Pattern Search in Nematode Genome

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SVFIG

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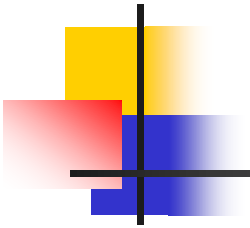

Summary

- Nematode, C. elegans
- Nematode genome
- MicroRNA and Noncoding RNA
- Pearls and Necklaces
- Pearls in Nematode
- Very few pearls are MicroRNA

Nematode

- **Roundworm, Caenorhabditis elegans, is a free-living, transparent nematode, about 1 mm in length, that lives in temperate soil environments.**

Nematode

Nematode

- In 1963, Sydney Brenner proposed research into C. elegans primarily in the area of neuronal development.
- In 1974, he began research into the molecular and developmental biology of C. elegans, which has since been extensively used as a model organism.
- It was the first multicellular organism to have its whole genome sequenced.

Nematode

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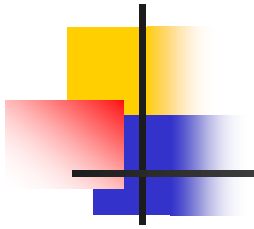
Nematode Genome

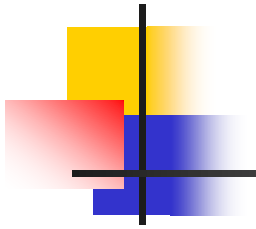
- Chr01 15,072,434 bp
- Chro2 15,279,421 bp
- Chro3 13,783,801 bp
- Chro4 17,493,829 bp
- Chro5 20,924,180 bp
- Chro6 17,718,942 bp
- Total 100,272,607 bp

Noncoding RNA



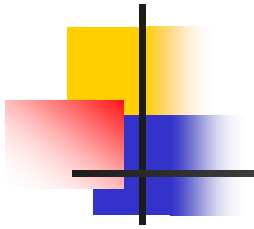
- NONCODEv5_celegans.fa
- 3154 noncoding RNAs
- Total size: 1,822,865 bp

MicroRNAs



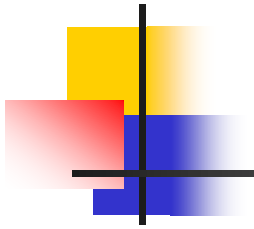
- NONCODEv5_celegans.fa
- 27990 microRNAs
- Total size: 3,886,196 bp

MicroRNAs in Nematode Noncoding RNAs



- **MicroRNAs form clusters in nematode noncoding RNAs.**
- **It seems that noncoding RNAs contain lists of microRNAs, revealing programming structures in genomes.**

MicroRNAs in Nematode Noncoding RNAs



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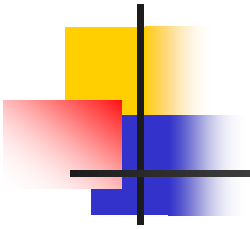
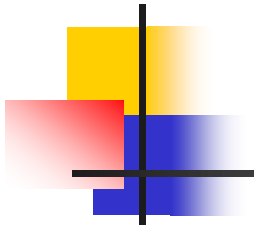


Noncoding DNA/RNA

- Collections of microRNAs
- Collections of microRNA-like information
  - Pearls: 20-base patterns
  - Necklaces: clusters of pearls

Exhaustive Search of Pearls

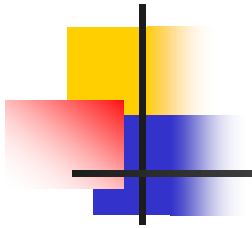


- **Identify all pearls, unique and repeated 20-base patterns in genomes.**
- **Identify all necklaces, which are clusters of adjacent pearls.**

Pearls and Necklaces in Nematode

- From 100 Mbp, 81641 pearls were identified.
- Lots of pearls form clusters, or necklaces.

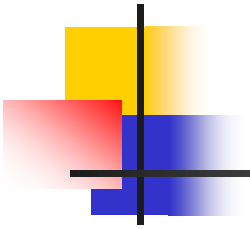
Pearls and Necklaces in Nematode



- **81,641 pearls are compared with 27,990 know microRNAs.**
- **Only 8 matches are found.**

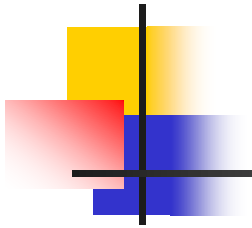
Pearls and microRNAs

M22192	CAAATGAAATCGTGGGCGGG
E64801	CAAATGAAATCGTGGGCGGG
L11451	GATCGACACCGACTGCCCACTCTG
E47437	GACACCGACTGCCCACTCTG
L32841	GATTGACACCGACTGCCCACTCTG
E47437	GACACCGACTGCCCACTCTG
L32841	GATTGACACCGACTGCCCACTCTG
E54108	TGACACCGACTGCCCACTCT
M22186	GCCTATCGGCCTAAAAGTTGTC
E33927	GCCTATCGGCCTAAAAGTTG
M20136	GGCTGCCTAGGGGGCTGGCTAG
E44268	CTGCCTAGGGGGCTGGCTAG
M32791	TCTCTTATCCACTAGGCCACGA
E43710	TCTTATCCACTAGGCCACGA
M22306	TGTATTAAACGGTAAGGGCCGGC
E16729	ATTAAACGGTAAGGGCCGGC

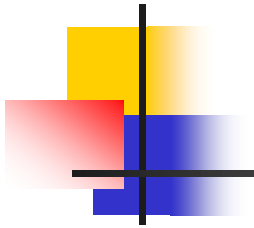


Pearls and microRNAs

- **Apparently, pearls are not microRNAs.**
- **My assumption that genomes are programmed in Forth has to be re-evaluated.**
- **I have to do more research on relations among genome DNA, noncoding RNAs and microRNAs.**



Questions?



Thank You!