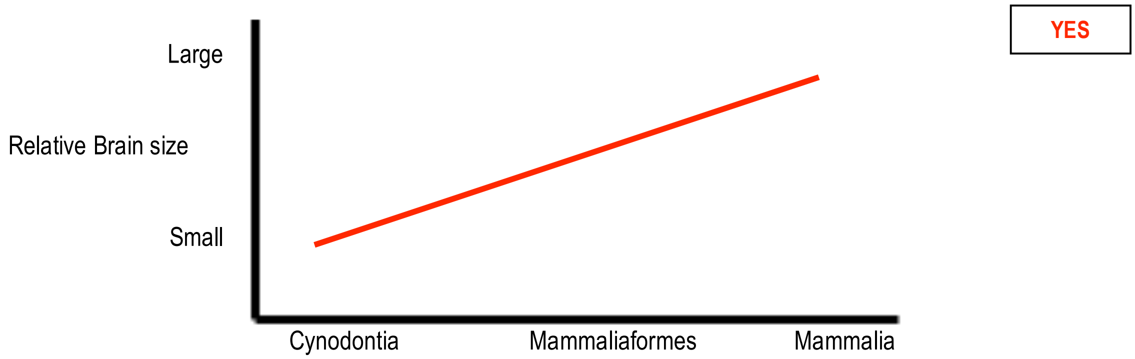
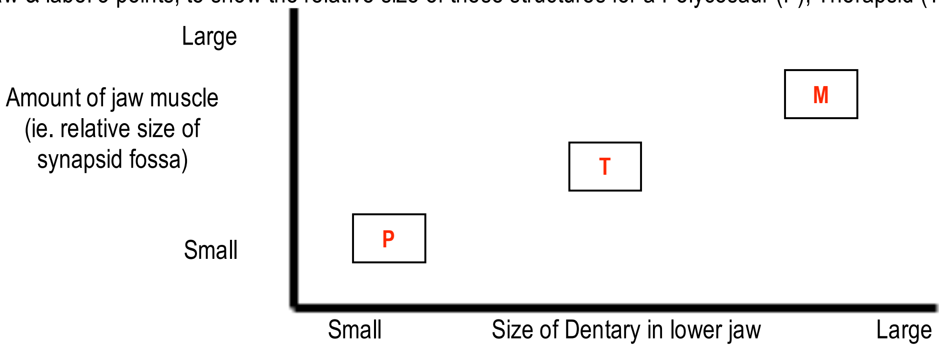
Biology 452
Mammalian Evolution, Lecture Exercise 2

1. Draw a line to show relative brain sizes during this portion of mammalian evolution. In particular did the olfactory region get larger?



2. Draw & label 3 points, to show the relative size of these structures for a Pelycosaur (P), Therapsid (T) & a Mammal (M):



3. How were the teeth modified for chewing during the evolution from pelycosaurs to mammals?

Teeth acquired additional cusps (points), and differentiated into a variety of functional shapes (eg. canines, incisors, premolars & molars. In particular, the teeth eventually occluded (surfaces of upper & lower teeth came in contact) to crush or grind food.

4. Answer these questions from the graph on slide 13 shown in class:

a. Which group(s) therapsids &/or theropod dinosaurs had nasal passages as large as similar sized endotherms?

Only the Therapsids.

b. What other evidence might be used to determine endothermy besides turbinates? List 1 trait for therapsids or theropods.

Development of a secondary bony palate isolated food & air passages in Therapsids, allows chewing & breathing simultaneously. It suggests the need for a higher respiration rate, thus endothermic.
Dental complexity & chewing of food meant faster processing of food for a higher intake of energy per unit time in Therapsids.
Presence of feathers that might provide some insulation in theropods suggests endothermy.
Not mentioned in class, scientists have studied bone histology of fossils to study growth rates for signs of endothermy.

5. In the example bird, from Hillenius & Ruben (on slide 14 shown in class), answer these questions:

a. Calculate the amount of water added to the air during inspiration (inhaling). ____**54 - 3 = 51 mg/l**________________

b. Calculate the amount of water removed from the air during expiration (exhaling). _____**54 - 17.5 = 36.5 mg/l** _______