Supplementary Materials

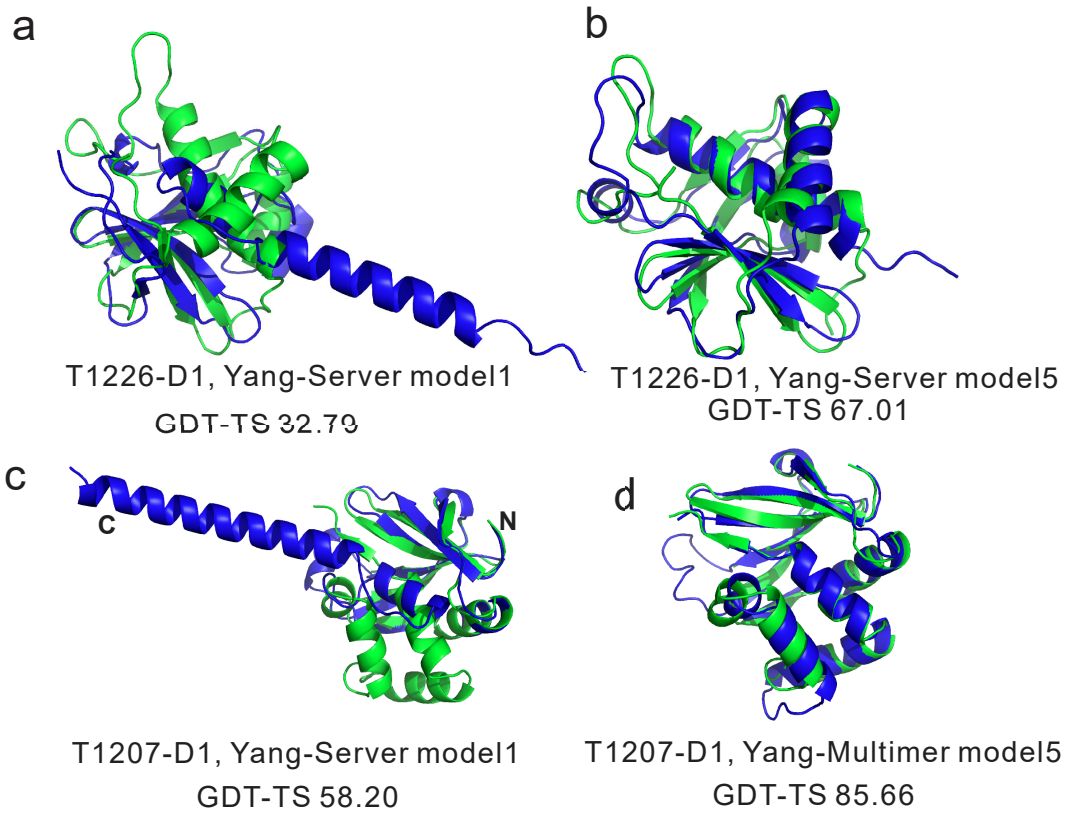

Fig. S1. Predicted structure models for T1226 (a, b) and T1207 (c, d). Predicted and experimental structures are shown in blue and green cartoons, respectively.

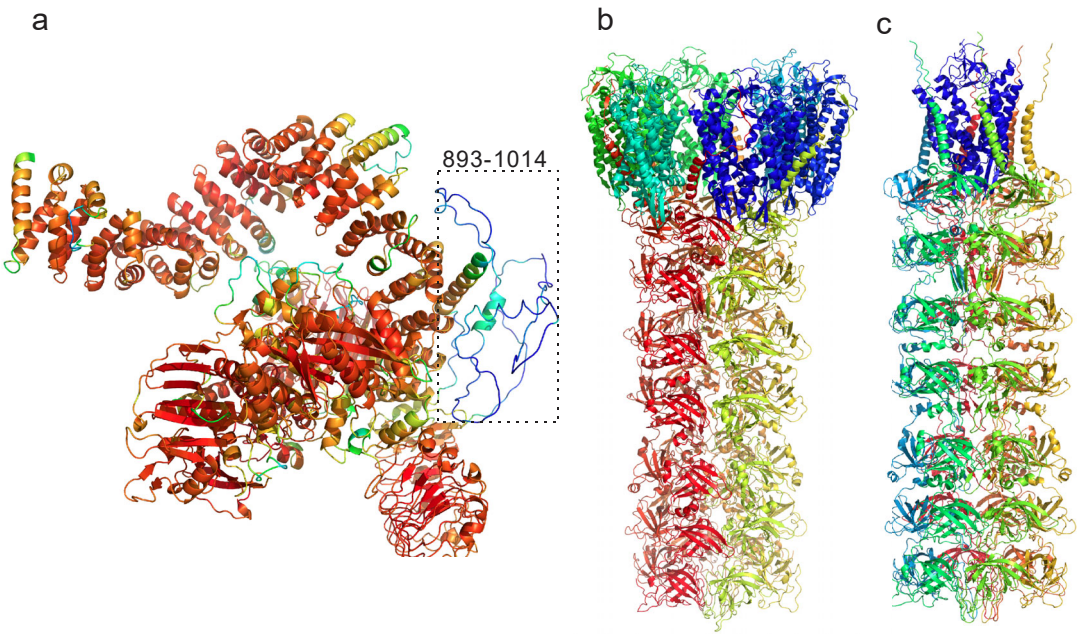

Fig. S2. Predicted models for the targets H0258 and H0227. (a) The predicted monomer structure of subunit A from target H0258, colored by pLDDT confidence score (from blue for low to red for high). The region within the dashed frame is identified as IDR based on its low pLDDT. (b) An incorrect A6B6 stoichiometry predicted for H0227 in Phase 0. (c) The refined, correct A1B6 model for H0227 obtained in Phase 1.

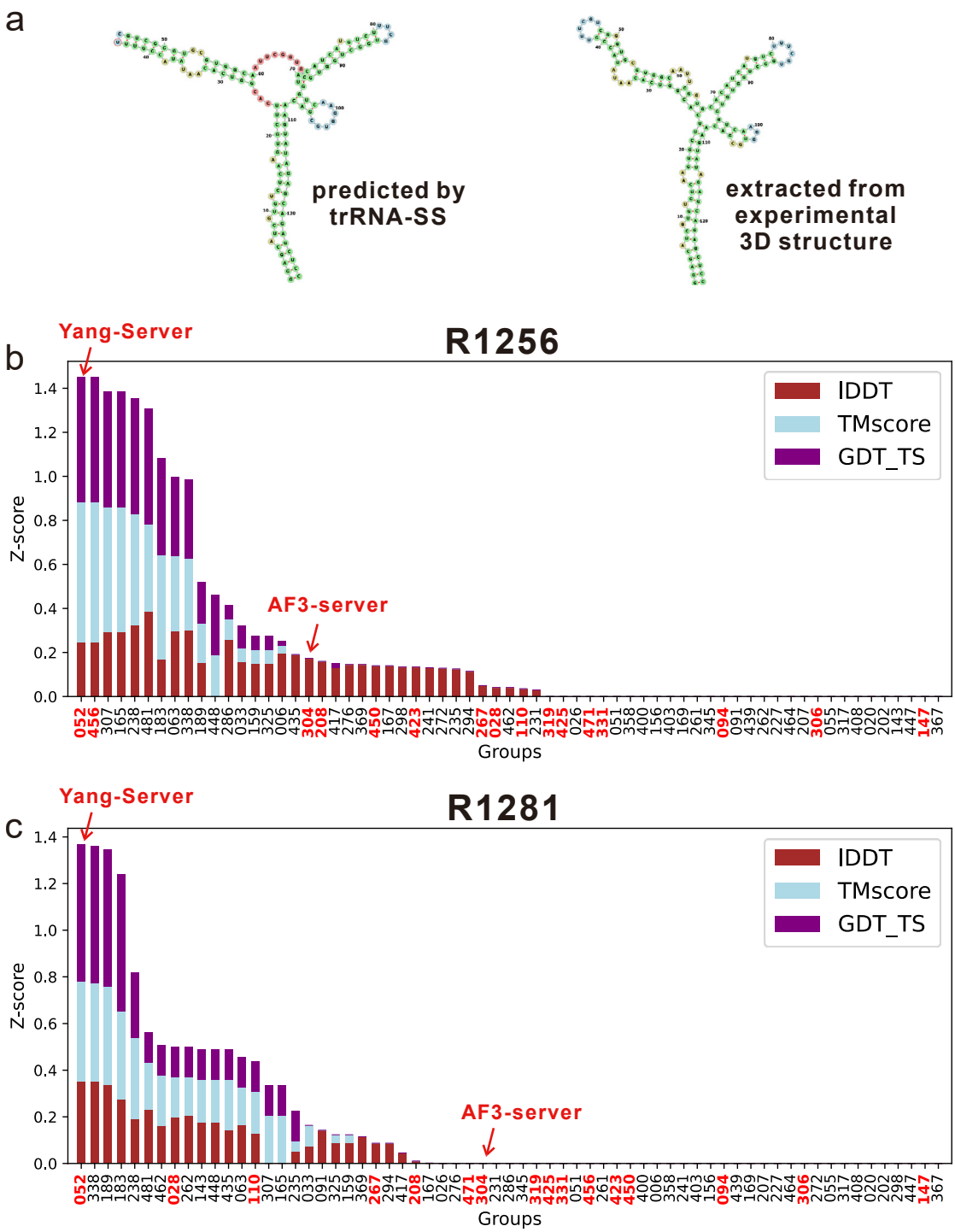

Fig. S3. Yang-Server results for targets R1256 and R1281. (a) Comparison of the SS predicted by trRNA-SS and that extracted from the experimental 3D structure of R1256. (b, c) Z-score rankings for R1256 and R1281. Server groups are highlighted in red bold in *x*-axis labels.

Table S1. The GDT-TS for the AF3-server and the Yang-Server models (Phase 1). The data are cited from the CASP16 website, all based on "model 1" submissions only.

#	Target ID	AF3-server	Yang-Server
1	T1201-D1	90.7	89.79
2	T1206-D1	99.13	99.13
3	T1207-D1	57.17	58.2
4	T1208s1-D1	92.95	91.19
5	T1208s2-D1	98.53	95.34
6	T1210-D1	70.02	70.34
7	T1212-D1	82.51	91.63
8	T1214-D1	92.32	92.51
9	T1218-D1	92.64	90.87
10	T1218-D2	90.13	77.59
11	T1218-D3	93.84	94.03
12	T1220s1-D1	62.63	63.11
13	T1226-D1	34.43	32.79
14	T1227s1-D1	86.54	90.69
15	T1228v1-D1	89.63	89.18
16	T1228v1-D2	95	94.26
17	T1228v1-D3	67.5	70.73
18	T1228v1-D4	74.62	74.24
19	T1228v2-D1	87.65	91.16
20	T1228v2-D2	93.52	93.52
21	T1228v2-D3	67.94	64.71
22	T1228v2-D4	74.24	73.48
23	T1230s1-D1	91.28	92.15
24	T1231-D1	94.72	94.19
25	T1234-D1	96.35	98.81
26	T1235-D1	92.92	96.23
27	T1237-D1	88.95	80.97
28	T1239v1-D1	90.24	90.85
29	T1239v1-D2	97.78	96.11
30	T1239v1-D3	72.56	86.22
31	T1239v1-D4	78.03	77.65
32	T1239v2-D1	89.94	89.18
33	T1239v2-D2	96.85	96.11
34	T1239v2-D3	72.33	85.56
35	T1239v2-D4	78.03	78.41
36	T1240-D1	99.04	99.04
37	T1240-D2	93.62	96.14
38	T1243-D1	86.75	87.41
39	T1244s1-D1	99.71	99.71
40	T1245s1-D1	89.12	93.97

41	T1245s2-D1	83.84	90.95
42	T1246-D1	95.69	96.43
43	T1249v1-D1	88.16	87.46
44	T1257-D1	45.4	86.74
45	T1259-D1	92.4	96.81
46	T1266-D1	84.15	90
47	T1267s1-D1	72.89	73.05
48	T1267s1-D2	90.98	91.08
49	T1267s2-D1	84.16	84.64
50	T1269-D1	85.9	86.27
51	T1269-D2	80.09	85.55
52	T1269-D3	85.01	87.04
53	T1270-D1	94.05	95.59
54	T1270-D2	87.75	84.88
55	T1271s1-D1	68.18	70.65
56	T1271s2-D1	84.76	85.22
57	T1271s3-D1	82.05	91.02
58	T1271s4-D1	73.34	71.61
59	T1271s5-D1	81.49	82.79
60	T1271s5-D2	85.28	83.64
61	T1271s6-D1	97.31	95.43
62	T1271s7-D1	92.13	94.21
63	T1271s8-D1	0	84.85
64	T1271s8-D2	70.59	86.93
65	T1272s2-D1	89.76	92.07
66	T1272s6-D1	94.97	94.03
67	T1272s8-D1	91.41	89.78
68	T1272s9-D1	86.71	86.14
69	T1274-D1	99.72	99.72
70	T1276-D1	93.69	94.2
71	T1278-D1	99.56	99.56
72	T1279-D1	98.75	98.75
73	T1279-D2	88.17	82.6
74	T1280-D1	97.97	98.61
75	T1284-D1	82.35	82.14
76	T1292-D1	99.09	99.09
77	T1294v1-D1	98.19	97.95
78	T1294v2-D1	97.1	97.46
79	T1295-D1	79.69	78.44
80	T1295-D2	96.38	96.01
81	T1295-D3	90.39	88.46
82	T1298-D1	90.55	90.55
83	T1298-D2	87.56	87.67

84	T1299-D1	93.9	95.98
Average	N/A	85.28	87.61

Table S2. The DockQ for the AF3-server and the Yang-Multimer models (Phase 1). The data are cited from the CASP16 website, all based on "model 1" submissions only.

#	Target ID	AF3-server	Yang-Multimer
1	H1202	0.844	0.85
2	H1204	0.508	0.591
3	H1208	0.829	0.808
4	H1213	0.801	0.799
5	H1215	0.195	0.126
6	H1217	0.698	0.712
7	H1220	0.766	0.699
8	H1222	0.627	0.669
9	H1223	0.556	0.537
10	H1225	0.487	0.501
11	H1227	0.521	0.476
12	H1229	0.546	0.4
13	H1230	0.584	0.669
14	H1232	0.473	0.496
15	H1233	0.859	0.87
16	H1236	0.301	0.267
17	H1244	0.631	0.615
18	H1245	0.374	0.83
19	H1258	0.309	0.405
20	H1265	0.386	0.269
21	H1265_v1	0.332	0.253
22	H1265_v2	0.729	0.878
23	H1265_v3	0.343	0.226
24	H1267	0.287	0.282
25	H1272	0.557	0.573
26	T1201o	0.79	0.766
27	T1206o	0.94	0.945
28	T1218o	0.004	0.393
29	T1219v1o	0.111	0.848
30	T1234o	0.017	0.315
31	T1235o	0.277	0.276
32	T1237o	0.774	0.747
33	T1240o	0.343	0.352
34	T1249v1o	0.429	0.451
35	T1249v2o	0.511	0.124
36	T1257o	0.197	0.783
37	T1259o	0.592	0.834
38	T1269v1o	0.539	0.652
39	T1270o	0.595	0.599
40	T1292o	0.852	0.946

41	T1294v1o	0.919	0.87
42	T1295o	0.244	0.231
43	T1295o_v2	0.749	0.725
44	T1298o	0.636	0.444
Average	N/A	0.524	0.571

Table S3. The optimized sequences of the target M1271 for running AF3.

>M1271_optimized A 467
FDASNGDVLANYVNFVADDATGPAATKENGAQPMRSLRSASAVENLLFTDAAKNYCRLCMEEVQVTPKAHIST
PYRGSHTNHTCREVVLDSLALLAIRGYPIDDVYFVWADTLYQSSVFQRIPELVSPRWTVDKRSEVLAKILFML
KDMGVIDISLAAQAPDLFDNTAQQVHHRRRVAFERLEYIGDNSWGNHLSNRMMLLFPDRQWTYSQNAYTFNCF
RDACEMNVTLEFMFDTLRVGELLPPGVREKLGTGKIKADVVEAVIGELHVTLWGLEPQLYDSVCFVEINGVGE
ARLAALVQHCLTEIYDLIVLSYVQELSGSAVPLAKQIAADRIWNSVYPPVRKAKDRAPGGRKSRSTVVNVVGV
GEVRQLPSLPSLFPAASKRPTRAPHPLRRLRKLGEIPEETVCAGTNKDVFVHLIESYERLDMLDDSLLPTLNM
RRLQDVQFSKLKRQLVPSLSPAALEELHN
>M1271_optimized B 355
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RRRMRLASTMRHLQEKGVLHHSLPRVTVDAQSEVSLTVESDSFVNYMFLGESFARQETLDRVARLMPRAEALE
LSSIISFVLSKRRLAHFFDIFEMRKMVLNGDSSDDKASADGDVPPTIPRLQQDGKAVILFSCLGELQMFSRRD
RSHSVATRSAAEQLVLNVLGTHVMENIIGELVHEALQTVVEEGTAVWREHCGELKHKLFEGTKAASPPIATTP
NPVSNSGGPEVTADVNDQMWVDLCRLYVLDKNGSVPQLQPTVKRHSWHDVARALTLELTVPNP
>M1271_optimized C 384
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ALTSSVLSEEALHGLFDRLLMKALVGEKPVGKMRDWSLTPNQCGQMLCAIVGEMSWFAARTKATDRTHNNALF
PPSDALILHVLCCHVLESLPAELLYNVLEPKVQRIKENWVNEPMSIPEQLHLKPRTIGSLSLSLVAKPLTEEE
GRRKEVAVSAEKCQLSLTPERVIGSVRSTMLPRWNYKRFEERRYHILESDKRQVLPLAMSPVGRGDVSLASEQ
MPDERRRELVALALGGRYR
>M1271_optimized D 274
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SRLVTQVFPPISAGMMTNFTQKCWGRSNGERMYDALRLQRIKAYYGWQPYESKEKKAFFVRQLLWELLSVEVR
DEVDELTKHMADLALRRMAFEMIFLQSMEYMHKVQYVYDLMGRPTVDELAAMNLL
>M1271_optimized E 572
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NSANIFLPFASVVTGTADRRKEMEAVARPTARATPEGAAPGIKRPGAMAGGAVAVGKGRSGGQILPIRELIKK
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>M1271_optimized F 187
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>M1271_optimized G 187
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>M1271_optimized H 108
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>M1271_optimized I 108
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>M1271_optimized J 210
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IQFASRCAEGPFVGASPTVTSCAHIEGVVRQVECGYVGGDRVLQFIIEVEEVPASGGTPMRLPLAVRWRPGSE
VAQNRMDEWQKEMERLVGRRVLASGRLQVEECFDSGSRRLYKTPSLVLPATSTVEMISLQELEC
>M1271_optimized K 133
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VRVIGRLKTTEVVDAGKKQPFPCIIVEQGRWSTVSLVHSLRKQRRDWQLQNILTSVATLE
>M1271_optimized L 129
LQQTFMRCCKSVNSVTLVGVVHDIQSGFVYEDAVTQFTLTTTSIDTTHPTQEVVVEKDHHTIRCFGELFSAEV
KQKVKEGNVVCVNGRLRLSPQLEPSCNKHFYFPYIQVQPPHGQVAVIHGDRRTVPA
>M1271_optimized M 129
LQQTFMRCCKSVNSVTLVGVVHDIQSGFVYEDAVTQFTLTTTSIDTTHPTQEVVVEKDHHTIRCFGELFSAEV
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>M1271_optimized N 129
LQQTFMRCCKSVNSVTLVGVVHDIQSGFVYEDAVTQFTLTTTSIDTTHPTQEVVVEKDHHTIRCFGELFSAEV
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>M1271_optimized O 129
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KQKVKEGNVVCVNGRLRLSPQLEPSCNKHFYFPYIQVQPPHGQVAVIHGDRRTVPA
>M1271_optimized Q 77
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ACCA