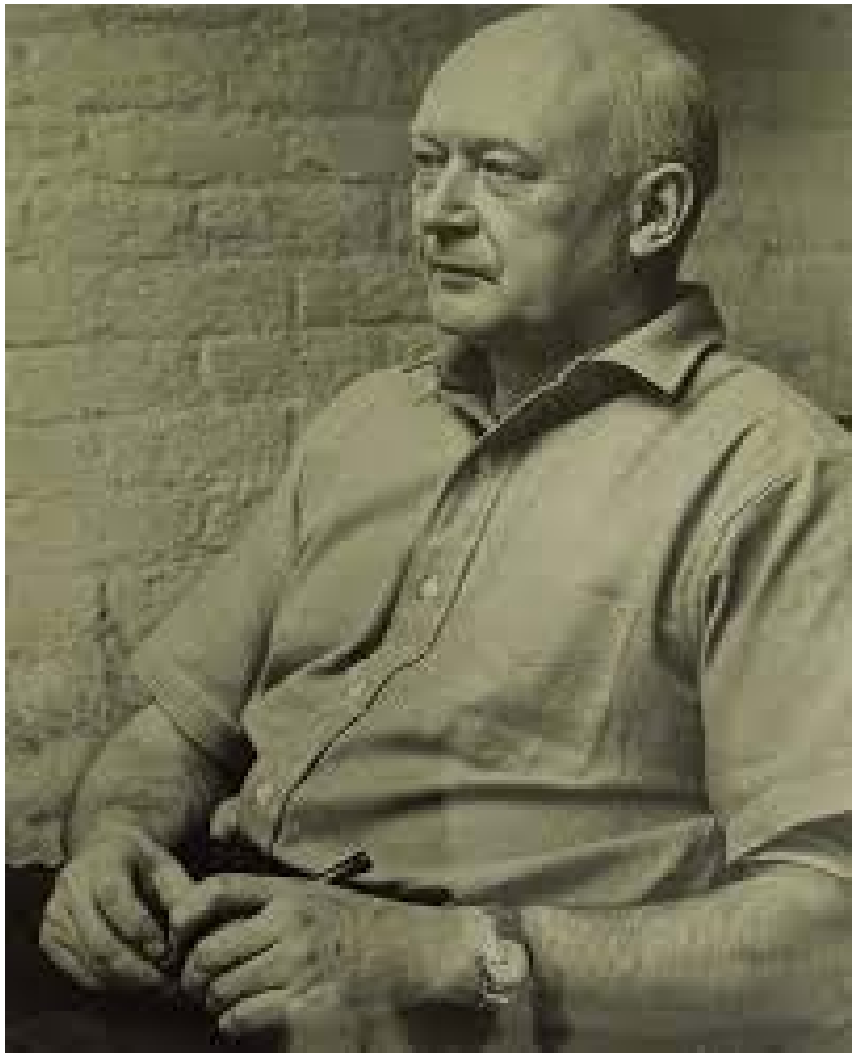
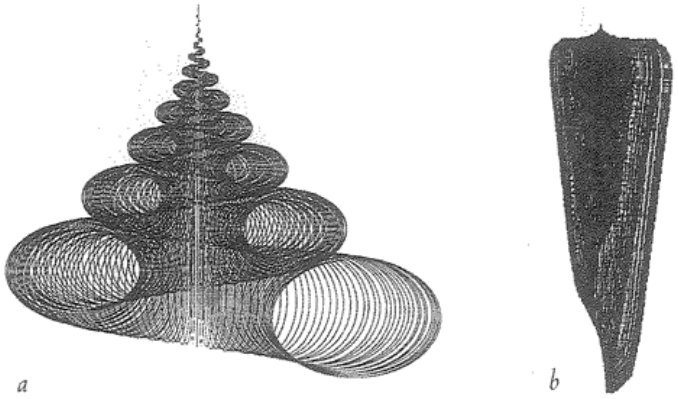
Institute of Animal Genetics, Edinburgh

C H Waddington



Waddington as malacologist



The Waddington Building

CANALIZATION OF DEVELOPMENT AND THE INHERITANCE OF ACQUIRED CHARACTERS

By Dr. C. H. WADDINGTON

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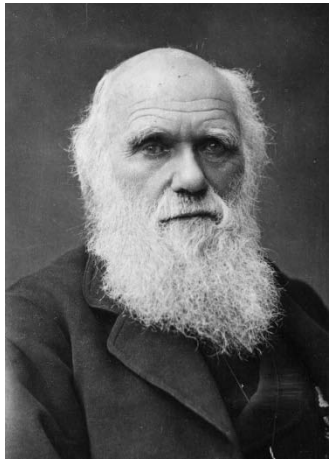
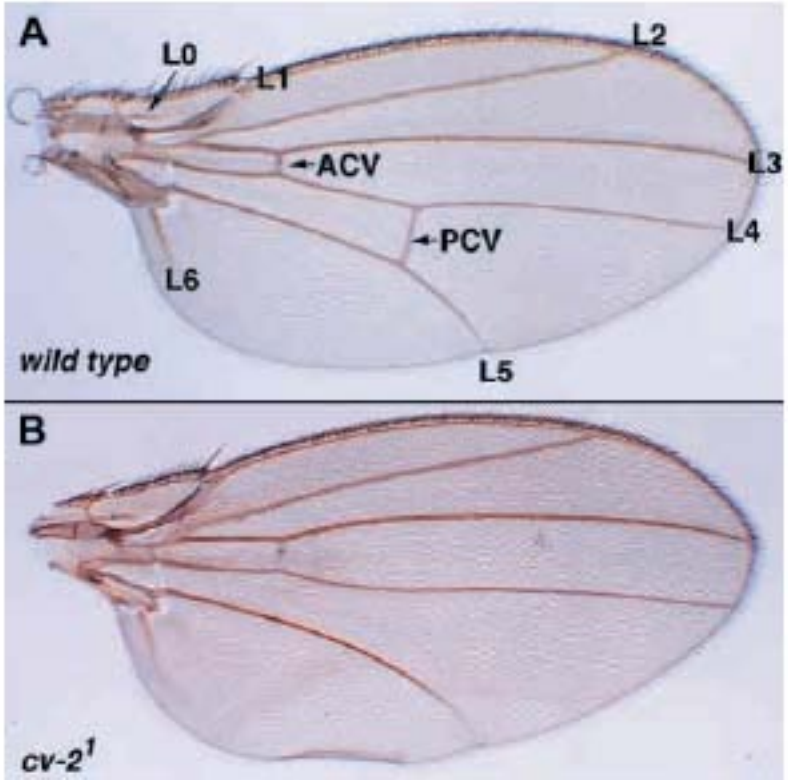
"*Fondateur de la Doctrine d'Evolution*" in the Jardin des Plantes



279. PARIS — Jardin des Plantes
Bas-relief de la Statue de Lamarck
fondateur de la Doctrine de l'Evolution

Crossveinless; Waddington's genetic assimilation experiment



Cepaea nemoralis

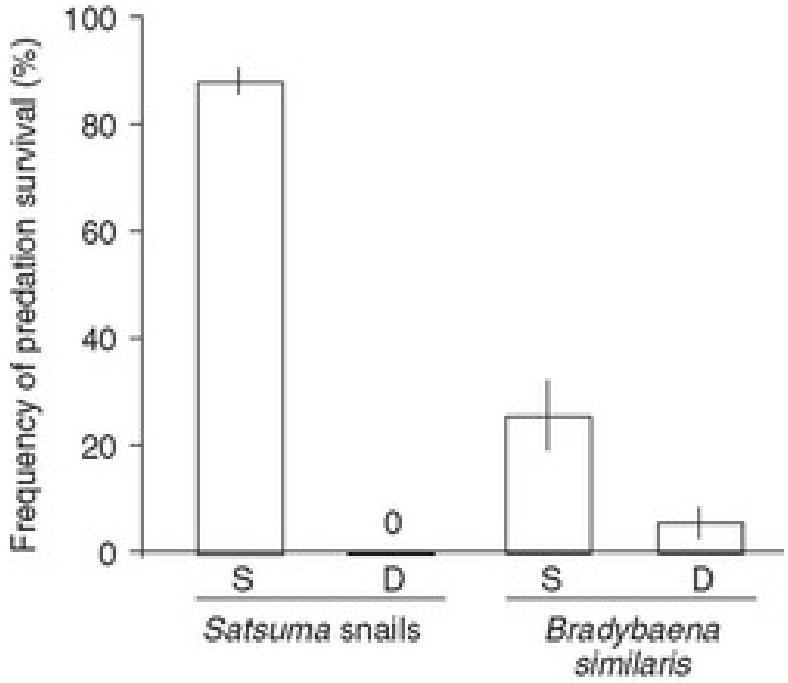
A rare left-leaning *Cepaea*: developmental accident 1/10 000

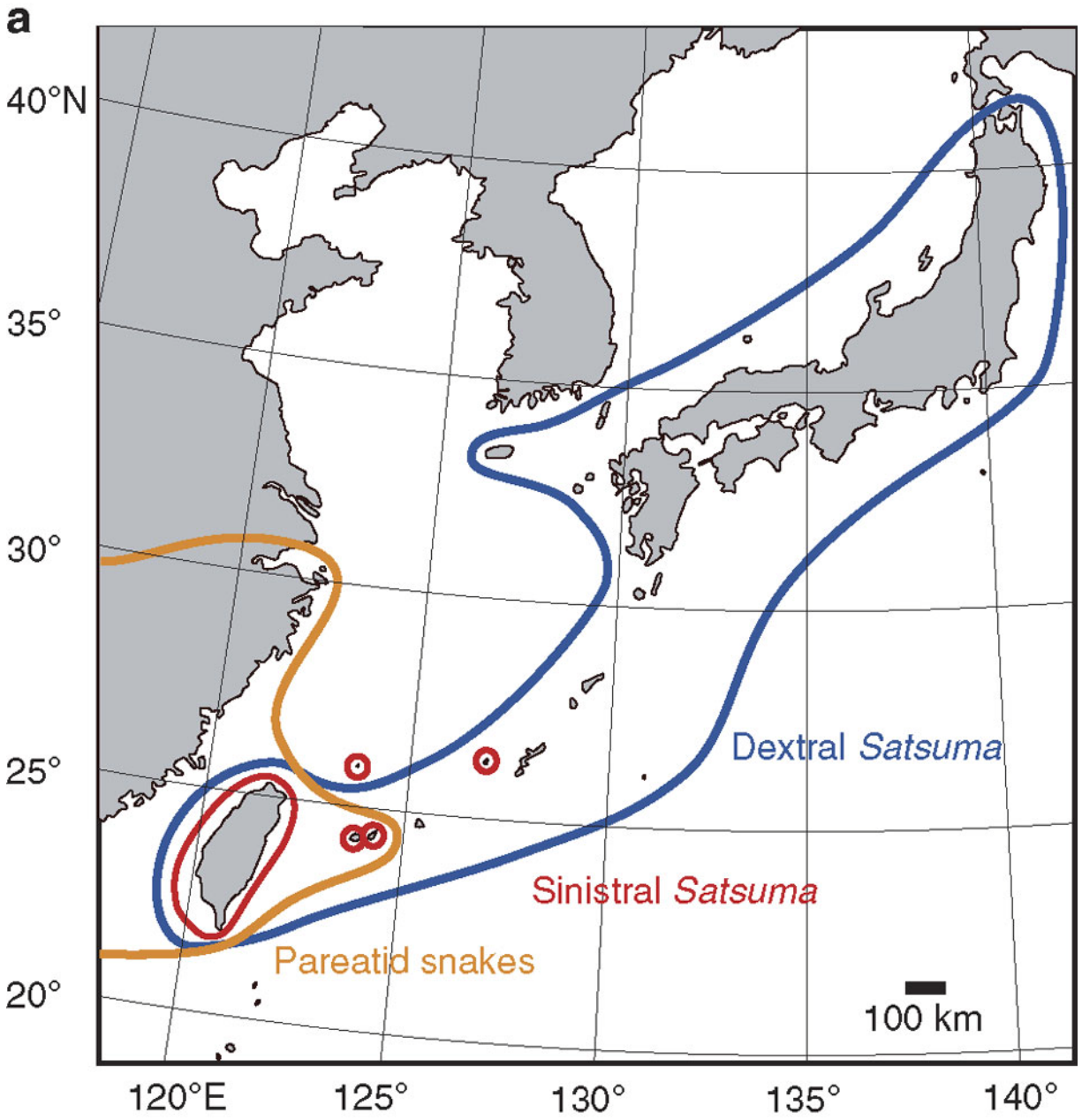
Prezygotic isolation: the tragic tale of the left-and right-handed snails. Successful (2 x dextral) versus failed (sinistral + dextral) copulations: arrows point at genital openings

Snail-eating Asian snake, specialises on right-coil shells

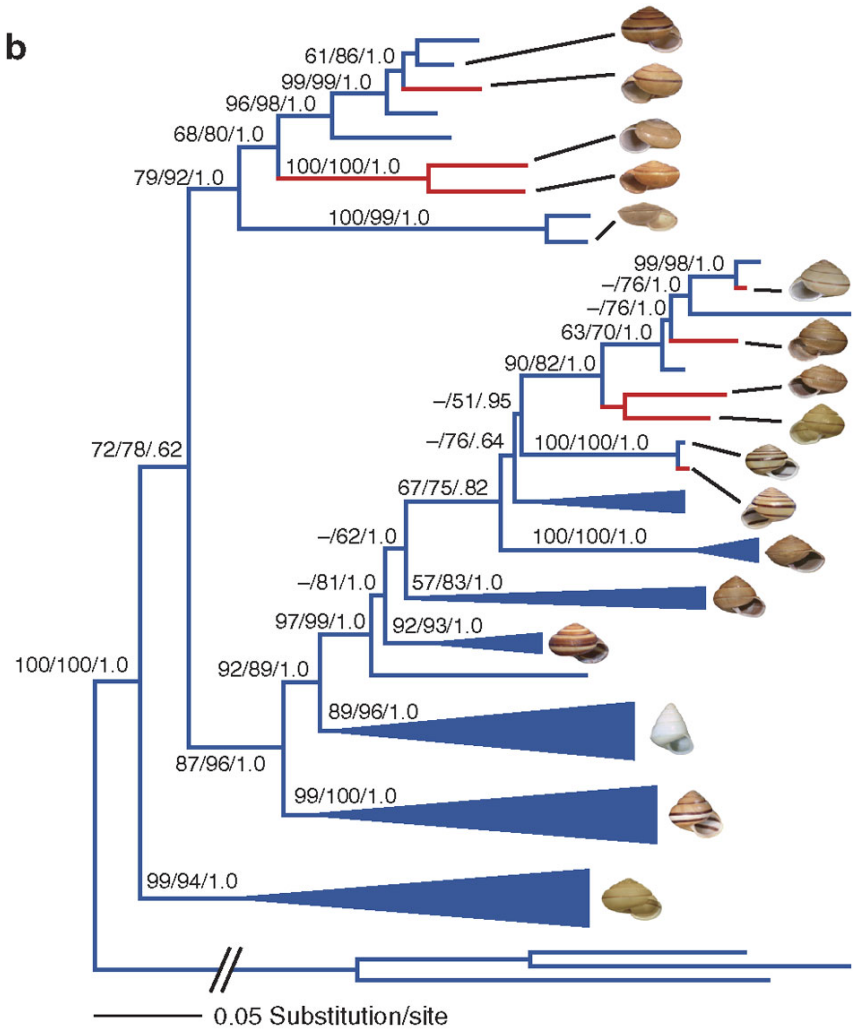
a

Sinistrals safe from attack



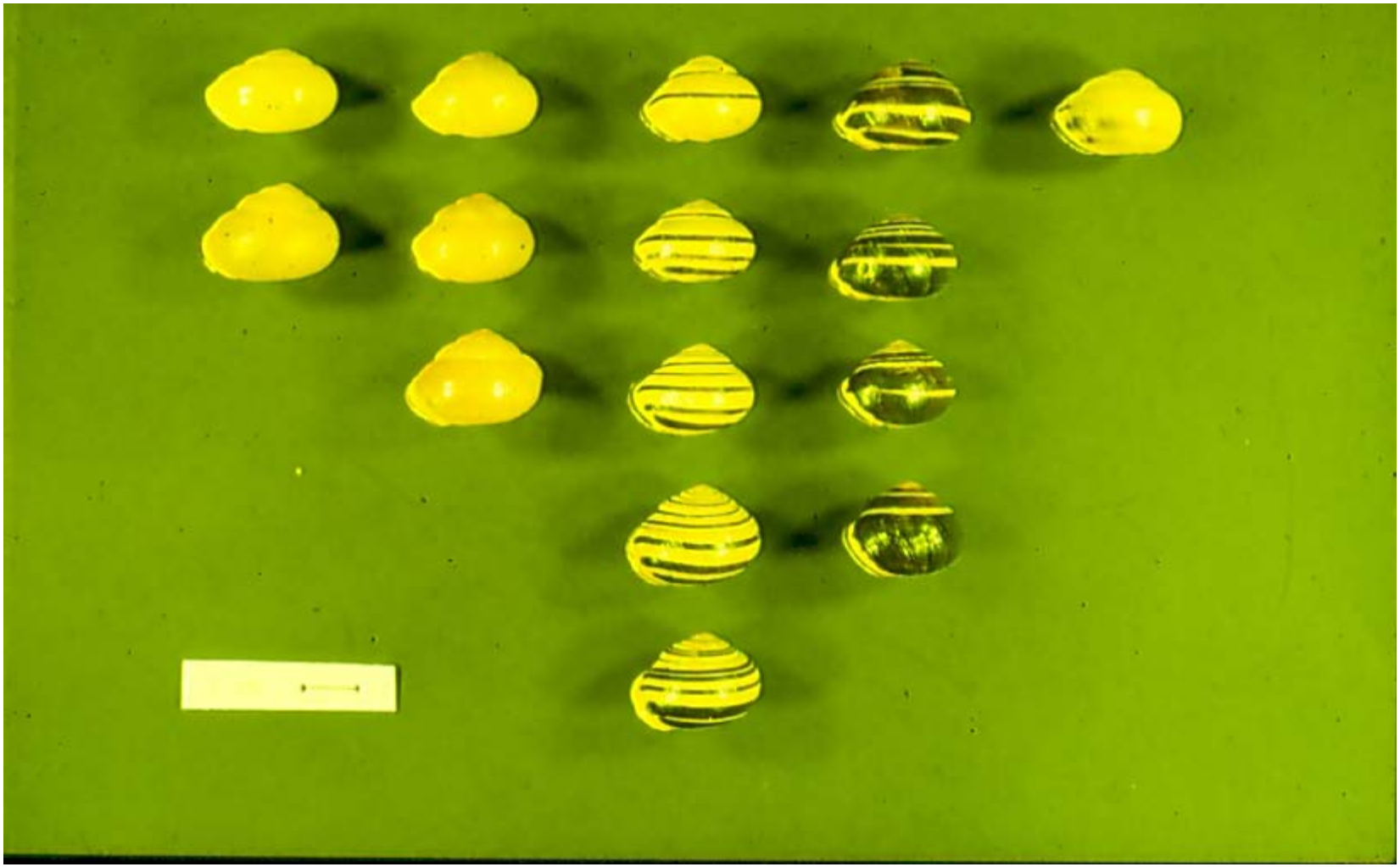

a
40°N
35°
30°
25°
20°
120°E
125°
130°
135°
140°
Dextral *Satsuma*
Sinistral *Satsuma*
Pareatid snakes
100 km

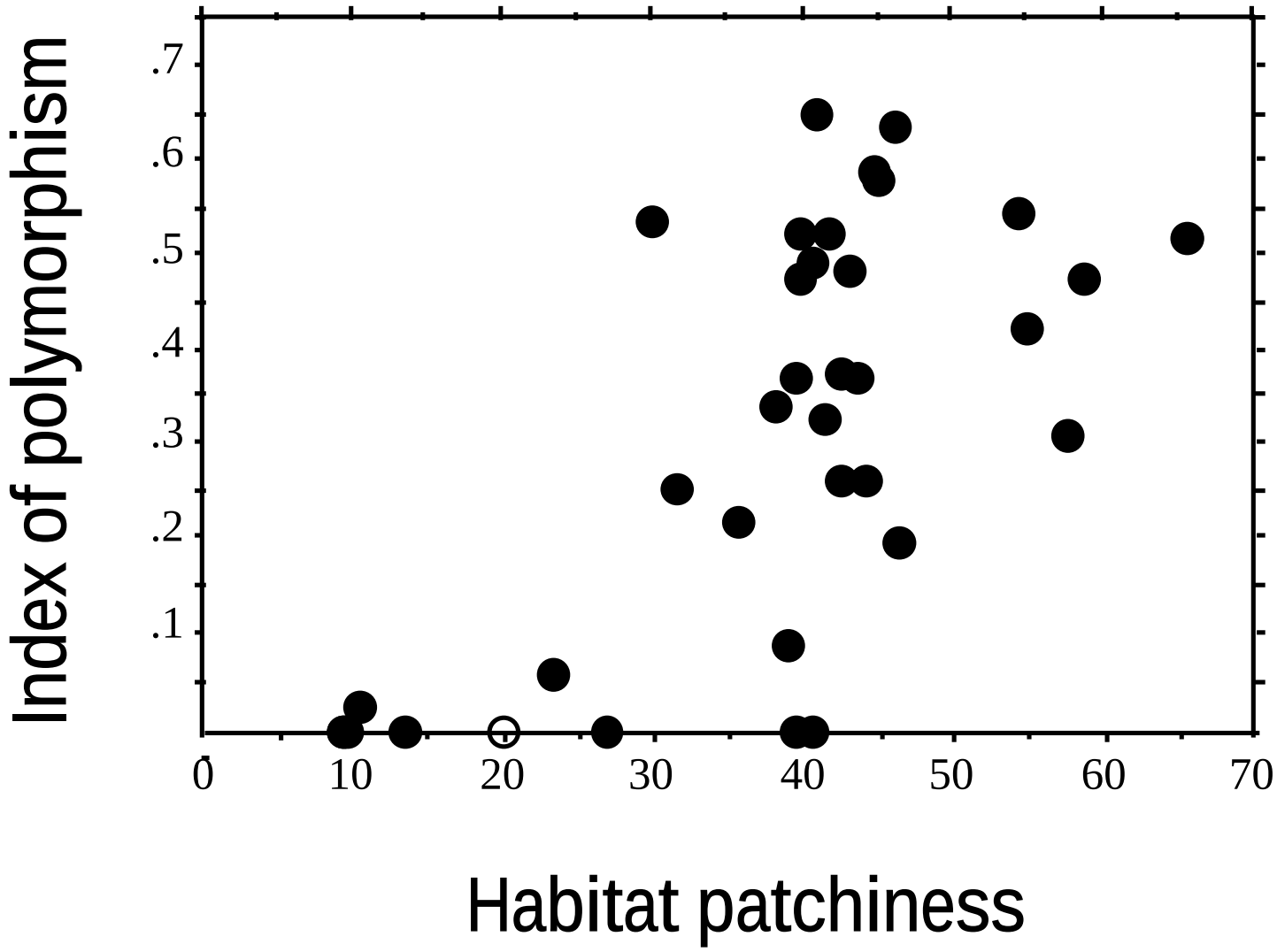
Independent origins of sinistrality in *Satsuma* snails: genetic assimilation of developmental accident?

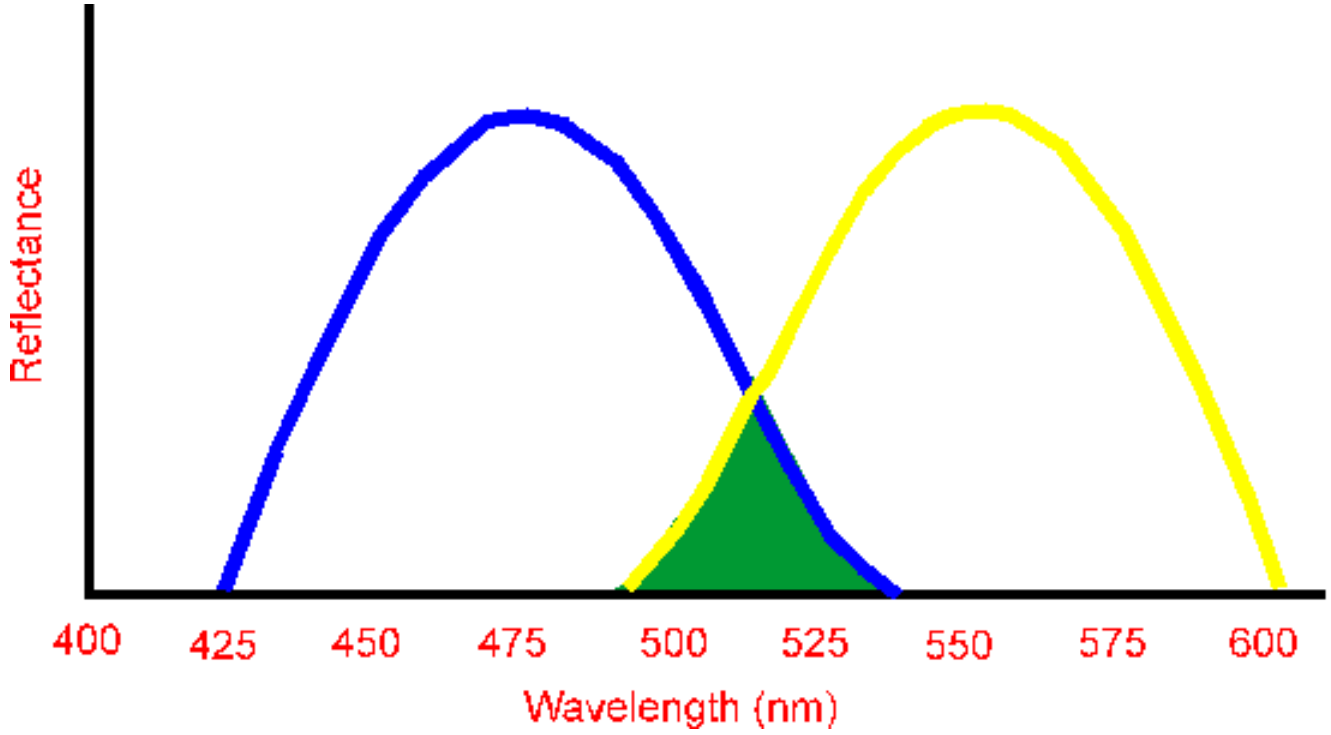


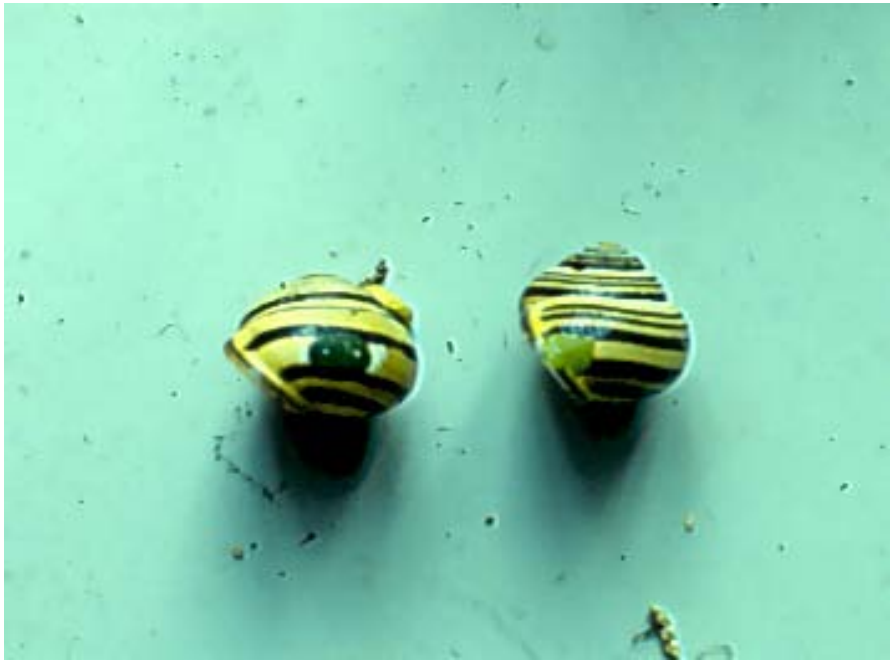
Valle de Aran – wide range of habitats

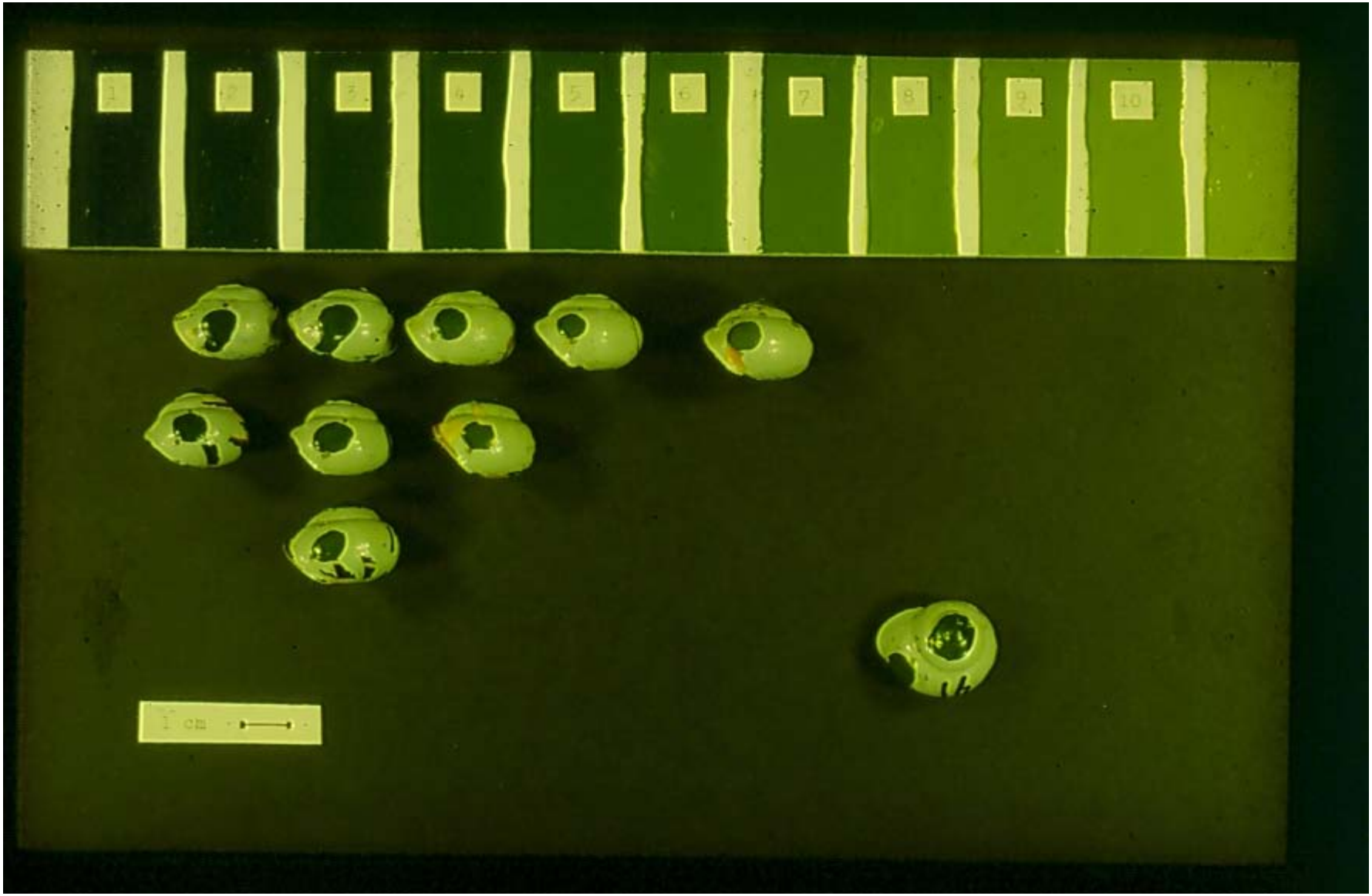
Habitat Types – Val d’ Aran

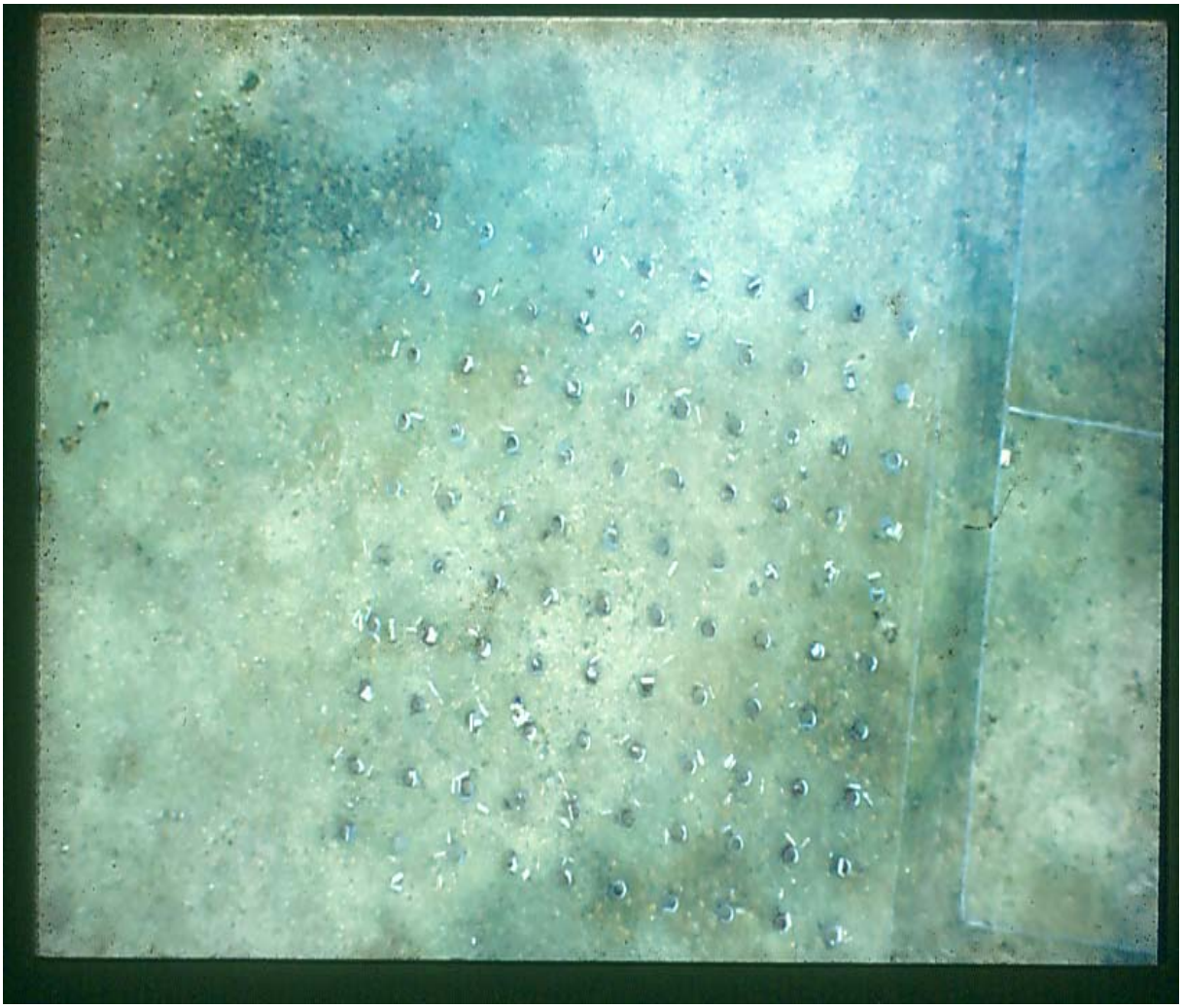



Index of polymorphism
.7
.6
.5
.4
.3
.2
.1
0
10
20
30
40
50
60
70
Habitat patchiness

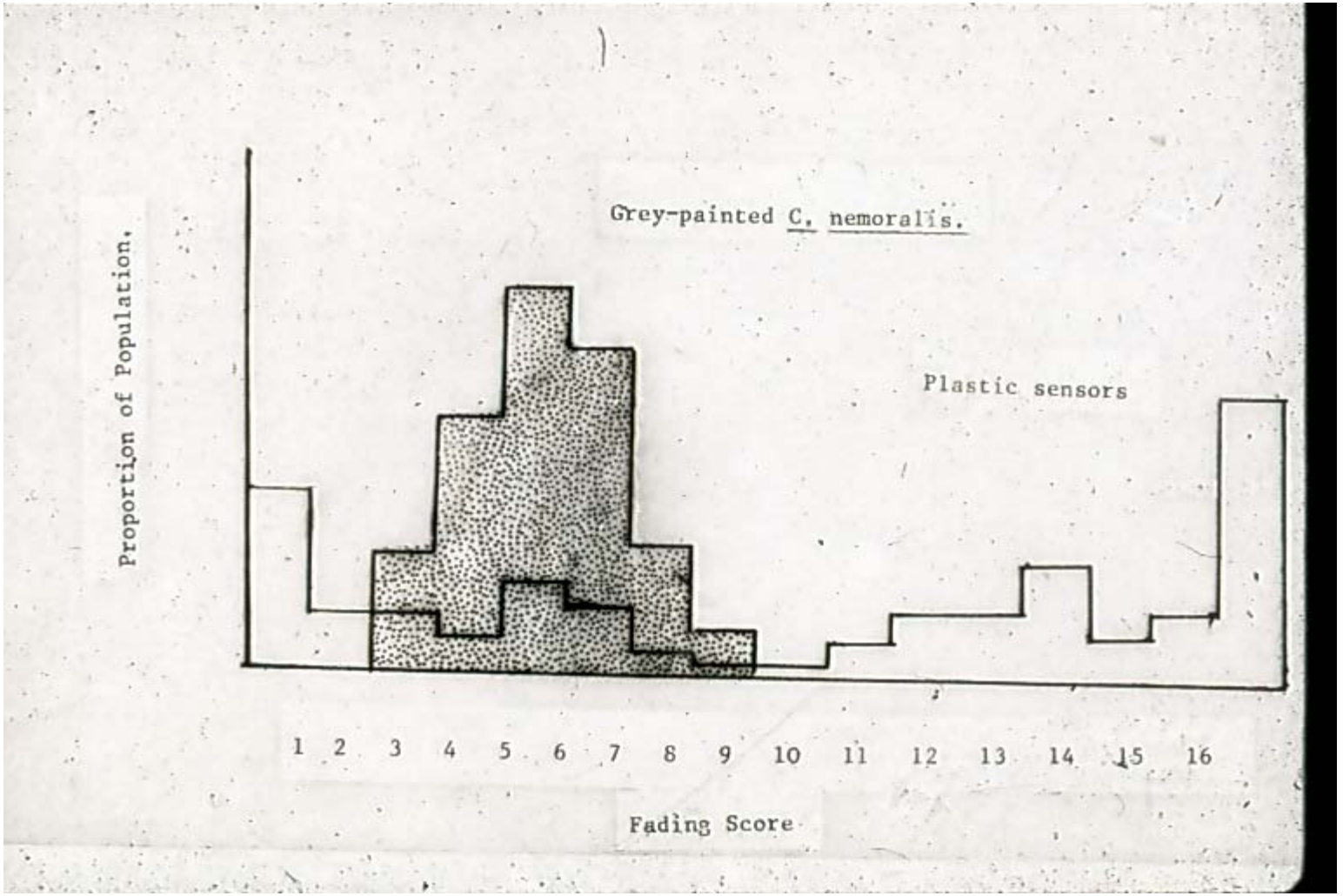

Reflectance
400
425
450
475
500
525
550
575
600
Wavelength (nm)

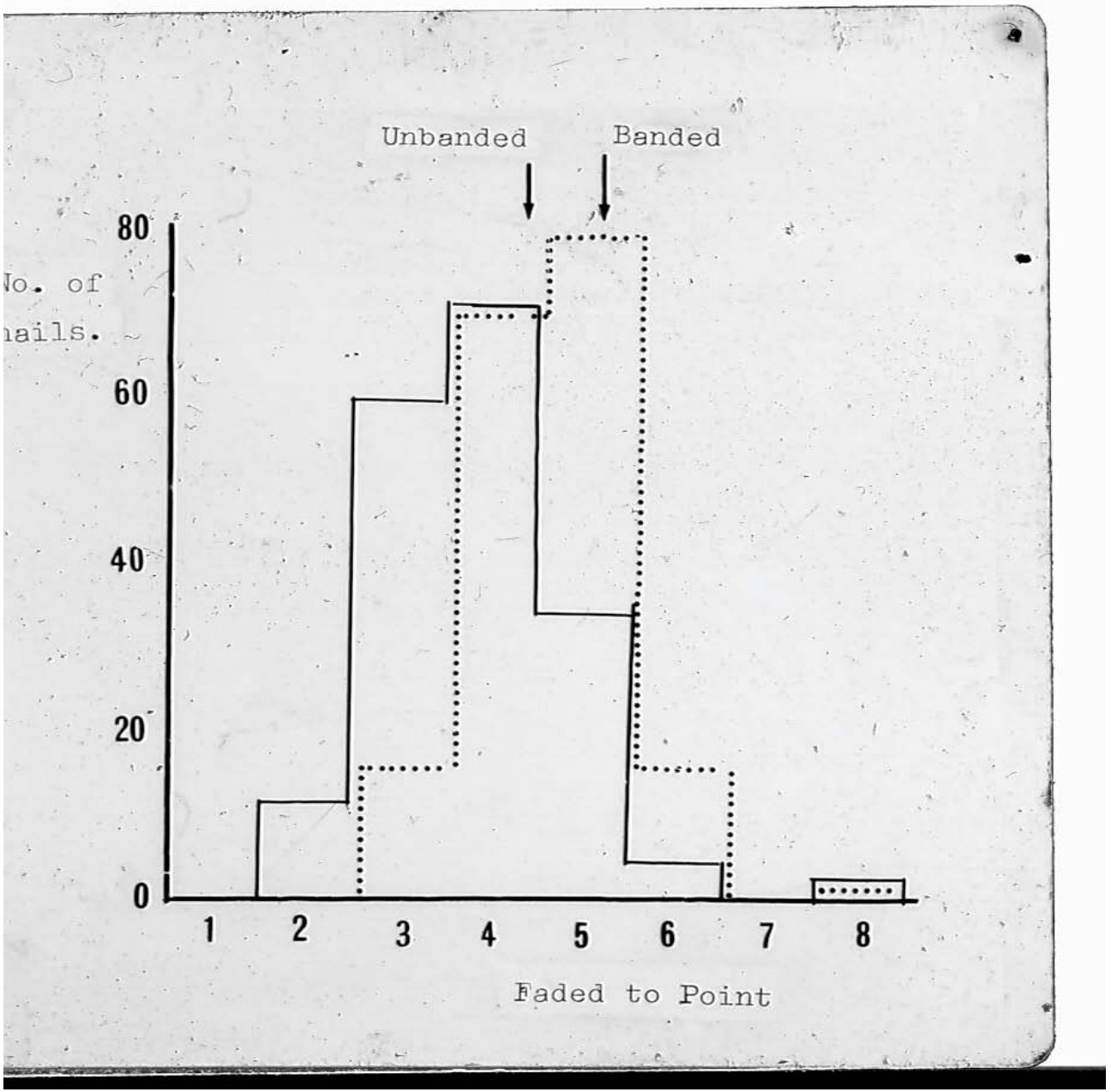


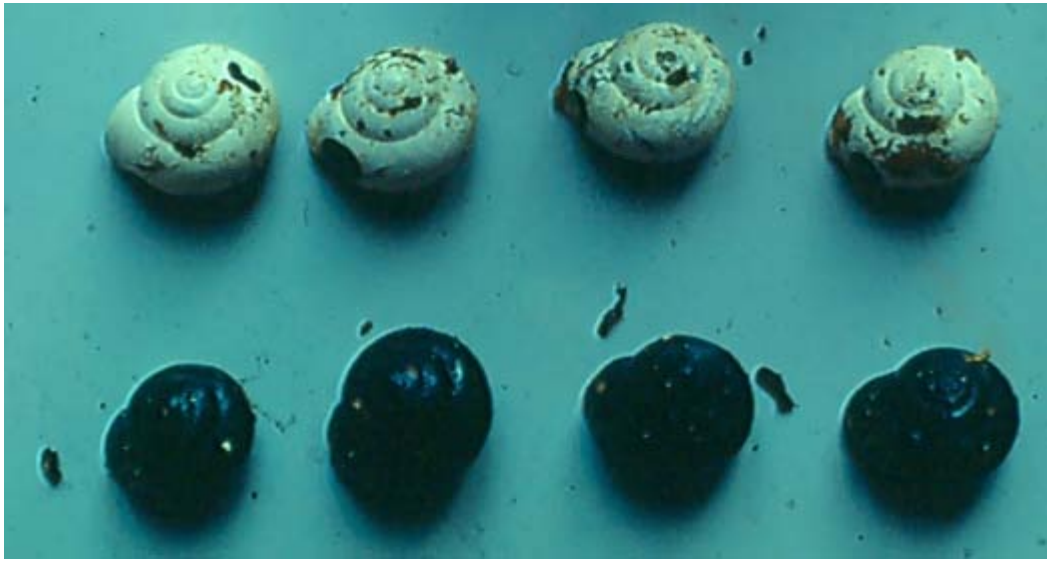

1
2
3
4
5
6
7
8
9
10
1 cm

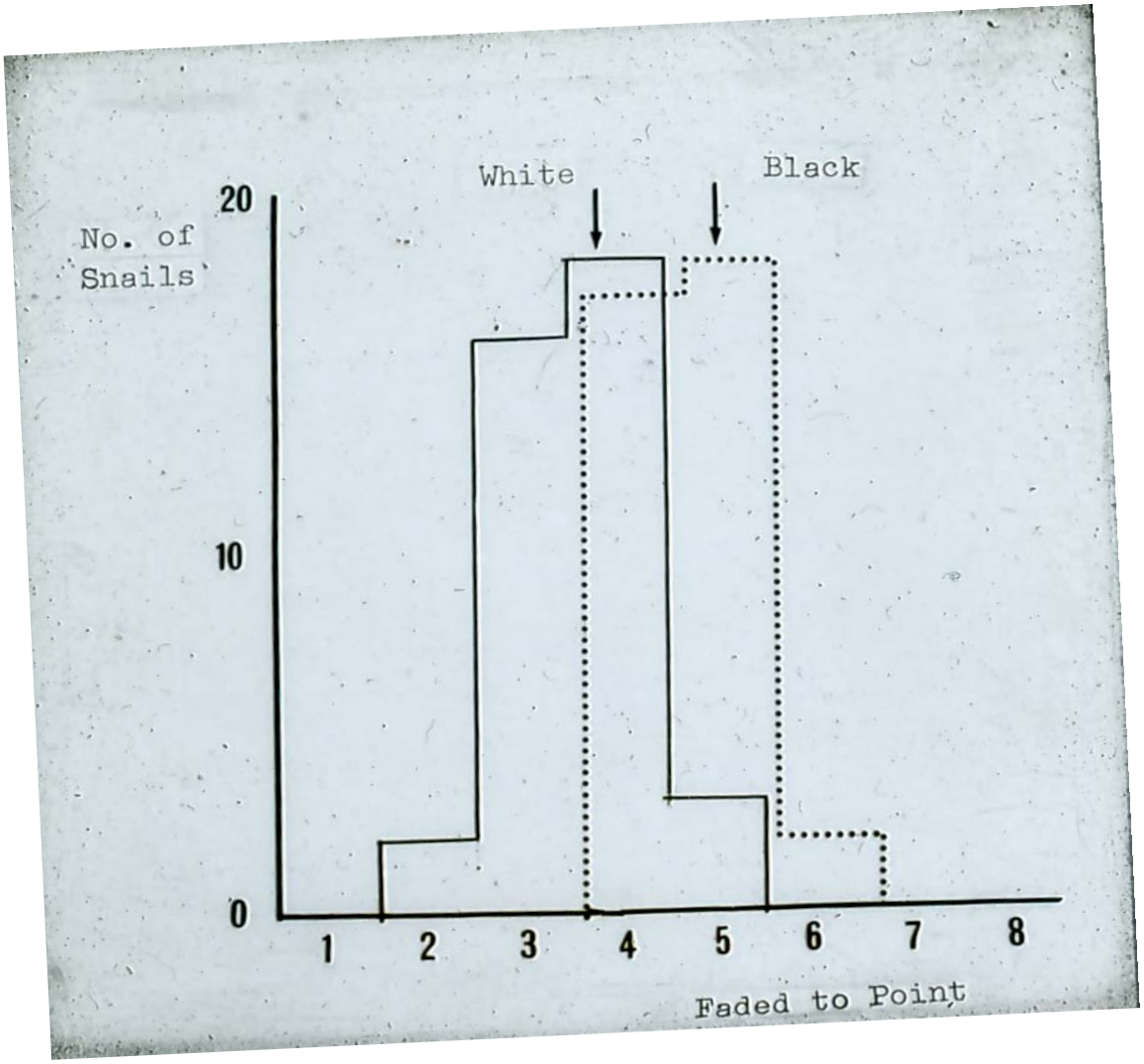


Potential and realised niche

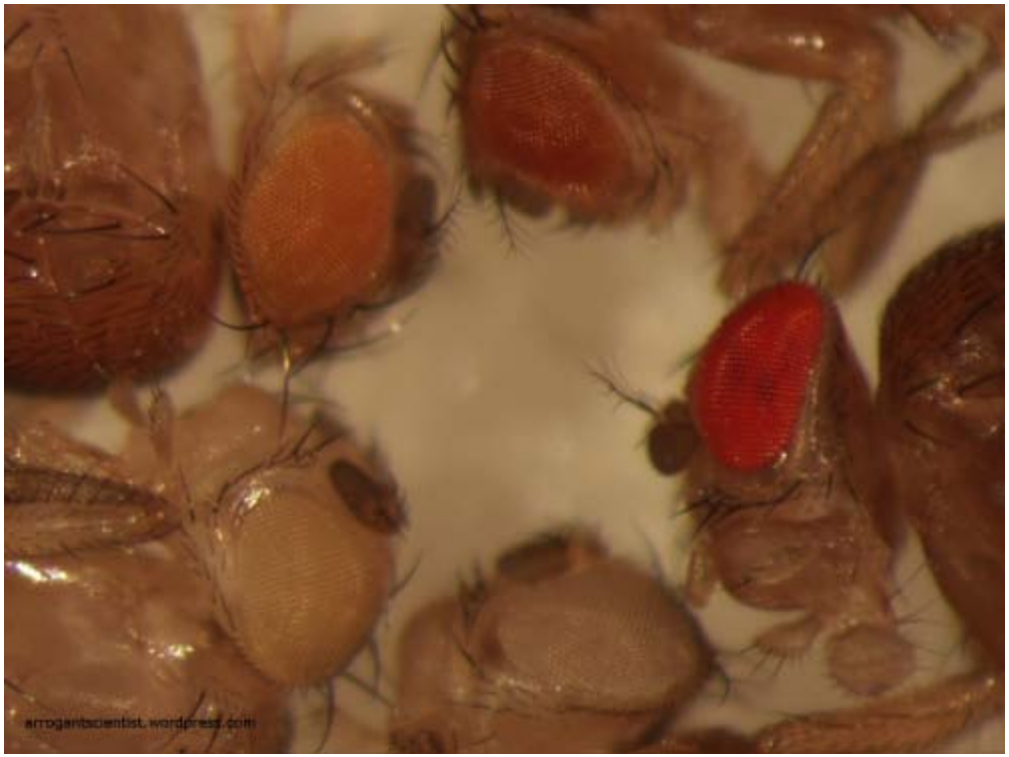



Unbanded
Banded
No. of
nails.
80
60
40
20
0
1
2
3
4
5
6
7
8
Faded to Point

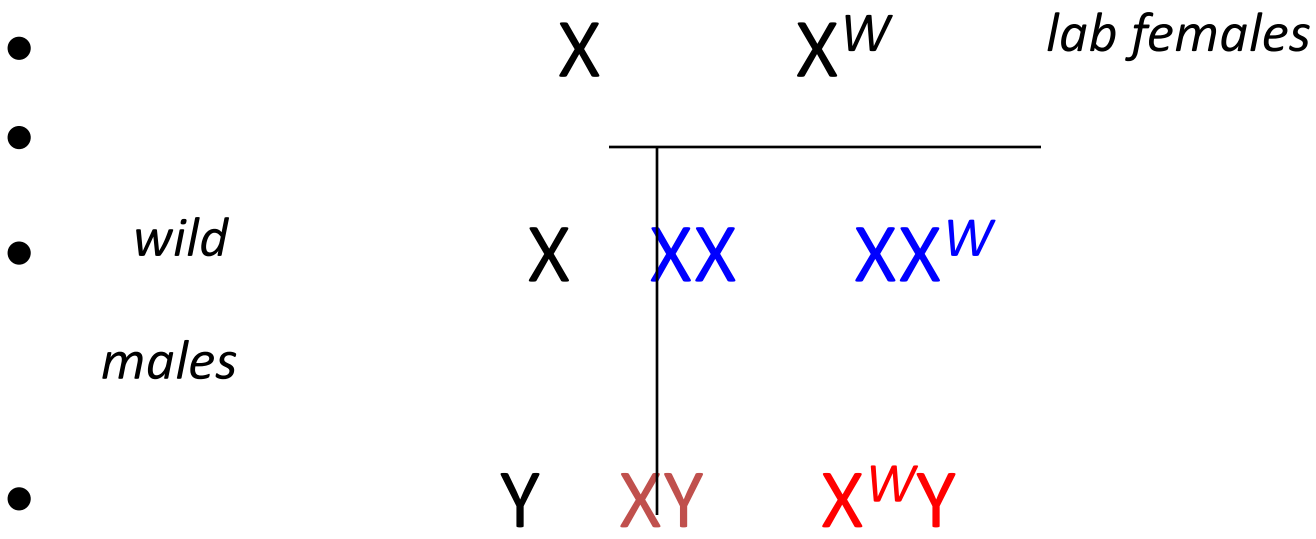


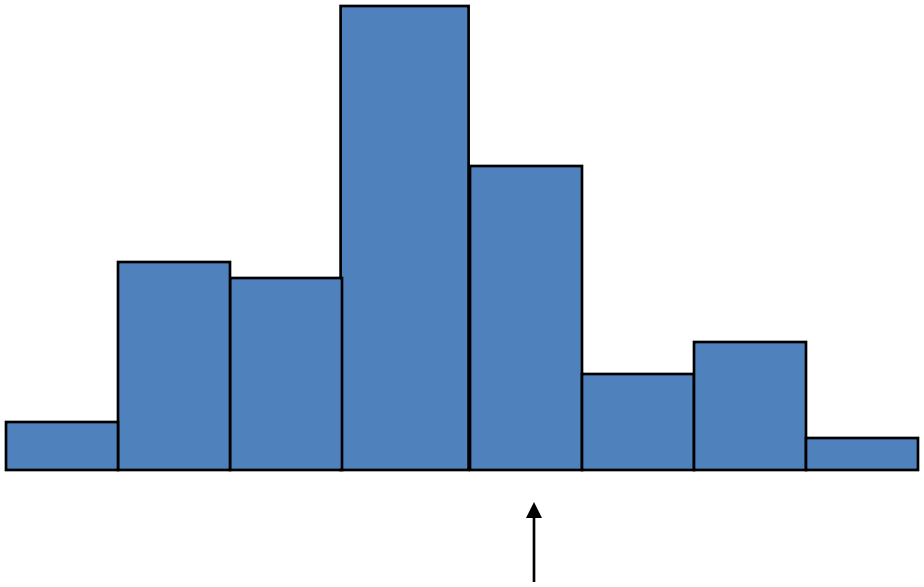

White
Black
No. of Snails
20
10
0
1
2
3
4
5
6
7
8
Faded to Point

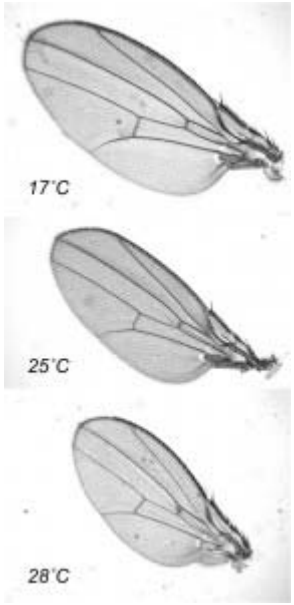
White^{blood} mutant at different temperatures



White-blood Release

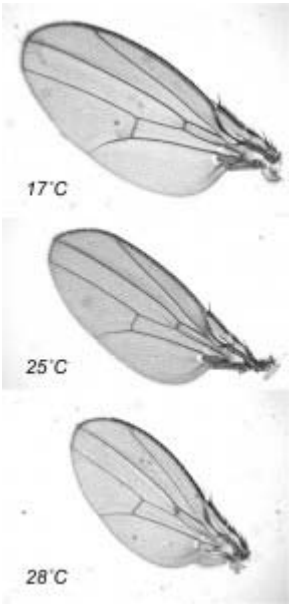






Range of developmental temperatures, from 18 to 32 degrees in the wild; plus effect on wing size

Effect of wing size on mating success in D mel; large males more successful



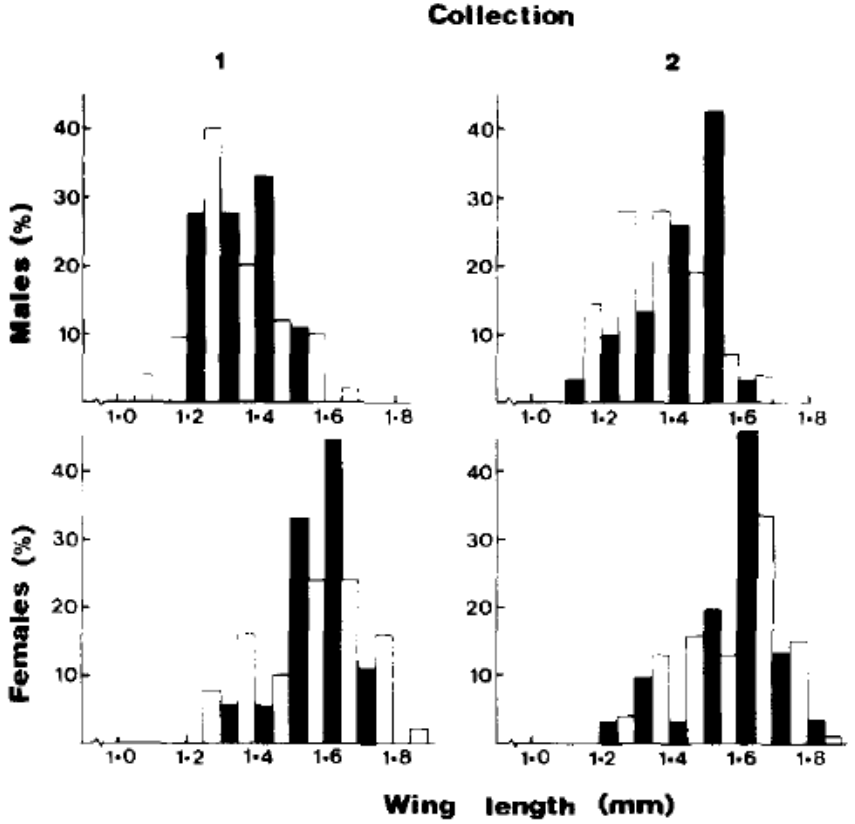
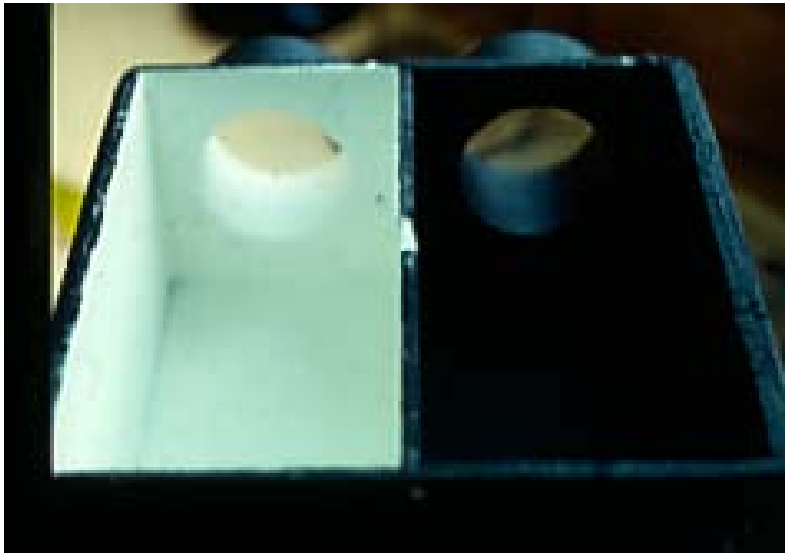
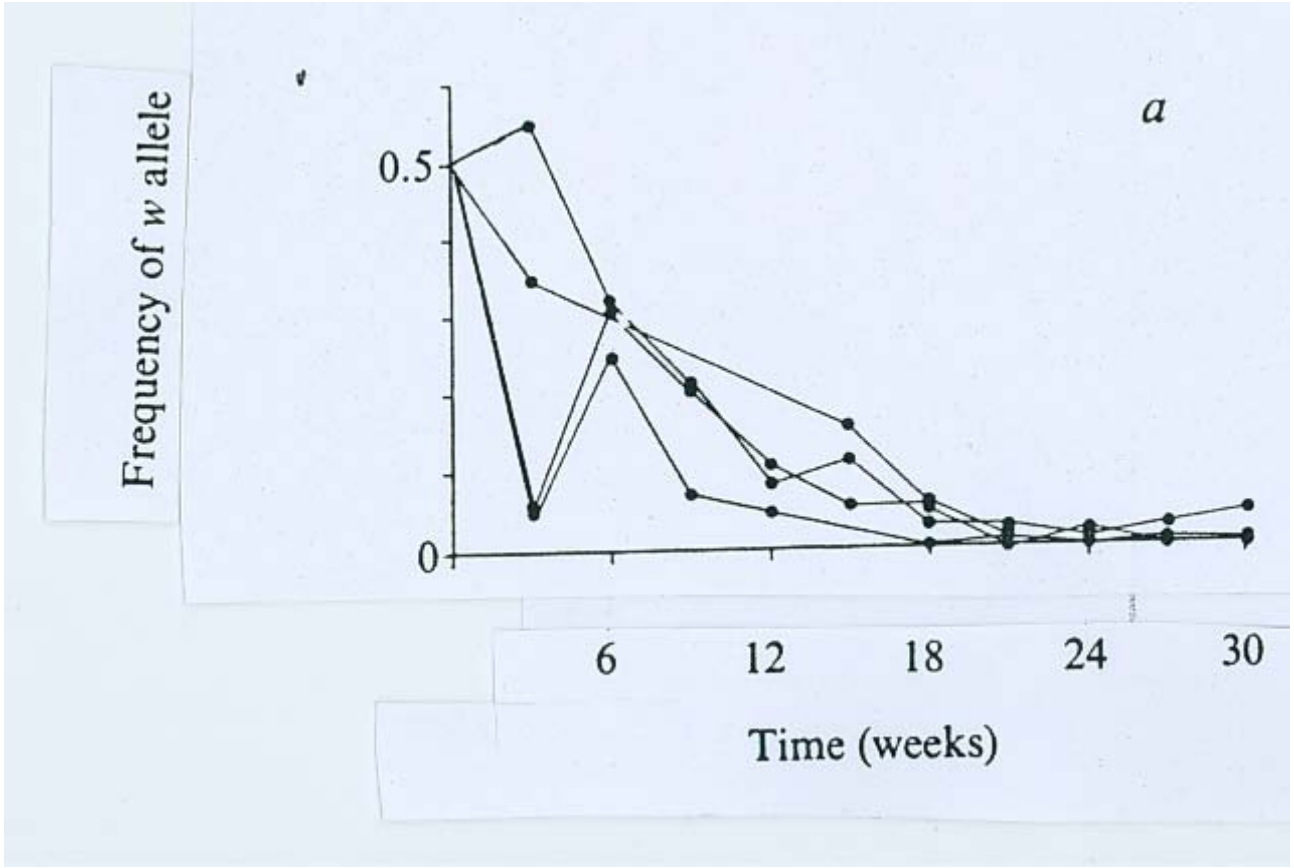


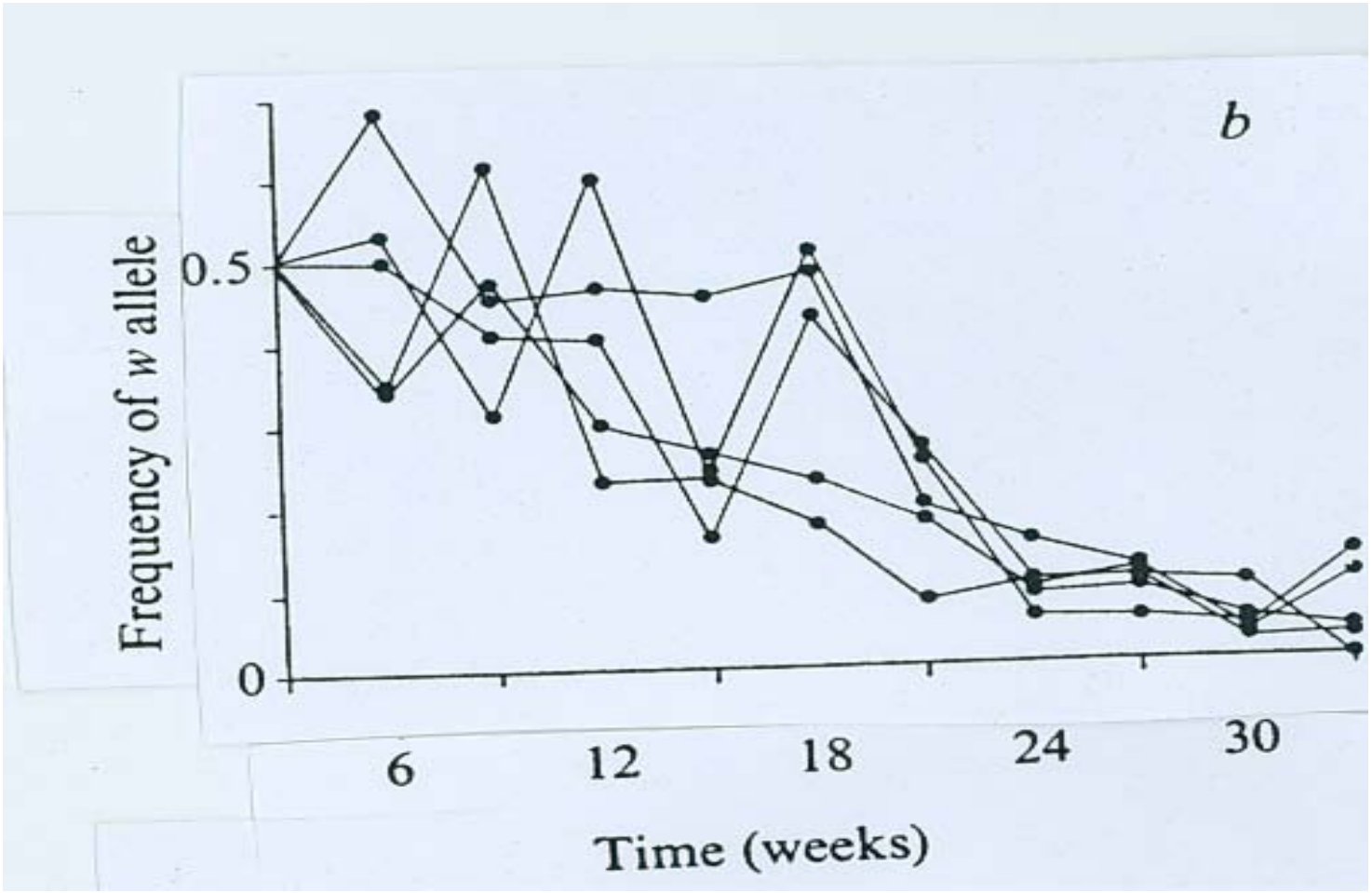
Figure 2. Frequency histograms of the sizes of mating (closed bars) and randomly-sampled (open bars) wild male and female *D. melanogaster* from cherries.



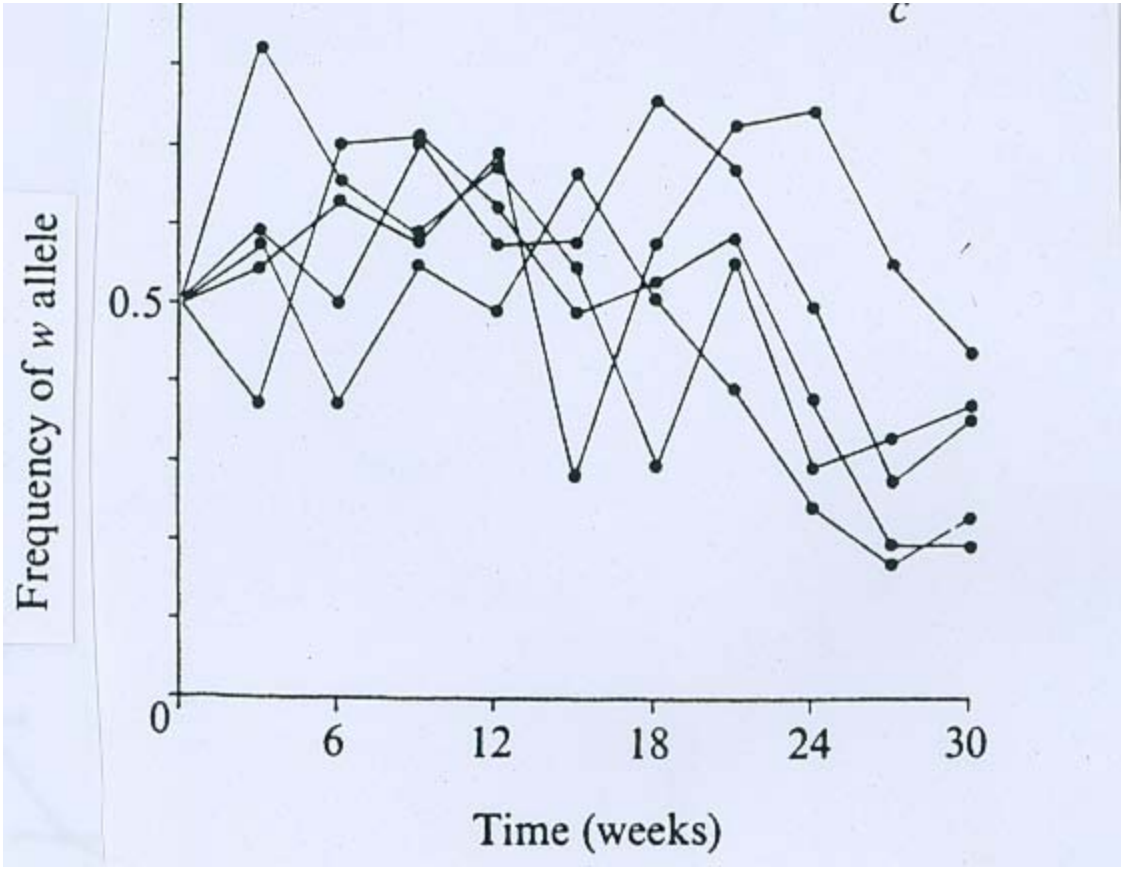
White-light cage



Red light cages



Patchy Cage



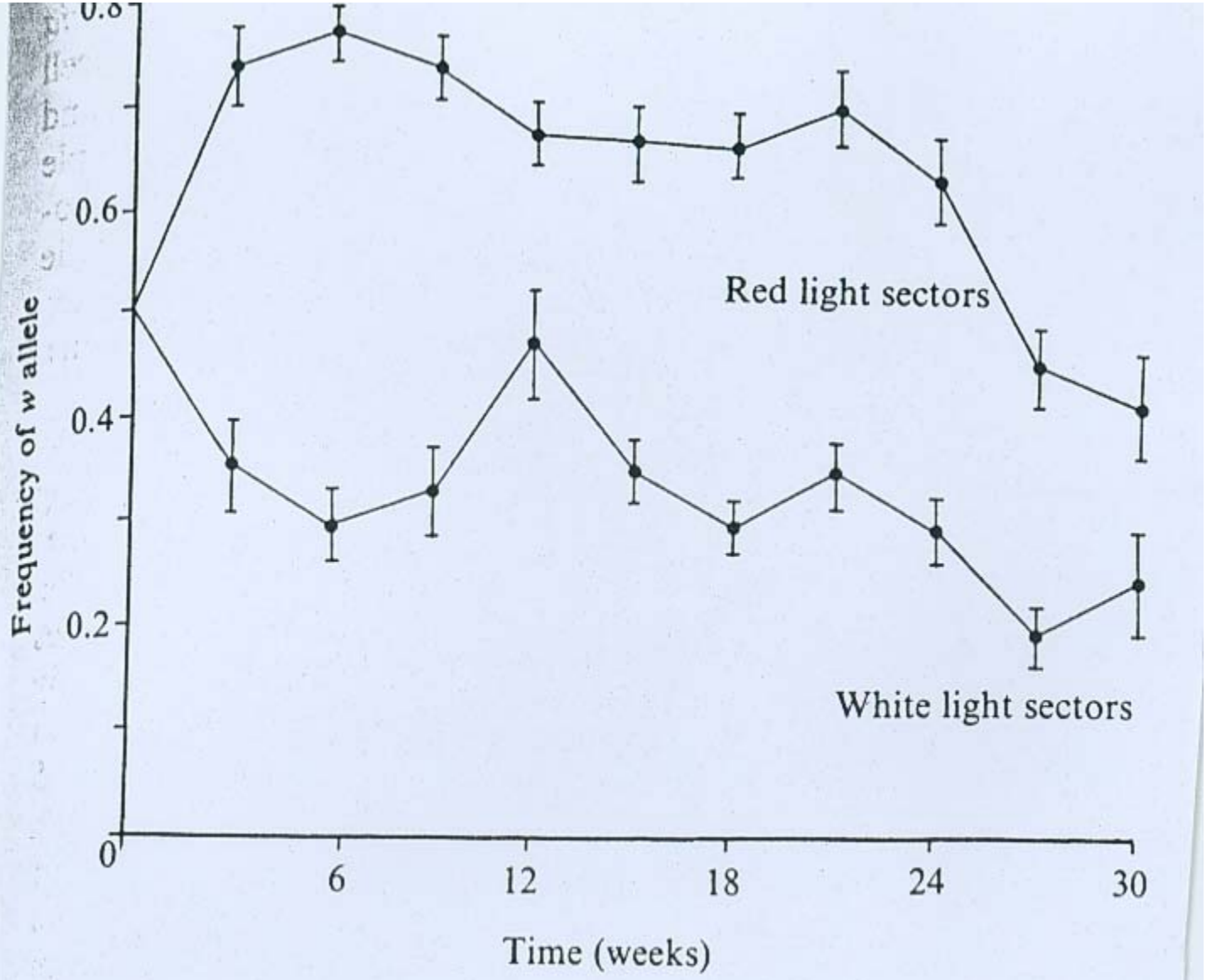


Fig. 2 Divergence in the frequency of the *w* allele between the red light and white light sectors of the experimental cages, summed over all cages

The Drosophila maze: choose up or down, dark or light, ethanol or acetaldehyde scent; plus fast and slow development

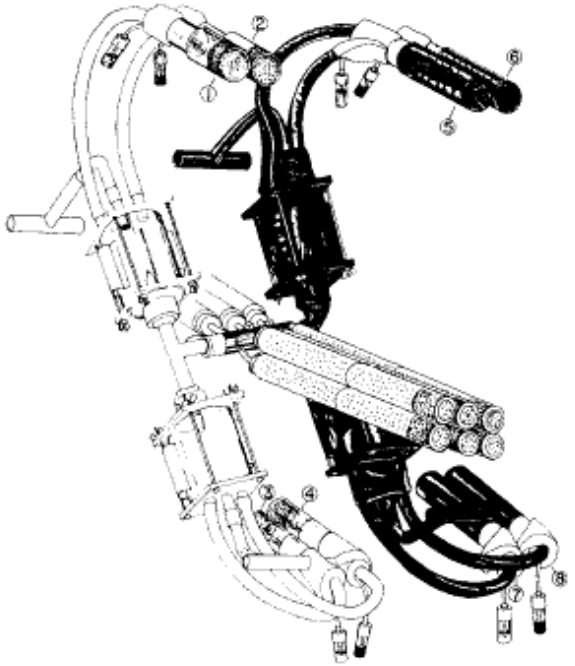
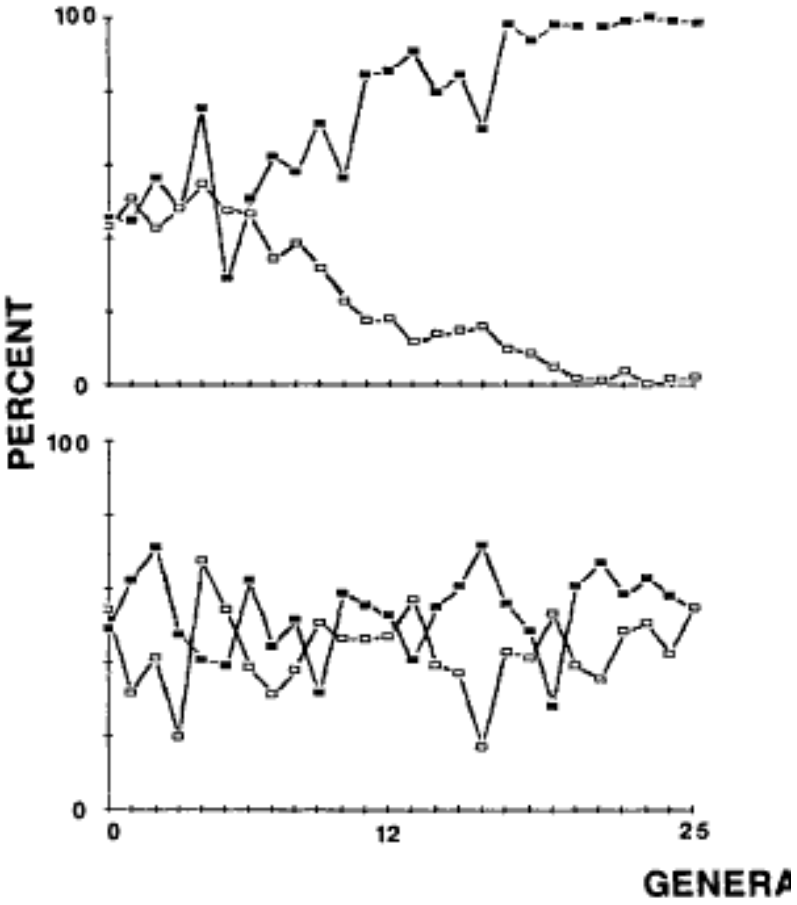


FIG. 1.—A drawing of the habitat maze indicating the position of the habitats (labeled 1–8), and the tygon tubes containing the pupae (center). The maze was continuously lighted by fluorescent ceiling lights. The temperature was 25°C and the relative humidity 50%. Chemotaxis vials, attached to each habitat, contained 47.5% ethanol (dark) or 0.5% acetaldehyde (light) and delivered the agents via a wick.

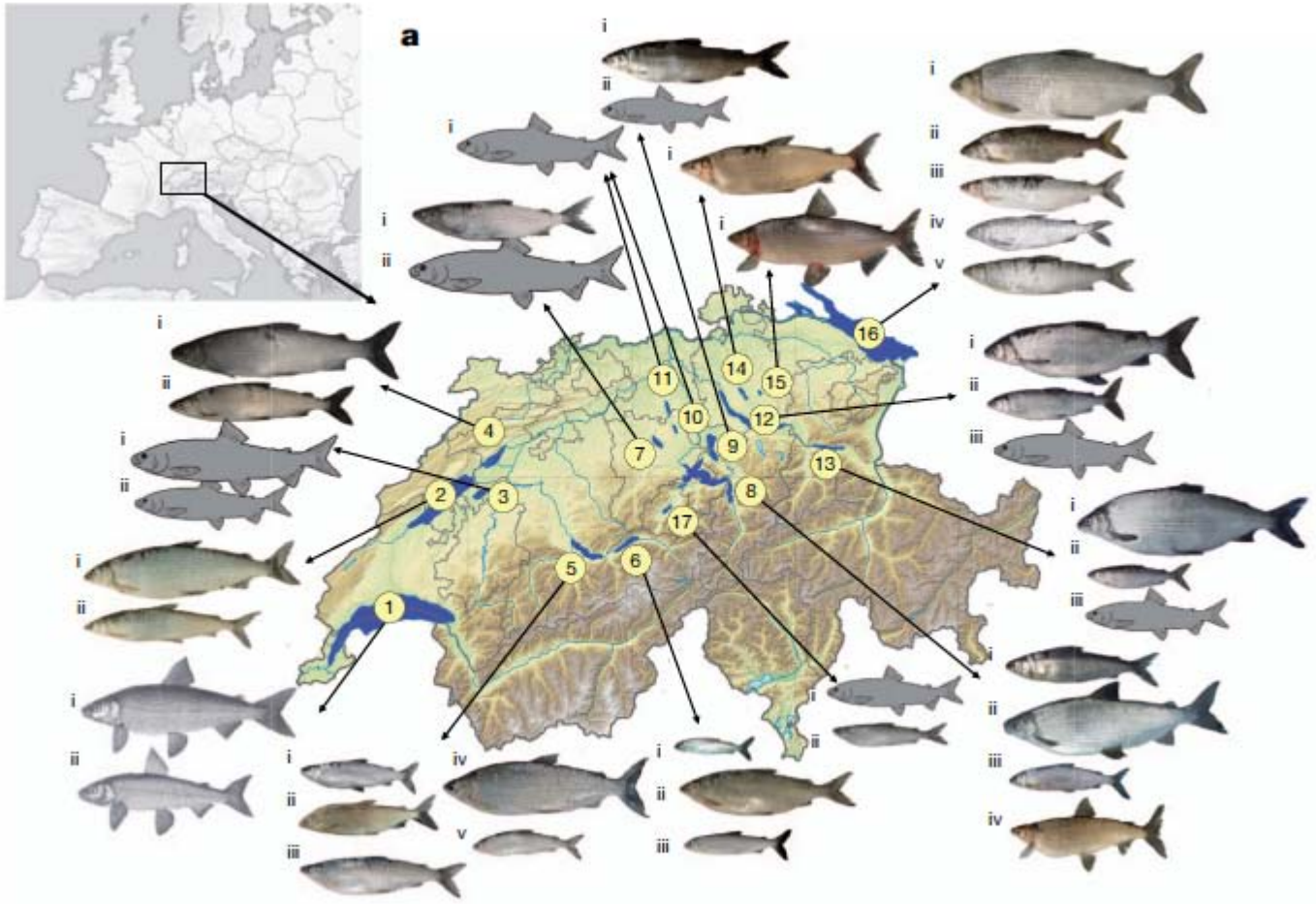
Rapid divergence by habitat choice and mating preference in the maze (expt above, control [no choice] below)



Two forms of *Coregonus* whitefish in Canadian Lakes <10ky old: large feeds on mud, small in open water – on the way to speciation; hybrids less likely to survive

Just the same story in Canadian sticklebacks *Gasterosteus;* each prefers to mate with their own type

The *Coregonus* of Swiss lakes fifty years ago: do not hybridise in the wild and seen as different species



Reduction in *Coregonus* species numbers after phosphate and mud pollution: DNA of old and new specimens show this is due to hybridisation of once distinct species