

technology as a research tool to knock-down genes of interest, others investigated the mechanism underlying this intriguing "new" phenomenon. For a review about the machinery behind RNAi:

RNA interference. Hannon GJ (2002). *Nature* 418:244.

It is also now apparent, that RNAi is part of a bigger picture of non-coding RNA (ncRNA) biology. Now we have snRNAs, snoRNAs, siRNAs, miRNAs, shRNAs, rasiRNAs and other small ncRNAs. These ncRNAs have a variety of functions, including editing of mRNA transcripts, post-transcriptional control, chromatin stability, chromosome cohesion, histone methylation, imprinting, even roles in diseases.

Sean Eddy's review gives a historical overview of the world of these non-coding RNAs, puts context around the phenomenon of RNA interference and depicts a fascinating modern world of RNA biology.

Non-coding RNA genes and the modern RNA world. Eddy SR (2001). *Nat Rev Genet* 2:919.

And a comprehensive, and most recent, overview of the field of small RNAs and a nice figure depicting the historical time line of discovery, are given in:

microRNAs: Runts of the Genome Assert Themselves. Lai EC (2003). *Curr Biol* 13:R925.

Recent work demonstrated that there are specific expression profiles for ncRNAs, depending on the cell type and developmental stage, and that the RNAi machinery fulfills crucial cellular functions very early in development, as its impairment results in severe phenotypes.

The small RNA profile during *Drosophila melanogaster* development. Aravin AA, Lagos-Quintana M, Yalcin A, Zavolan M, Marks D, Snyder B, Gaasterland T, Meyer J, Tuschl T (2003). *Dev Cell* 5:337.

Embryonic stem cell-specific MicroRNAs. Houbaviy HB, Murray MF, Sharp PA (2003). *Dev Cell* 5:351.

Dicer is essential for mouse development. Bernstein E, Kim SY, Carmell MA, Murchison EP, Alcorn H, Li MZ, Mills AA, Elledge SJ, Anderson KV, Hannon GJ (2003). *Nat Genet* 35:215.

The microRNA-producing enzyme Dicer1 is essential for zebrafish development. Wienholds E, Koudijs MJ, van Eeden FJ, Cuppen E, Plasterk RH (2003). *Nat Genet* 35:217.

And to finish, perhaps one of the most fascinating newly emerging roles of the RNAi machinery: a role in the epigenetic control of chromatin. The following review and papers give an overview on epigenetic control of gene expression and a basis for recent advances in the understanding of heterochromatin (silent chromatin) regulation, by RNAi and small ncRNAs, transcribed from repetitive sequences and transposons dispersed throughout the genome.

Heterochromatin and epigenetic control of gene expression. Grewal SI, Moazed D (2003). *Science* 301:798.

Establishment and maintenance of a heterochromatin domain. Hall IM, Shankaranarayana GD, Noma K, Ayoub N, Cohen A, Grewal SI (2003). *Science* 297:2232.

Regulation of heterochromatic silencing and histone H3 lysine-9 methylation by RNAi. Volpe TA, Kidner C, Hall IM, Teng G, Grewal SI, Martienssen RA (2002). *Science* 297:1833.

Hairpin RNAs and retrotransposon LTRs effect RNAi and chromatin-based gene silencing. Schramke V, Allshire R (2003). *Science* 301:1069.

It remains to be seen whether the usage of siRNAs as tools to inhibit gene expression has also the added effect of chromatin modifications at the loci of the targeted genes.

Additional reading can be found at the RNAi web focus by NPG at www.nature.com/focus/mai/