Gene mapping in the Senegalese sole *Solea senegalensis*

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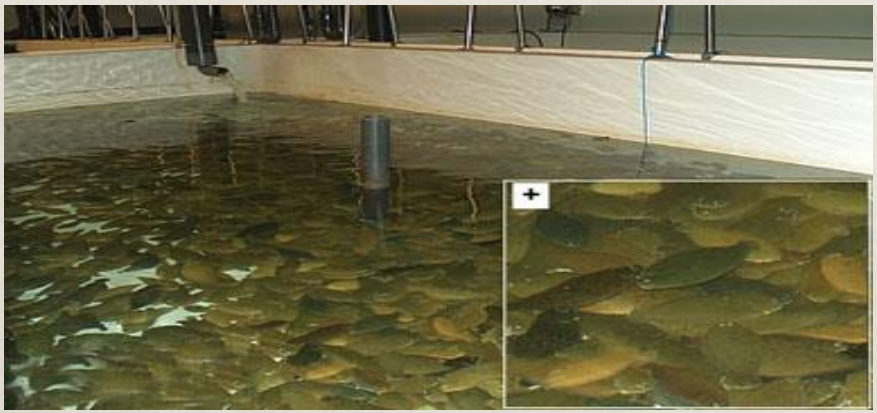
Solea senegalensis: Senegalese sole

Díaz-Ferguson *et al*., 2007

http://fishbase.mnhn.fr/summary/8852

Culture optimization

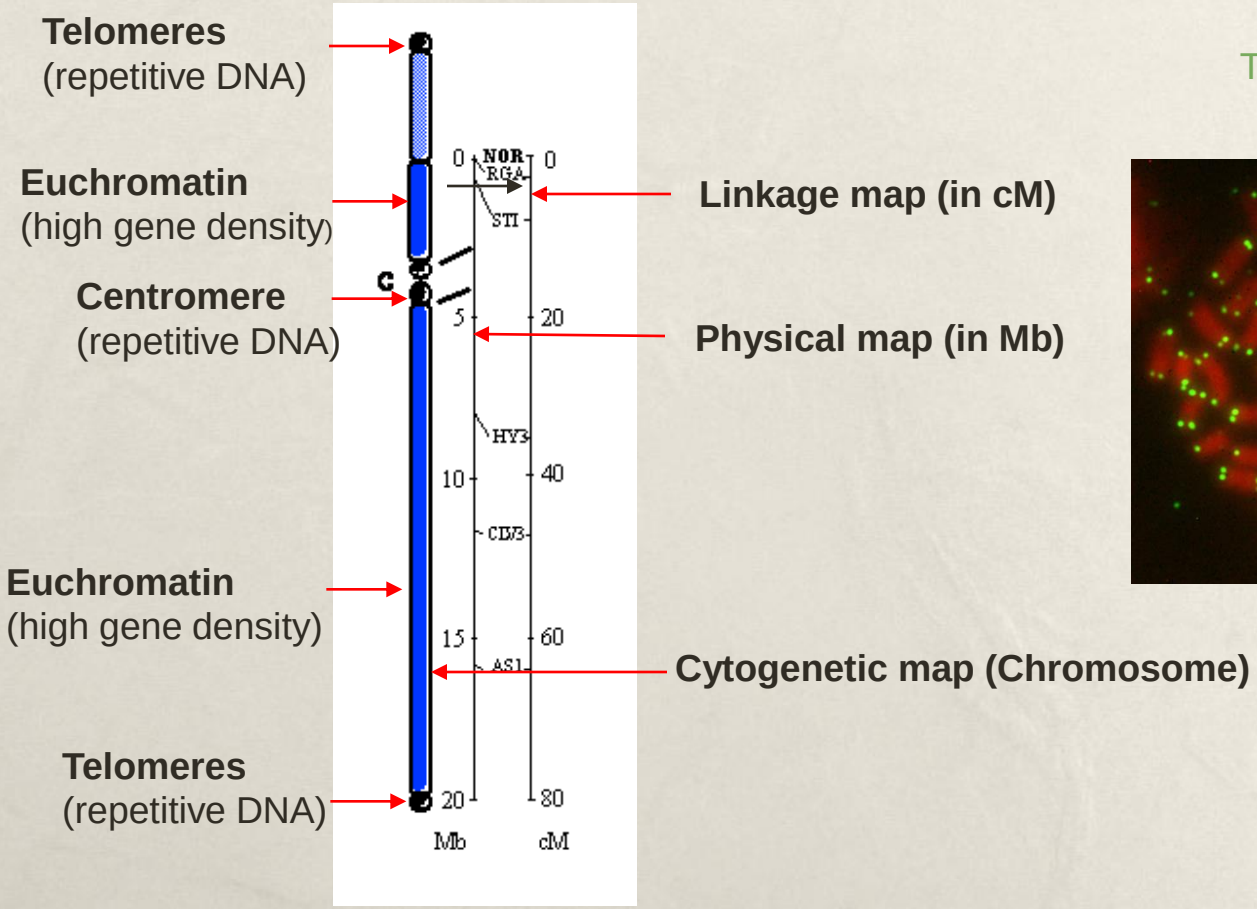
Production improvement



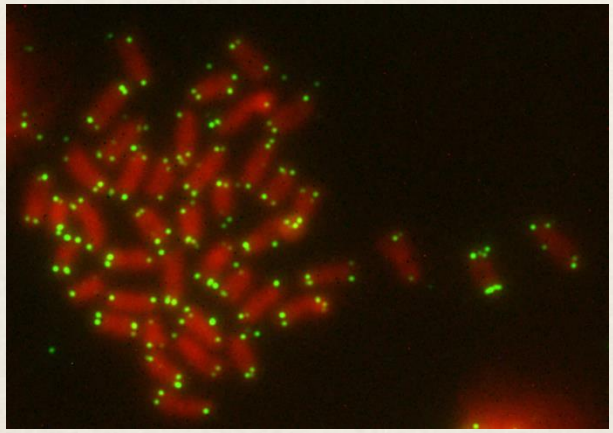
Reproduction

Metamorphosis

Integrated genetic maps



Telomeres hybridized with TTAGGG



Alignment of overlapping BAC clones and anchoring on genetic maps

Physical map (in Mb)

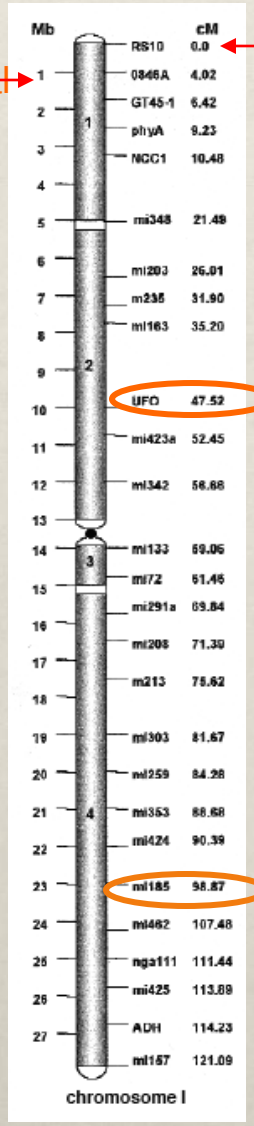
Linkage map (in cM)

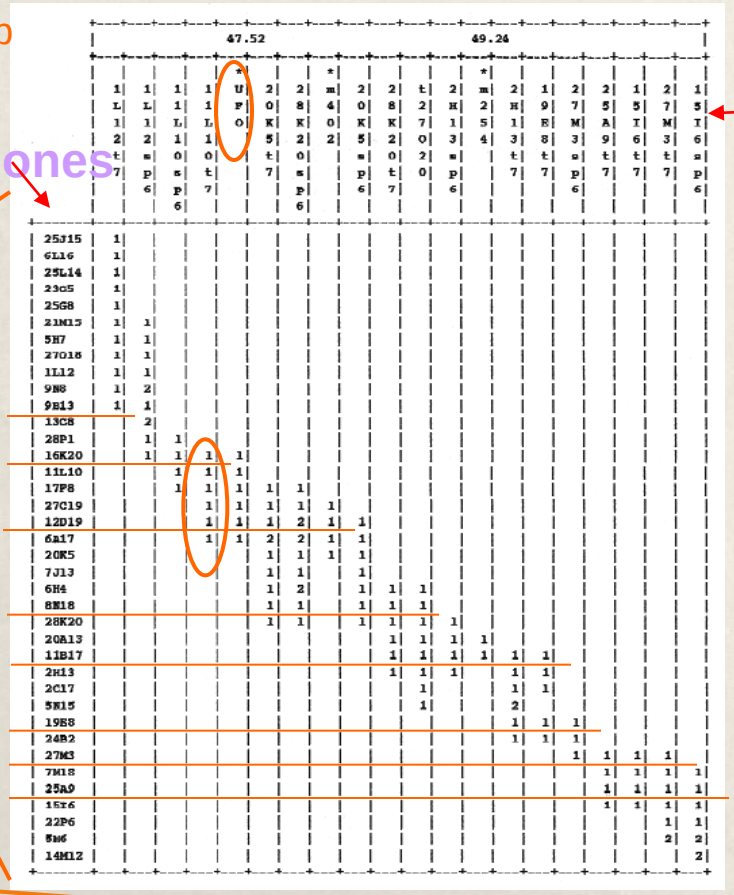
BAC clones

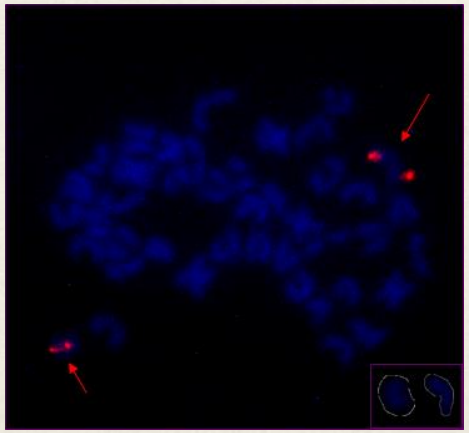
BAC ends

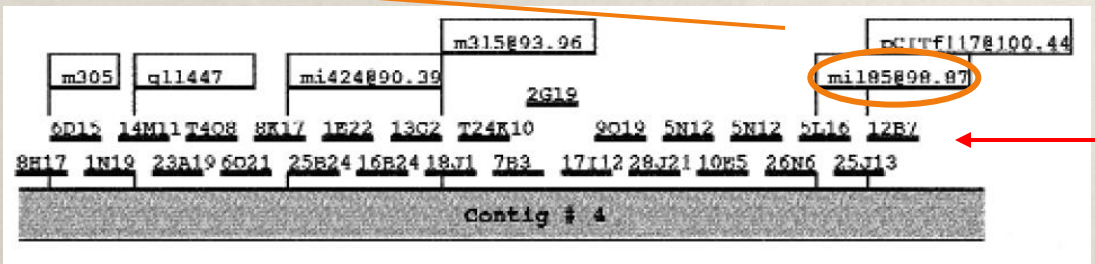
BAC –FISH

BAC clones



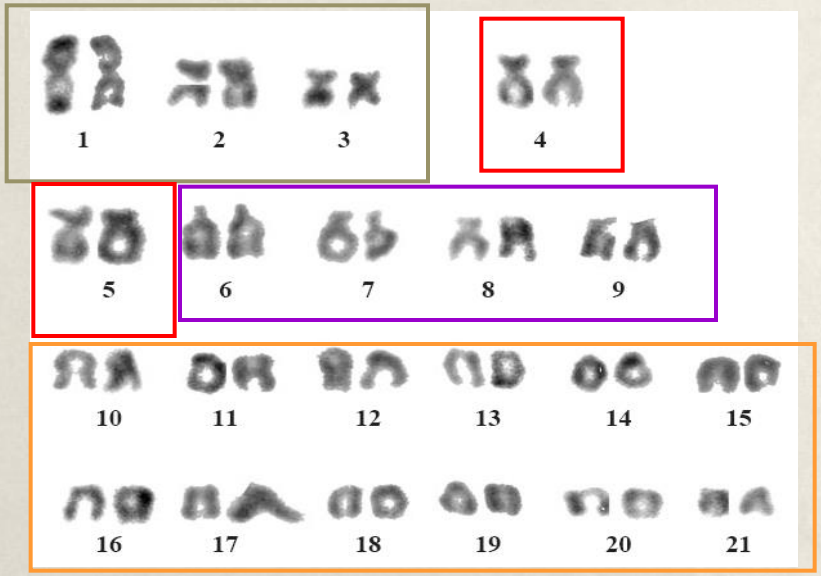






Karyotype

2n = 42



Vega et al. 2002

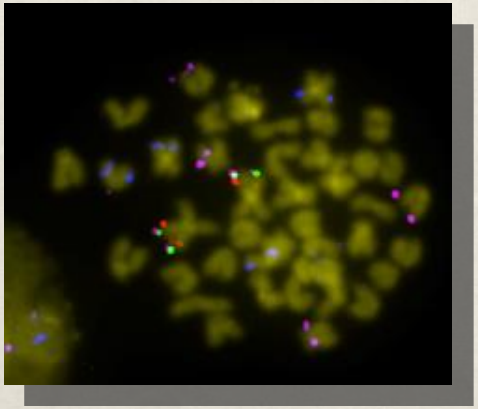
PCR-4D gene detection

Location of genes of interest in the aquaculture of *S. senegalensis*

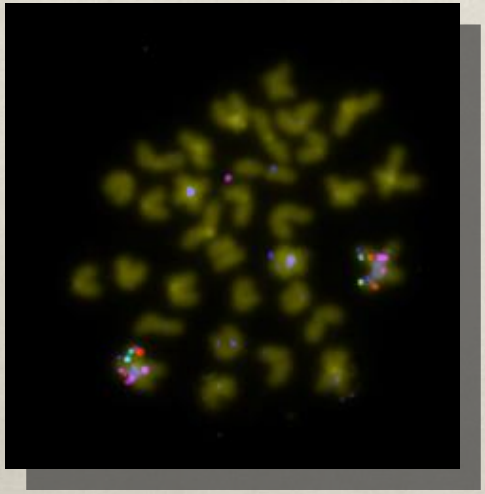
- **Innate immune system**
- **Metamorphosis**
  - **Tyroid hormone receptors (TR):**
  - **Receptors of thyrotropin-releasing hormone (TRH)**
- **Growth**
- **Reproduction**
- **Gene regulation and DNA packing**

mFISH location

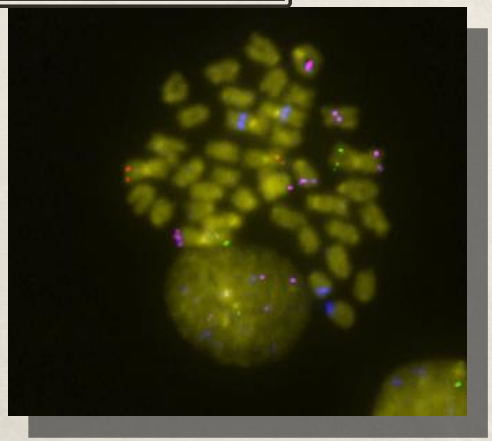
*calr-**dmrt1-** **dmrt2-*** 3F15



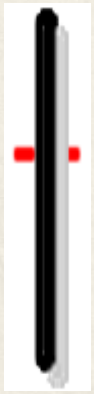
*calr-**dmrt1-** **H4-H3***



casq1a – – dmrt2 - nanos3– tlr8

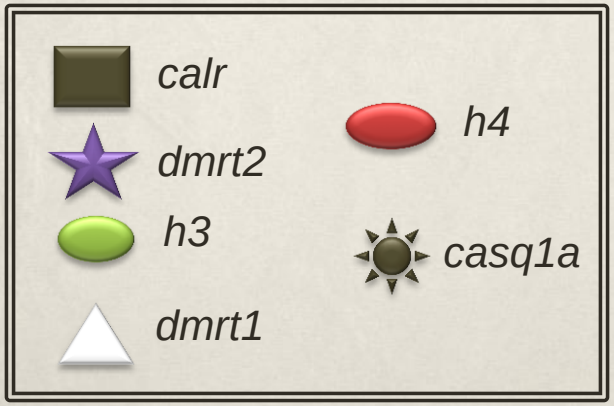


Cynoglossus semilaevis

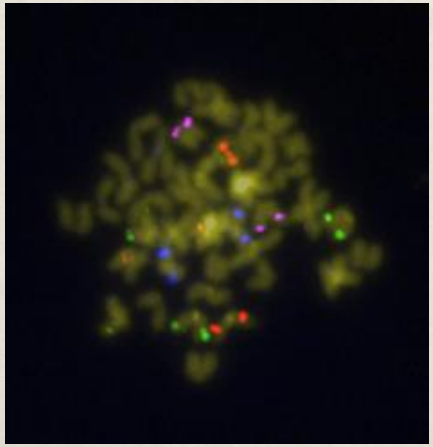


dmrt1, dmrt2, dmrt3

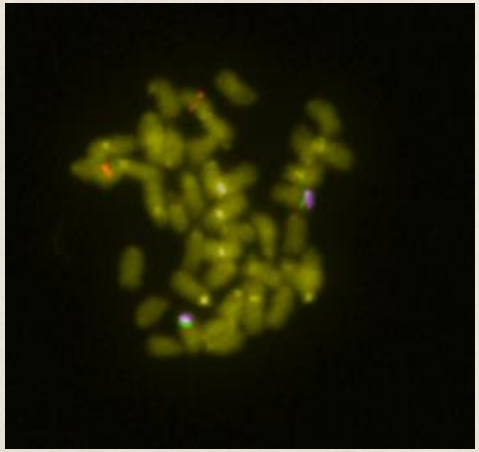
Z



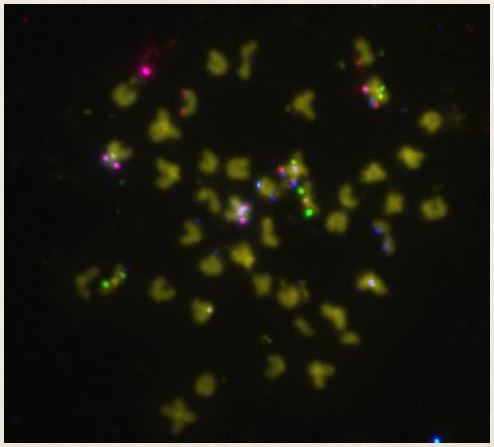
sox6 – sox9 – sox8 – sox3



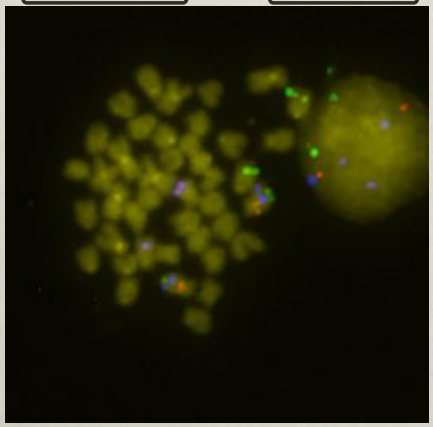
sox8 –aqp3 *-dmrt1*



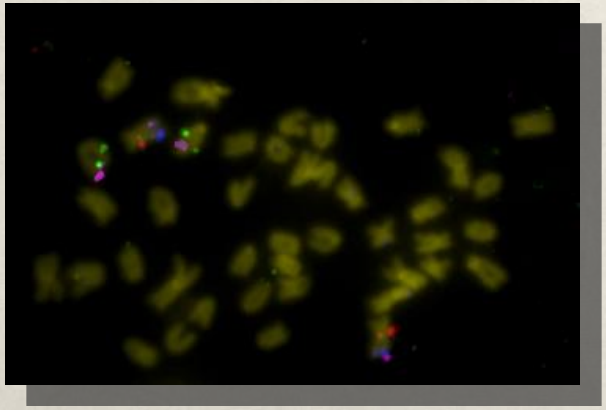
sox9 – nanos3 – vasa – thrβ

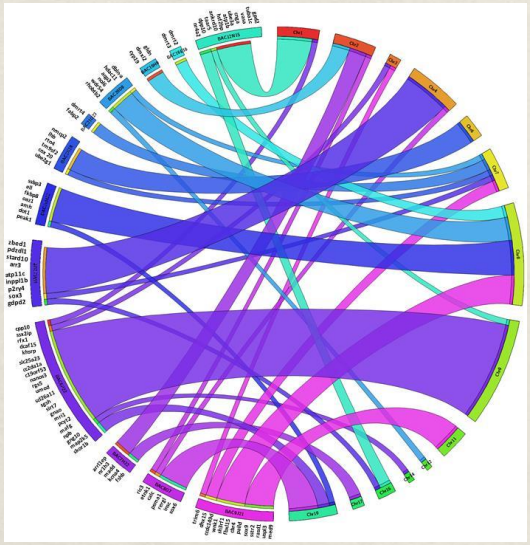


sox6 – fsh- sox8 –cyp19a1a



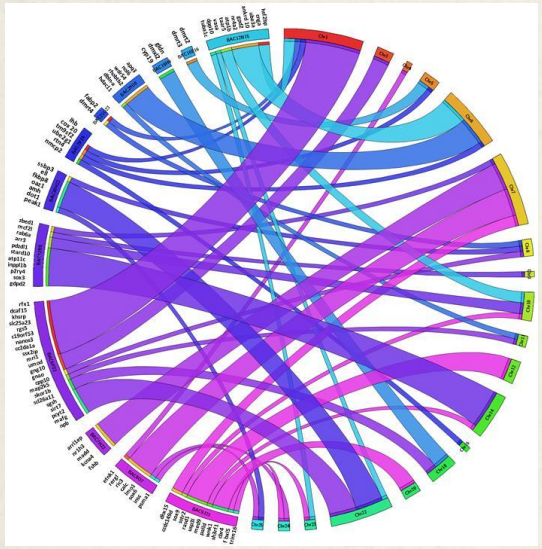
lysg – sox6- sox3 – igsf9b





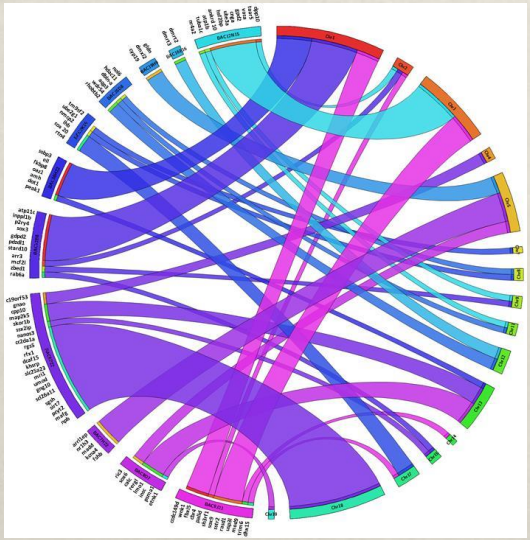
Gasterosteus aculeatus (stickleback)

aqp3-dmrt2→aqp3-dmrt2-amh



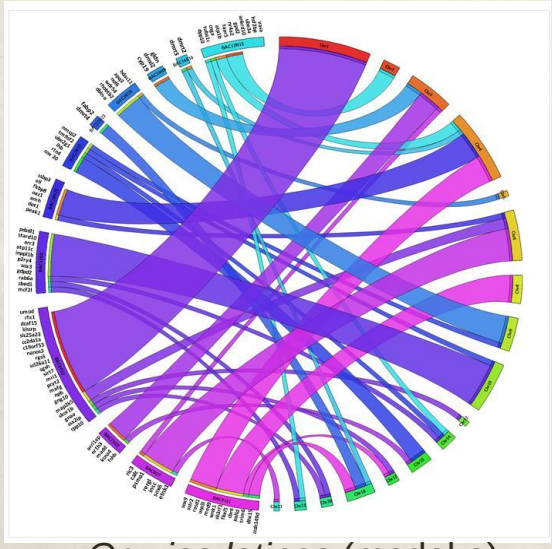
Danio rerio (zebrafish)

sox9→ 7 chromosomes



Tetraodon nigroviridis (pufferfish)

sox9-vasa→ sox9-vasa

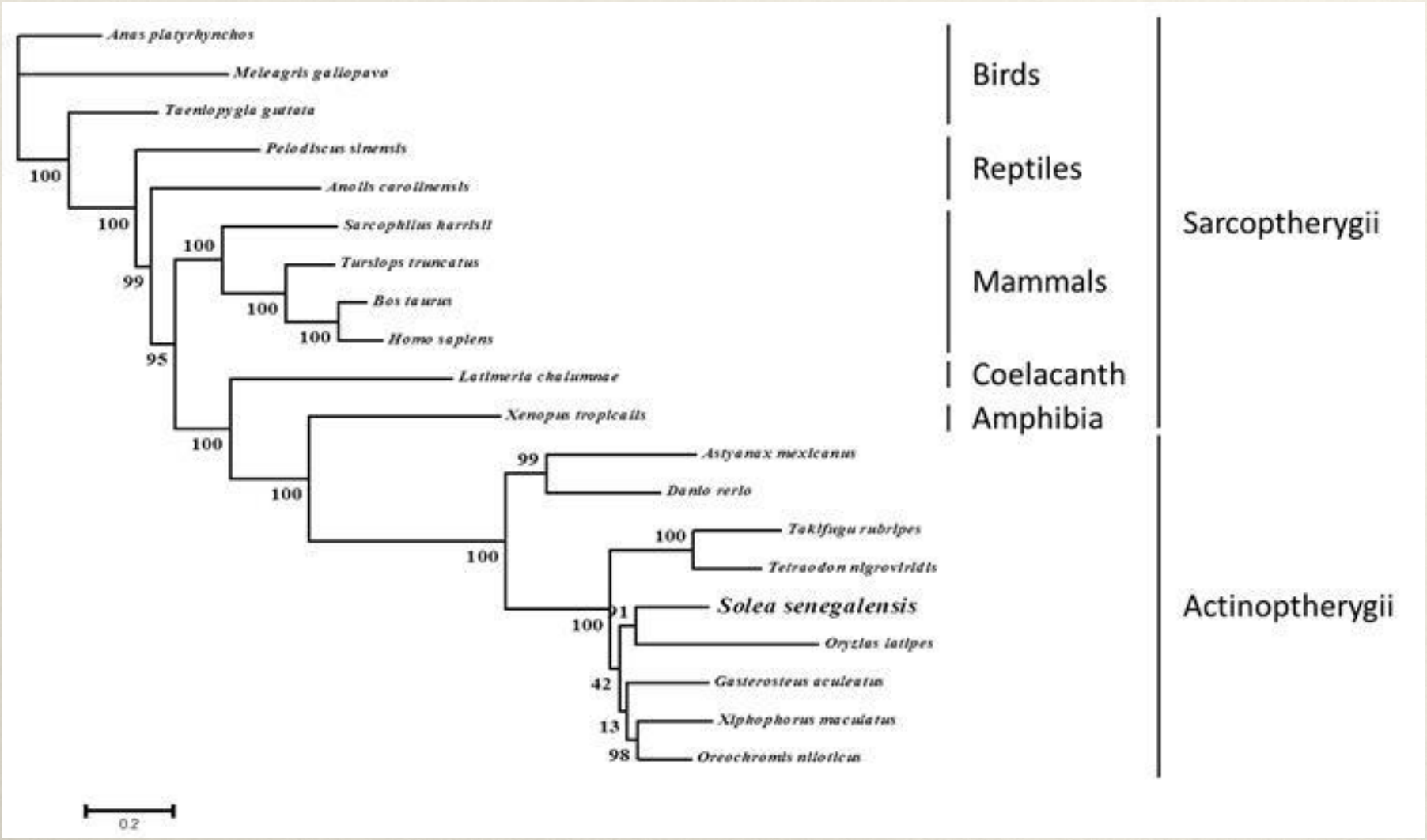


Oryzias latipes (medaka)

--- → sox9-amh-dmrt2

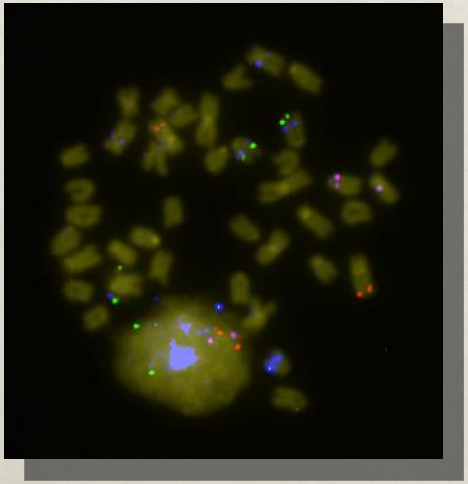
Distribution among the chromosomes of the five different species analyzed

Species	Location of BACs in chromosomes[a]	Location of candidate genes in chromosomes[b]	N° of chromosomes (>1 candidate gene in BACs)[c]	N° of candidate genes missing[d]
S. senegalensis **2n= 42**	9	5	2	0
G. aculeatus **2n= 42**	12	9	1	0
T. nigroviridis **2n= 42**	15	6	3	1 (*dmrt4)*
O. latipes **2n= 48**	15	7	3	1 (*vasa)*
D. rerio **2n= 50**	17	8	2	1 (*lhb*)

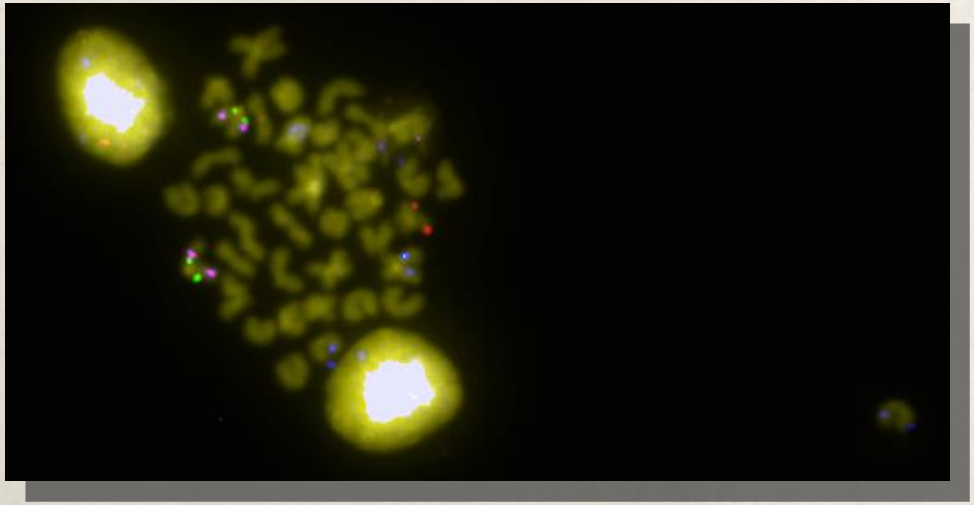

Anas platyrhynchos
Meleagris gallopavo
Taeniopygia guttata
Pelodiscus sinensis
Anolis carolinensis
Sarcophilus harrisii
Tursiops truncatus
Bos taurus
Homo sapiens
Latimeria chalumnae
Xenopus tropicalis
Astyanax mexicanus
Danio rerio
Takifugu rubripes
Tetraodon nigroviridis
Solea senegalensis
Oryzias latipes
Gasterosteus aculeatus
Xiphophorus maculatus
Oreochromis niloticus
100
100
99
100
100
95
100
99
100
100
100
91
100
42
13
98
0.2
Birds
Reptiles
Mammals
Coelacanth
Amphibia
Sarcoptherygii
Actinoptherygii

BACs multiplex hybridizationof the immune system

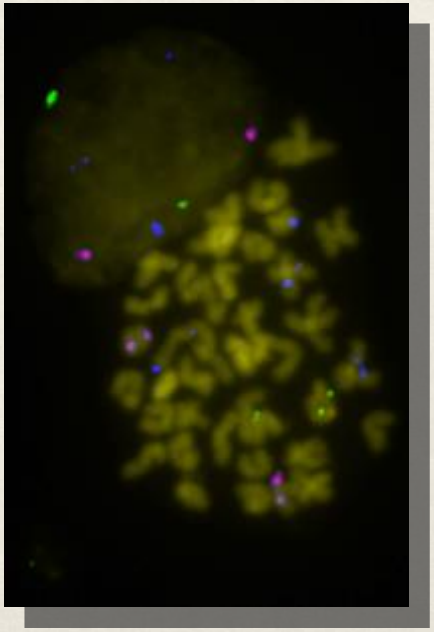
sema7-mstn- foxp3-igsf9b



tlr3-lysg-irf5--tlr8

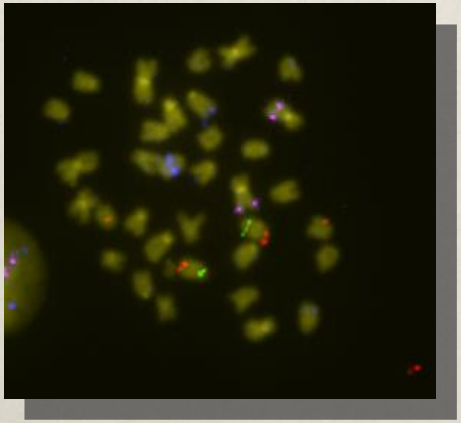


tlr3-tlr2-tlr8

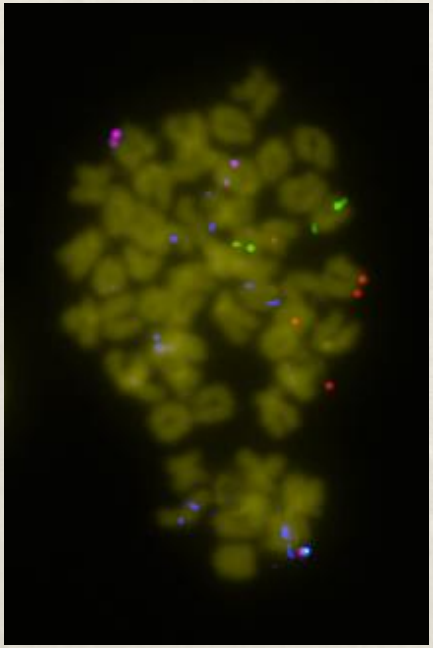


BACs multiplex hybridization of methamorphosis

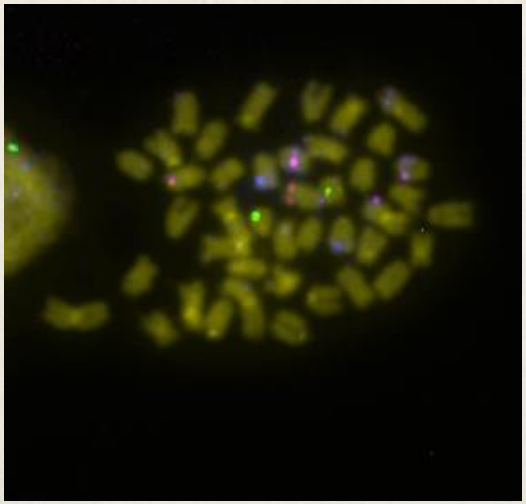
a3 – trhr1 – 5SrDNA – foxP3



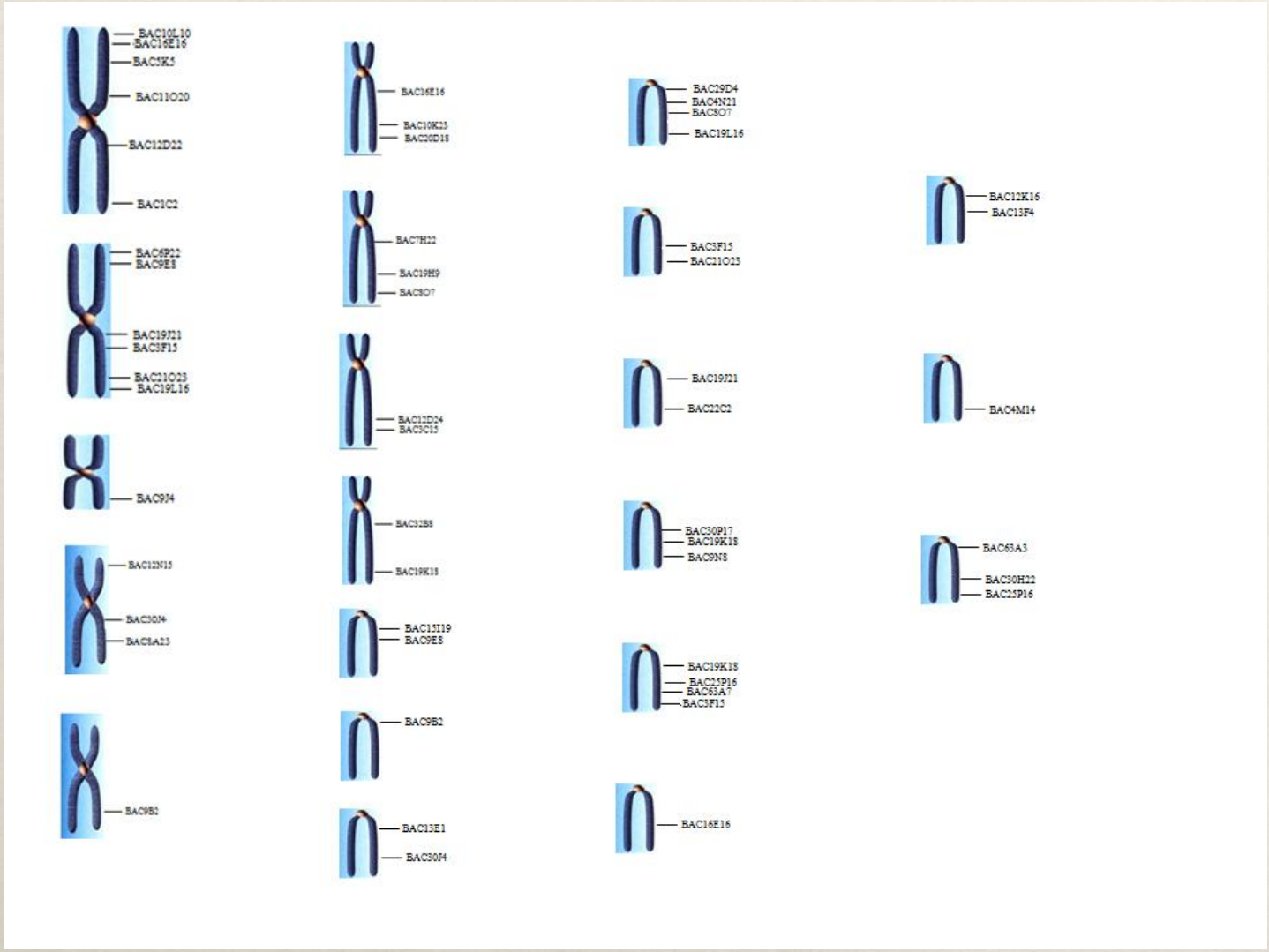
trαb-thr1-trαa-thrβ



trαb – amh – thrβ – thr3

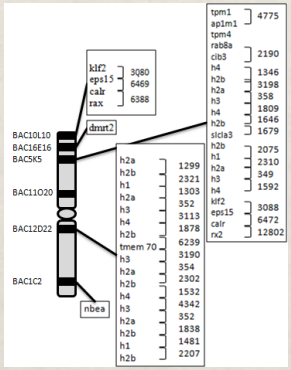


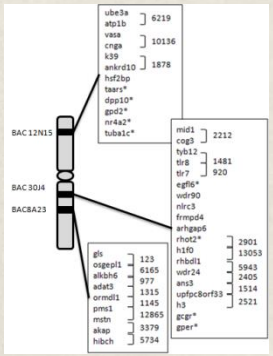
Cytogenetic map: all chromosomes with at least one BAC

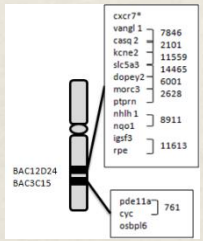


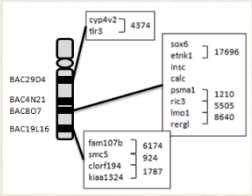
Integrated genetic map

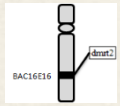
241 annotated genes coming from 119569 reads **10 % genome size**

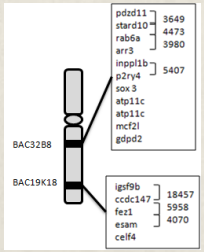


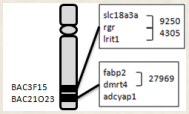


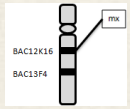


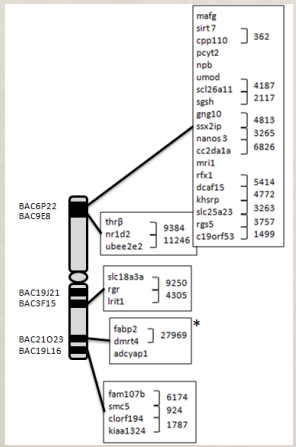


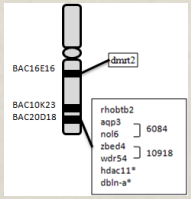


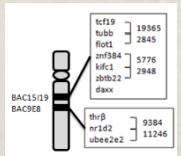


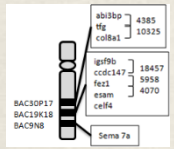


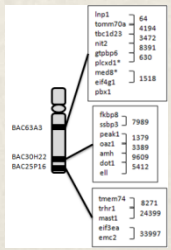


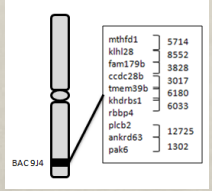


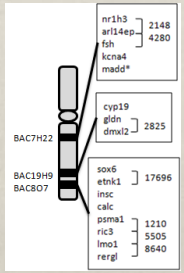


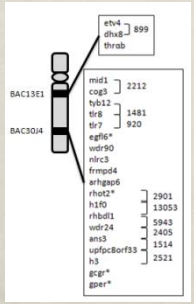


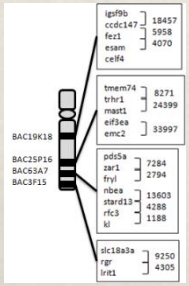




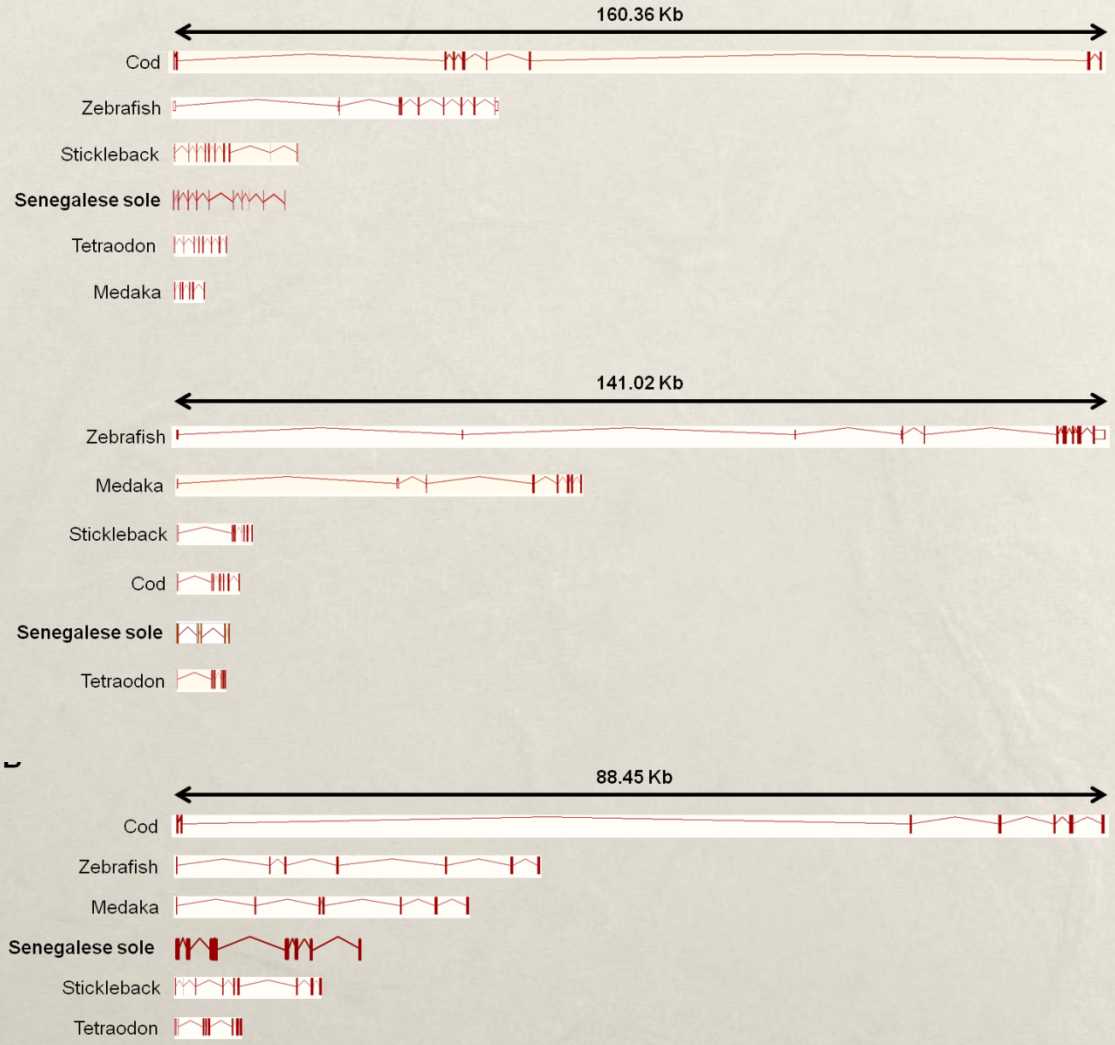








Homology with other fish species



nanos3
sox6 isoforms
sox3 inversions
dmrt1-dmrt3-dmrt2

Silvia Portela-Bens
Alejandro Merlo
Emilio Garcia
Jose Ramón Aracama
Ismael Cross
María Esther Rodriguez
Laureana Rebordinos

Manuel Manchado

Thomas Liehr

Thank you for your attention

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