

Tail loss: investigating the Molgula

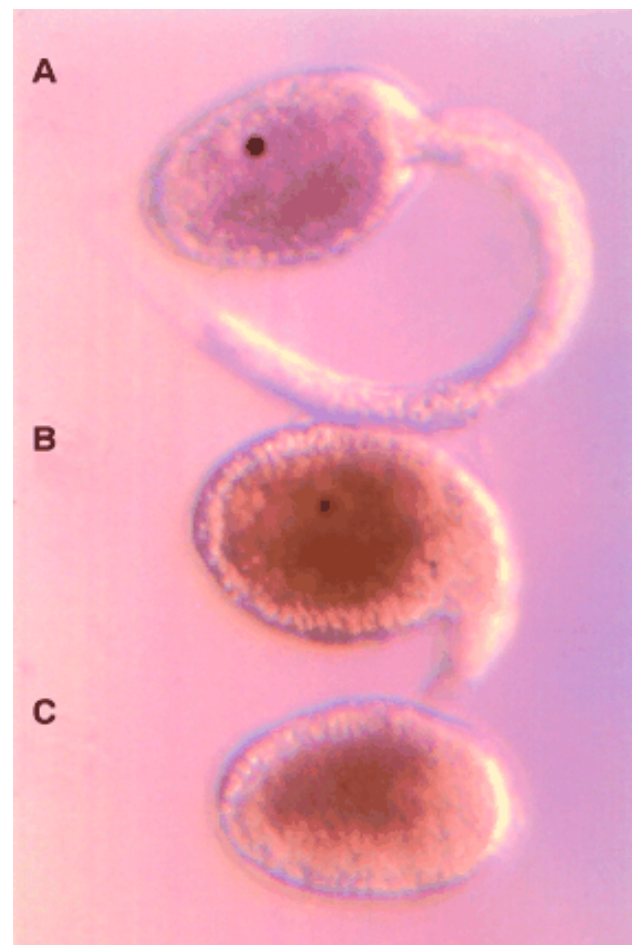
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Two Species of Closely Related Ascidiacs and a Hybrid Larva

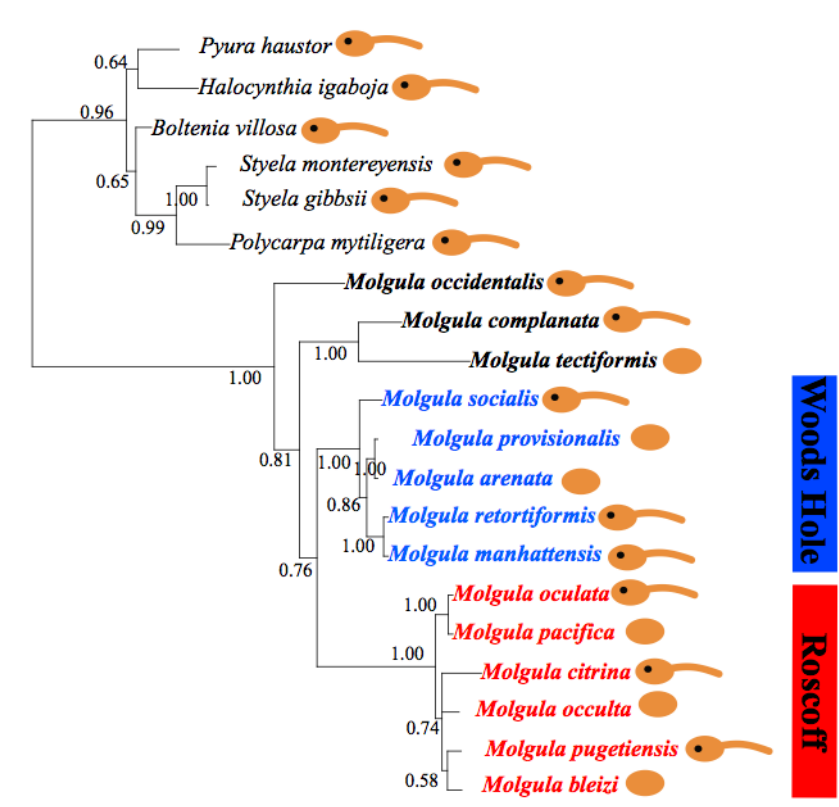


Molgula oculata has a head, tail, and otolith - chordate embryo.

M. oculata egg X *M. oculata* sperm has a head, short tail, and otolith.

Molgula oculata lacks chordate features - head, tail, and otolith.

Molgulids have many anural embryos - why?? (Ascidiacs generally: ~1% of 3,000 are tailless)



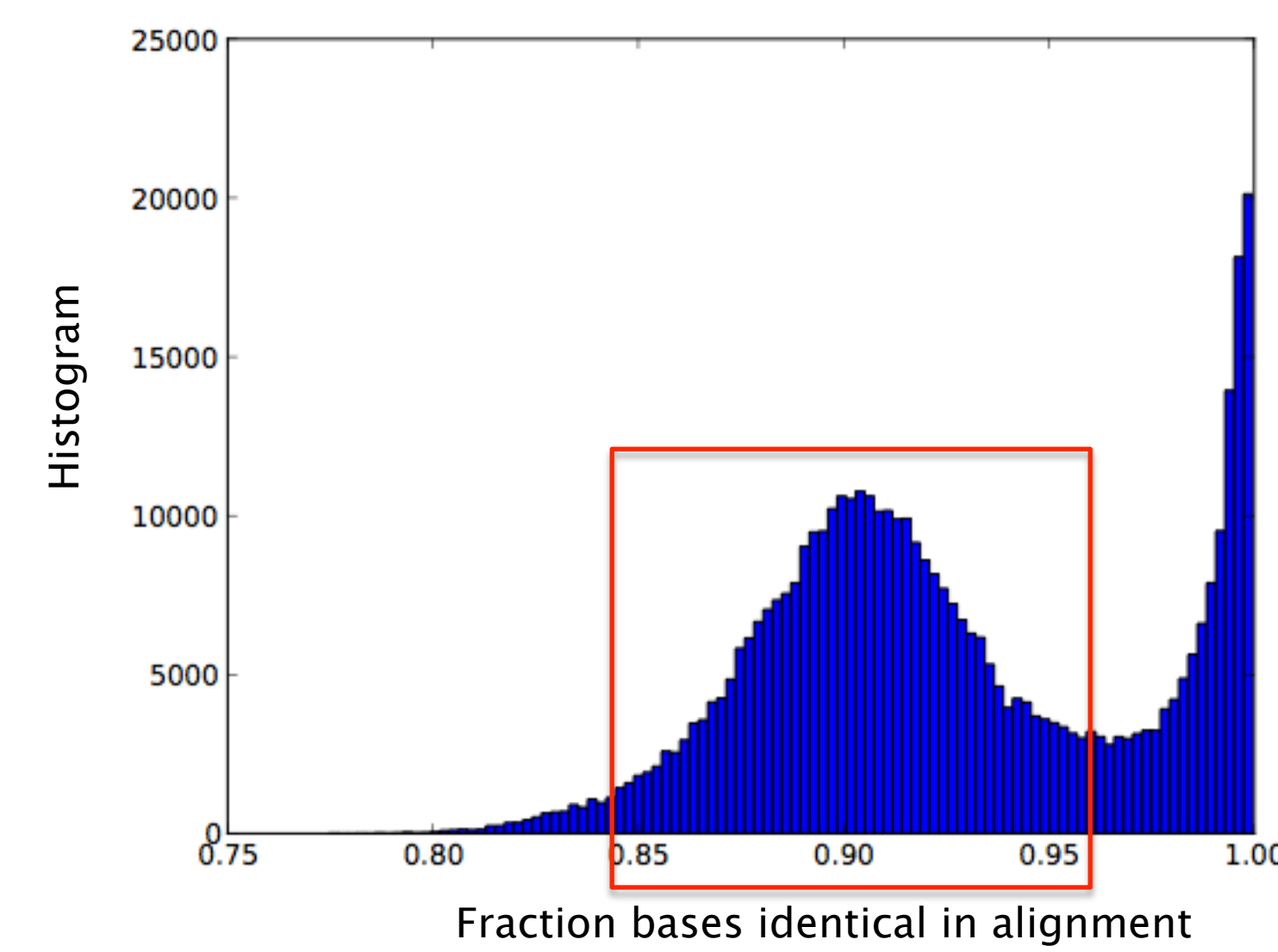
Is the transcriptome assembly any good?

- ▶ No reference genome! ...
- ▶ 96/98 Sanger-sequenced Molgulid genes found in assembly of individual lanes.

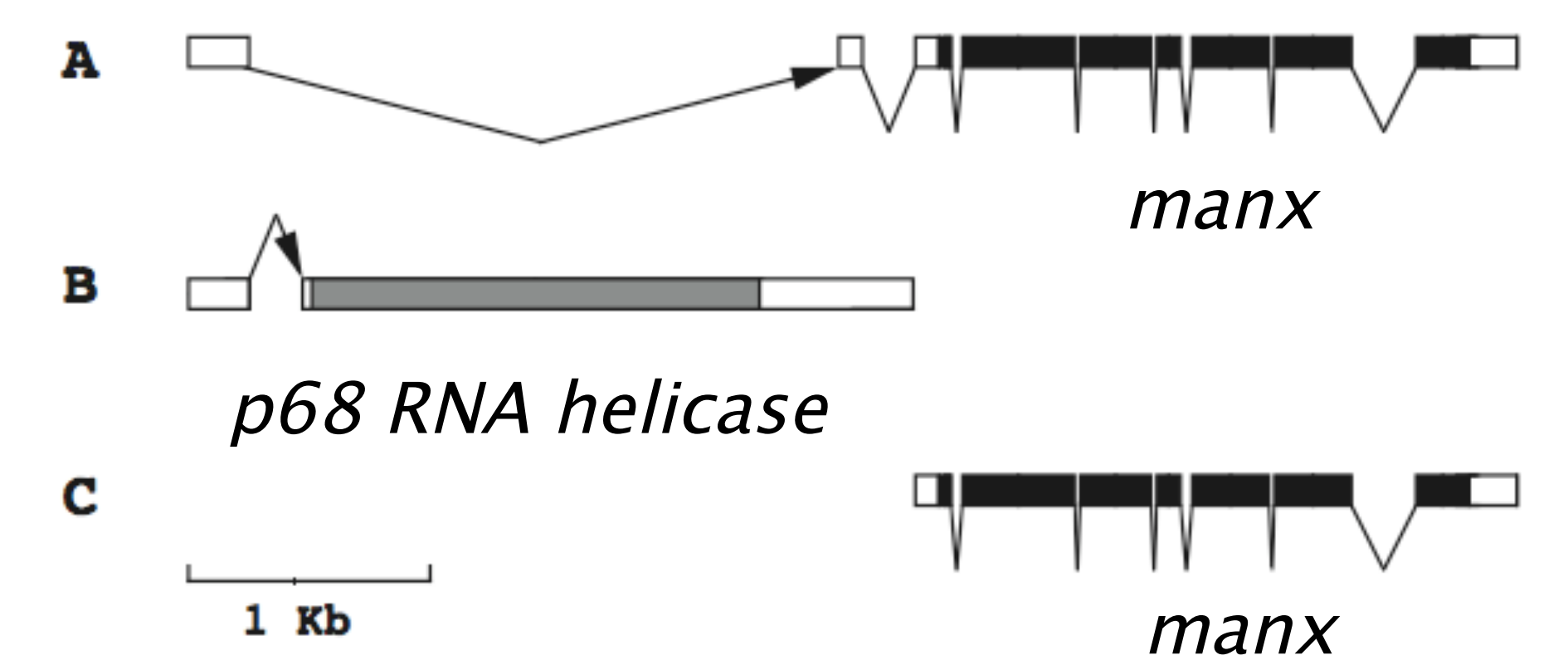
Query: 1 MDSNRSHPNHLQYHTDYNYPFRVMLAAVKEGLYHPRLPSLRMDMDTATHKLPDEH 60
MDSNRSHPNHLQYHTDYNYPFR+VMLAAVKEGLYHPRLPSLRMDMDTATHKLPDEH
Sbjct: 60 MDSNRSHPNHLQYHTDYNYPFRKVMMLAAVKEGLYHPRLPSLRMDMDTATHKLPDEH 229

- ▶ Can we distinguish & count parent transcripts in the hybrid?

A large subset of transcripts have variation ~10% (at DNA level)

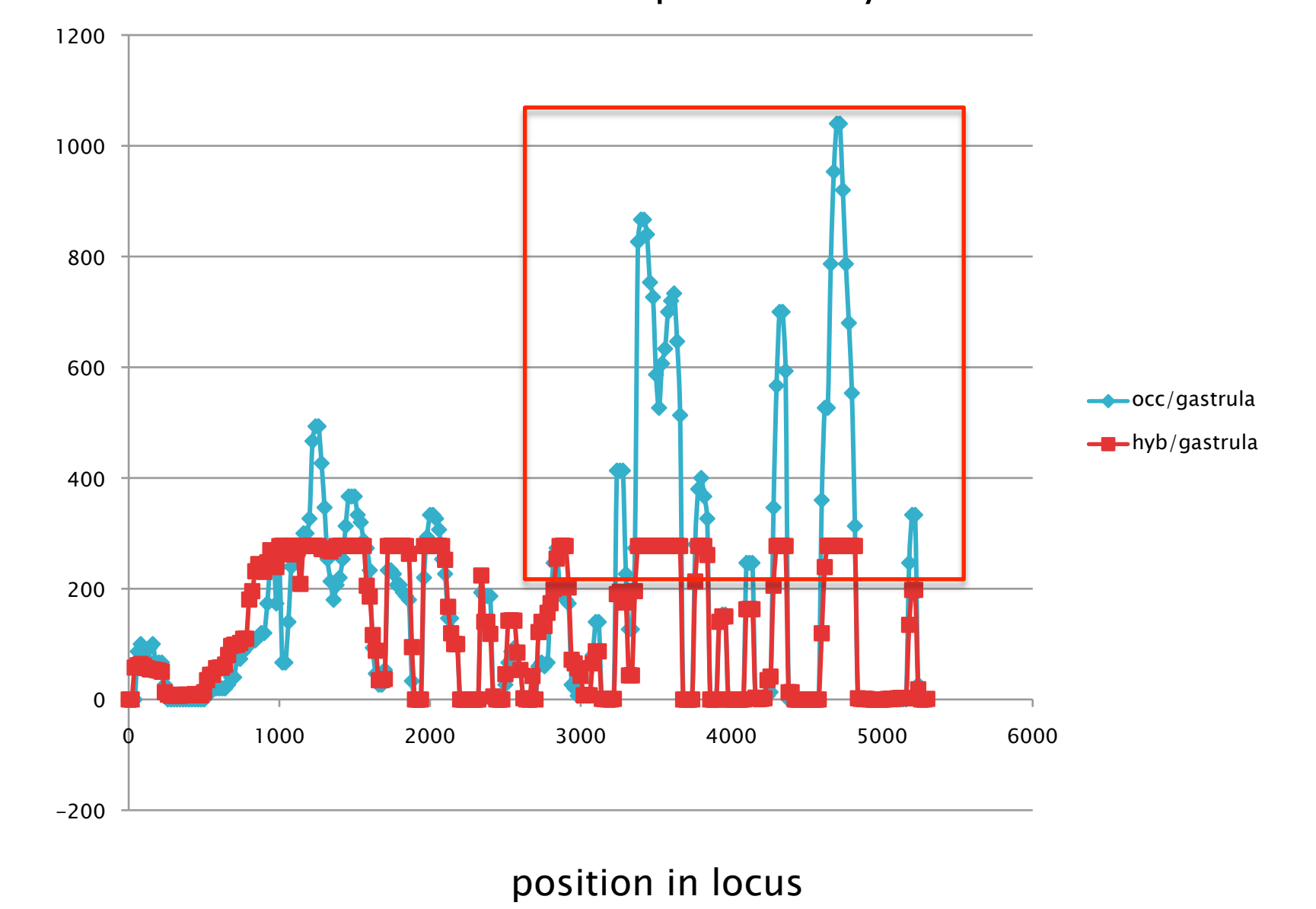


manx and p68/bobcat - probable isoform variation



Swalla et al. (1999) *Development* 126:1643-1653

M. oculata (tailless) bobcat gene - differential expression by exon



Preliminary round of sequencing

M. oculata and *M. oculata* genes assemble together as splice variants

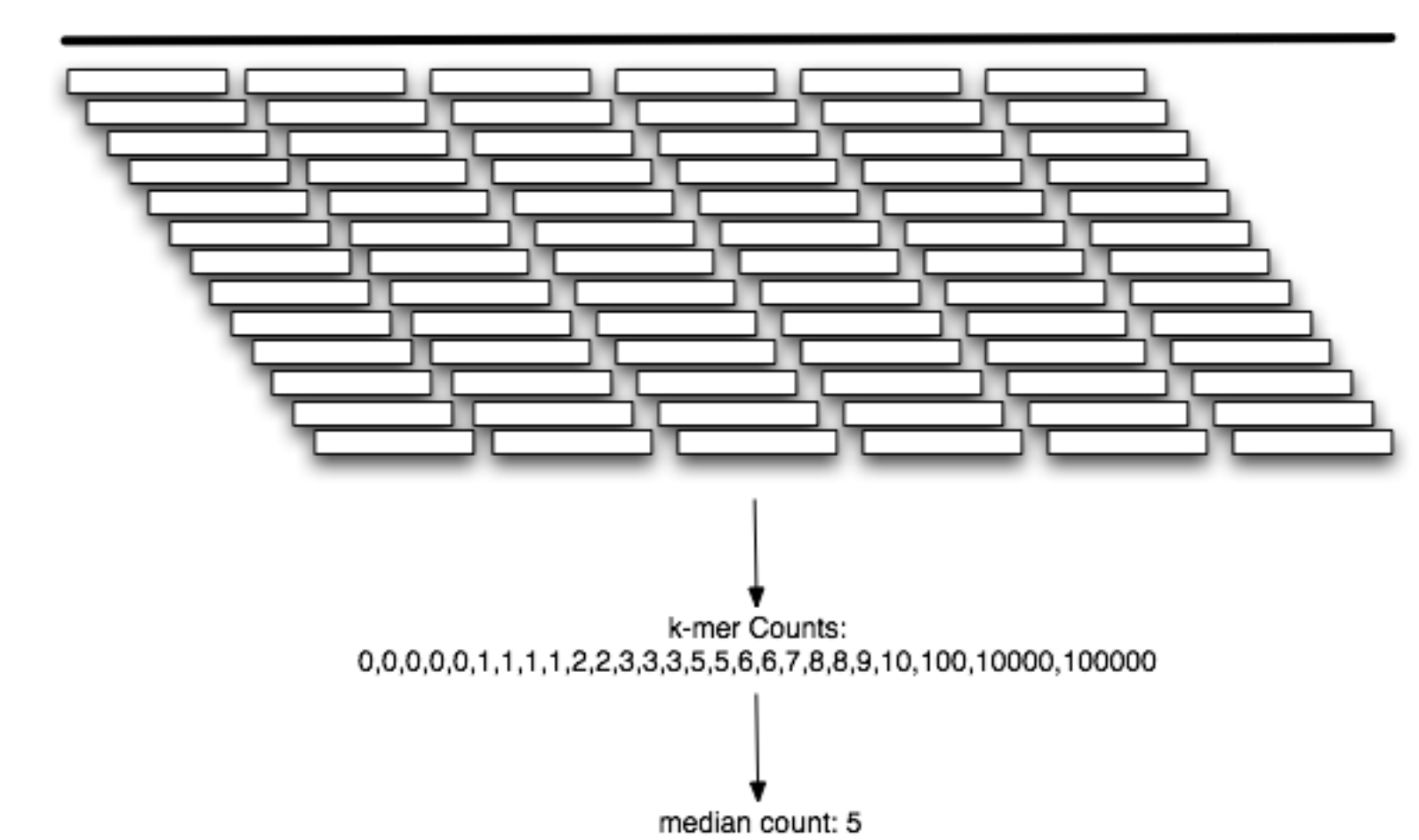
Sample Name	Total reads after trim+filter	Loci (total genes, > 500)	Total incl splice variants (> 500)
<i>M. oculata</i> (gastrula)	35,252,607	13,172	16,269
Hybrid (gastrula)	38,690,601	14,148	24,209
<i>M. oculata</i> (gastrula)	22,548,831	8,046	10,802
<i>M. oculata</i> (neurula)	38,030,938	10,365	11,043
Hybrid (neurula)	38,699,913	14,400	29,189
<i>M. oculata</i> (tailbud)	38,073,640	14,204	17,835
Hybrid (tailbud)	34,307,907	15,399	26,594

Hybrids express *only* *M. oculata* (tailless) versions??

Sample Name	<i>M. oculata</i> manx	<i>M. oculata</i> manx	<i>M. oculata</i> bobcat	<i>M. oculata</i> bobcat
<i>M. oculata</i> (gastrula)	9	0	11	0
Hybrid (gastrula)	0	28	0	255
<i>M. oculata</i> (gastrula)	0	41	0	76
<i>M. oculata</i> (neurula)	5	0	4	1
Hybrid (neurula)	0	38	0	223
<i>M. oculata</i> (tailbud)	6	0	6	0
Hybrid (tailbud)	0	8	0	121

Expression analysis - how?

Decompose sequence into k-mers (k ~ 32); count; take median



Allele specific expression

- ▶ Detect haplotype-specific changes in gene expression as indicator of functional cis-variation.

