Integrative Structure Validation Report

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The following software was used in the production of this report:

IHMValidation Version 3.0
Python-IHM Version 2.5
MolProbity Version 4.5.2
PrISM Version dbe5a41
PyMOL Version 2.5.0

PDB ID	9A82 | pdb_00009a82
PDB-Dev ID	PDBDEV_00000367
Structure Title	Tomaymycin NRPS system: complex of the substrate-loaded peptidyl-carrier-protein domain from the A module (APCP-load) with the adaptor (BN91) and condensation (BC) domains of the B module
Structure Authors	Karanth, M.N.; Kirkpatrick, J.P.; Carlomagno, T.
Deposited on	2024-01-22

This is a PDB-IHM Structure Validation Report.

We welcome your comments at helpdesk@pdb-ihm.org

A user guide is available at https://pdb-ihm.org/validation_help.html with specific help available everywhere you see the symbol.

List of references used to build this report is available here.

1. Overview

1.1. Summary

This entry consists of 4 model(s). A total of 7 dataset(s) were used to build this entry.

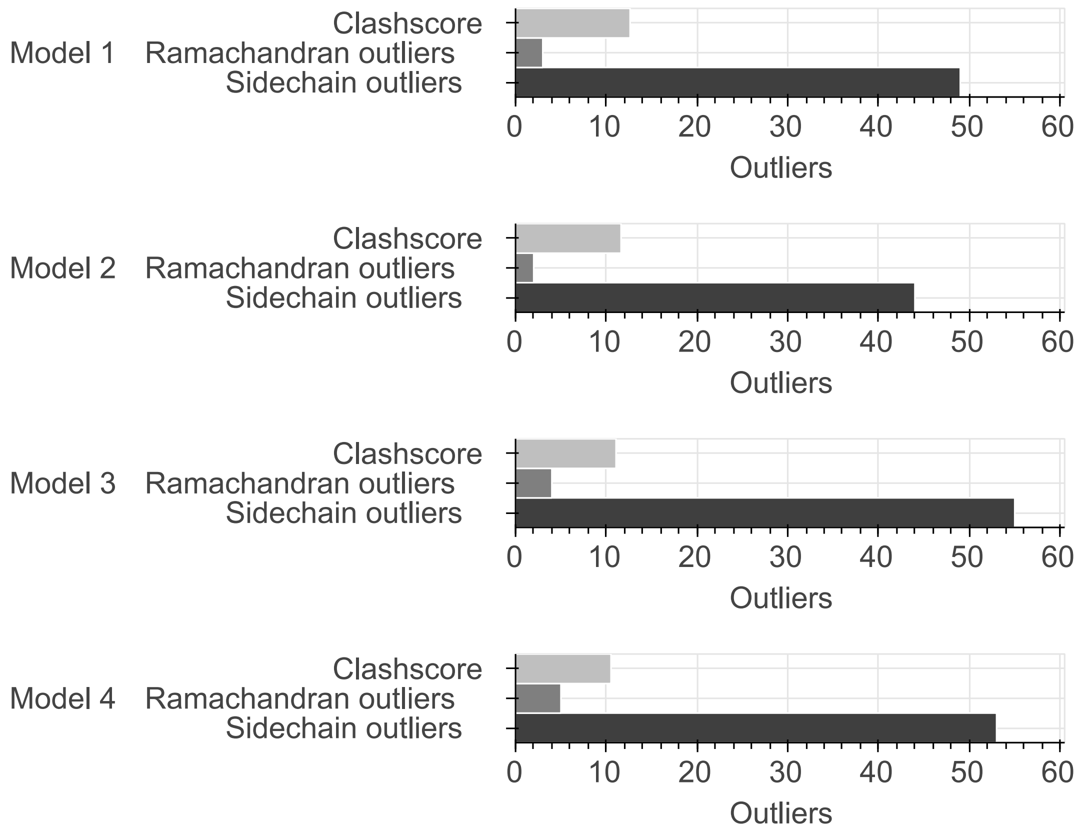
Name	Type	Count
NMR data	Experimental data	2
Predicted contacts	Experimental data	2

Name	Type	Count
Experimental model	Starting model	3

1.2. Overall quality

This validation report contains model quality assessments for all structures, data quality and fit to model assessments for SAS and crosslinking-MS datasets. Data quality and fit to model assessments for other datasets and model uncertainty are under development. Number of plots is limited to 256.

Model Quality: MolProbity Analysis



2. Model Details

2.1. Ensemble information

This entry consists of 1 distinct ensemble(s).

2.2. Representation

This entry has 1 representation(s).

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
1	1-4	1	Adaptor (BN91) and condensation (BC) domains of Tomaymycin B module	A	508	-	1-76, 77-508	100.00 / 100.00	Atomic
		2	Substrate-loaded peptidyl-carrier-protein (APCP) domain of the Tomaymycin A module	B	75	-	1-75	100.00 / 100.00	Atomic

2.3. Datasets used for modeling

There are 7 unique datasets used to build the models in this entry.

ID	Dataset type	Database name	Data access code
1	NMR data	Not available	Not available
2	Predicted contacts	Not available	Not available
3	NMR data	Not available	Not available
4	Predicted contacts	Not available	Not available
5	Experimental model	PDB	pdb_00008qsx
6	Experimental model	PDB	pdb_00008qnf
7	Experimental model	PDB	pdb_00008qrx

2.4. Methodology and software

This entry is a result of 1 distinct protocol(s).

Step number	Protocol ID	Method name	Method type	Method description	Number of computed models	Multi state modeling	Multi scale modeling
1	1	Not available	Data-driven docking using PRE-derived distance restraints within HADDOCK.	Step 1: docking of BC domain and APCP to form a binary BC-APCP complex (representing the starting models for step 2).	Not available	False	False
2	1	Not available	Data-driven docking using PRE-derived distance restraints within HADDOCK.	Step 2: docking of BN91 domain to binary BC-APCP complex generated in step 1.	Not available	False	False

There is 1 software package reported in this entry.

ID	Software name	Software version	Software classification	Software location
1	HADDOCK	2.40	Data-driven docking	https://wenmr.science.uu.nl/haddock2.4/

3. Data quality

3.4. Predicted contacts

Validation for this section is under development.

3.4. NMR

Validation for this section is under development.

4. Model quality

For models with atomic structures, MolProbity analysis is performed. For models with coarse-grained or multi-scale structures, excluded volume analysis is performed.

4.1b. MolProbity Analysis

Excluded volume satisfaction for the models in the entry are listed below. The Analysed column shows the number of particle-partice or particle-atom pairs for which excluded volume was analysed.

Standard geometry: bond outliers

There are no bond length outliers.

Standard geometry: angle outliers

There are 6 bond angle outliers in this entry (0.02% of 25164 assessed bonds). A summary is provided below.

Chain	Res	Type	Atoms	|Z|	Observed (Å)	Ideal (Å)	Model ID (Worst)	Models (Total)
B	1	PRO	CA-N-CD	6.09	103.47	112.00	4	4
B	1	PRO	N-CA-CB	4.50	107.95	103.00	3	2

Too-close contacts

The following all-atom clashscore is based on a MolProbity analysis. All-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The table below contains clashscores for all atomic models in this entry.

Model ID	Clash score	Number of clashes
1	12.62	114
2	11.62	105
3	11.07	100
4	10.52	95

There are 414 clashes. The table below contains the detailed list of all clashes based on a MolProbity analysis. Bad clashes are >= 0.4 Angstrom. The output is limited to 100 rows.

Atom 1	Atom 2	Clash(Å)	Model ID (Worst)	Models (Total)
A:376:THR:HA	A:501:PRO:HA	0.88	1	4
B:32:WP9:N13	B:32:WP9:S44	0.82	2	2
A:305:ALA:HB1	A:464:LEU:HB3	0.79	2	4

Atom 1	Atom 2	Clash(Å)	Model ID (Worst)	Models (Total)
A:311:LEU:HD22	A:495:ALA:HA	0.77	3	4
A:26:PRO:HB2	A:29:ASP:HB3	0.77	4	4
A:7:THR:HB	A:48:PHE:HZ	0.75	3	4
A:377:VAL:HB	A:498:PRO:HA	0.75	3	4
A:22:THR:H	A:25:GLU:HG3	0.75	4	4
B:13:ILE:HG13	B:41:ARG:HH21	0.74	4	1
A:301:PRO:HD3	A:488:ARG:HD3	0.72	1	4
A:26:PRO:HD2	A:30:ARG:HG3	0.72	3	2
A:97:PRO:HB3	A:450:LYS:HB2	0.72	1	4
A:493:GLN:HB3	A:505:LEU:HD22	0.72	3	4
A:16:LEU:HD12	A:31:CYS:HB3	0.71	2	4
A:318:THR:HG22	B:56:PHE:HB3	0.71	2	3
A:497:ARG:NH2	A:504:GLU:HB3	0.70	3	4
A:33:HIS:O	A:36:LEU:HG	0.70	2	4
A:106:VAL:HG11	A:218:LEU:HD11	0.68	2	4
B:11:LYS:HG2	B:17:ASP:HA	0.68	2	3
A:103:PRO:HG2	A:174:ALA:HA	0.67	2	2
A:7:THR:HB	A:48:PHE:CZ	0.67	4	4
A:267:ALA:HA	A:406:LEU:HD21	0.66	3	4
A:44:LEU:HA	A:47:VAL:HG12	0.66	3	4
A:321:MET:HG2	A:385:ARG:HA	0.66	4	4
A:210:ASP:HA	B:32:WP9:S44	0.65	2	2
B:55:VAL:HA	B:64:LEU:HD21	0.65	3	2
A:477:GLU:HB3	A:478:PRO:HD3	0.64	3	4
A:155:PHE:HA	A:188:VAL:O	0.64	1	4
A:454:SER:HB2	A:469:GLU:HB2	0.63	2	4
A:40:LEU:HD23	A:57:LEU:HD21	0.63	3	4
A:61:ALA:HB1	A:66:VAL:HG22	0.61	2	4
A:101:ASN:HA	B:32:WP9:O11	0.61	1	2
A:33:HIS:CE1	A:35:ALA:HB3	0.61	1	1
A:321:MET:HE1	B:53:GLU:HG3	0.61	3	2
A:497:ARG:HH22	A:504:GLU:HB3	0.60	4	4
A:22:THR:N	A:25:GLU:HG3	0.60	4	2
A:129:GLU:HA	A:132:ARG:NH1	0.59	1	4
A:219:ARG:HD2	A:356:GLU:OE1	0.59	1	3

Atom 1	Atom 2	Clash(Å)	Model ID (Worst)	Models (Total)
A:66:VAL:HG12	A:70:MET:HE3	0.58	2	4
B:8:GLN:HA	B:11:LYS:HD2	0.58	1	3
B:9:ALA:HB1	B:41:ARG:HD2	0.58	4	1
A:10:ASP:O	A:13:ARG:HG2	0.58	3	4
A:40:LEU:O	A:44:LEU:HG	0.58	2	4
A:5:ARG:HD3	A:67:ALA:HB3	0.58	2	1
A:269:ARG:HH22	A:390:GLU:HG3	0.58	1	4
A:462:GLU:CD	A:463:GLY:H	0.58	4	2
A:84:GLN:HG2	A:207:ILE:HG12	0.57	3	4
A:321:MET:SD	A:385:ARG:HG3	0.57	3	4
A:32:GLU:CD	A:32:GLU:H	0.57	3	1
B:53:GLU:OE1	B:57:ARG:HD3	0.57	4	2
A:270:LEU:HB3	A:274:LEU:HD11	0.57	1	2
A:385:ARG:HH21	A:386:GLU:CD	0.56	1	1
A:36:LEU:HA	A:39:ASP:OD1	0.56	4	4
A:354:THR:HA	A:357:LEU:HD12	0.56	1	4
A:224:ALA:HA	A:234:VAL:HG21	0.56	3	4
A:107:ARG:HD2	A:442:GLU:OE2	0.56	1	4
A:339:ARG:HG2	A:370:GLU:HG2	0.55	4	3
A:347:SER:HB2	B:32:WP9:C33	0.55	2	2
A:160:TYR:O	A:193:GLY:HA2	0.55	3	4
A:22:THR:H	A:25:GLU:CG	0.54	1	2
A:407:GLN:N	A:408:PRO:HD3	0.54	4	4
A:254:MET:HA	A:254:MET:HE2	0.53	3	4
B:38:LEU:O	B:42:LEU:HG	0.53	3	4
A:50:VAL:HG11	A:70:MET:HG2	0.53	1	1
A:4:LEU:O	A:8:VAL:HG23	0.53	4	4
A:23:ALA:HA	A:63:VAL:HG22	0.53	1	1
A:362:VAL:HG21	B:32:WP9:C39	0.53	2	2
A:104:PHE:HB3	A:443:ARG:HD3	0.53	1	2
A:117:LEU:O	A:121:VAL:HG23	0.53	3	4
A:218:LEU:HD13	A:221:LEU:HD23	0.53	2	4
A:26:PRO:HD2	A:30:ARG:CG	0.52	3	2
A:21:LEU:HD13	A:25:GLU:HB2	0.52	3	1
A:33:HIS:HB2	B:44:LYS:HB3	0.52	4	1

Atom 1	Atom 2	Clash(Å)	Model ID (Worst)	Models (Total)
A:189:THR:HB	A:201:ILE:HB	0.51	3	4
A:37:LEU:HD13	A:58:ALA:HB2	0.51	4	1
A:11:LEU:HD21	A:48:PHE:HE2	0.51	3	3
A:262:SER:HA	A:394:HIS:ND1	0.51	2	4
A:255:ASN:HB2	A:256:PRO:HD2	0.51	1	4
B:53:GLU:O	B:57:ARG:HG2	0.50	2	2
A:32:GLU:OE2	B:41:ARG:HD3	0.50	4	1
A:351:ASP:OD1	A:352:PRO:HD2	0.50	1	1
A:127:ARG:HD2	A:234:VAL:HG12	0.50	4	4
A:104:PHE:HB2	A:441:ILE:HG22	0.49	3	4
A:62:THR:O	A:66:VAL:HG23	0.49	2	4
A:94:LEU:HB3	A:95:PRO:HD2	0.49	1	2
B:6:VAL:HG22	B:46:PHE:CZ	0.49	2	4
A:165:GLU:O	A:169:LEU:HG	0.49	2	4
B:58:HIS:ND1	B:63:GLN:HB3	0.49	2	2
A:132:ARG:HD2	A:149:ASP:O	0.48	3	4
A:362:VAL:HG21	B:32:WP9:N41	0.48	3	2
A:443:ARG:HH12	B:32:WP9:C14	0.48	1	2
A:80:ALA:HA	A:144:GLN:NE2	0.48	1	4
A:335:THR:HB	A:337:GLN:HG3	0.48	4	4
A:4:LEU:HD12	A:48:PHE:CD1	0.48	1	2
A:122:ARG:HB3	A:150:ASP:OD2	0.48	3	4
A:29:ASP:OD2	A:30:ARG:HG2	0.47	1	2
A:47:VAL:HG13	A:48:PHE:CD2	0.47	1	4
A:316:GLY:C	B:57:ARG:HB2	0.47	2	2
A:291:HIS:O	A:448:GLY:HA2	0.47	2	2
A:21:LEU:HA	A:25:GLU:HG3	0.47	3	1

Torsion angles: Protein backbone ?

In the following table, Ramachandran outliers are listed. The Analysed column shows the number of residues for which the backbone conformation was analysed.

Model ID	Analysed	Favored	Allowed	Outliers
1	574	534	37	3
2	574	540	32	2
3	574	531	39	4
4	574	530	39	5

There are 5 unique backbone outliers. Detailed list of outliers are tabulated below.

Chain	Res	Type	Models (Total)
A	52	ILE	4
A	409	PRO	4
A	507	ALA	3
A	463	GLY	2
A	21	LEU	1

Torsion angles : Protein sidechains

In the following table, sidechain rotameric outliers are listed. The Analysed column shows the number of residues for which the sidechain conformation was analysed.

Model ID	Analysed	Favored	Allowed	Outliers
1	475	379	47	49
2	475	380	51	44
3	475	373	47	55
4	475	373	49	53

There are 71 unique sidechain outliers. Detailed list of outliers are tabulated below.

Chain	Res	Type	Models (Total)
A	14	THR	4
A	21	LEU	4
A	29	ASP	4
A	71	ASP	4
A	72	ASP	4
A	129	GLU	4
A	134	THR	4
A	156	GLU	4
A	162	ASP	4
A	163	ASP	4
A	218	LEU	4
A	234	VAL	4
A	295	THR	4
A	370	GLU	4
A	400	ASP	4
A	411	SER	4
A	412	SER	4
A	415	THR	4

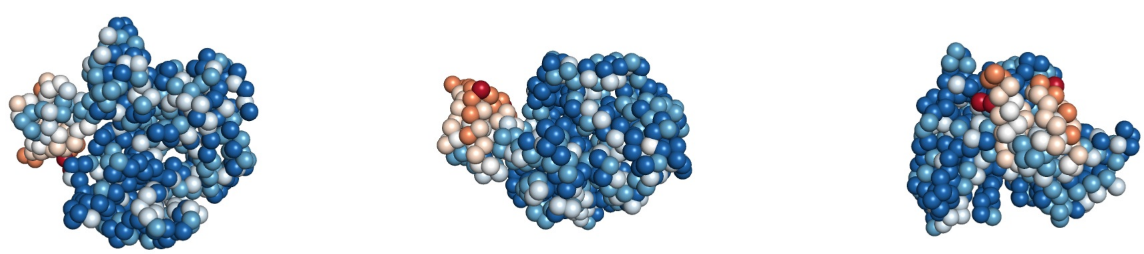
Chain	Res	Type	Models (Total)
A	425	THR	4
A	435	ASP	4
A	460	ASP	4
A	462	GLU	4
A	479	THR	4
A	485	ASP	4
B	7	LEU	4
B	14	SER	4
B	20	THR	4
B	21	THR	4
B	22	THR	4
B	52	THR	4
A	7	THR	3
A	32	GLU	3
A	53	THR	3
A	125	LEU	3
A	171	HIS	3
A	264	ASP	3
A	373	ASP	3
A	386	GLU	3
A	455	LEU	3
A	467	LEU	3
A	18	SER	2
A	81	SER	2
A	101	ASN	2
A	111	SER	2
A	138	SER	2
A	141	THR	2
A	173	VAL	2
A	182	ARG	2
A	210	ASP	2
A	220	GLU	2
A	309	GLU	2
A	314	THR	2
A	410	ARG	2

Chain	Res	Type	Models (Total)
A	459	ARG	2
B	4	THR	2
B	40	SER	2
B	53	GLU	2
B	56	PHE	2
B	60	THR	2
B	71	SER	2
A	4	LEU	1
A	130	VAL	1
A	167	ASP	1
A	306	ASP	1
A	355	HIS	1
A	401	LYS	1
A	421	MET	1
A	442	GLU	1
A	476	ASP	1
B	37	GLN	1
B	45	ILE	1

4.2. PrISM Precision Analysis

*Regions of **low** **high** precision, defined as the variability among the models that satisfy the input data and calculated as the density-weighted root mean-square fluctuation (RMSF) from the bead/atom center of density, annotated and visualized using PrISM. The per-bead precision is computed from the deposited ensemble of superposed integrative models. High- and low-precision regions are then determined by clustering beads of similar precision based on their proximity in the structure. Only coarse-grained beads (or CA atoms for atomic models) of deposited models are used for assessment and visualization, and three projections for each representative model are generated.*

PrISM analysis for Ensemble 1 (models deposited/total: 4/4).



5. Fit to Data Used for Modeling Assessment

5.4. Predicted contacts

Validation for this section is under development.

5.4. NMR

Validation for this section is under development.

6. Fit to Data Used for Validation Assessment

Validation for this section is under development.

Acknowledgments

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