

nature REVIEWS

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RNA-mediated silencing was first described some 15 years ago in plants and was later made famous by studies in *Caenorhabditis elegans*. Out of the many types of RNA-mediated silencing process, RNA interference (RNAi) has become by far the best known. The reason for its popularity lies in its usefulness as a molecular biology tool. 'Knocking down' genes is infinitely easier than knocking them out: there is no need for time-consuming crosses and tricky cloning, all that is required is a well-designed RNA to mediate the silencing. Importantly, RNAi is amenable to high-throughput approaches, making large-scale functional genomic screens possible. For similar reasons, RNAi has become an important tool in drug target screening.

Parallel to the efforts towards maximizing the usefulness of RNAi as a tool have been the studies of the molecular mechanisms that underlie RNAi *in vivo*. Recent years have also seen progress in uncovering the functions of RNAi-like processes. Much evidence indicates that they originally evolved as a genome defence mechanism, but it is clear that small interfering RNAs (siRNAs) are involved in processes that range from chromatin dynamics to gene regulation during development.

When talking about RNAi, it is difficult to separate biology from technology. And so this Nature Reviews collection on RNA interference includes reviews and highlights on both aspects of this topic. The collection first focuses on biology — Marjori Matzke and James Birchler review the biological processes in which RNAi has been implicated: among them are DNA methylation and heterochromatin formation.

The next three reviews focus on applications. Hideo Akashi and colleagues describe how siRNA and ribozyme libraries can be used to discover gene function. siRNA-based high-throughput screens have become popular, but their success often hinges on good design and selection of siRNAs; in addition, the therapeutic potential of siRNAs also depends on their efficient delivery to cells and organisms. These issues are the subject of our third review, by Vivek Mittal, and are further developed by Yair Dorsett and Thomas Tuschl in the final article.

We hope that you enjoy this collection. It is accompanied by a web focus (www.nature.com/reviews/focus/rnai), which alongside further reviews and primary papers also features an animation of the RNAi process. Access to the articles in the web focus is free until October 2006.

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