

Plant Small RNAs Poster: Biogenesis and functions of plant small RNAs. For further information, see [1-8] and refs therein. Send questions and comments to Blake Meyers (BMeyers@danforthcenter.org) and/or to Dmitry Shevela (info@scigrafik.se).

Abbreviations: AGO, Argonaute protein; CLSY1, chromatin remodeling factor Classy 1; DCL, Dicer-like proteins; DDL, forkhead-associated domain protein Dawdle; DMS3, hinge-domain protein defective in meristem silencing 3; DRD1, defective in RNA-directed DNA methylation 1; DRM2, domains rearranged methyltransferase 2; dsRNA, double-stranded RNA; easiRNAs, epigenetically activated siRNAs; ER, endoplasmic reticulum; hc-siRNAs, heterochromatic siRNAs; HSP90, heat-shock protein 90; HEN1, methyltransferase Hua Enhancer 1; HST, Hasty protein; HYL1, Hyponastic Leaves 1 protein; lncRNAs, long non-coding RNAs; mRNAs, messenger RNAs; miRNA, microRNA; nat-siRNAs, natural antisense transcript siRNAs; nt, nucleotide; phasiRNA, phased, secondary siRNA; Pol, RNA polymerase; RDM1, required for DNA methylation 1 RDR2, RNA-dependent RNA polymerase 2; rRNAs, ribosomal RNAs; SE, Serrate; SGS3, suppressor of gene silencing 3; SHH1, Sawadee Homeodomain Homolog 1; siRNAs, small interfering RNAs; snRNAs, small nuclear RNAs; snoRNAs, small nucleolar RNAs; TGH, G-patch domain protein Tough; tRFs, tRNA-derived fragments; tRNAs, transfer RNAs; tasiRNAs, trans-acting siRNAs.

Notes: Complexes and cofactors were generated with Protein Imager software using coordinates of the following PDB codes: 2xcm, 3htx, 4g0y, 7eld, 7roz, and 7vg2.

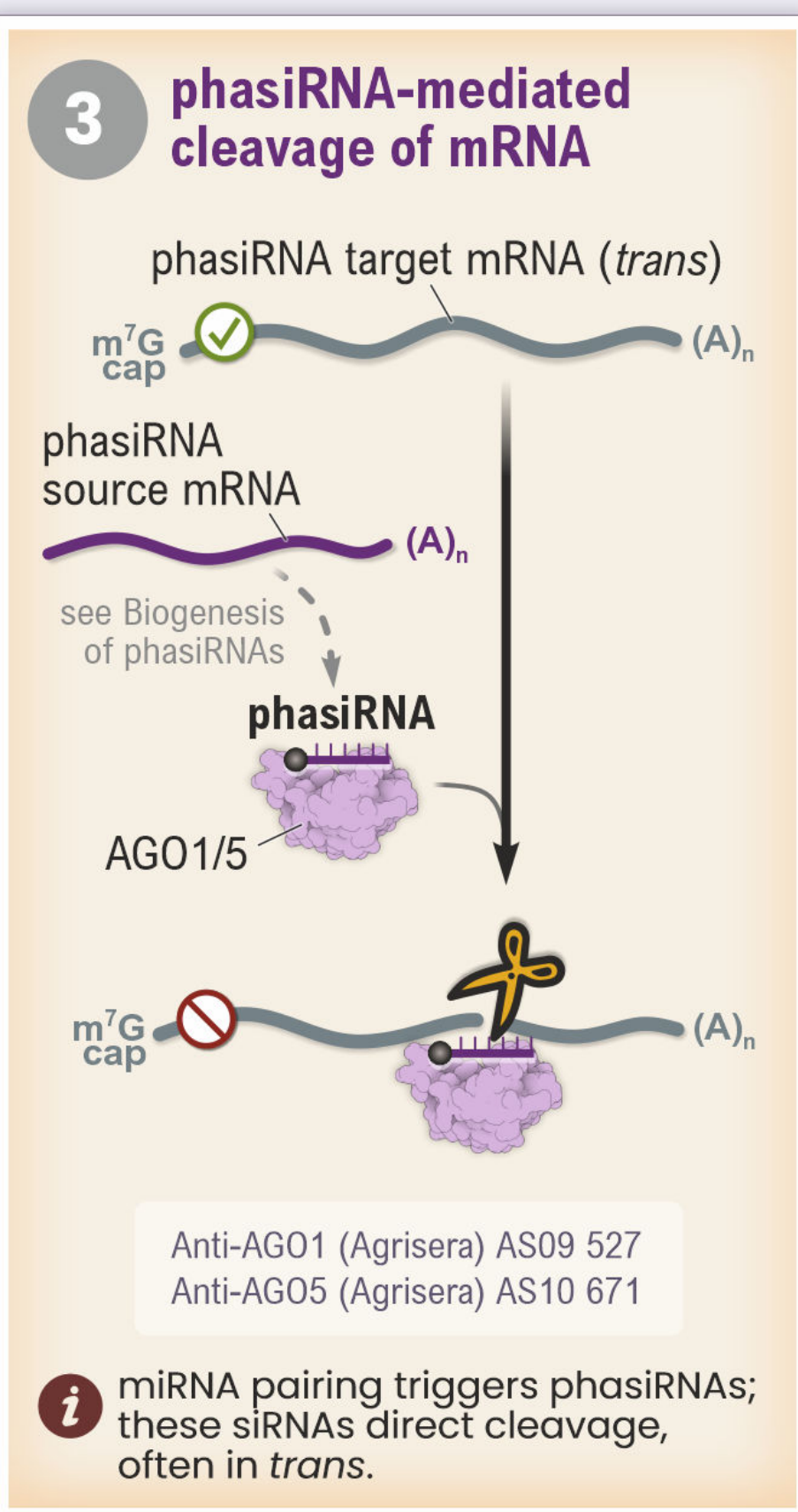
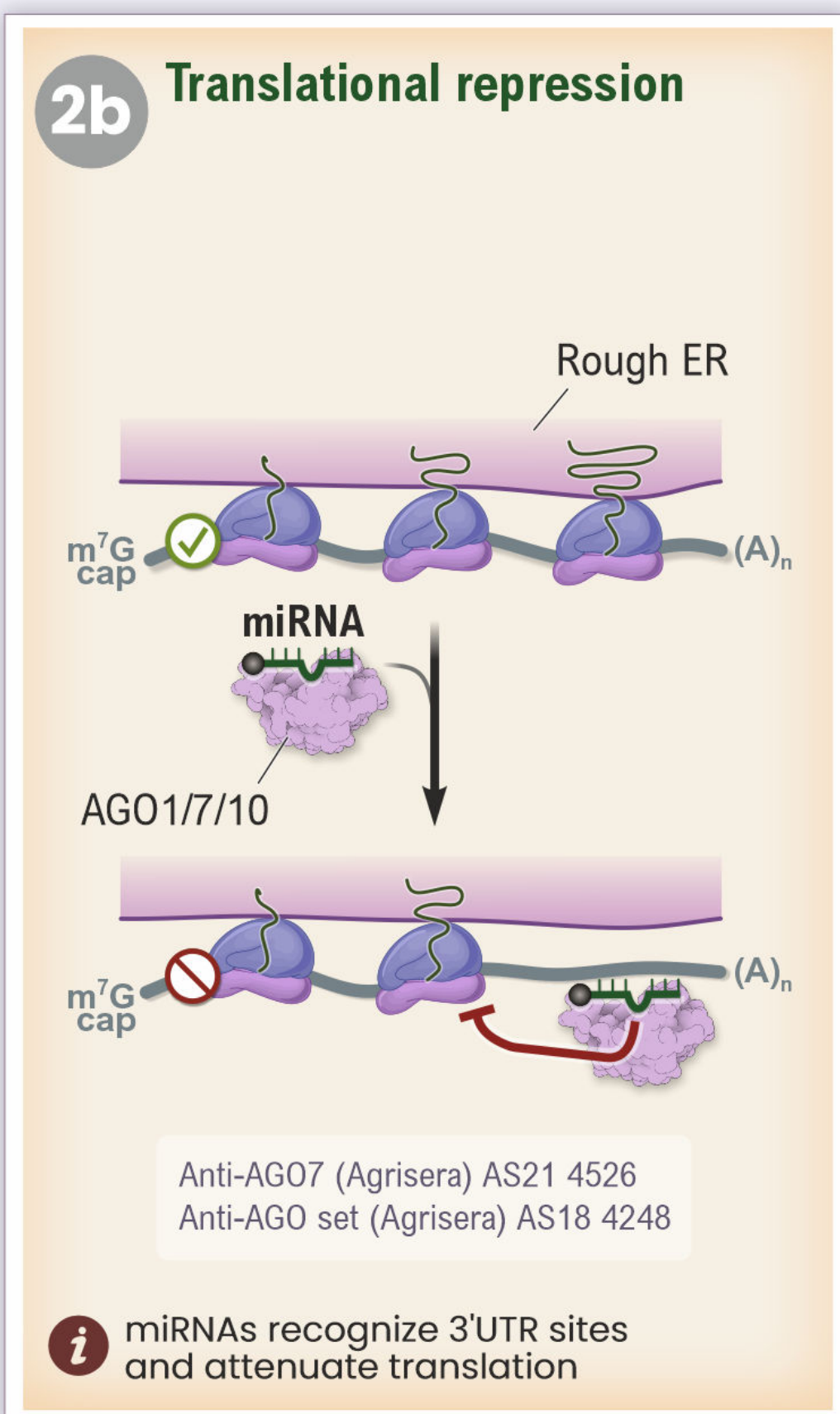
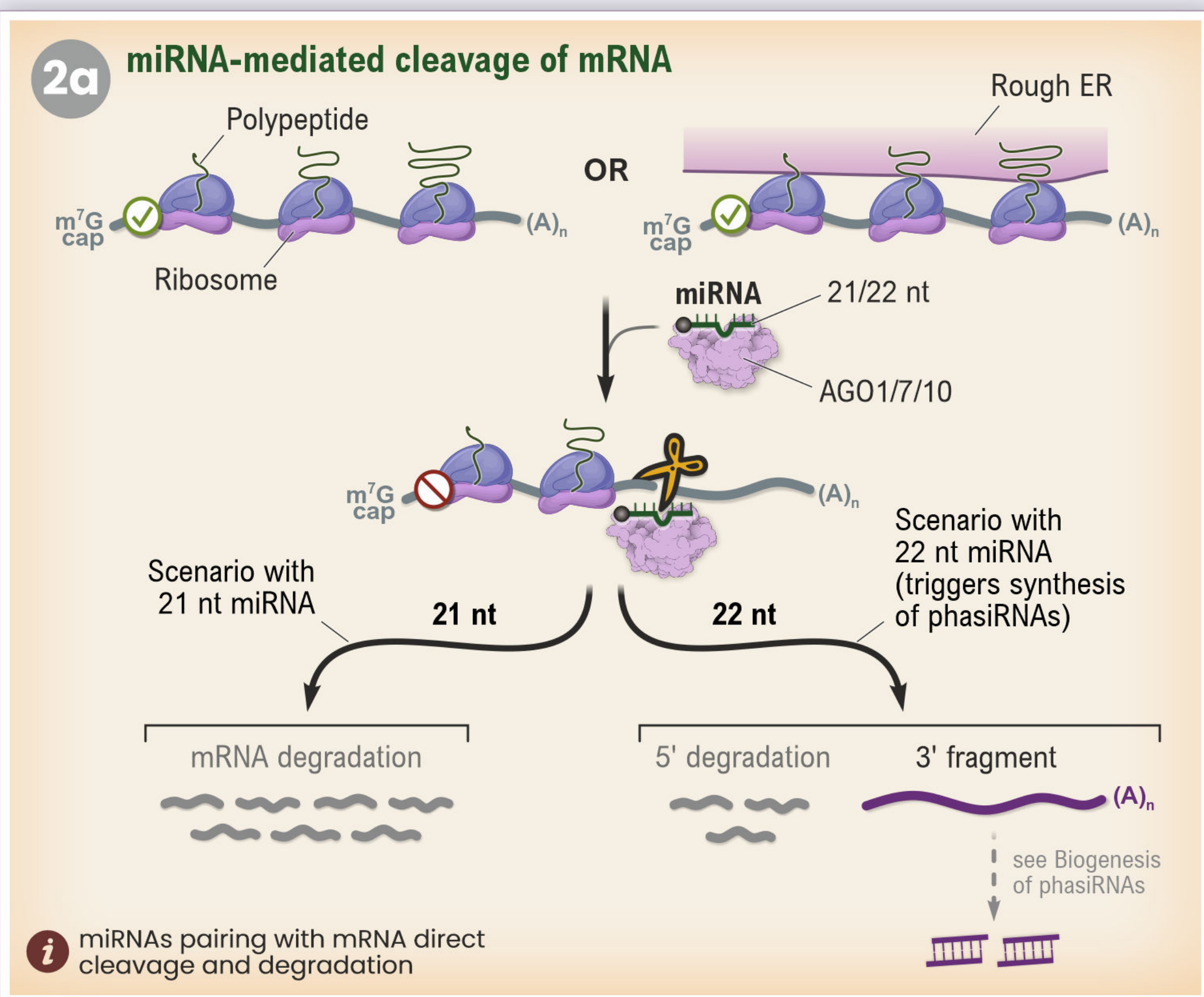
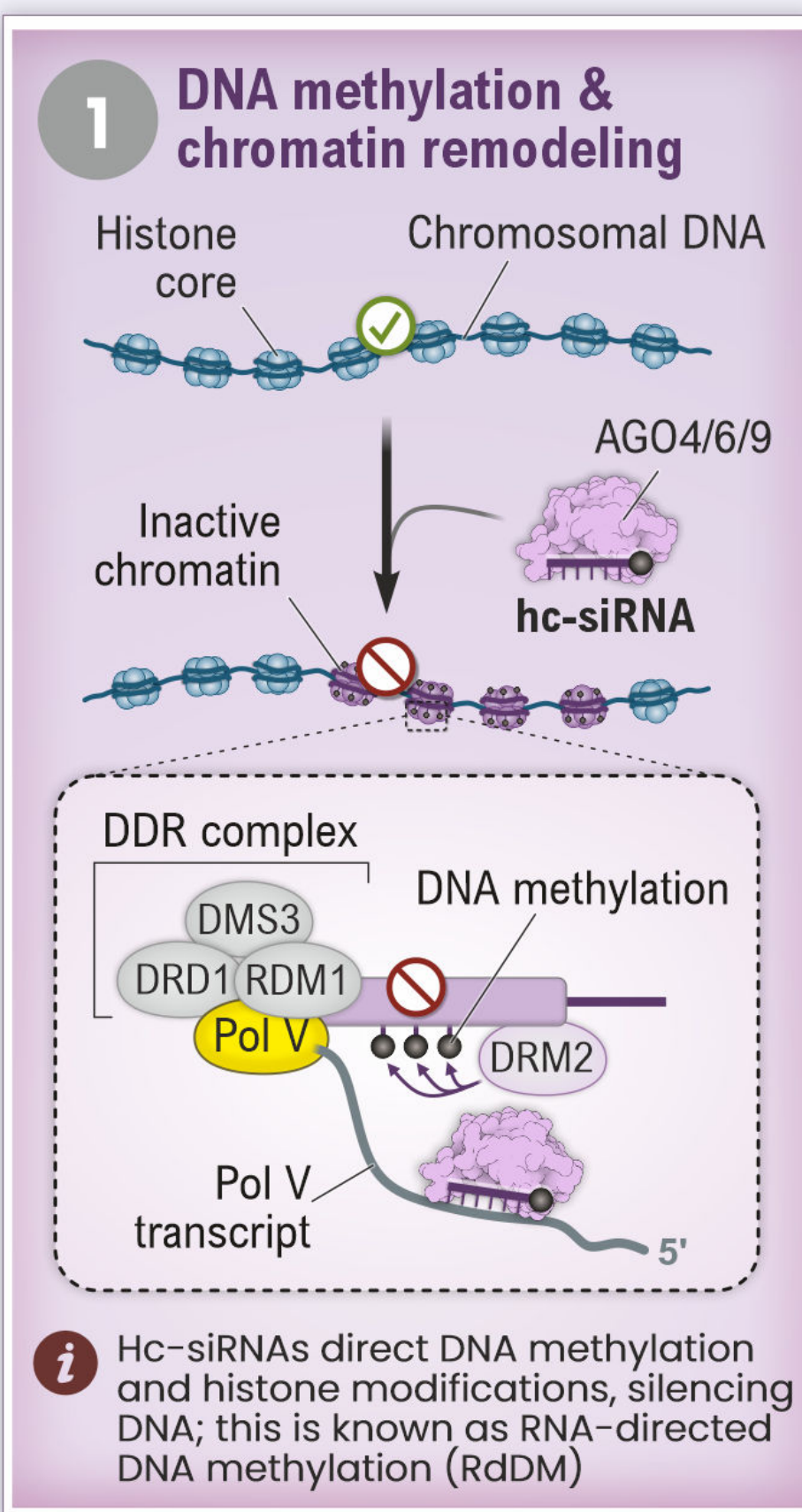
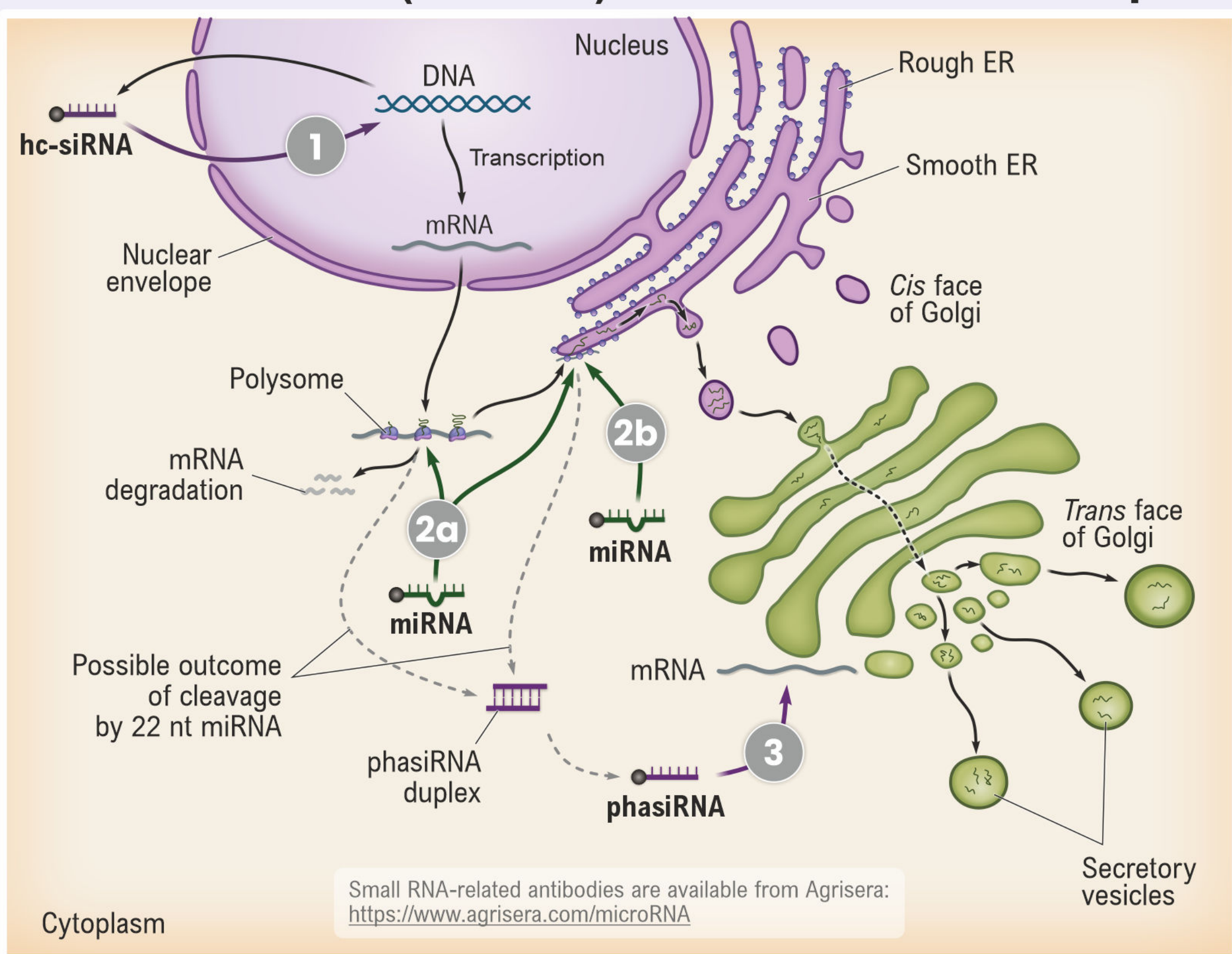
Acknowledgements: We thank Joanna Porankiewicz-Asplund and Edith Kalén for their valuable comments and corrections. We are highly grateful to Agrisera for sponsoring the poster design, printing, and free distribution at conferences around the world.

Citation: Meyers B, Zhan J, Shevela D, Slotkin K (2022) Plant Small RNAs: Biogenesis and Functions, *Agrisera Educational Poster 6*: doi:10.6084/m9.figshare.21186073.

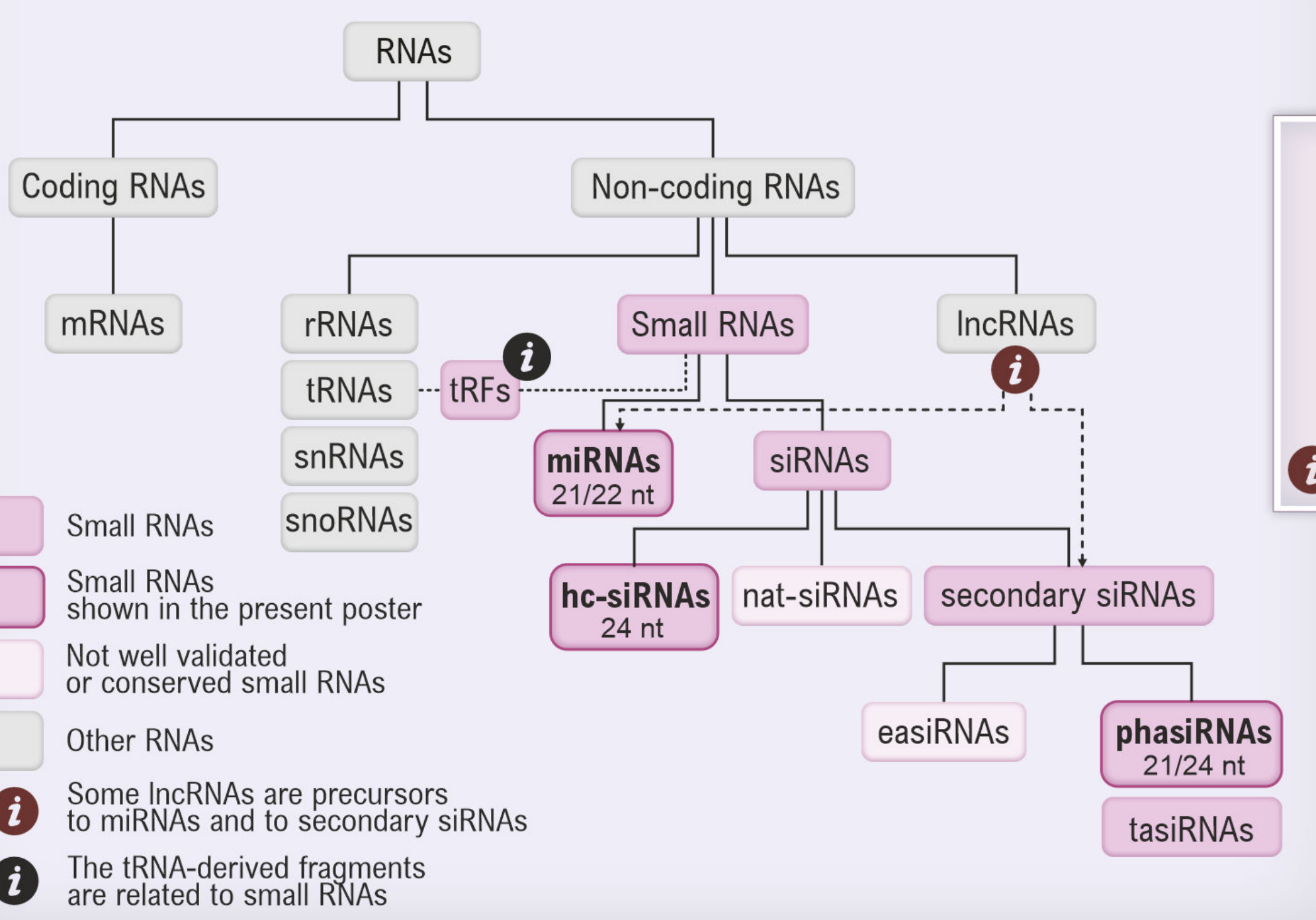
References: [1] Axtell MJ (2013) Classification and comparison of small RNAs from plants. *Annu. Rev. Plant Biol.* 64: 137-159; [2] Liu Y, Teng C, Xia R, Meyers BC (2020) PhasiRNAs in plants: Their biogenesis, genetic sources, and roles in stress responses, development, and reproduction. *Plant Cell* 32: 3059-3080; [3] Yu Y, Jia T, Chen X (2017) The 'how' and 'where' of plant microRNAs. *New Phytol.* 216: 1002-1017; [4] Cuenda-Gil D, Slotkin R (2016) Non-canonical RNA-directed DNA methylation. *Nat. Plants* 2: 16163. [5] Löffler A, Singh J, Fukudome A et al. (2022) A DCL3 dicing site within Pol IV-RDR2 transcripts diversifies the siRNA pool guiding RNA-directed DNA methylation. *eLife* 11: e73260; [6] Gonzalo L, Tossolini I, Gulanciz T et al. (2022) R-loops at microRNA encoding loci promote co-transcriptional processing of pri-miRNAs in plants. *Nat. Plants* 8: 402-418; [7] Borges F, Martienssen RA (2015) The expanding world of small RNAs in plants. *Nat. Rev. Mol. Cell Biol.* 16: 727-741; [8] McCue AD, Panda K, Nuthikattu S et al. (2015) ARGONAUTE 6 bridges transposable element mRNA-derived siRNA to the establishment of DNA methylation. *EMBO J.* 34: 20-35.

Plant Small RNAs: Biogenesis and Functions

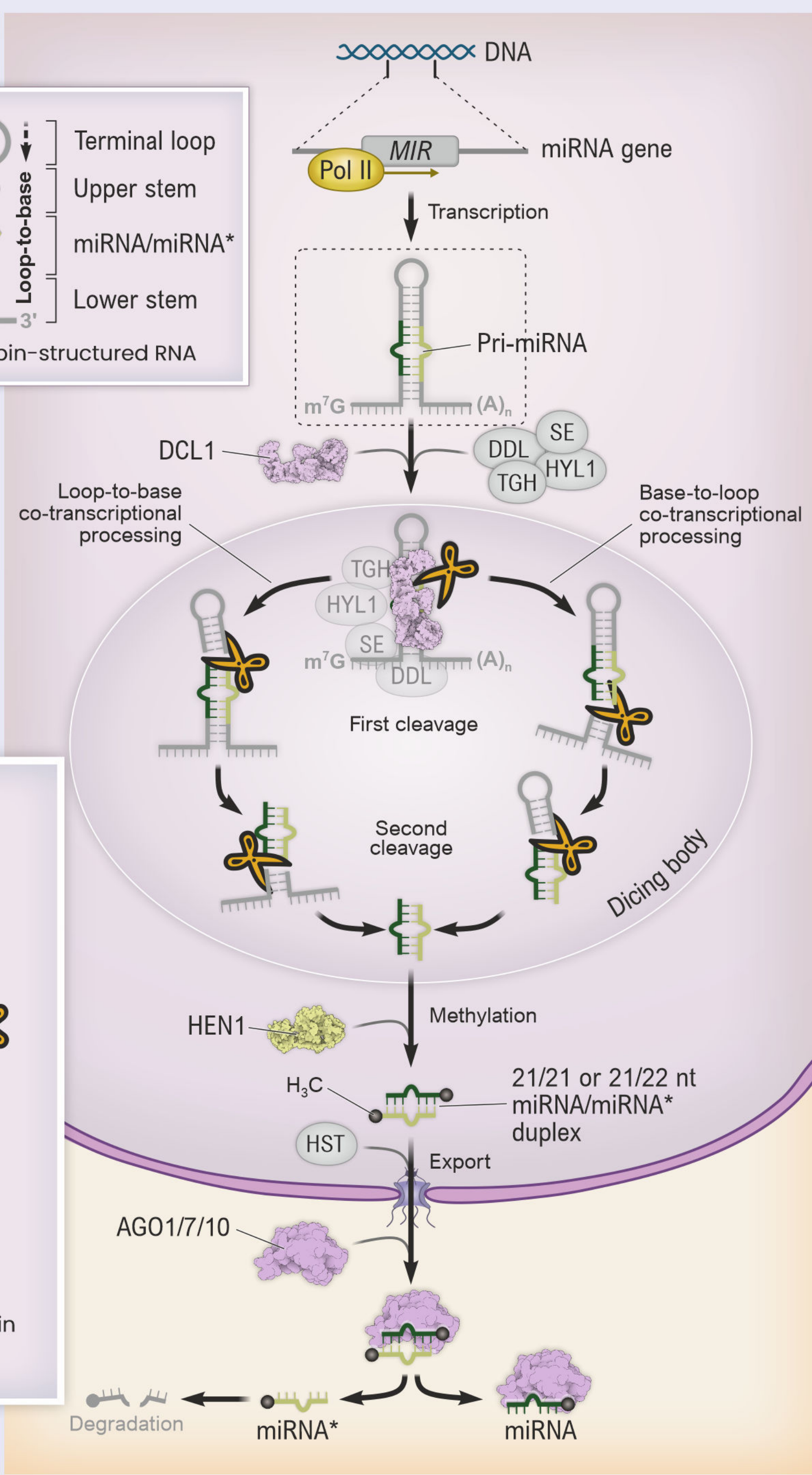
Plant Small RNAs (21-24 nt) Silence Genes or Transposable Elements



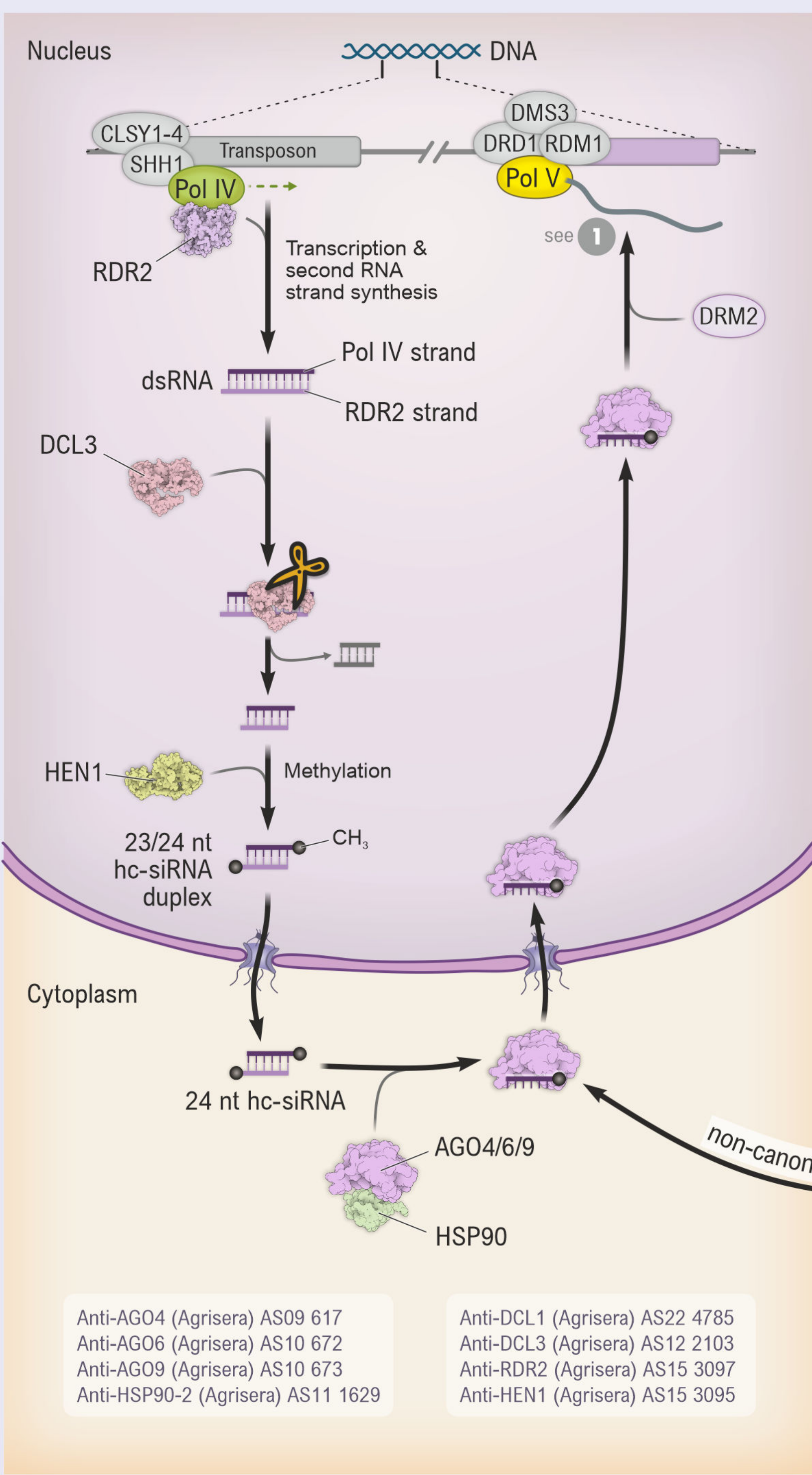
Classification of Small RNA in Plants



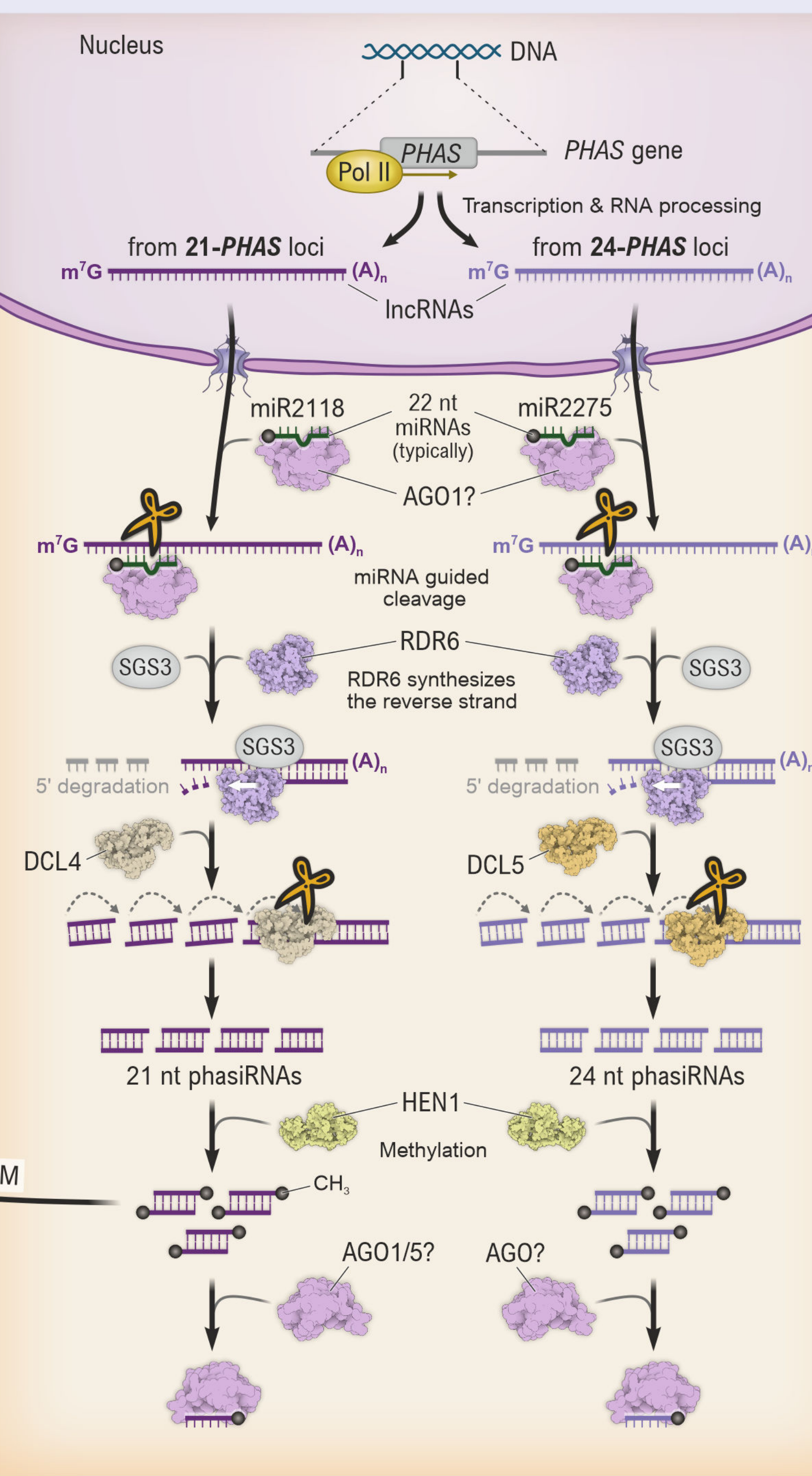
Biogenesis of miRNAs



Biogenesis and function of hc-siRNAs

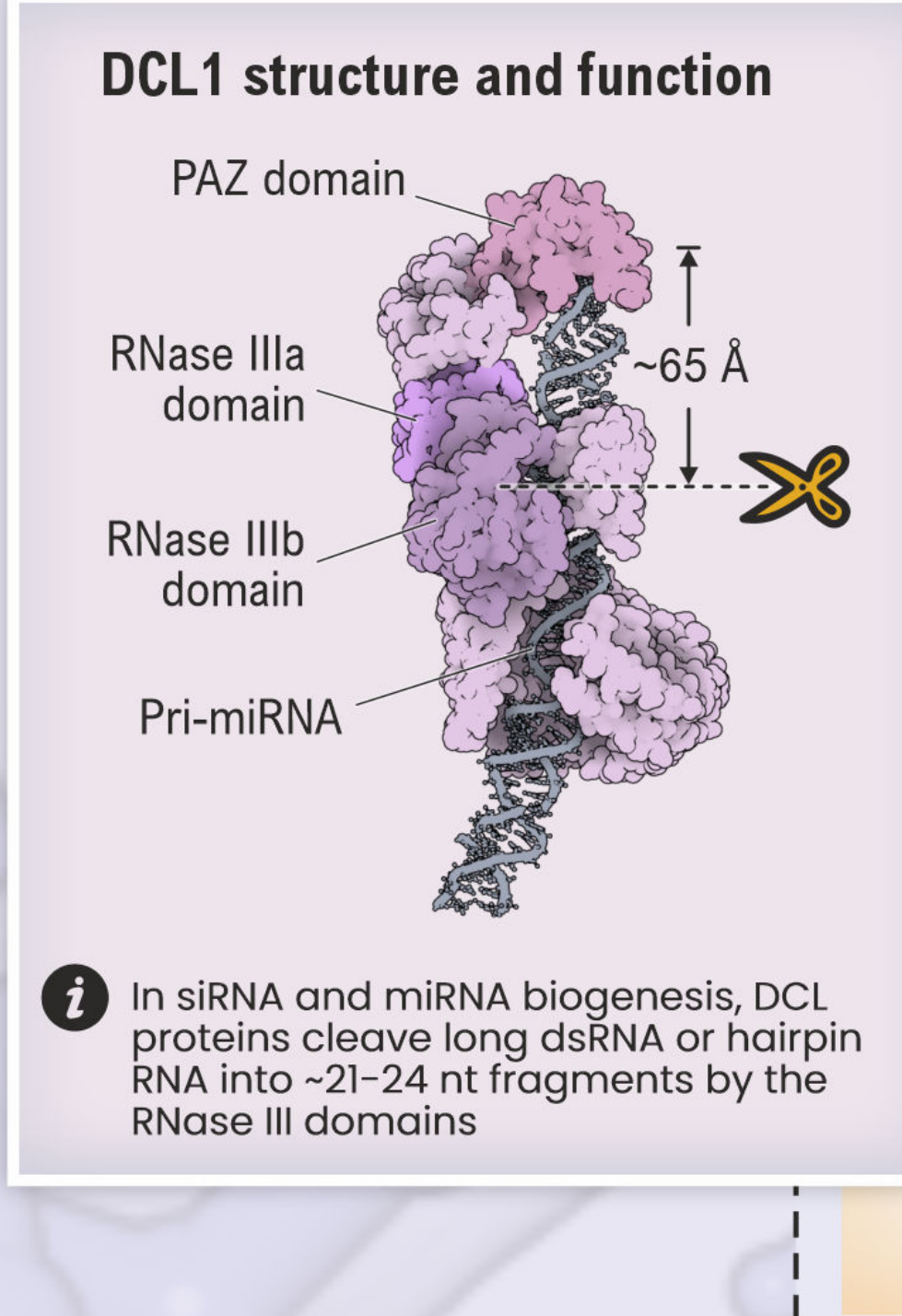


Biogenesis of phasiRNAs



miRNAs vs. siRNAs

Properties	miRNAs	siRNAs
Origin	Endogenous non-coding RNA. Distinct genomic loci. Encoded by their own genes (<i>MIR</i>)	Exogenous double-stranded RNA. Encoded by transposons, viruses, and heterochromatin
Precursors	Hairpin-structured single-stranded RNA	Short or long dsRNA
Structure	21/21 or 21/22 nt miRNA/miRNA* duplex	21/24 nt long RNA duplex with a dinucleotide 3' overhang
Target	Homology-dependent pairing with Pol II products, with some mismatches allowed	Specific Pol II or unknown transcripts for phasiRNAs; Pol V transcripts for hc-siRNAs
Role	Endogenous gene expression regulator	Regulate genome stability via transposon suppression, plus viral defense and gene regulation



加LINE詢問
更方便喔!