	HIS	CA-CB-CG	5.06	122.21	113.60	5	1

There are no chirality outliers.

All unique planar outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Group	Models (Total)
1	A	41	TYR	Sidechain	8
1	A	46	ARG	Sidechain	4

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Mol	Chain	Res	Type	Group	Models (Total)
1	A	34	TYR	Sidechain	2
1	A	23	MET	Peptide	1
1	A	132	ASP	Sidechain	1

6.2 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 each 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 averaged over the ensemble.

Mol	Chain	Non-H	H(model)	H(added)	Clashes
1	A	1050	1013	1013	2±2
All	All	21000	20260	20260	45

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 1.

All unique clashes are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:36:PHE:HA	1:A:43:ILE:HD13	0.58	1.74	4	5
1:A:46:ARG:HG3	1:A:109:ILE:HD11	0.57	1.75	11	1
1:A:29:ILE:HD12	1:A:30:ASN:N	0.56	2.16	8	2
1:A:53:MET:HB2	1:A:111:THR:HG21	0.52	1.81	18	4
1:A:26:THR:OG1	1:A:29:ILE:HG23	0.51	2.06	3	1
1:A:20:LYS:HA	1:A:25:LEU:HD12	0.51	1.82	6	1
1:A:8:LEU:HD21	1:A:12:PHE:CD2	0.49	2.42	10	3
1:A:41:TYR:CD1	1:A:43:ILE:HD11	0.49	2.42	4	1
1:A:29:ILE:HD12	1:A:29:ILE:C	0.47	2.29	10	7
1:A:12:PHE:CD2	1:A:55:LEU:HD22	0.47	2.43	2	2
1:A:111:THR:HG23	1:A:142:VAL:HG11	0.44	1.89	12	3
1:A:43:ILE:N	1:A:43:ILE:HD12	0.44	2.27	11	5
1:A:8:LEU:O	1:A:8:LEU:HD13	0.43	2.12	14	1
1:A:8:LEU:HD13	1:A:8:LEU:C	0.42	2.34	19	1
1:A:8:LEU:HD13	1:A:10:LEU:O	0.42	2.15	3	2
1:A:45:ASN:CG	1:A:46:ARG:H	0.41	2.18	18	2
1:A:16:LEU:HD22	1:A:29:ILE:HD13	0.40	1.92	3	1
1:A:87:ALA:O	1:A:91:ILE:HD12	0.40	2.16	7	1
1:A:8:LEU:HD21	1:A:12:PHE:HD2	0.40	1.76	5	1
1:A:46:ARG:HG2	1:A:109:ILE:HD11	0.40	1.92	5	1

6.3 Torsion angles (i)

6.3.1 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 NMR 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	134/142 (94%)	123±3 (92±2%)	10±2 (7±2%)	1±1 (1±1%)	20	68
All	All	2680/2840 (94%)	2456 (92%)	196 (7%)	28 (1%)	20	68

All 7 unique Ramachandran outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
1	A	8	LEU	15
1	A	103	ALA	6
1	A	133	VAL	2
1	A	45	ASN	2
1	A	25	LEU	1
1	A	63	ASP	1
1	A	29	ILE	1

6.3.2 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 NMR 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	113/120 (94%)	102±3 (90±2%)	11±3 (10±2%)	11	56
All	All	2260/2400 (94%)	2032 (90%)	228 (10%)	11	56

All 52 unique residues with a non-rotameric sidechain are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
1	A	20	LYS	20
1	A	23	MET	19
1	A	107	LYS	16

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Mol	Chain	Res	Type	Models (Total)
1	A	41	TYR	13
1	A	131	MET	11
1	A	14	LYS	9
1	A	118	PHE	9
1	A	124	LYS	7
1	A	8	LEU	6
1	A	119	LYS	6
1	A	130	SER	6
1	A	132	ASP	6
1	A	32	ASP	5
1	A	92	ASP	5
1	A	9	SER	5
1	A	84	GLU	5
1	A	50	CYS	5
1	A	67	ASN	4
1	A	83	ASP	4
1	A	123	HIS	4
1	A	108	CYS	4
1	A	63	ASP	3
1	A	70	HIS	3
1	A	39	GLU	3
1	A	42	GLU	3
1	A	142	VAL	3
1	A	26	THR	3
1	A	37	TRP	3
1	A	56	SER	3
1	A	46	ARG	3
1	A	48	THR	3
1	A	55	LEU	2
1	A	27	ASP	2
1	A	31	GLU	2
1	A	24	THR	2
1	A	19	CYS	2
1	A	53	MET	2
1	A	45	ASN	2
1	A	88	GLN	2
1	A	36	PHE	1
1	A	18	GLU	1
1	A	33	PHE	1
1	A	60	ASN	1
1	A	79	LYS	1
1	A	126	ASN	1

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Mol	Chain	Res	Type	Models (Total)
1	A	29	ILE	1
1	A	76	PHE	1
1	A	105	ASP	1
1	A	85	THR	1
1	A	78	LYS	1
1	A	47	GLU	1
1	A	16	LEU	1

6.3.3 RNA (i)

There are no RNA molecules in this entry.

6.4 Non-standard residues in protein, DNA, RNA chains (i)

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

6.5 Carbohydrates (i)

There are no monosaccharides in this entry.

6.6 Ligand geometry (i)

There are no ligands in this entry.

6.7 Other polymers (i)

There are no such molecules in this entry.

6.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

7 Chemical shift validation (i)

No chemical shift data were provided