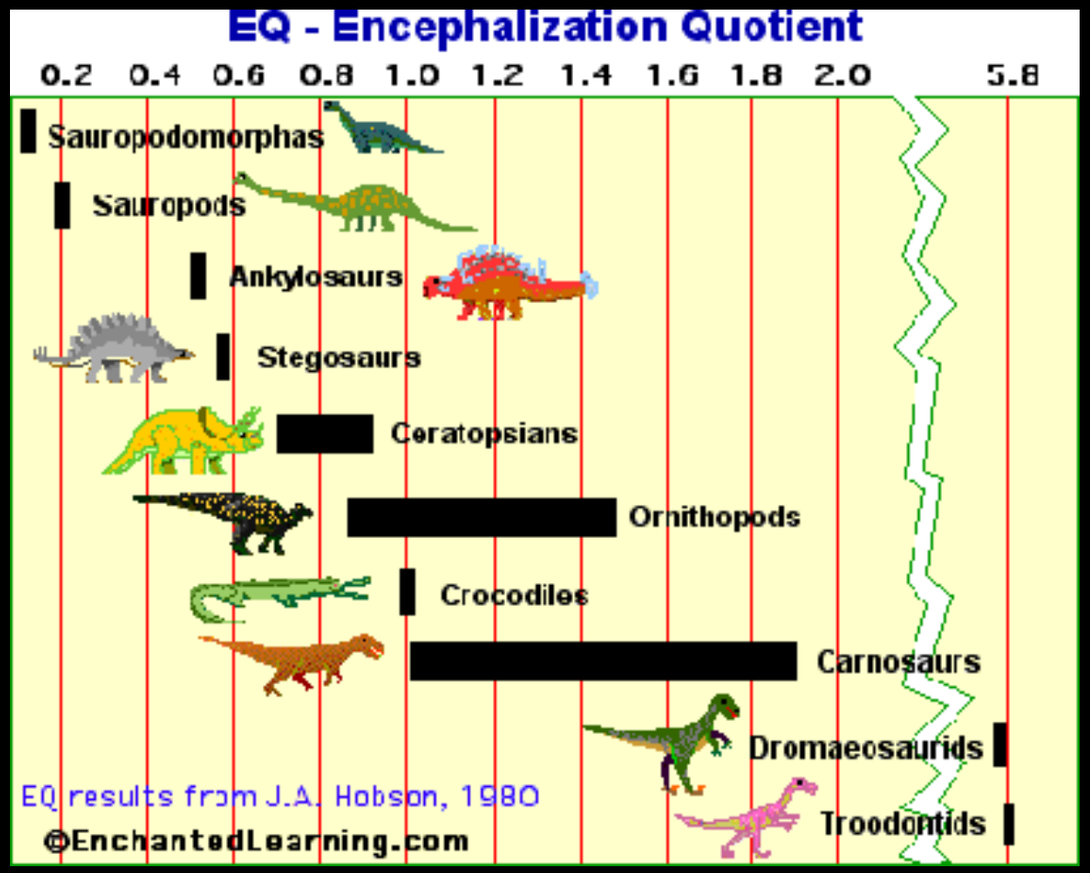
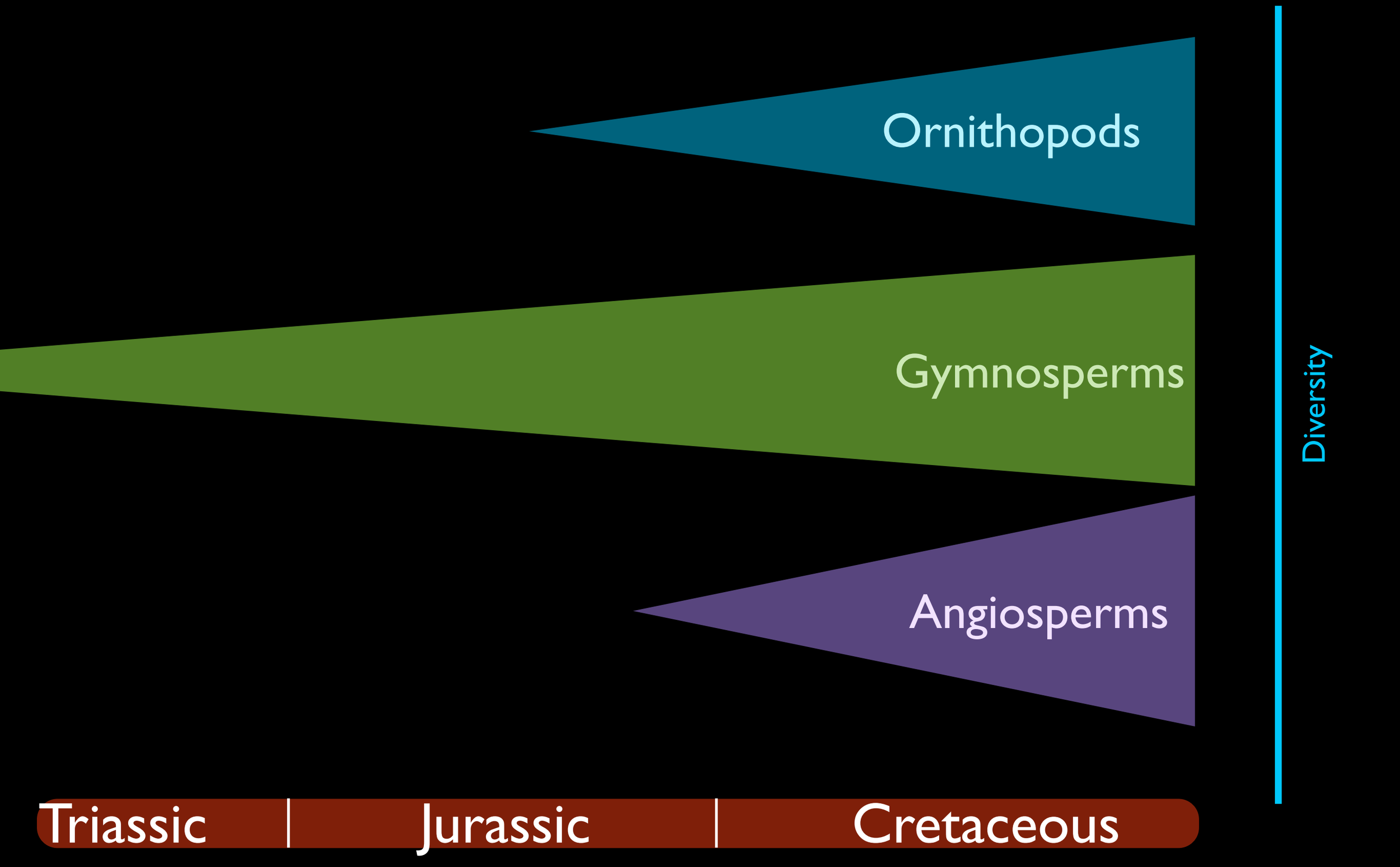
# Brains




+ fossil evidence==> “sophisticated” social behavior

# Evolutionary Trends
# Ornithopod diversity and plant diversity

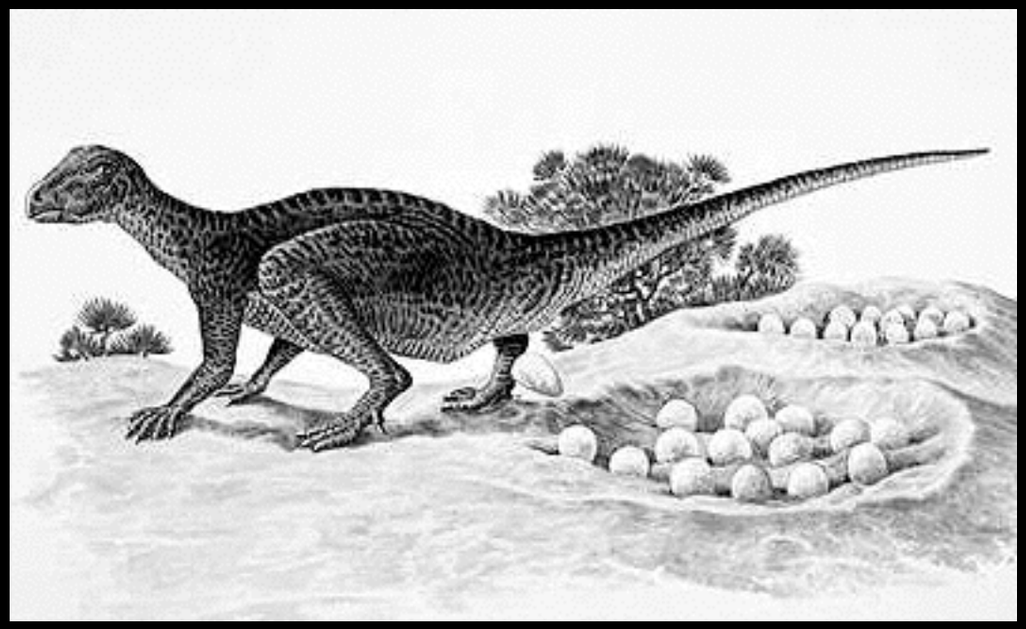


*Behavior!*

*1) Hadrosaur head gear*

*2) Herding*

*3) Reproductive Behavior*



*Behavior!*

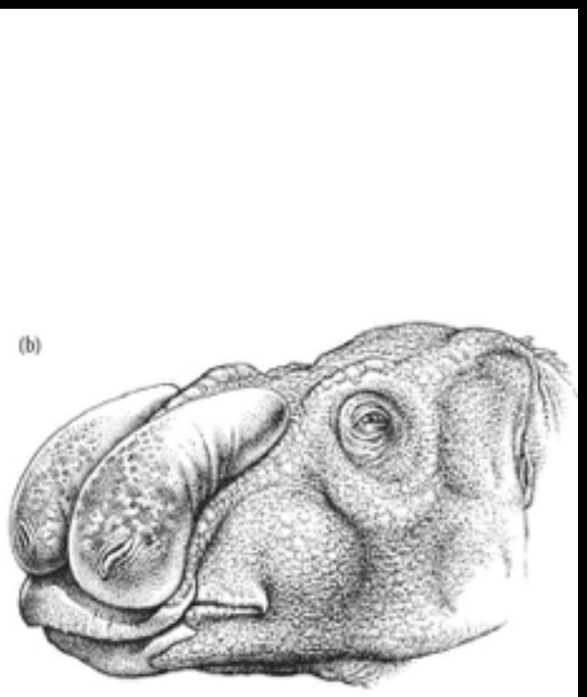
*1) Hadrosaur head gear*

*Vocal adaptations*

*Air sacs?*

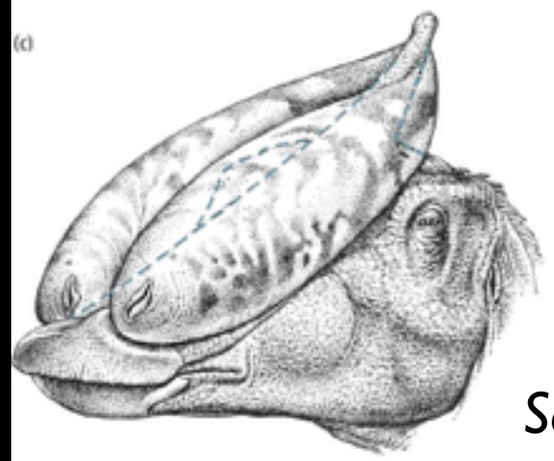
*Visual adaptations*

*Gryposaurus*




*Gryposaurus*

*Saurolophus*




*Saurolophus*

*Species specific (recognition)*

*Male-male competition (competition for mating)*

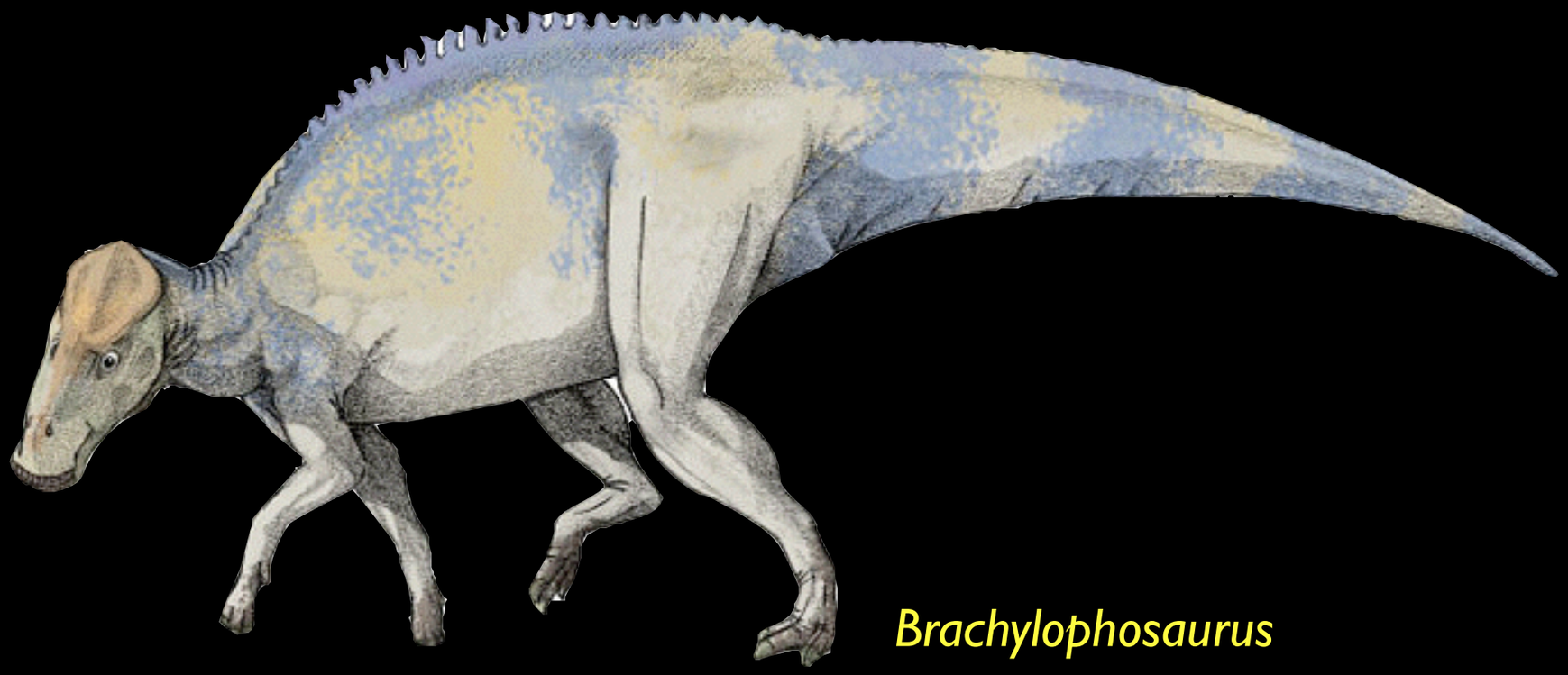
*Intimidation*

*Physical head-butting?*

*Attract females (competition for mating)*

*Altirhinus*

*Edmontosaurus*



*Brachylophosaurus*

*Altirhinus*

*Behavior!*

*1) Hadrosaur head gear*

*Proof?*

*Such sexual selective traits would suggest certain evidence would be present*

*a) Hadrosaurs should have good hearing / eyesight* ✓

*b) Outside structure of the 'horns', headgear, should be divorced from the internal workings (indicating the outside is being used as a visual stimulus)* ✓

*c) Crests should be species specific* ✓

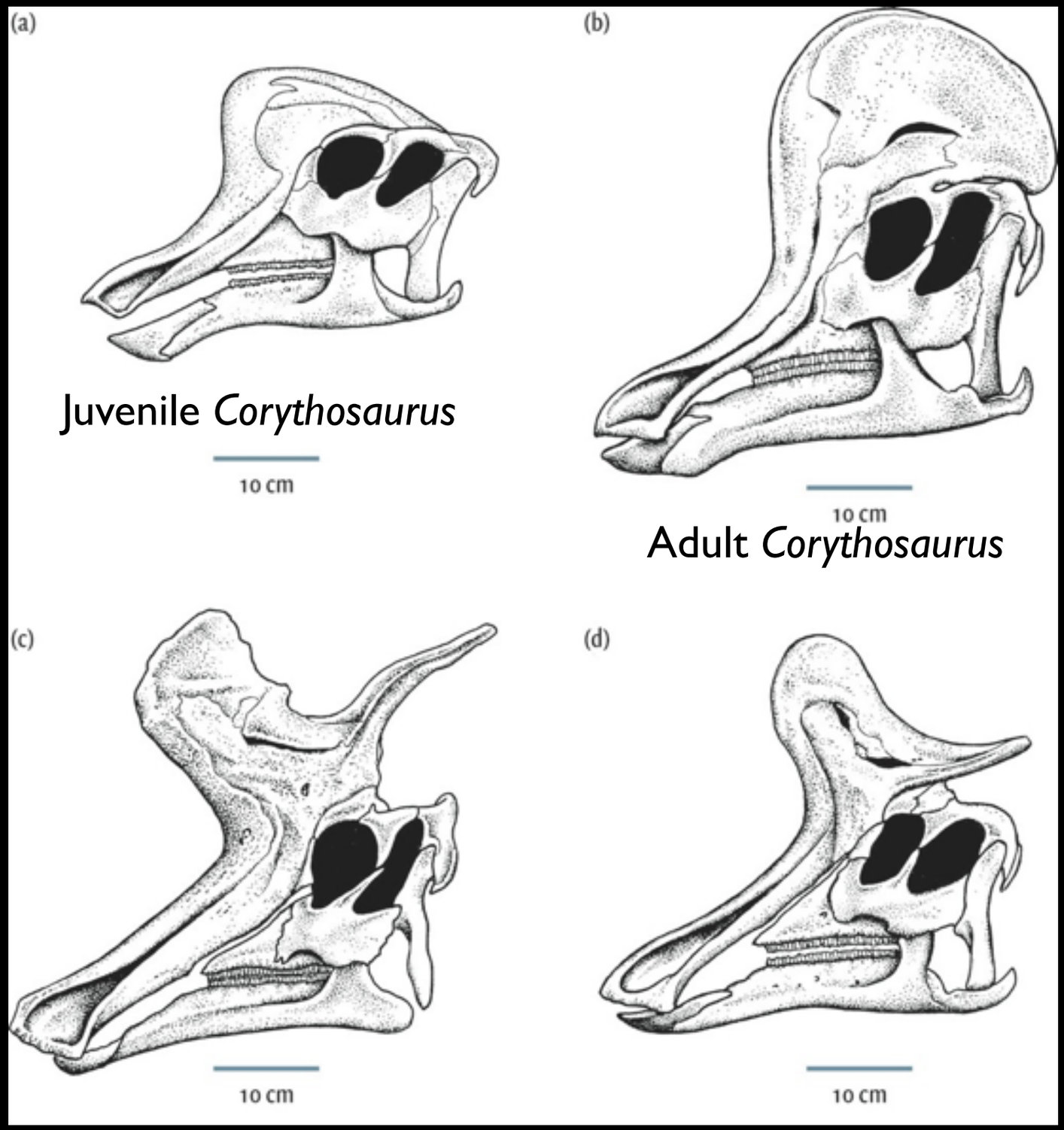
*d) When multiple species co-occur, differences between species should be more exaggerated* ✓

*e) Differences between dimorphic crests should increase through time* ✗

*Behavior!*

*1) Hadrosaur head gear*

*Growth and Sexual Dimorphism*




Juvenile *Corythosaurus*

Adult *Corythosaurus*

Male? *Lambeosaurus*

Female? *Lambeosaurus*

*Behavior!*

*2) Bonebeds*

*Bonebeds found for:*

*Dryosaurus*

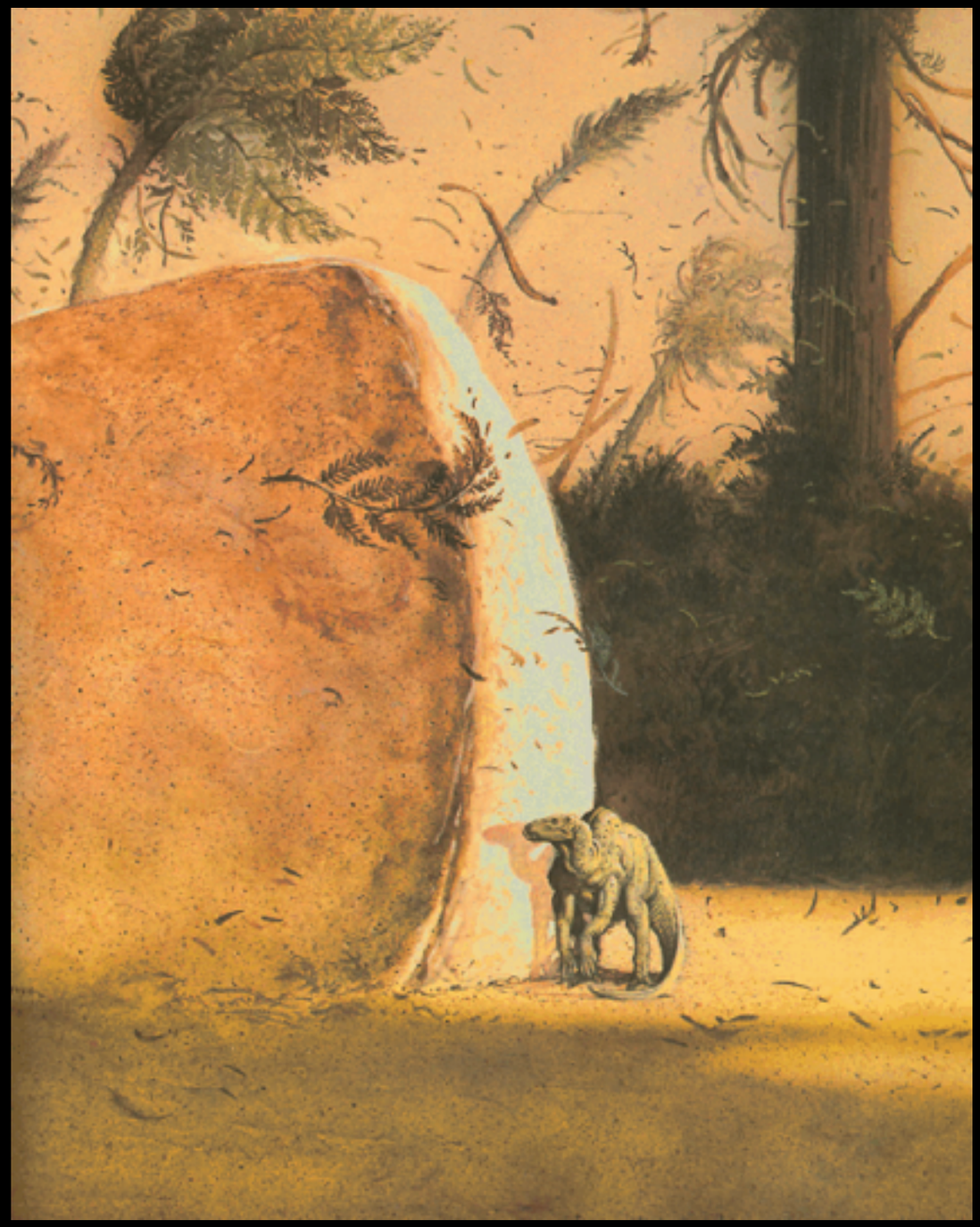
*Iguanodon*

*Maiasaura*

*Hypacrosaurus*


*Herds?*

*Migratory behavior?*



*Behavior!*

*3) Reproductive Behavior*

"R-selected" "K-selected"

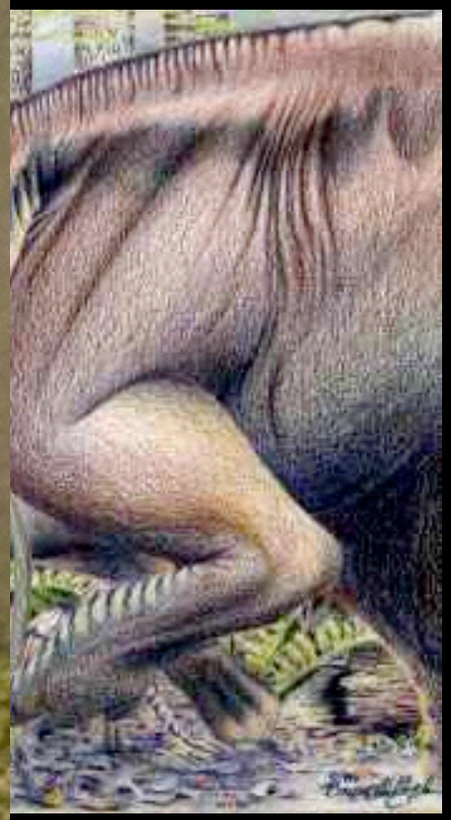
*Behavior!*

*3) Reproductive Behavior*

"R-selected

*Orodromeus*

K-selected"



*Maiasaura*

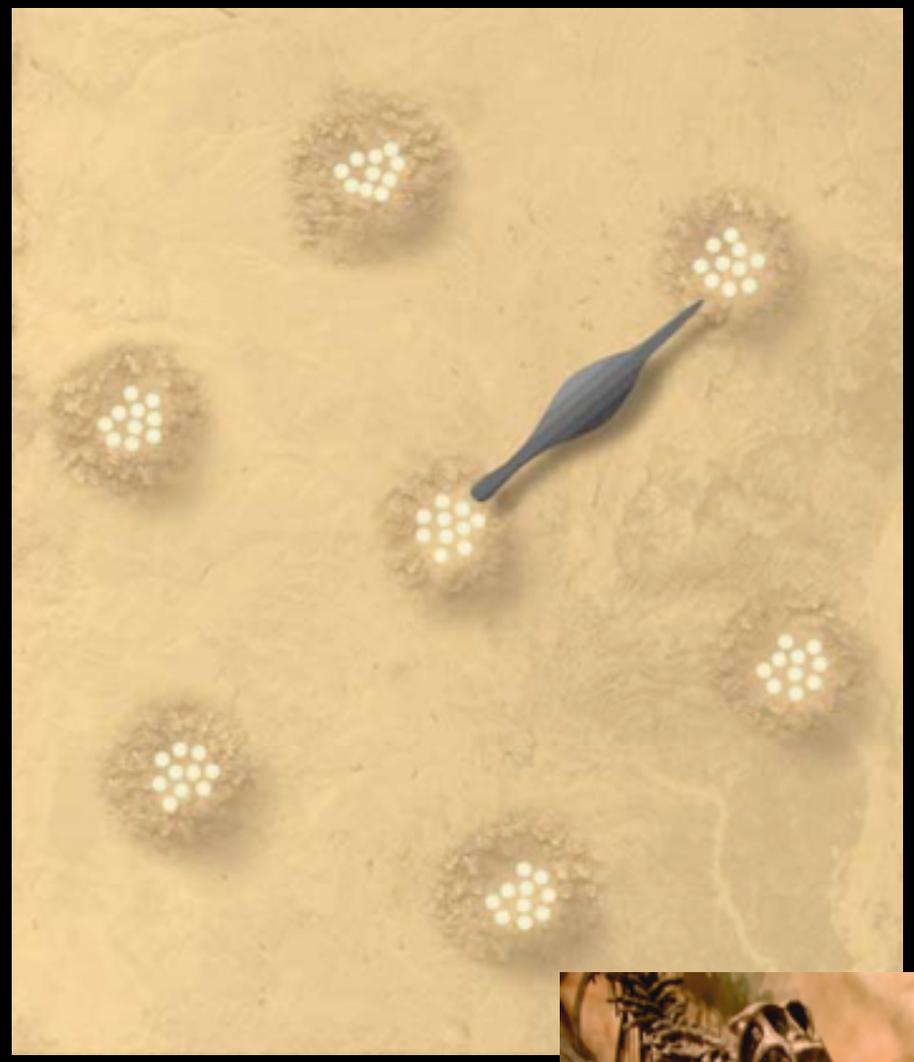
Hatchlings have well-developed limb bones
Fully formed joint surfaces
Parental care assumed to be minimal
But still groups
**= Precocial**

Nested in colonies
Usually 17 (30 max) eggs in each nest
Hatchlings have poorly developed limbs; likely needed constant parental care for 8-9 months after birth
**= Altricial**

# *Maiasaura* Nesting Sites

*Maiasuara: 30 ft long*

*LARGE HERDS: up to 10,000 individuals!*



*Nests*

*Eggs packed tightly together, like modern seabirds*

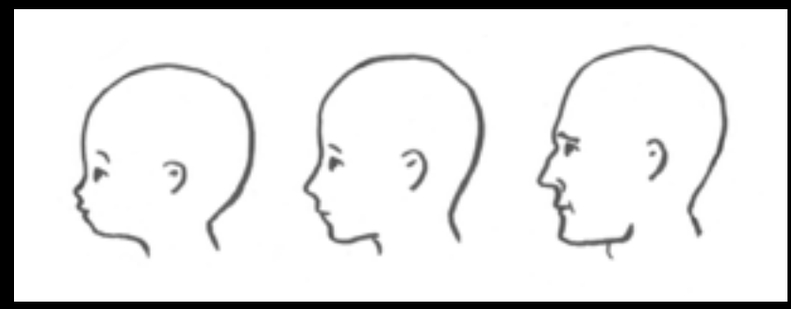
*Ostrich egg size*

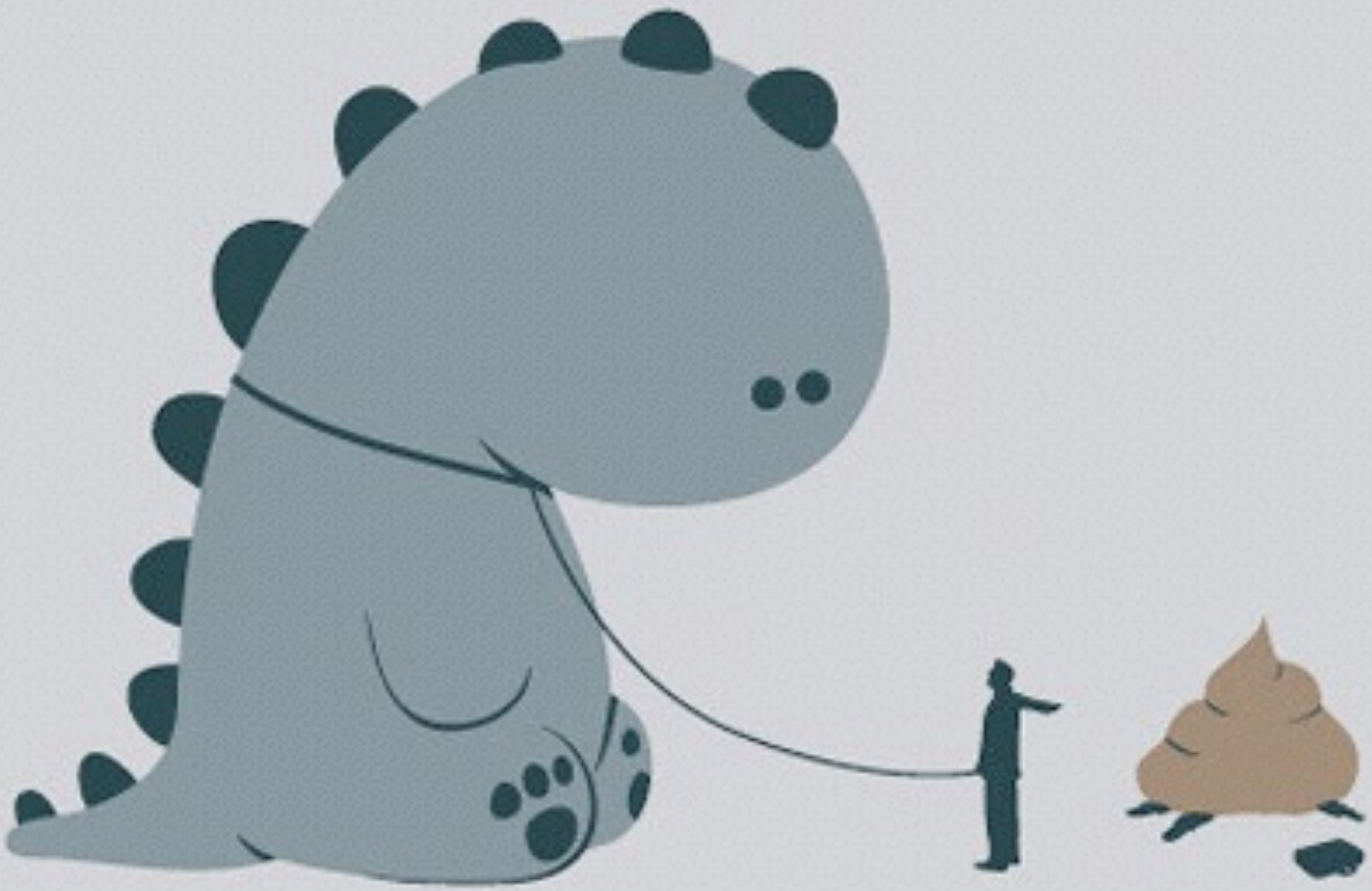
*Rotten vegetation helped incubate the nests (no sitting)*

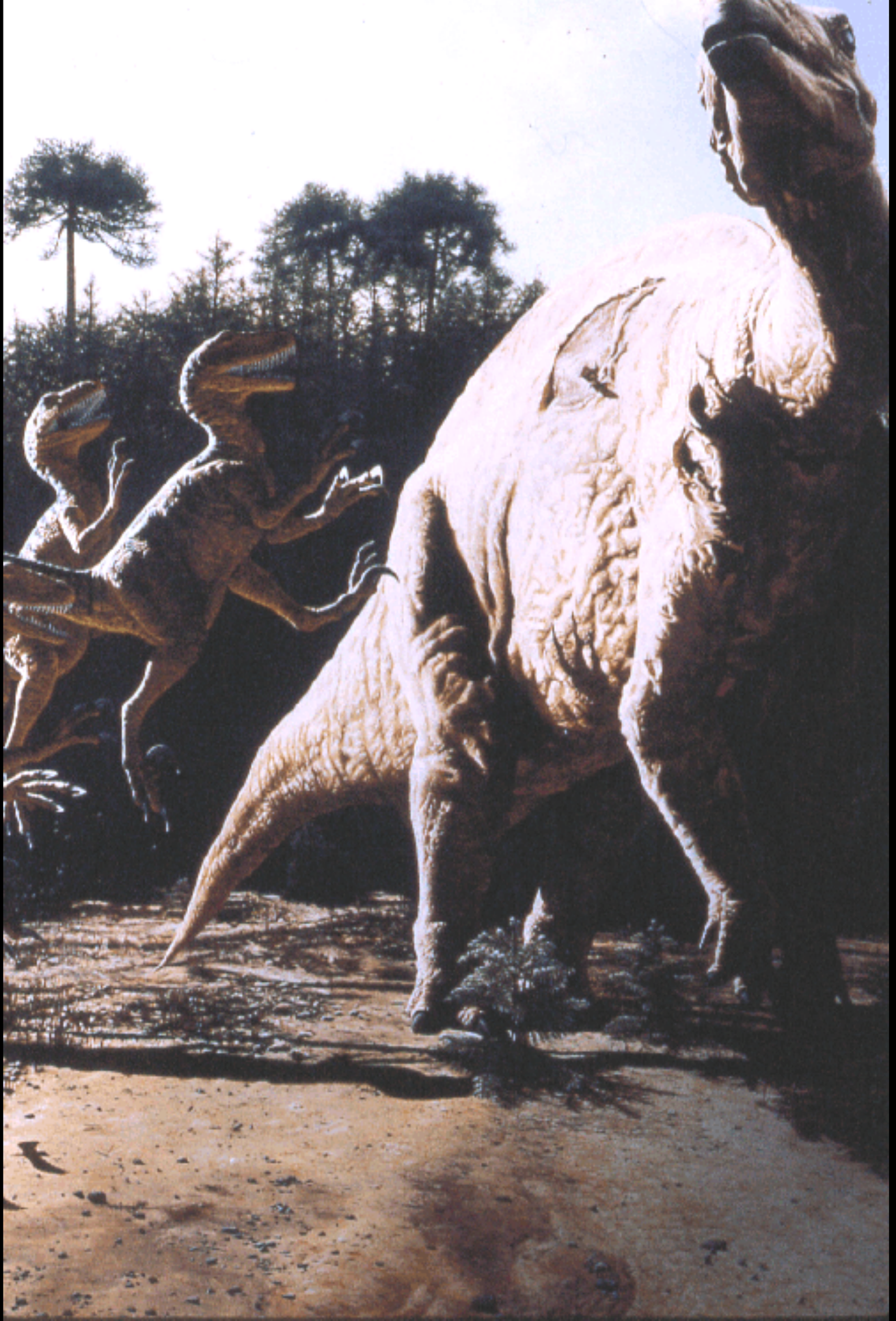
*Hatchlings incapable of walking*

*Hatchling rate of growth thought to be extremely high: warm-bloodedness?*

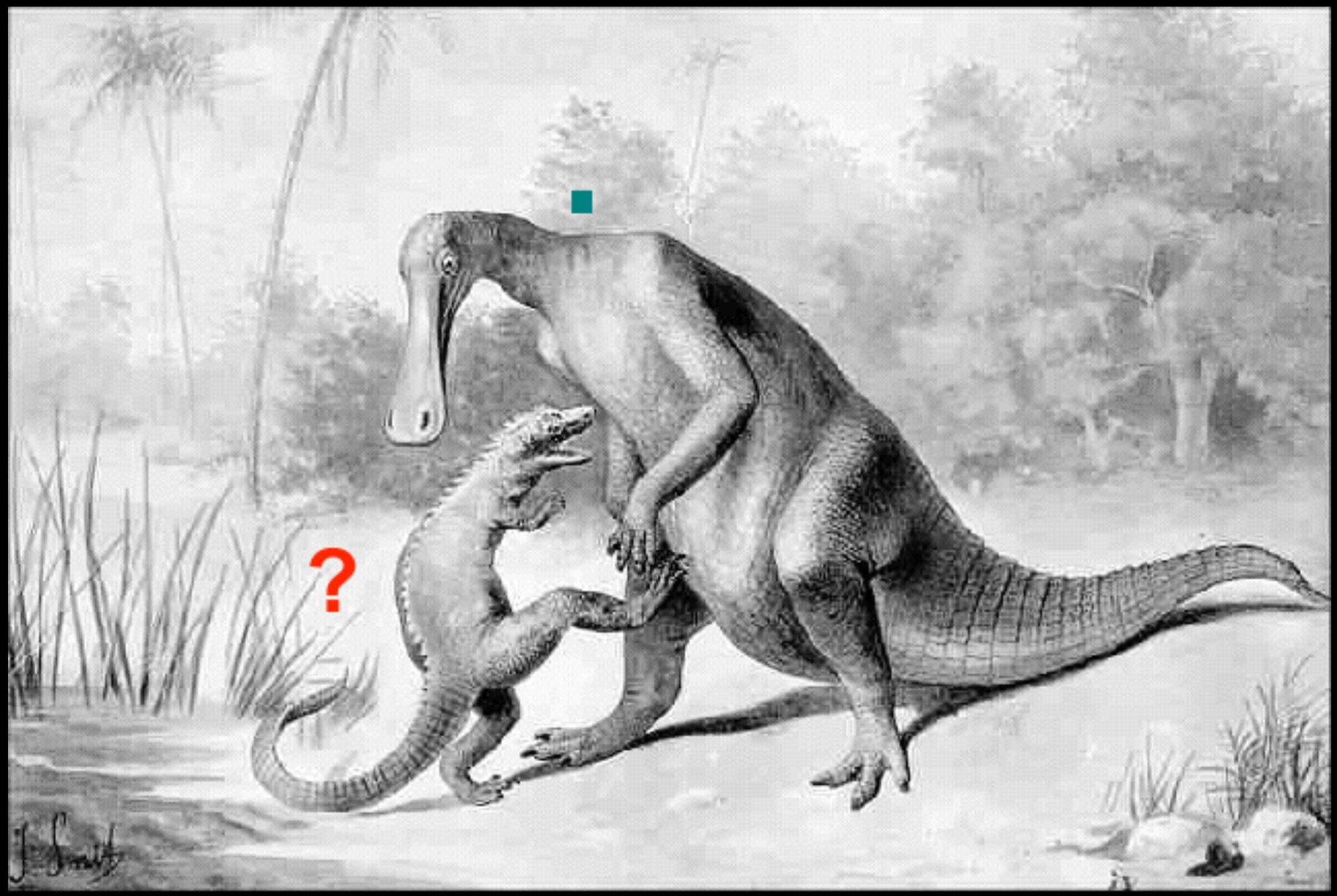
*Hatchlings were 'cute': a common feature among altricial young*








Hadrosaurus




*Hadrosaurus*

# *Walking with DINOSAURS: Spirits of the Ice Forest*

## The Ornithopod Players:

### *Leaellynasaura*

Hypsilophodont (basal euornithopod) Ornithopod
Enlarged eyes (adaptation for low light conditions?)

### *Muttaburrasaurus*

### Iguanodontine Ornithopod

Enlarged eyes (adaptation for low light conditions?)

Some things to look out for:

- Assumed sociality of *Leaellynasaura*
  - Here they've modeled them after Meerkats
- Herding behavior in *Muttaburrasaurus*
- Migration
- Nasal air sacs
- Group defense
- Bipedality vs. Quadrupedality within *Muttaburrasaurus*
  - *Middle digits of front foot => hoof-like pad*