References

[1] Moore PB, Steitze TA. RNA, the first macromolecular catalyst: the ribosome is a ribozyme. Trends Biochem. Sci. 2003;28:411–418.

[2] Fica SM, Oubridge C, Galej WP, et al. Structure of a spliceosome remodeled for exon ligation. Nature. 2017;542:377–380.

[3] Bertram K, Agafonov DE, Liu WT, et al. Cryo-EM structure of a human spliceosome activated for step 2 of splicing. Nature. 2017;542:318–323.

[4] Gorski SA, Vogel J, Doudna JA. Nat. Rev. Mol. Cell Biol. 2017;18:215–228.

[5] Hall KB. F1000Res. 2017;6:345.

[6] Esakova O, Krasilnikov AS. Of proteins and RNA: the RNase P/MRP family. RNA. 2010;16:1725–1747.

[7] Guerrier-Takada C, Gardiner K, Marsh T, et al. The RNA moiety of ribonuclease P is the catalytic subunit of the enzyme. Cell. 1983;35:849–857.

[8] Kirsebom LA. RNase P RNA mediated cleavage: substrate recognition and catalysis. Biochimie. 2007;89:1183–1194.

[9] Smith JK, Hsieh J, Fierke CA. Importance of RNA-protein interactions in bacterial ribonuclease P structure and catalysis. Biopolymers. 2007;87:329–338.

[10] Brown JW, Haas ES, James BD, et al. Phylogenetic analysis and evolution of RNase P RNA in proteobacteria. J. Bacteriol. 1991;173:3855–3863.

[11] Haas ES, Banta AB, Harris JK, et al. Structure and evolution of ribonuclease P RNA in Gram-positive bacteria. Nucleic Acids Res. 1996;24:4775–4782.

[12] Waugh DS, Pace NR. Complementation of an RNase P RNA (*rnpB*) gene deletion in *Escherichia coli* by homologous genes from distantly related eubacteria. J. Bacteriol. 1990;172:6316–6322.

[13] Wegscheid B, Condon C, Hartmann RK. Type A and B RNase P RNAs are interchangeable *in vivo* despite substantial biophysical differences. EMBO J. 2006;7:411–417.

[14] Loria A, Pan T. Domain structure of the ribozyme from eubacterial ribonuclease P. RNA. 1996;2:551–563.

[15] Loria A, Pan T. Modular construction for function of a ribonucleoprotein enzyme: the catalytic domain of *Bacillus subtilis* RNase P complexed with *B. subtilis* RNase P protein. Nucleic Acids Res. 2001;29:1892–1897.

[16] Christian EL, Kaye NM, Harris ME. Evidence for a polynuclear metal ion binding site in the catalytic domain of ribonuclease P RNA. EMBO J. 2002;21:2253–2262.

[17] Torres-Larios A, Swinger KK, Krasilnikov AS, et al. Crystal structure of the RNA component of bacterial ribonuclease P. Nature. 2005;437:584–587.

[18] Kazantsev AV, Krivenko AA, Harrington DJ, et al. Crystal structure of a bacterial ribonuclease P RNA. Proc. Natl. Sci. USA. 2005;102:13392–13397.

[19] Reiter NJ, Osterman A, Torres-Larios A, et al. Structure of a bacterial ribonuclease P holoenzyme in complex with tRNA. Nature. 2010;468:784–789.

[20] Liu F, Altman S. Requirements for cleavage by a modified RNase P of a small model substrate. Nucleic Acids Res. 1996;24:2690–2696.

[21] Komine Y, Kitabatake M, Yokogawa T, et al. A tRNA-like structure is present in 10Sa RNA, a small stable RNA from *Eschrichia coli*. Proc. Natl. Sci. USA. 1994;91:9223–9227.

[22] Alifano P, Rivellini F, Piscitelli C. Ribonuclease E provides substrates for ribonuclease P-dependent processing of a polycistronic mRNA. Genes Dev. 1994;8:3021–3031.

[23] Altman S, Wesolowski D, Guerrier-Takada C, et al. RNase P cleaves tramsient structures in some riboswiches. Proc. Natl. Sci. USA. 2005;102:11284–11289.

[24] Seif E, Altman S. RNase P cleaves the adenine riboswiche and stabilizes pbuE mRNA in *Bacillus subtilis*. RNA. 2008;14:1237–1243.

[25] Jarrous N, Gopalan V. Archaeal/eukaryal RNase P: subunits, functions and RNA diversification. Nucleic Acids Res. 2010;38:7885–7894.

[26] Xiao S, Houser-Scott F, Engelke DR. Eukaryotic ribonuclease P: increased complexity to cope with the nuclear pre-tRNA pathway. J. Cell Physiol. 2001;187:11–20.

[27] Jarrous N, Altman S. Human ribonuclease P. Methods Enzymol. 2001;342:93–100.

[28] Kikovska E, Svard SG, Kirsebom LA. Eukaryotic RNase P RNA mediates cleavage in the absence of protein. Proc Natl Acad Sci USA. 2007;104:2062–2067.

[29] Wilusz JE, Freier SM, Spector DL. 3′ end processing of a long nuclear-retained noncoding RNA yields a tRNA-like cytoplasmic RNA. Cell. 2008;135:919–932.

[30] Sunwoo H, Dinger ME, Wilusz JE, et al. MEN epsilon/beta nuclear-retained non-coding RNAs are up-regulated upon muscle differentiation and are essential components of paraspeckles. Genome Res. 2009;19:347–359.

[31] Ishiguro A, Kassavetis GA, Geiduschek EP. Essential roles of Bdp 1, a subunit of RNA polymerase III initiation factor TFIIIB, in transcription and tRNA processing. Mol. Cell Biol. 2002;22:3264–3275.

[32] Reiner R, Ben-Asouli Y, Krilovetzky I, et al. A role for the catalytic ribonucleoprotein RNase P in RNA polymerase III transcription. Genes Dev. 2006;20:1621–1635.

[33] Jarrous N, Reiner R. Human RNase P: a tRNA-processing enzyme and transcription factor. Nucleic Acids Res. 2007;35:3519–3524.

[34] Mann H, Ben-Asouli Y, Schein A, et al. Eukaryotic RNase P: role of RNA and protein subunits of a primordial catalytic ribonucleoprotein in RNA-based catalysis. Mol Cell. 2003;12:925–935.

[35] Perederina A, Esakova O, Quan C, et al. Eukaryotic ribonucleases P/MRP: the crystal structure of the P3 domain. EMBO J. 2010;29:761–769.

[36] Hipp K, Galani K, Batisse C, et al. Modular architecture of eukaryotic RNase P and RNase MRP revealed by electron microscopy. Nucleic Acids Res. 2011;40:3275–3288.

[37] Darr SC, Pace B, Pace NR. Characterization of ribonuclease P from the archaebacterium *Sulfolobus solfataricus*. J. Biol. Chem. 1990;265:12927–12932.

[38] Nieuwlandt DT, Haas ES, Daniels CJ. The RNA component of RNase P from the archaebacterium *Haloferax volcanii*. J. Biol. Chem. 1991;266:5689–5695.

[39] Andrews AJ, Hall TA, Brown JW. Characterization of RNase P holoenzyme from *Methanococcus jannaschii* and *Methanothermobacter thermoautotrophiccus*. Biol. Chem. 2001;382:1171–1177.

[40] Hall TA, Brown JW. Archaeal RNase P has multiple protein subunits homologous to eukaryotic nuclear RNase P proteins. RNA. 2002;8:296–306.

[41] Pannucci JA, Haas ES, Hall TA, et al. RNase P RNAs from some archaea are catalytically active. Proc. Natl. Acad. Sci. USA. 1999;96:7803–7808.

[42] Kouzuma Y, Mizoguchi M, Takagi H, et al. Reconstitution of archaeal ribonuclease P from RNA and four protein components. Biochem. Biophys. Res. Commun. 2003;306:666–673.

[43] Fukuhara H, Kifusa M, Watanabe M, et al. A fifth protein subunit Ph1496p elevates the optimum temperature for the ribonuclease P activity from *Pyrococcus horikoshii* OT3. Biochem. Biophys. Res. Commun. 2006;343:956–964.

[44] Tsai HY, Pulukkunat DK, Woznick WK, et al. Functional reconstitution and characterization of *Pyrococcus furiosus* RNase P. Proc. Natl. Acad. Sci. USA. 2006;103:16147–16152.

[45] Chen W-K, Pulukkunat DK, Cho I-M, et al. Dissecting functional cooperation among protein subunits in archaeal RNase P, a catalytic ribonucleoprotein complex. Nucleic Acids Res. 2010;38:8316–8327.

[46] Cho I-M, Lai LB, Susanti D, et al. Ribosomal protein L7Ae is a subunit of atchaeal RNase P. Proc. Natl. Acad. Sci USA. 2010;107:14573–14578.

[47] Terada A, Honda T, Fukuhara H, et al. Characterization of the archaeal ribonuclease P proteins from *Pyrococcus horikoshii* OT3. J. Biochem. 2006;140:293–298.

[48] Kifusa M, Fukuhara H, Hayashi T, et al. Protein-protein interactions in the subunits of ribonuclease P in the hyperthermophilic