DNA Habitat and RNA Inhabitants

Viruses, Mobile Genetic Elements, Viroids, Introns, Ribozymes and other RNAgents

RNA 2013
The Eighteenth Annual Meeting of the RNA Society
June 11th - June 16th
Congress Center Davos
Davos, Switzerland

Evolution of Diversity

20th century: Innovation by error

~~Quasi Species: master copy (fittest Type) + mutant spectra~~

21st century: Innovation by de novo generation

Cooperative and integrative RNA stem loop consortia

Conclusions:

Cooperative Ensembles of RNA stem loops, Viruses, and subviral Consortia

→ generate, transfer, insert, delete, (re-)combine and (re-)regulate genomic content arrangements

→ drive variation (genetic novelty) coherent with syntax (Chargaff Rules), semantics (Function) and pragmatics (Context) of nucleic acid language

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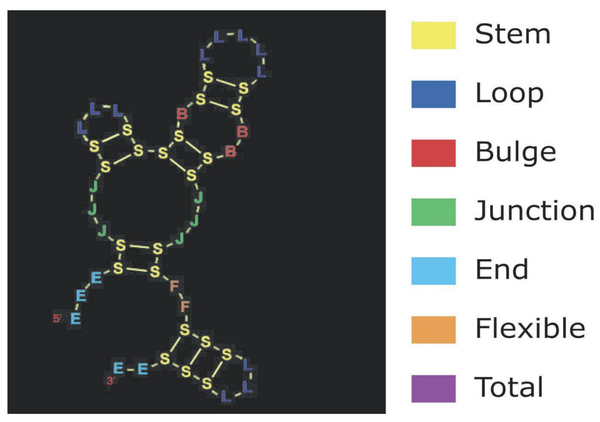
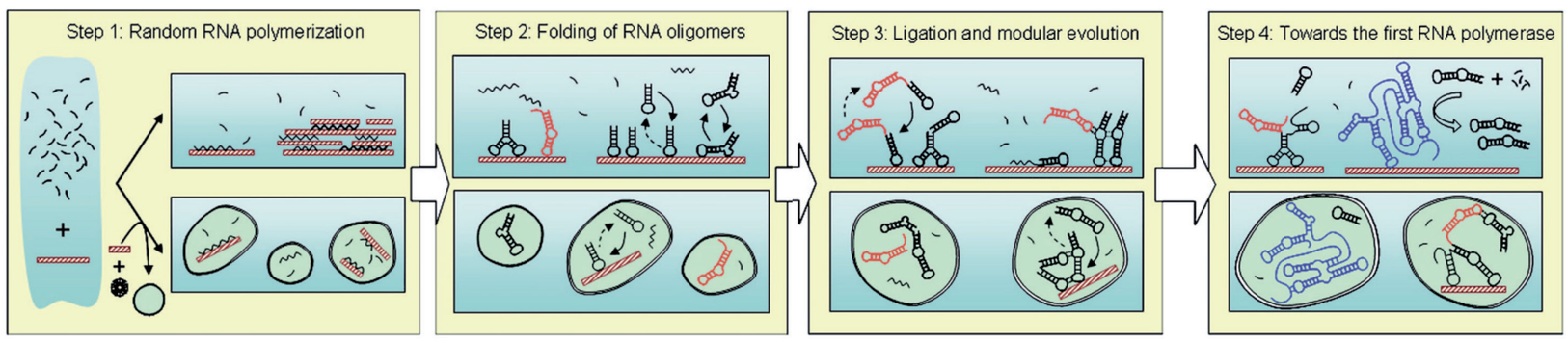
The basic module: RNA stem loop

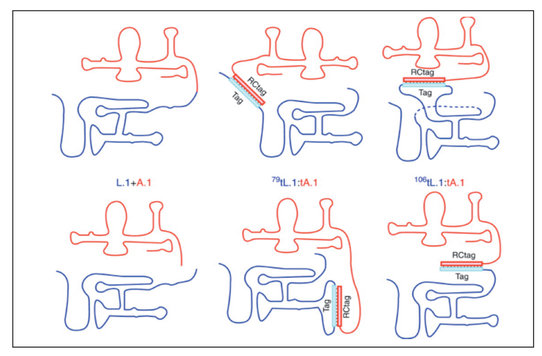


Smit, S, Yarus M, Knight R. (2006) Natural selection is not required to explain universal compositional patterns in rRNA secondary structure categories. RNA 12:1-14

From single RNA stem loops to RNA polymerase ribozyme modularity



Briones C, Stich M, Manrubia SC (2009) The Dawn of the RNA World: Toward Functional Complexity through Ligation of Random RNA Oligomers. RNA 15: 743–749.



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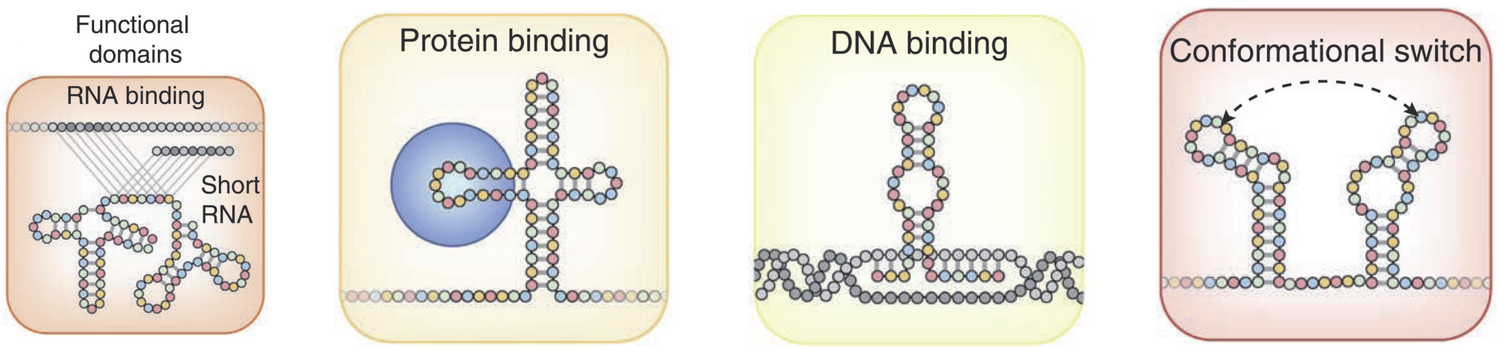
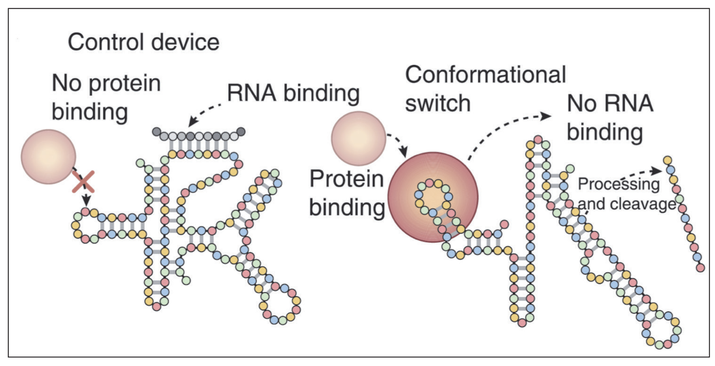
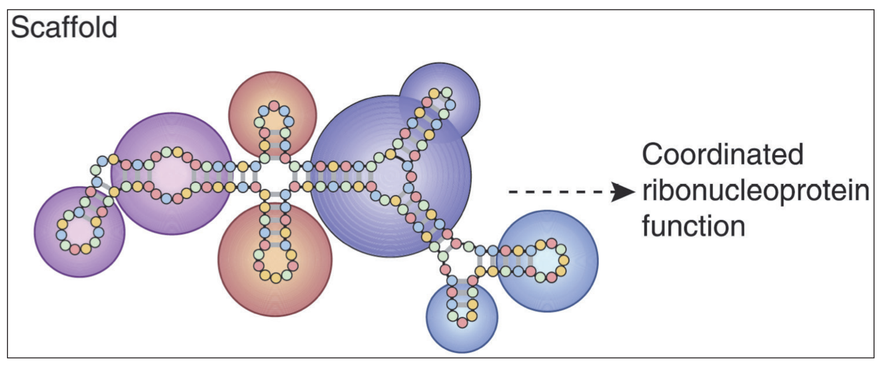
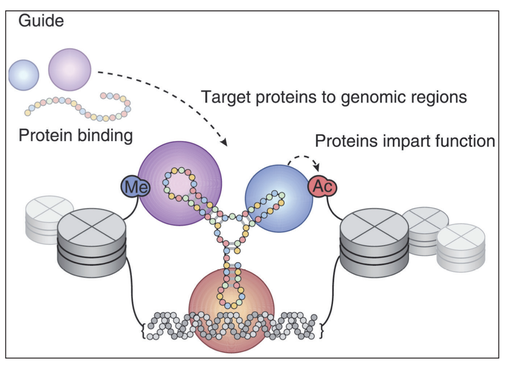
Functional domains: RNA-binding, DNA-binding, Protein-binding









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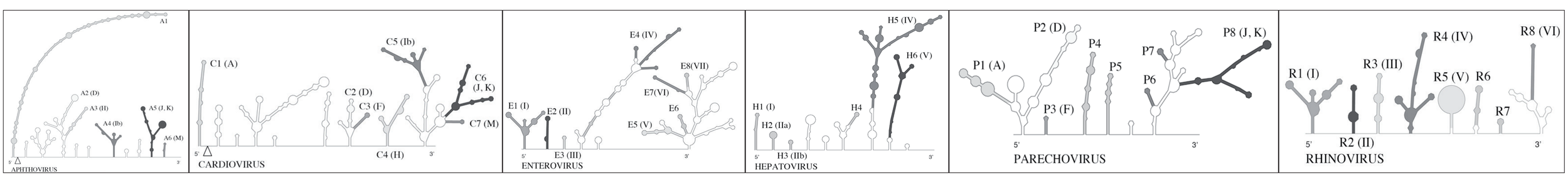
RNA stem loop consortia generate RNAgent-Identities (e.g. viruses)



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