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Guest Editorial

25 years of catalytic RNA: looking younger than ever!

In the decade after the discovery of RNA catalysis in Group I introns (Cech et al., 1981) and RNase P (Guerrier-Takada et al., 1983), several new classes of ribozymes were identified, among them Group II introns (Peebles et al., 1986; van der Veen et al., 1986) and the small endonucleolytic ribozymes, namely the hammerhead (Prody et al., 1986), hairpin (Buzayan et al., 1986), HDV (Kuo et al., 1988; Wu et al., 1989) and VS (Saville and Collins, 1990) ribozymes. While the 1990s were a rather scanty period concerning the discovery of novel ribozymes, the current decade started with a sensational bang, when the crystal structure of the *Haloarcula marismortui* ribosome revealed that protein biosynthesis is fundamentally RNA-catalysed (Nissen et al., 2000), supporting biochemical data that had shown earlier the persistence of ribosome activity to protein extraction procedures (Noller et al., 1992). Since then, several new catalytic RNAs or novel genomic locations of known motifs have been uncovered, such as the first catalytic riboswitch, glmS (Winkler et al., 2004) and a HDV-like ribozyme in the human genome (Salehi-Ashtiani et al., 2006). Parallel to these findings, an enormous amount of data was obtained on high-resolution structures and the function and mechanisms of individual catalytic RNA entities.

These exciting developments are part of the unprecedented boom and tremendous progress that RNA research in general has experienced in the past years. In particular, non-coding RNAs that can regulate gene expression on the transcriptional, post-transcriptional and translational levels have taken centre stage. Some substantial differences in their modes of action in various organisms are just beginning to emerge and it is likely that many surprises are still lurking. The foundation for the speedy progress in understanding the new mechanisms of RNA-induced gene regulation was laid in the seminal paper by Fire and Mello (Fire et al., 1998), for which they were awarded the Nobel Prize in Medicine in the past year. With the Prize in Chemistry awarded to Roger Kornberg for his contributions to the understanding of transcription in eukaryotes, RNA research has received the highest scientific honours twice in 2006.

As early as 1993, the international RNA Society (www.rnasociety.org) was formed to facilitate sharing and dissemination of experimental results and emerging concepts in ribonucleic acid research. Similarly, and on a more local level, the RNA boom of recent years became manifest in the foundation of the study section 'RNA Biochemistry' during the fall meeting 2001 of the German Society for Biochemistry and Molecular Biology (www.gbm-online.de). The study section aims to provide a forum for RNA scientist and has currently well above 250 members from Germany and neighbouring countries. As well as offering a web page with a job market and a methods forum (www.rna-biochemistry.de), key aspects of the activity of the study section are the biannual conferences that cover all aspects of RNA research represented by the study group members.

Based on the RNA catalysis session during the 4th meeting of the study section in October 2006, we have put together a series of articles on this topic written by speakers at this session and further experts in the field. With this highlight issue, we also celebrate the first quarter of a century since the discovery of catalytic properties of RNA molecules. It therefore is a particular honour that both pioneers of the field and Nobel laureates, Sid Altman and Tom Cech, have contributed their views on the development of RNA catalysis, and RNA biochemistry in general, to this highlight issue of *Biological Chemistry* (see the Commentaries on the following pages).

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