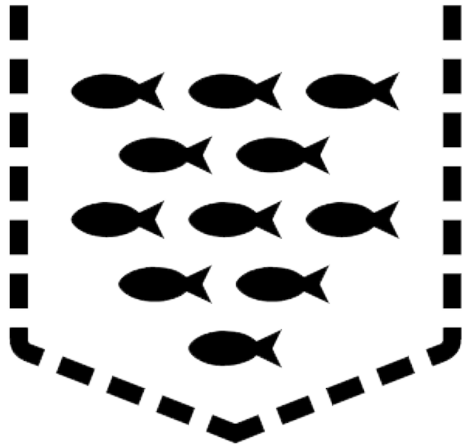
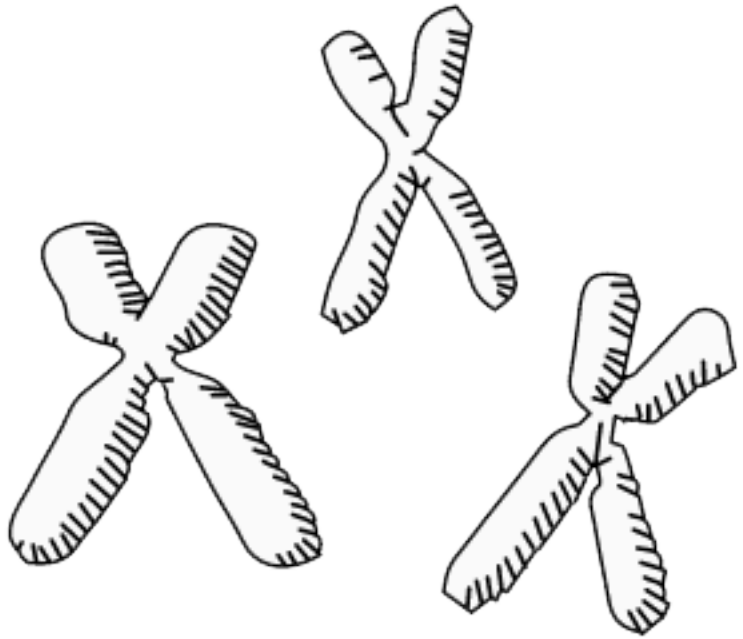
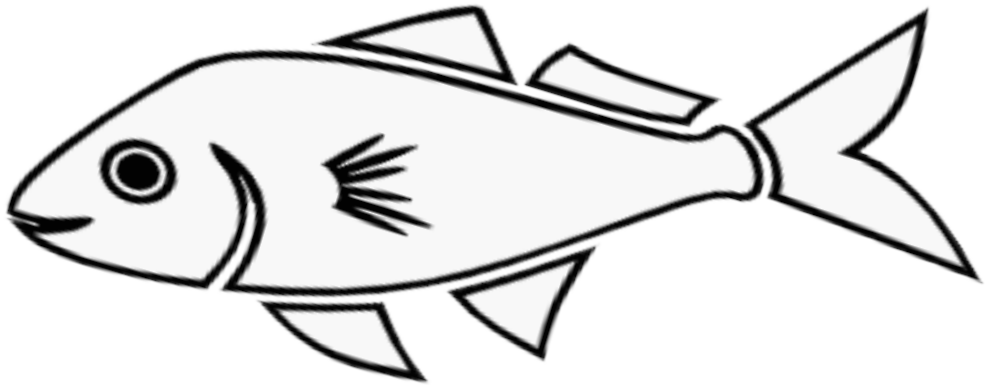


AQS 224 Fish Breeding

Dr. F. Sertel SEÇER





1. Week Domestication, Genetic Improvement Practices in Aquaculture

2. Week Selective breeding / production in seafood

3. Week Theoretical Foundations of Cultivation and Selection

4. Week Breeding Programs

5. Week Strategies for Breeding

6. Week Selection and Mating Design Methods

7. Week Estimation of Breeding Values

8. Week Genotype and Environment Interaction

9. Week Calculating the Selection Response

10. Week Side Effects in Fish Breeding Practices

11. Week Biotechnology in Fish Farming

12. Week Reproduction Techniques in Fish Breeding 1

13. Week Reproduction Techniques in Fish Breeding 2

14. Week Economic Evaluation of Fish Farming

11. Week

Biotechnology in Fish Farming

- Linkage Maps
- Quantitative Trait Loci (QTL)
- Marker Assisted Selection
- Other Applications of Genetic Markers
- Gene Expression Data
- Transgenics
- Genome Sequencing and Future Technologies

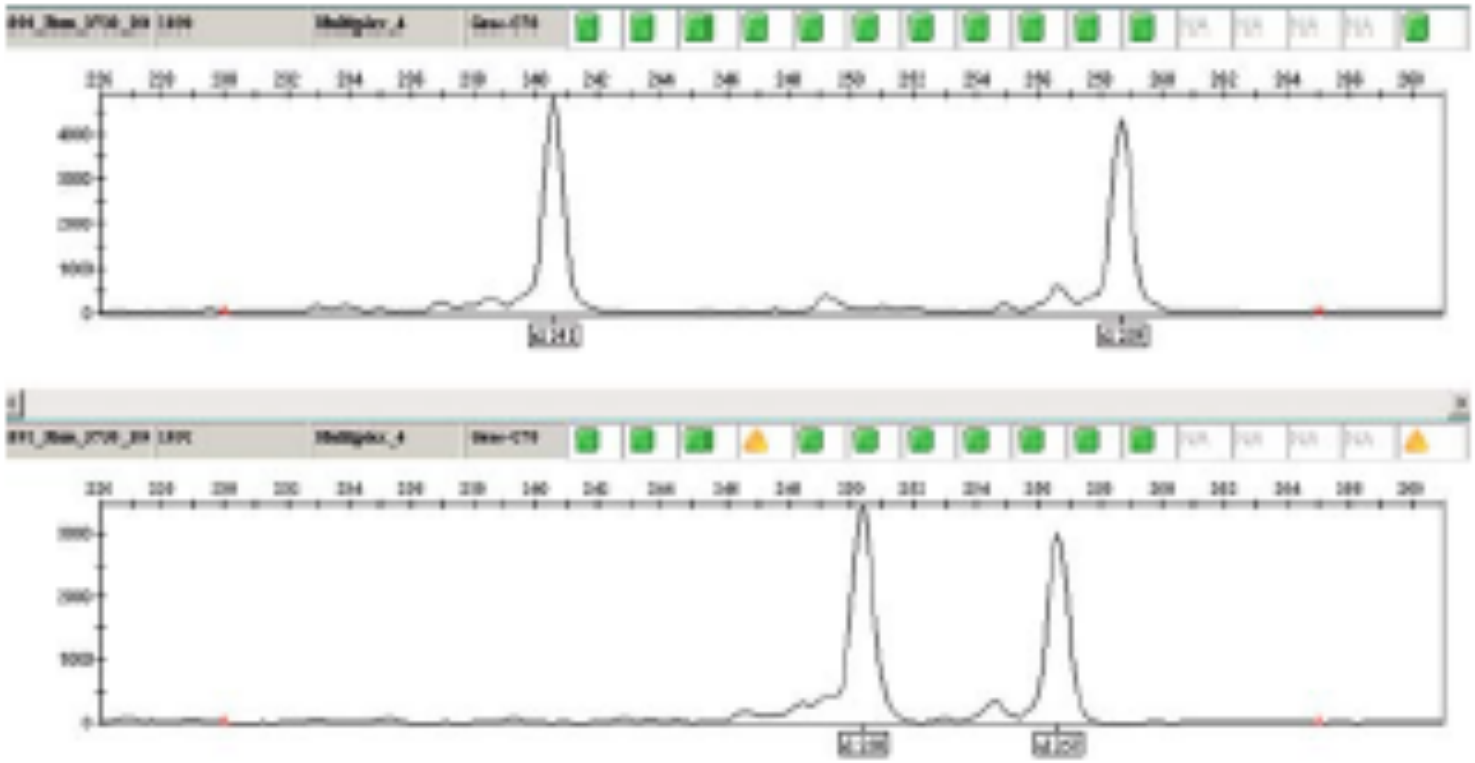


Fig. 14.1 Example of two microsatellite genotypes. Two heterozygous individuals are represented, with alleles of size 241, 259 and 250, 257

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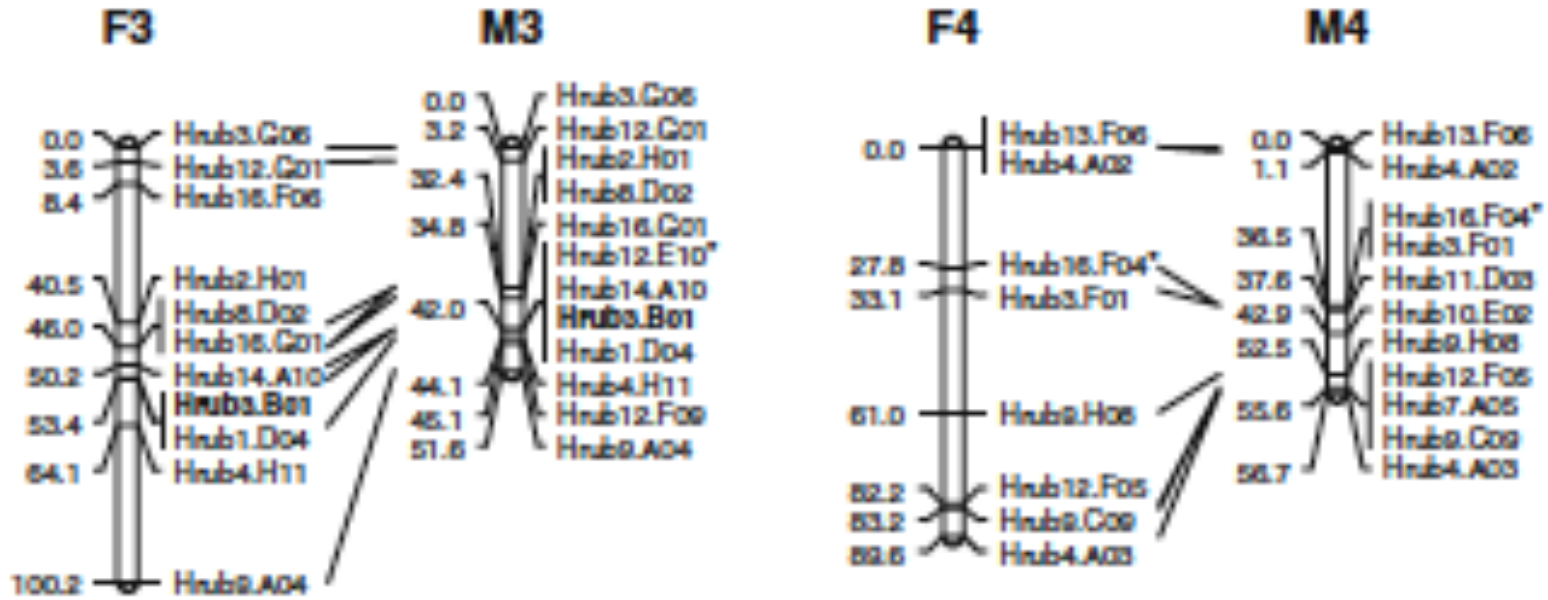

Fig. 14.2 Two linkage groups for the blacklip abalone (*Haliotis rubra*). Note the larger amount of recombination in the female map (F)

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Table 14.1 A selection of aquaculture species with linkage maps developed

Species	Reference
Pacific oyster	Hubert and Hedgecock (2004), Li and Guo (2004)
Channel catfish	Waldbieser et al. (2001)
Tilapia	Kocher et al. (1998), Lee et al. (2005)
Eastern oyster	Yu and Guo (2003)
Japanese flounder	Coimbra et al. (2003)
Yellowtail	Ohara et al. (2005)
Common carp	Sun and Liang (2004)
Zhikong scallop	Wang et al. (2005)
Atlantic salmon	Moen et al. (2004c), Gilbey et al. (2004), Moen et al. (2008b)
Rainbow trout	Sakamoto et al. (2000), Nichols et al. (2003b)
Brown trout	Gharbi et al. (2006)
Black tiger shrimp	Wilson et al. (2002), Staelens et al. (2008)
Kuruma prawn	Moore et al. (1999)
European sea bass	Chistiakov et al. (2005a)
Blacklip abalone	Baranski et al. (2006)

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Table 14.2 A selection of QTL studies in aquaculture species

Species	Trait	Reference
Rainbow trout	Upper thermal tolerance	Jackson et al. (1998), Perry et al. (2005)
	Spawning time	Danzmann et al. (1999), Sakamoto et al. (1999)
	Embryonic development	Robison et al. (2001), Sundin et al. (2005)
	Disease resistance	Ozaki et al. (2001), Nichols et al. (2003a), Rodriguez et al. (2004)
	Length	Perry et al. (2005)
Tilapia	Cold tolerance	Moen et al. (2004a)
	Body colour	Howe and Kocher (2003)
	Salinity tolerance	Lee (2003)
Channel catfish	Feed conversion efficiency	Karsi et al. (2000)
Atlantic salmon	ISA resistance	Moen et al. (2004b)
	IPN resistance	Houston et al. (2008)
	Body weight and condition factor	Reid et al. (2004)
Arctic charr	Body weight, condition factor, age at sexual maturation	Moghadam et al. (2007)
Common carp	Cold tolerance	Sun and Liang (2004)
Blacklip abalone	Growth rate (body weight)	Baranski et al. (2008)

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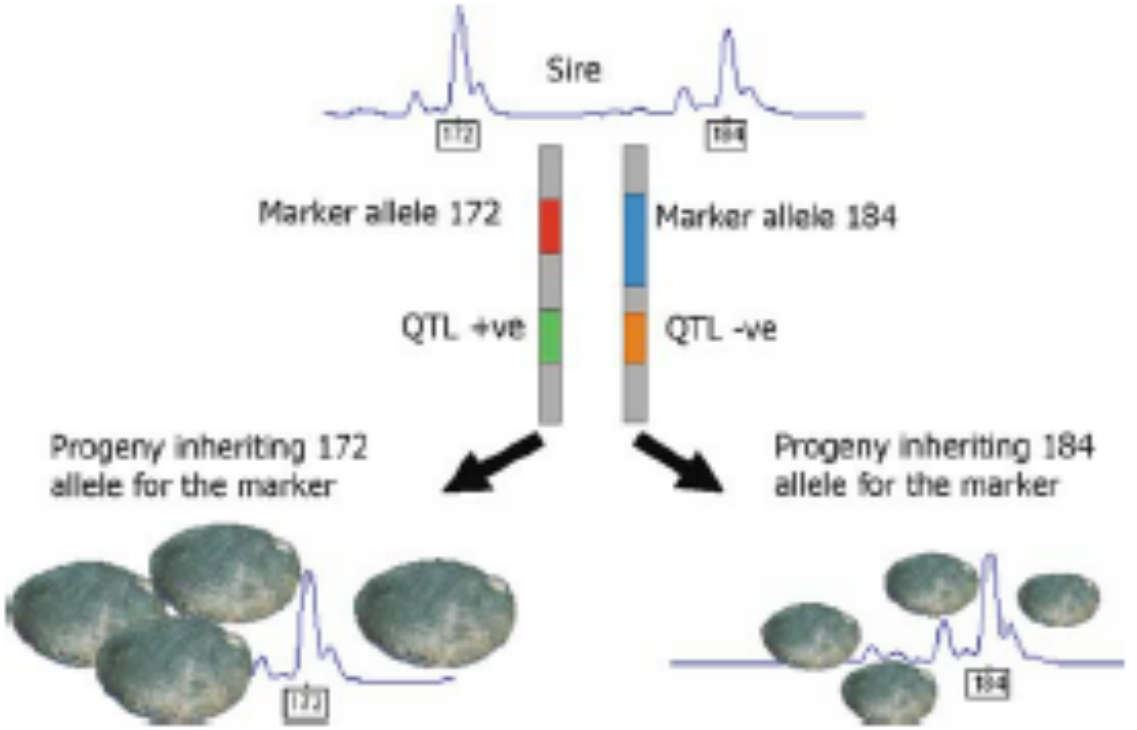

Fig. 14.3 Schematic of marker segregation and co-inheritance with QTL. At this marker, the sire carries the marker alleles 172 and 184. The progeny that inherit the 172 marker allele, linked to the positive QTL allele, tend to be larger than the progeny inheriting the 184 allele, linked to the negative QTL allele

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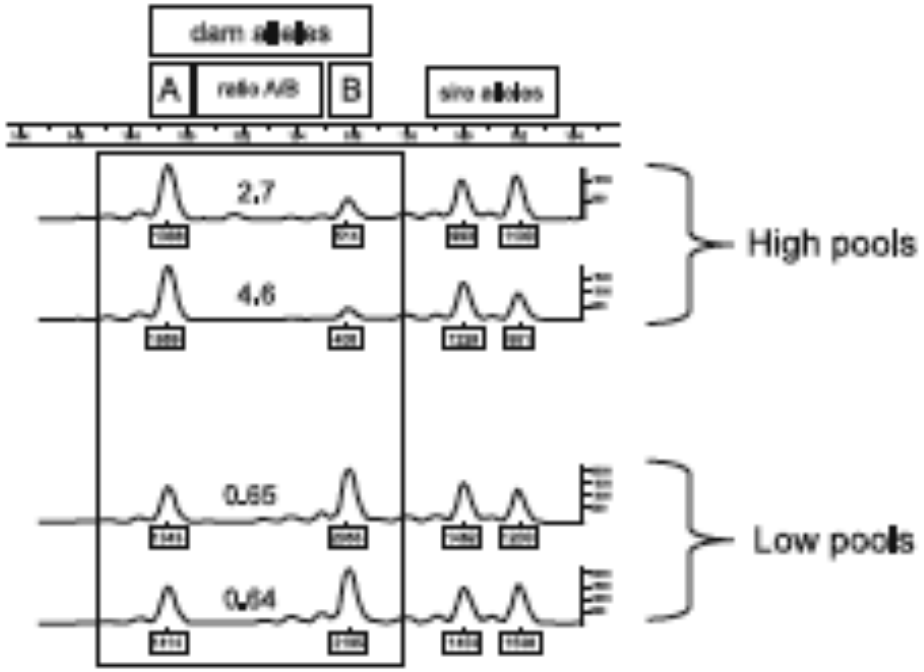

Fig. 14.4 Example of selective DNA pooling results for body weight in abalone. Peak heights for each of the four alleles of a microsatellite marker are shown (in RFUs) below each peak. Two high pools and two low DNA pools are shown along with the ratio of peak heights between dam alleles *A* and *B*, that fast growing abalone tend to inherit allele *A*, while slow growers tend to inherit allele *B*

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Fig. 14.5. Components of an integrated system for the use of molecular genetic information in breeding programs for marker assisted selection (MAS). Reproduced from Dekkers (2004) by permission of Journal of Animal Science.

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Reference

- Gjedrem, T., & Baranski, M. (2010). *Selective breeding in aquaculture: an introduction* (Vol. 10). Springer Science & Business Media.