

Shellfish Farmed on the Pacific Coast

Native	Nonnative
Geoduck	Pacific oyster
Olympia oyster	Manila clam
Giant rock scallop	Mediterranean mussel
Western Blue mussel	Kumamoto oyster
Littleneck clam	Eastern Blue mussel
Nuttall's cockle	Eastern oyster
Red abalone	Japanese scallop
Spiny & pink scallops	European flat oyster
Green sea urchins	Varnish clam
Weathervane scallop	

WA's top 12 agricultural commodities, their absolute and relative values, and origins

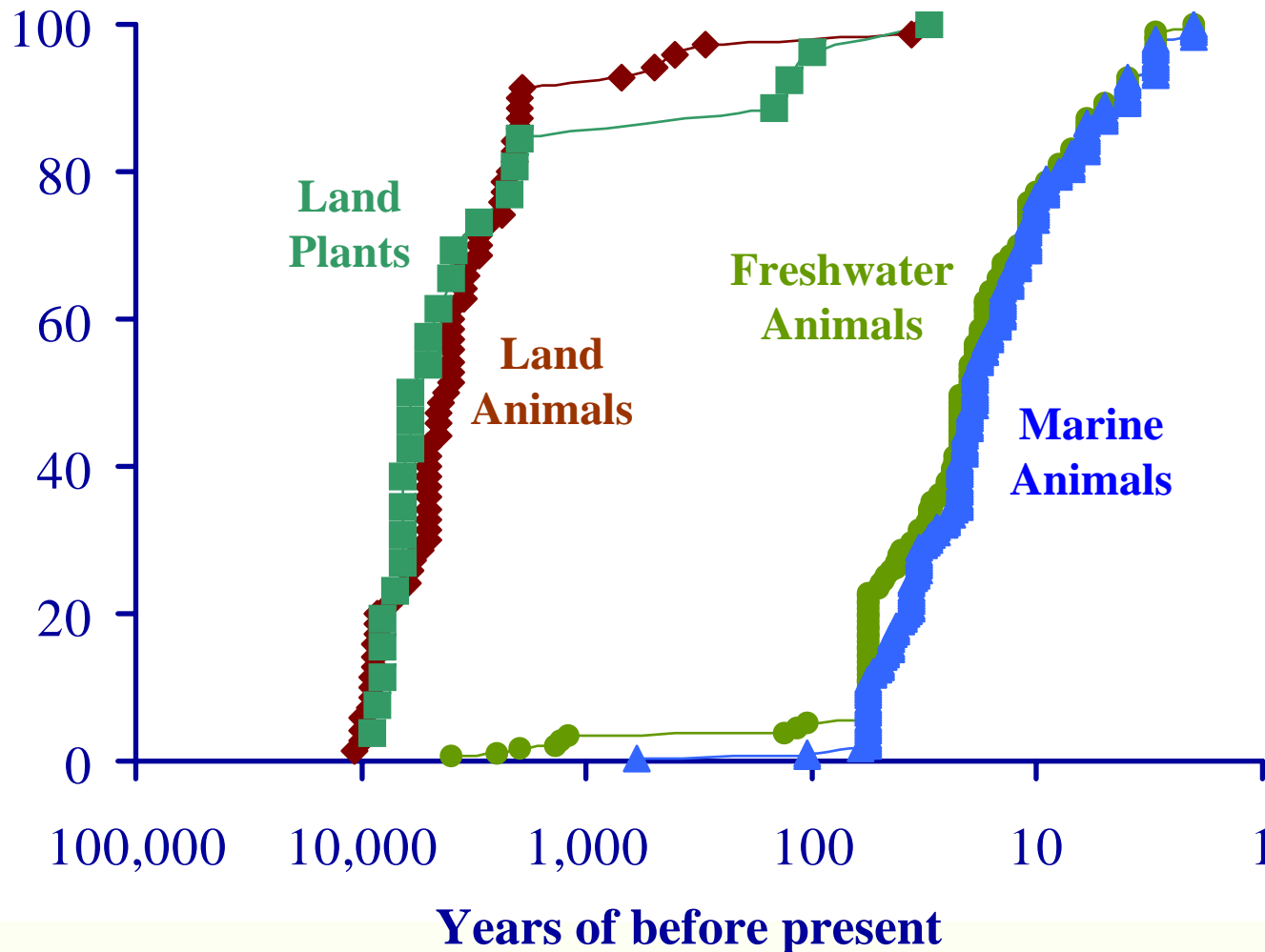
Rank	Item	Value (millions)	Percent of WA \$	Percent of U.S. \$	Origin
1	Apples	942	16.2	59.2	Central Asia
2	Dairy products	832	14.3	3.1	Middle East
3	Cattle and calves	685	11.8	1.4	Middle East
4	Wheat	484	8.3	7.1	Middle East
5	Potatoes	431	7.4	18.1	S. America
6	Greenhouse/nursery	376	6.5	2.3	various
7	Cherries	338	5.8	61.7	Western Asia
8	Hay	262	4.5	5.5	Asia
9	Grapes	142	2.4	4.1	Middle East
10	Pears	138	2.4	46.7	Western China
11	Onions	133	2.3	12.9	Pakistan
12	Aquaculture	94	1.6	11.0	Japan, N. America

California Agriculture

Item	Farms	Sales (millions \$)	Rank by Sales	Percent of Total Sales
Total sales	79,631	25,737		100
Fruits, tree nuts, and berries	36,386	8,721	1	33.9
Vegetables, melons, potatoes, and sweet	4,131	4,785	2	18.6
Milk and other dairy products from cows	2,422	3,739	3	14.5
Nursery, greenhouse, floriculture, and sod	4,423	3,287	4	12.8
Cattle and calves	12,897	1,582	5	6.1
Poultry and eggs	1,980	1,018	6	4.0
Other crops and hay	5,730	943	7	3.7
Grains, oilseeds, dry beans, and dry peas	4,952	722	8	2.8
Cotton and cottonseed	1,392	683	9	2.7
Other animals and other animal products	1,665	68	10	0.3
Aquaculture	204	65	11	0.3
Sheep, goats, and their products	4,256	52	12	0.2
Horses, ponies, mules, burros, and donkeys	4,033	32	13	0.1
Hogs and pigs	1,513	27	14	0.1
Cut Christmas trees and short-rotation woody	403	12	15	<0.1

A Brief History of Domestication

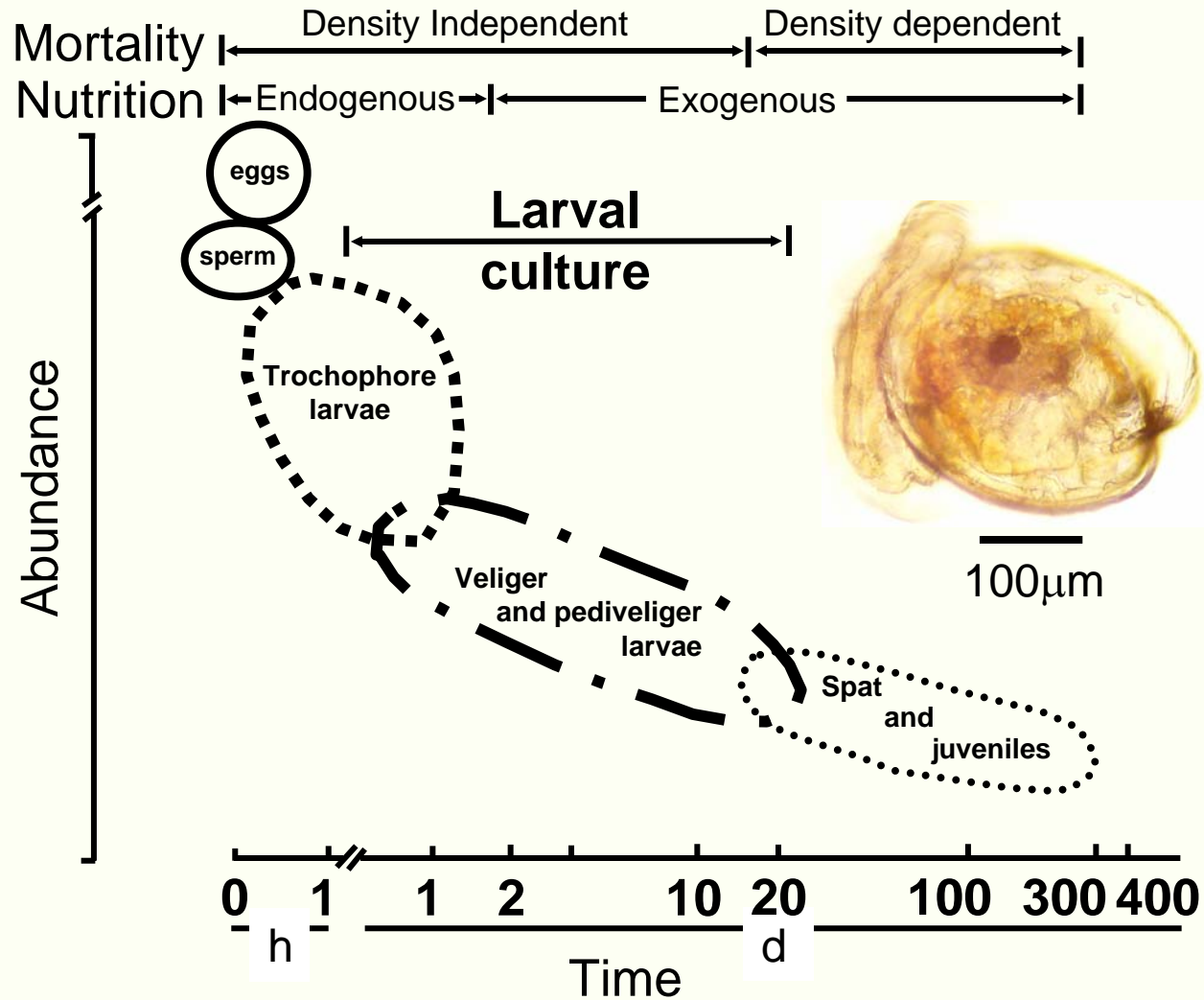
Percent of species in each category



After Duarte, C.M., N. Marbá, & M. Holmer. 2007. Science 316:382-384



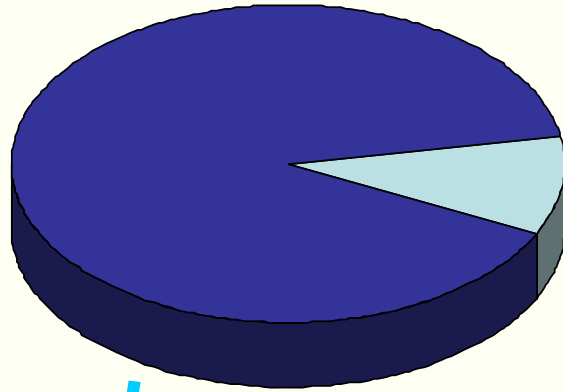
Early Life of a Bivalve



After Kennedy, V.S. 1996, Ch. 10, in "The Eastern Oyster *Crassostrea virginica*"

Genetic Dilution? Not Necessarily

G₀ Spawning Stock



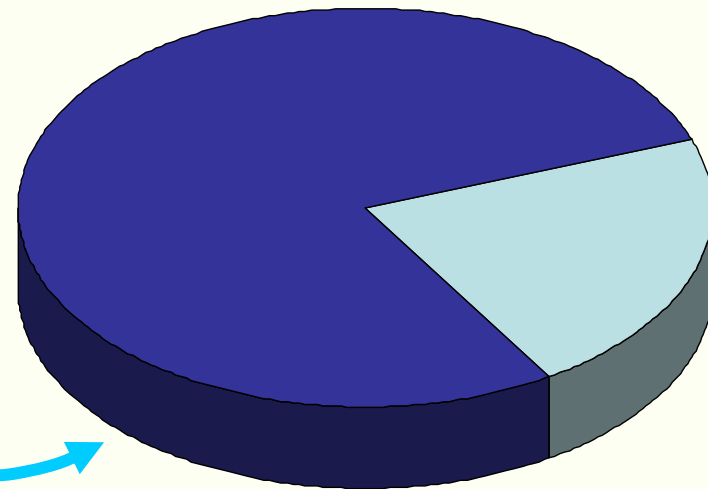
Hatchery Propagation
(improved early survival)

$$N_e/N_b = 0.8$$

Natural Reproduction
(less brood stock)

$$N_e/N_b = 0.001?$$

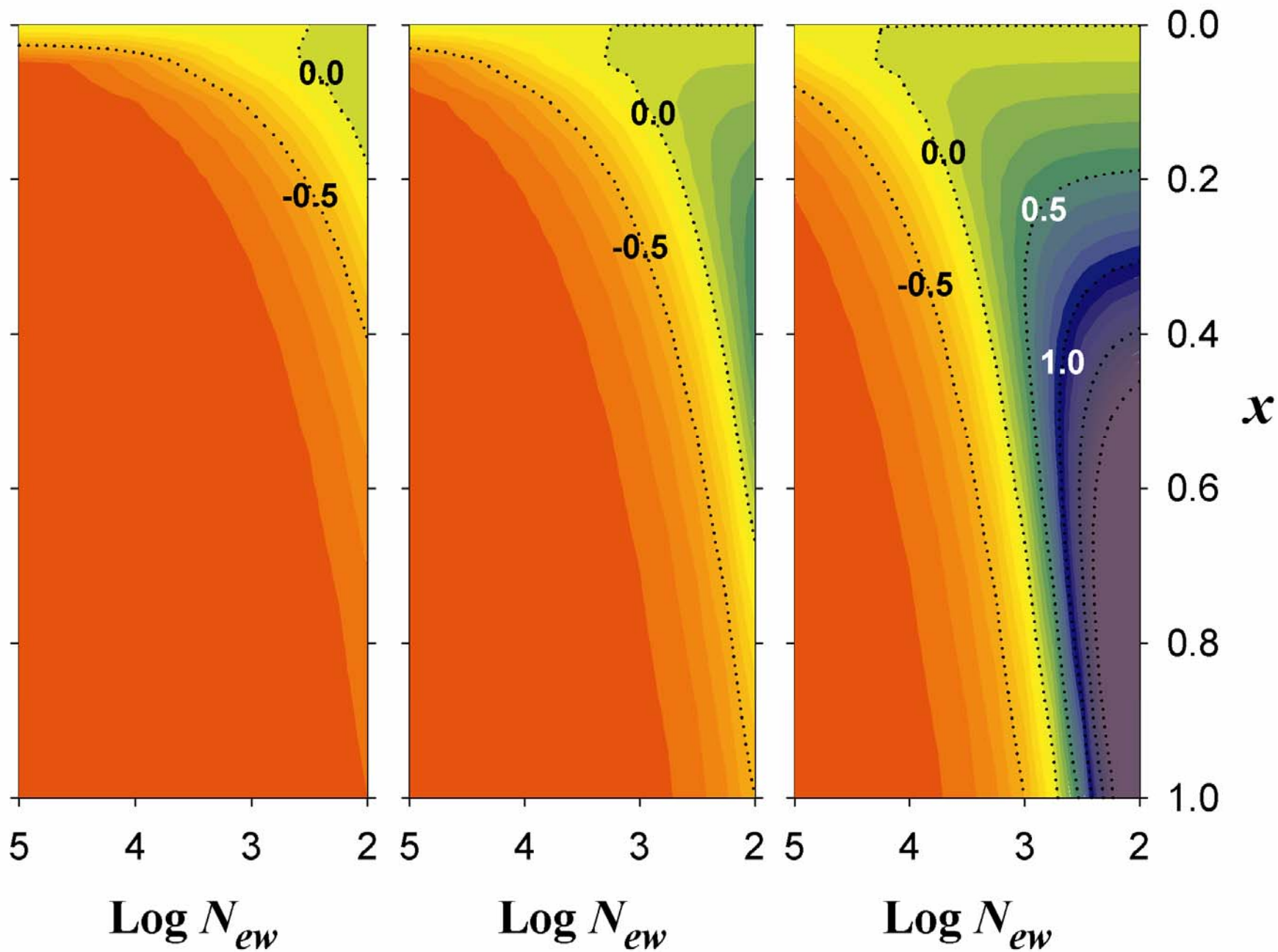
G₁ Spawning Stock



A. $N_{eh} = 10$

B. $N_{eh} = 50$

C. $N_{eh} = 500$



A Study of Flat Oyster Spat

(Hedgecock et al. 2007. *Marine Biology* 150:1173-1182)



Ostrea edulis

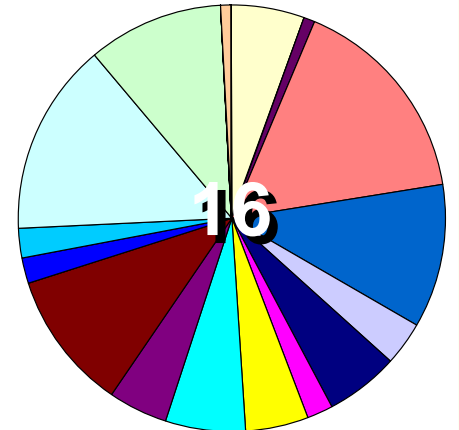
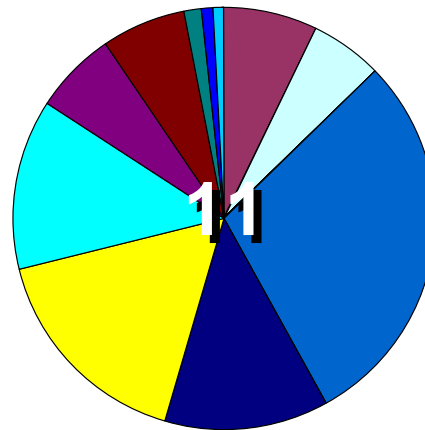
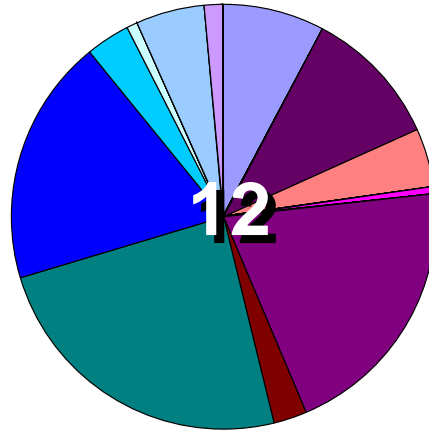
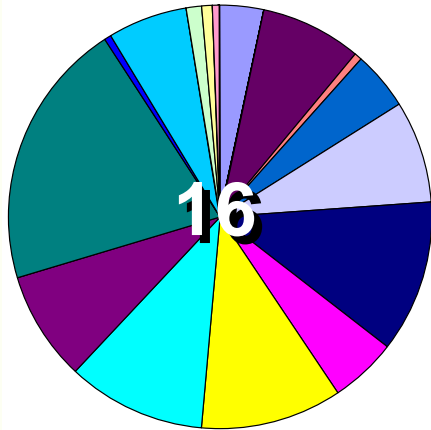


**Dr. Sophie
Launey**

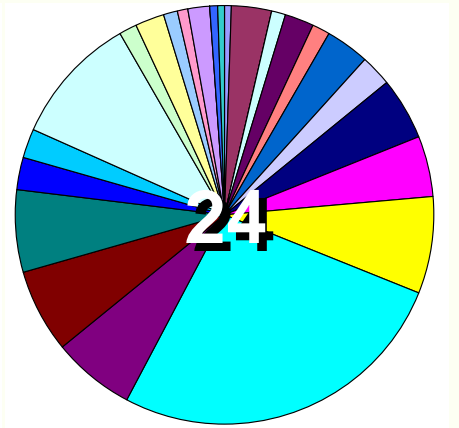
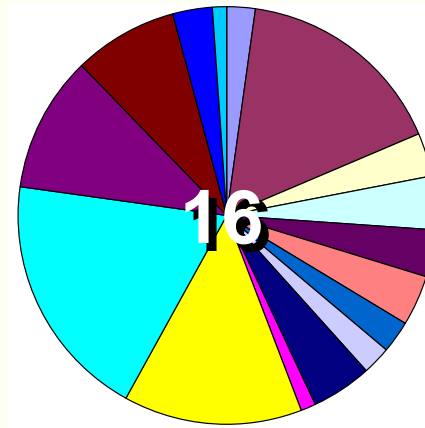
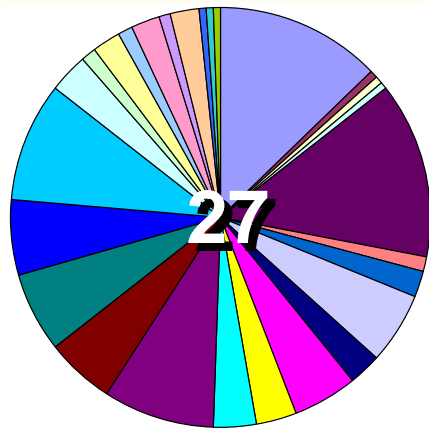
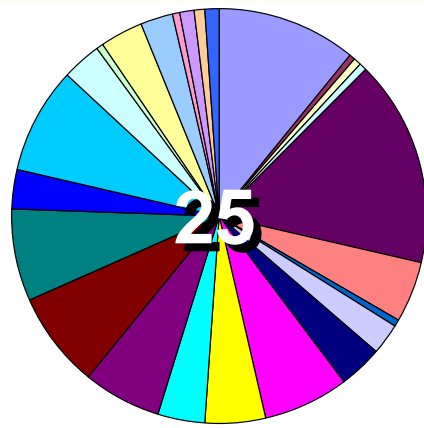


Reduced Allelic Diversity

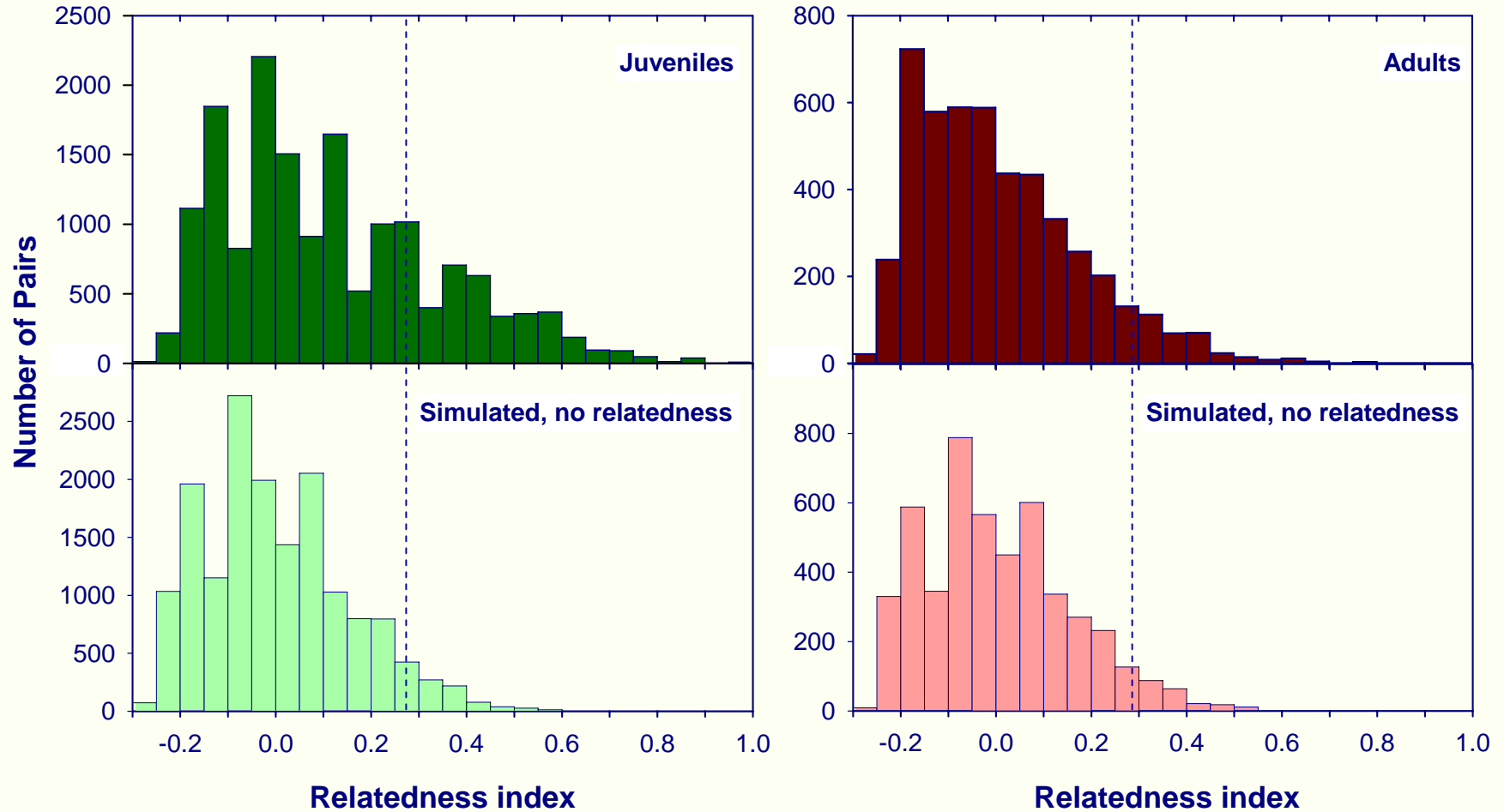
Juveniles, n=185



Adults, n=99



Relatedness within a Cohort



from Hedgecock, Edmands, and Barber. 2007 *Oceanography* 20:70-79

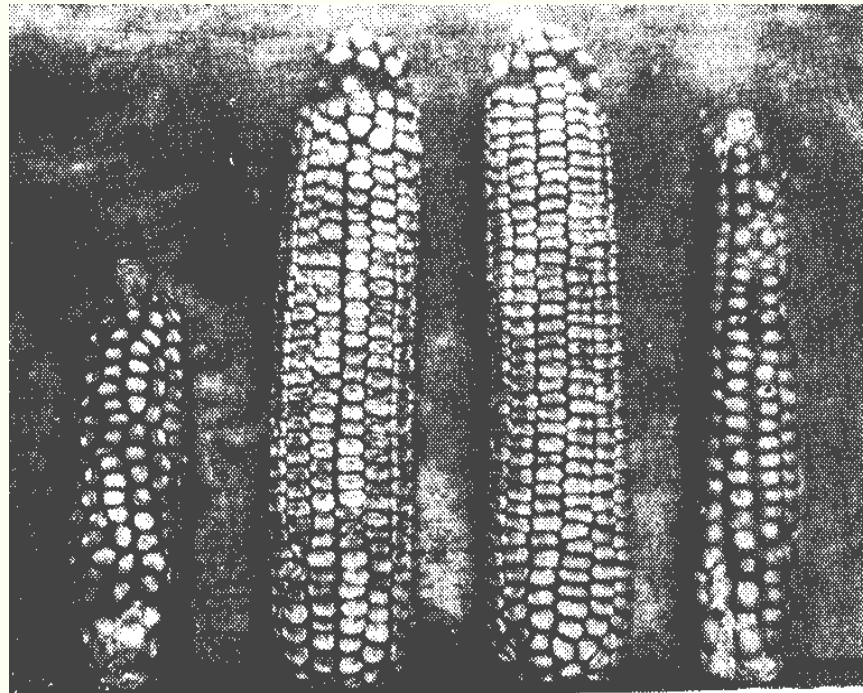
Causes of Hybrid Vigor for Growth?



Experimental crosses enable detailed physiological, genetic, and genomic analyses of this phenomenon

Heterosis for Yield in Corn

Strain B (Shull's 1908 photographs & drawings) **Strain A**



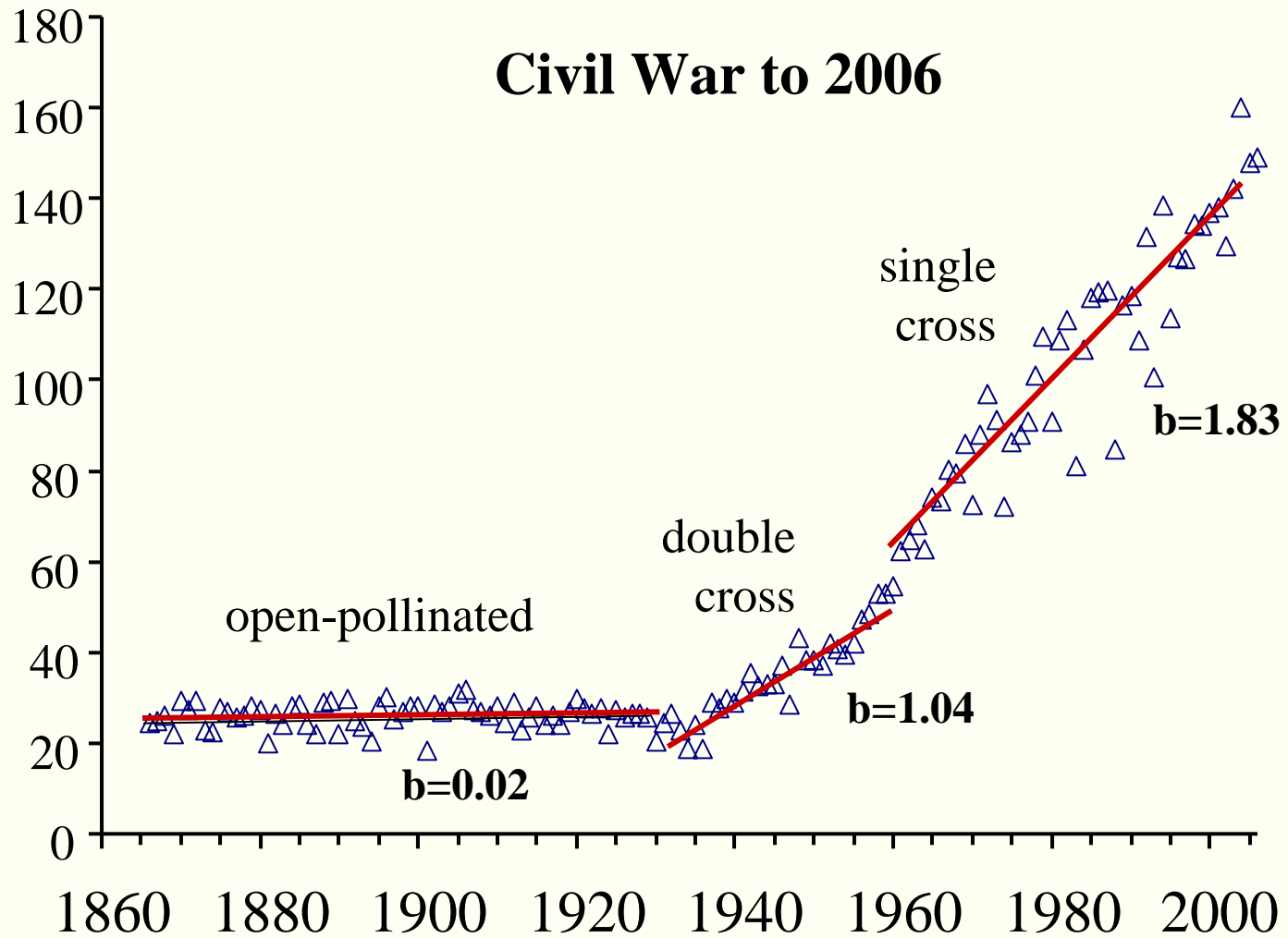
B x B A x B B x A A x A

G. H. Shull (1950) Beginnings of the Heterosis Concept. In *Heterosis*, J. W. Gowan, ed. Iowa State College Press



U.S. Yields & Kinds of Corn

bu. per acre



Data from USDA

Sterile Triploids Eliminate Interaction of Farmed & Wild Fish



Photograph by Joth Davis