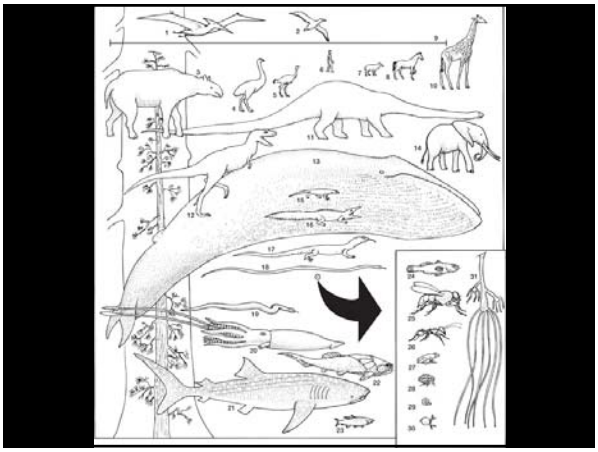
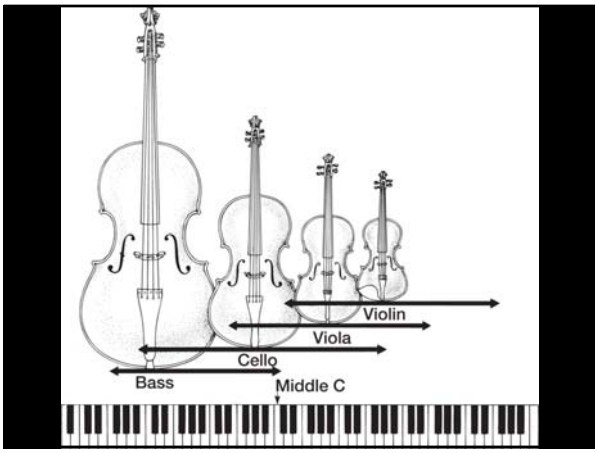
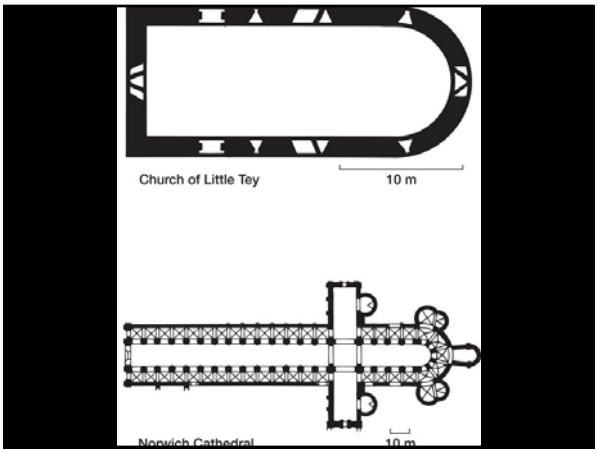
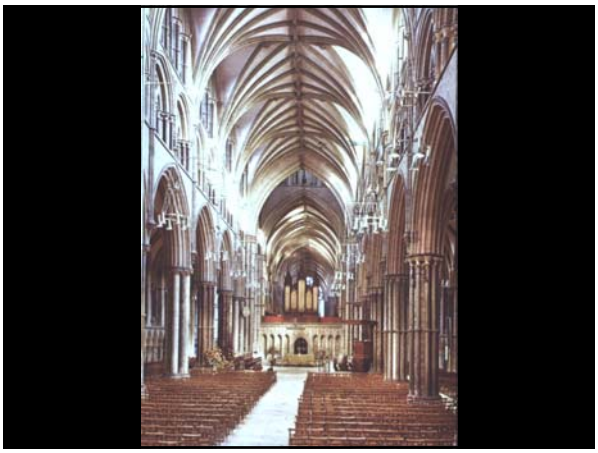
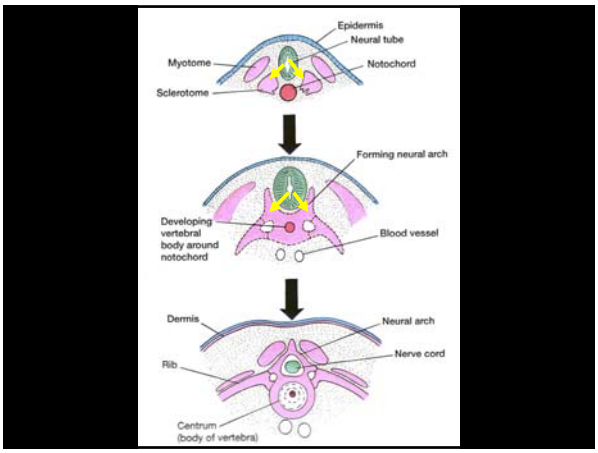
Size and Shape

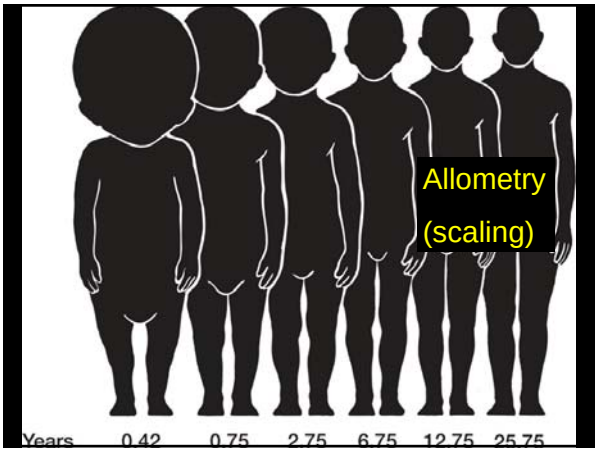


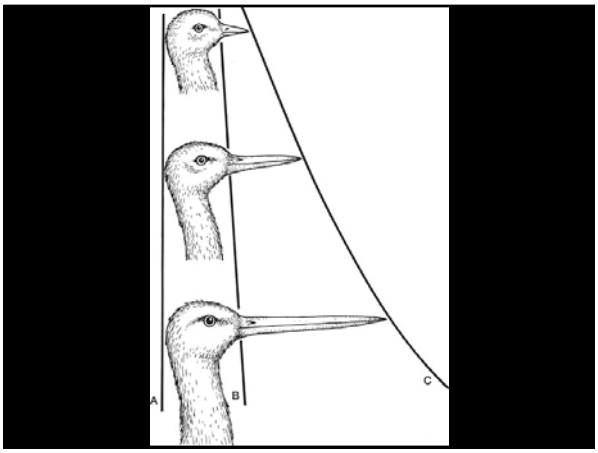


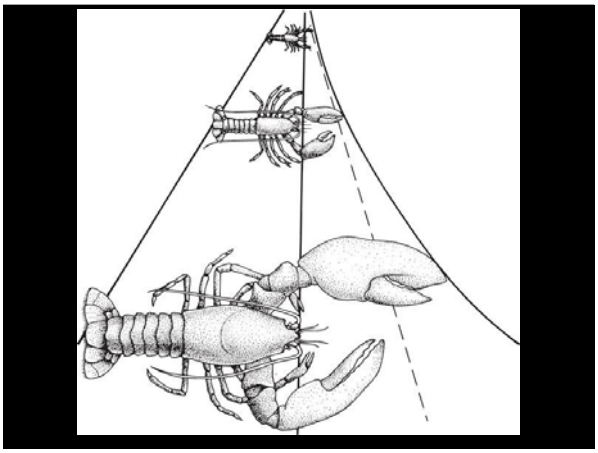





Epidermis
Neural tube
Myotome
Notochord
Sclerotome
Forming neural arch
Developing vertebral body around notochord
Blood vessel
Dermis
Neural arch
Nerve cord
Rib
Centrum (body of vertebra)

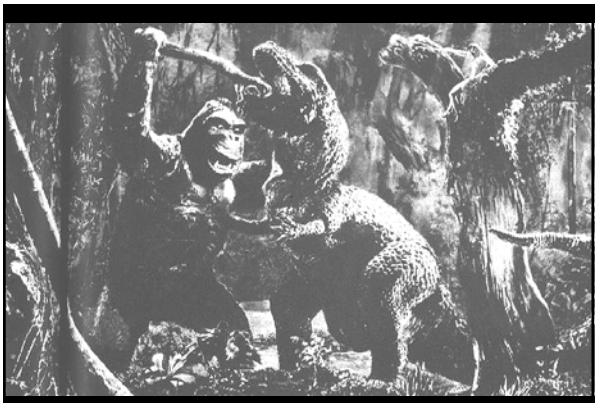

Allometry
(scaling)
Years 0.42 0.75 2.75 6.75 12.75 25.75

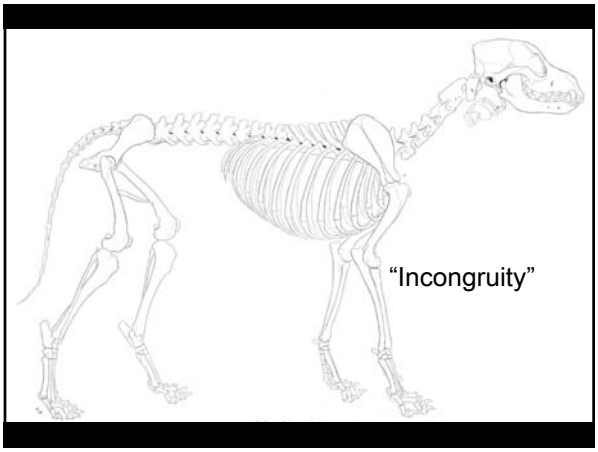

A
B
C

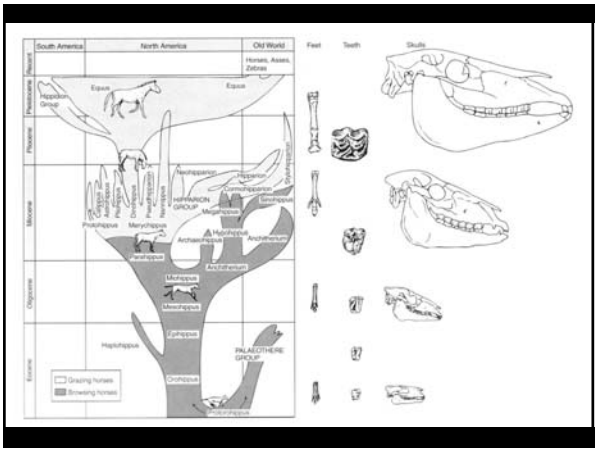


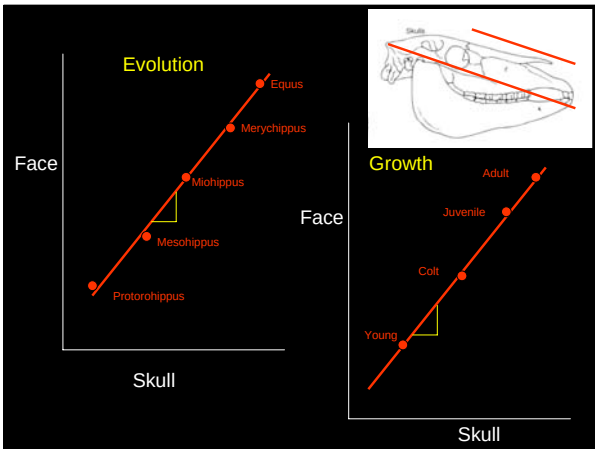
Allometry

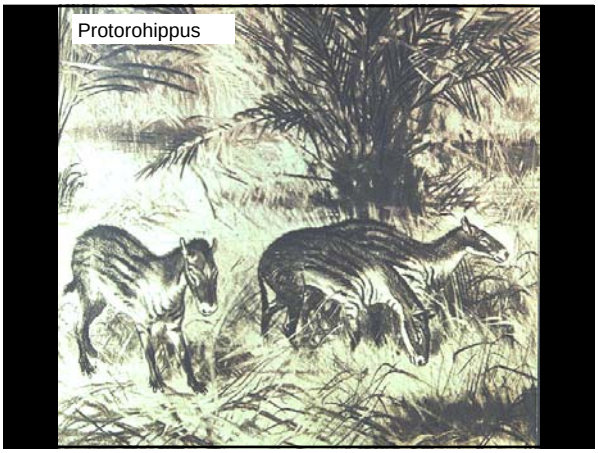
Scaling—compensation



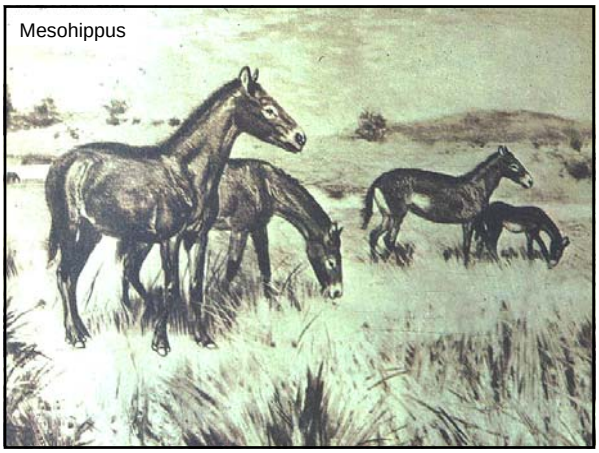




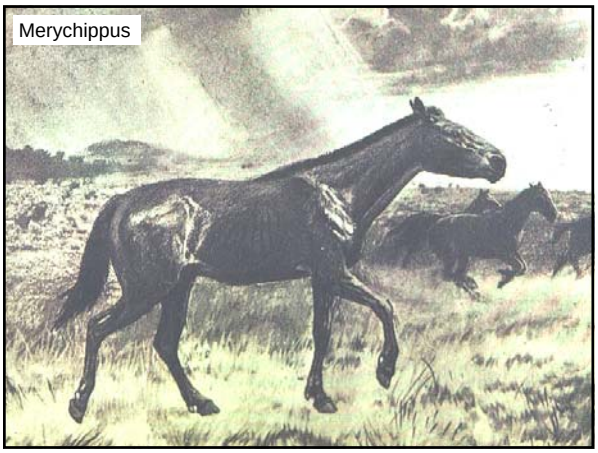


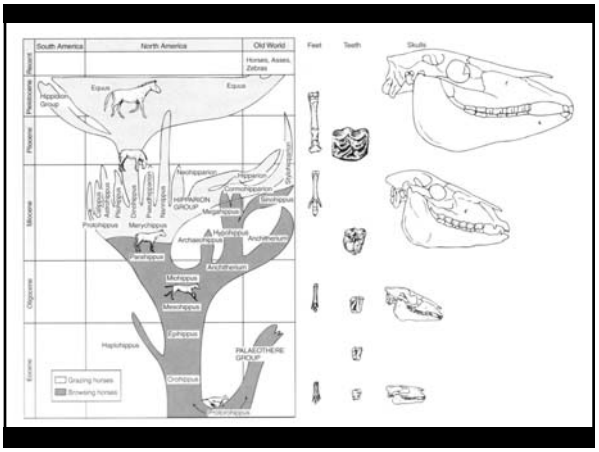


Mesohippus

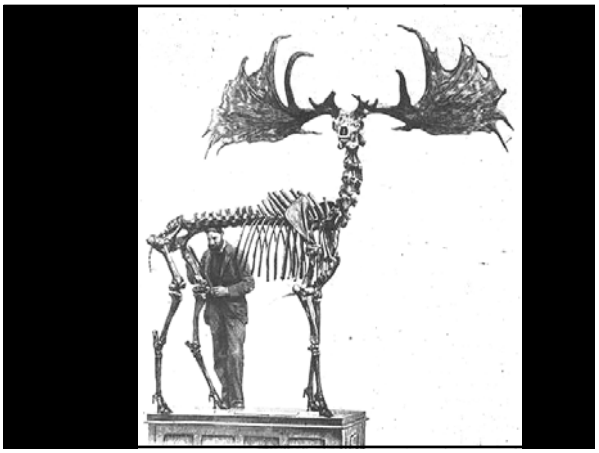


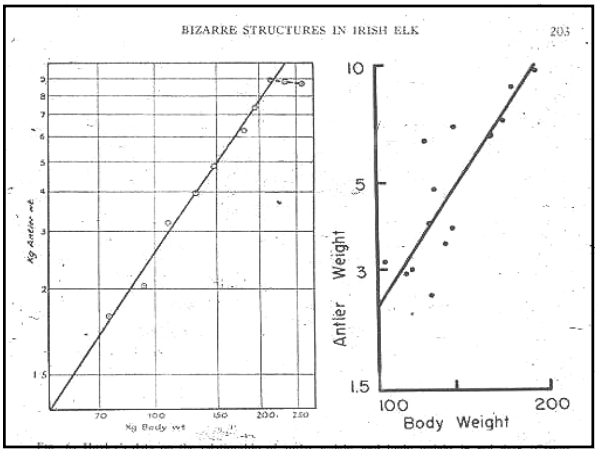
Merychippus



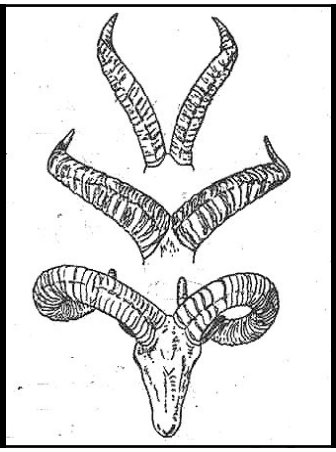


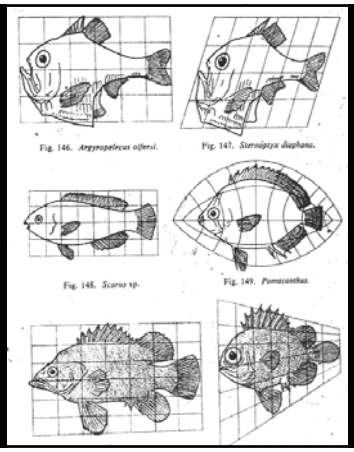
Irish “elk” (deer)





SHAPE





DuBrul

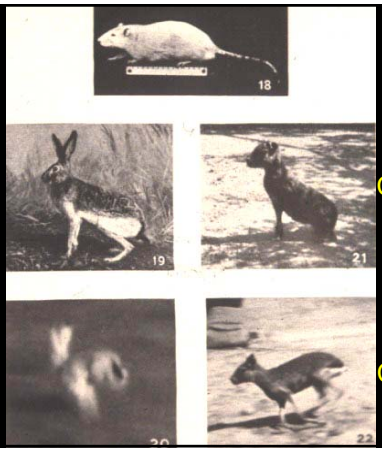
Rat

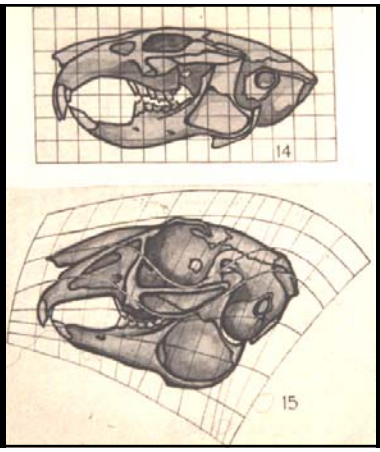
Hare

Cavy

Hare

Cavy





Pika

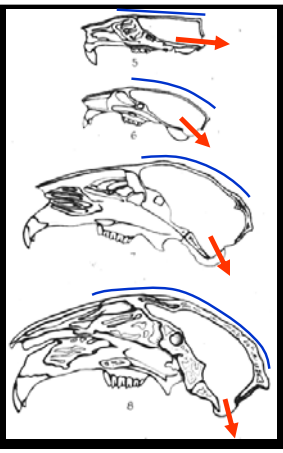
Hare

Rat

Pika

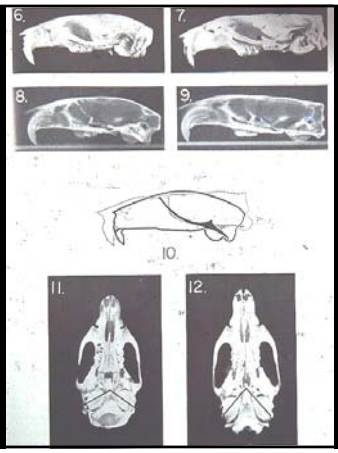
Hare

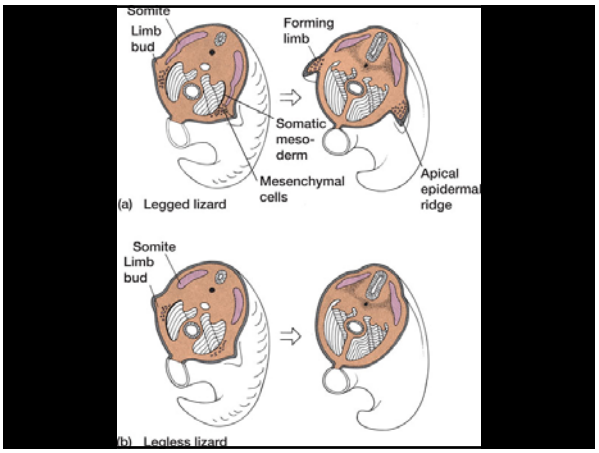
Cavy

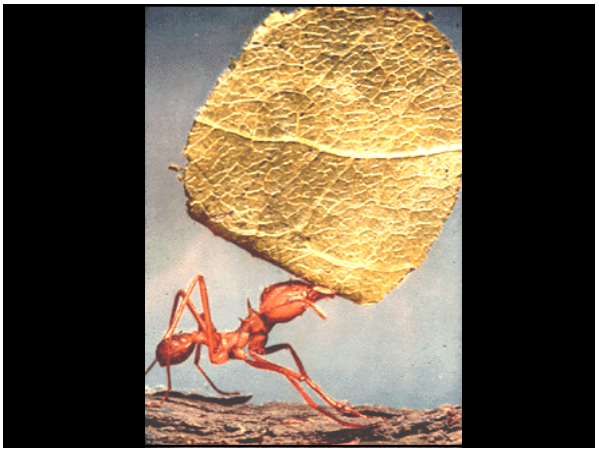


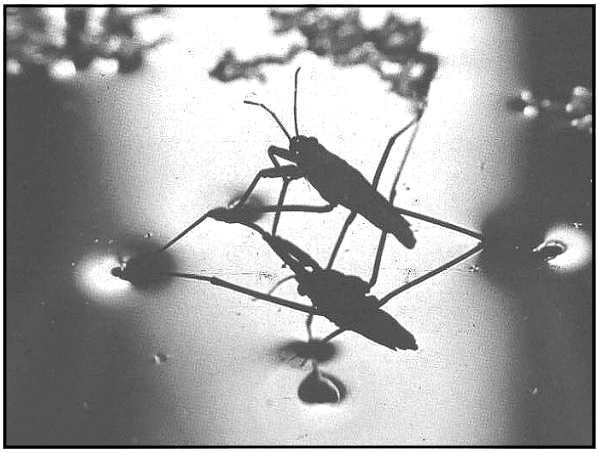
Rat—exp

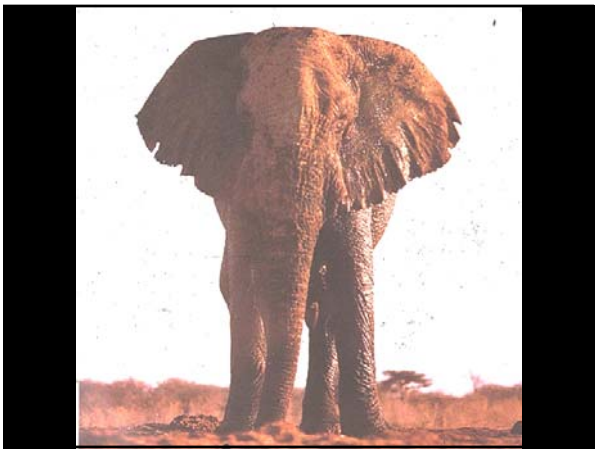
Rat—normal



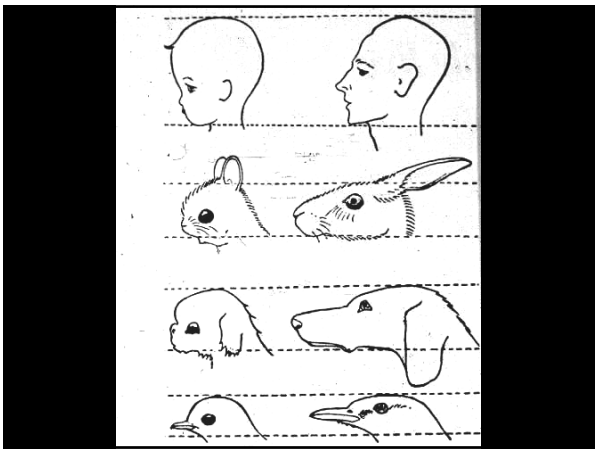

Somite
Limb bud
Forming limb
Somatic meso-derm
Mesenchymal cells
Apical epidermal ridge
(a) Legged lizard
Somite
Limb bud
(b) Legless lizard

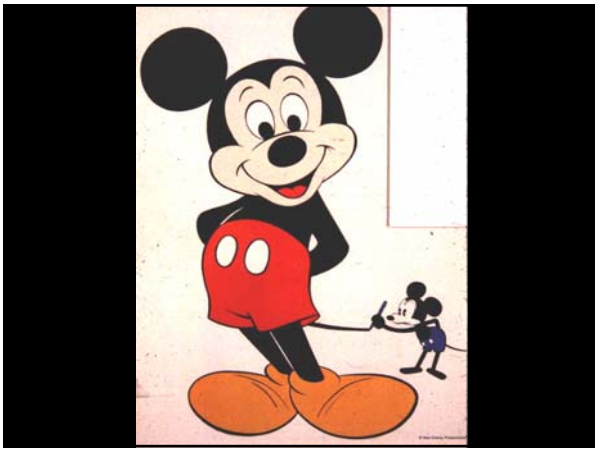


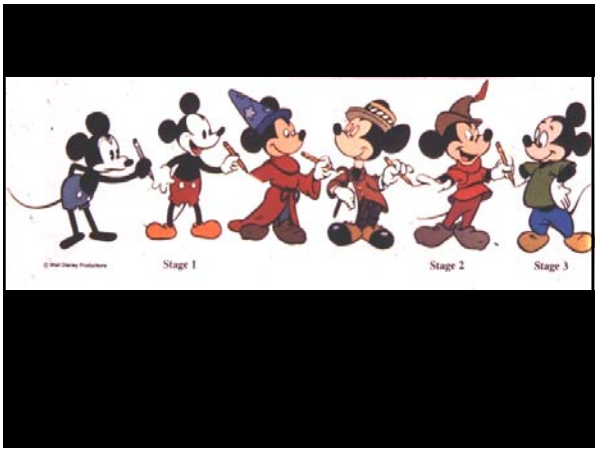


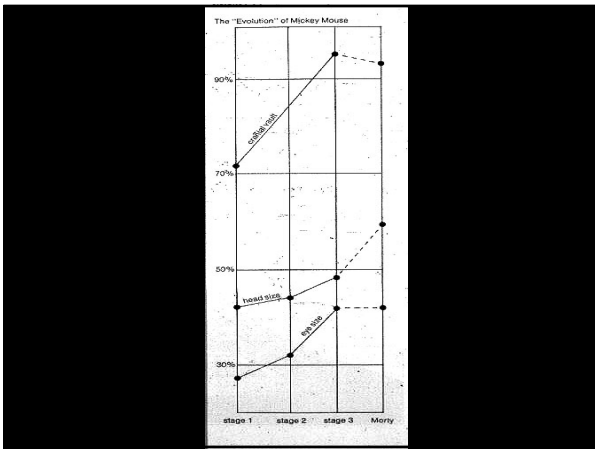


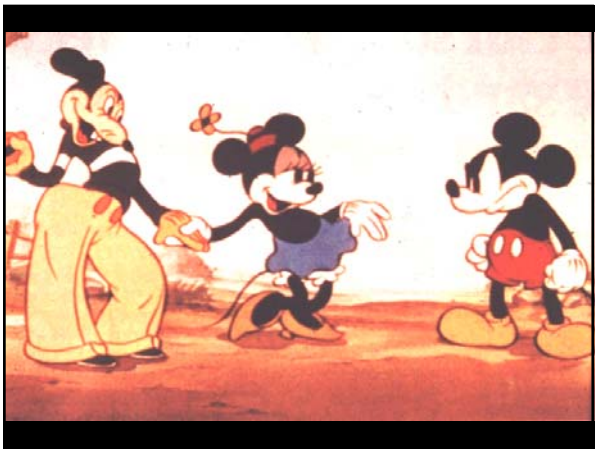
Proportions






Stage 1
Stage 2
Stage 3


The "Evolution" of Mickey Mouse
90%
70%
50%
30%
overall size
head size
eye size
stage 1
stage 2
stage 3
Morty



CONCLUSIONS

1) Pattern—fixed association parts

2) Evolution of Pattern

amplification—horse family

close down—legless lizards/snakes

RAPID EVOLUTION—modification of a pattern