Tutorial Four: Food for thought: the evolution of diet

In order to understand brain evolution, we will be looking at the brain cases of a range of skulls in tutorial. Working in groups, you'll be asked to examine the skulls and compare their size and shape in order to get a sense for evolutionary change in hominid brains and to reflect on the differences among hominids of various types.

### Braincase

1. Does the FOREHEAD (frontal bone) look more **vertical** or **flatter** when the skull is held in normal anatomical position [NAP] (i.e., with the eyes oriented forward)?

2. Is a SUPRAORBITAL BROWRIDGE present?

3. If present, is the BROWRIDGE **divided** in the middle, or **continuous**?

4. How would you describe the **shape** of the BRAINCASE (front to back) from above?

5. Is a SAGITTAL CREST present?

6. Is the FORAMEN MAGNUM oriented **more downward** or **more to the rear**?

### Face

7. Are the NASAL BONES **raised (arched)** or **flat**?

8. Measure the MAXIMUM BREADTH (width) of the NASAL OPENING.

9. Measure the MAXIMUM HEIGHT of the NASAL OPENING.

10. Measure the LENGTH of the MAXILLA (the upper jaw). (Measure the middle of the palate from the front edge of the foramen magnum to either between or just in front of the two central incisors to determine how much the face projects.)

11. Measure the BIZYGOMATIC BREADTH using the hinge caliper. (This is the width of the face from the widest part of one zygomatic arch to the widest part of the other.)
Dentition (Teeth)

12. SHAPE OF THE DENTAL ARCADE: Do the tooth rows **diverge** towards the back or are they more straight-sided and parallel?

13. When viewed from the side, are the INCISORS **angled out or are they vertical**?

14. Measure the COMBINED WIDTH or BREADTH of the 4 INCISORS together.

15. Does the CANINE tooth **project beyond the chewing surfaces** of the other teeth?

16. Is a CANINE DIASTEMA present?

17. Measure the COMBINED LENGTH of the LEFT 2 PREMOLARS and 3 MOLARS together by measuring from the back of the last molar to the front of the first premolar to determine the length of the chewing surface of the “cheek teeth”. (NOTE: Measure the right side if the left side is missing any of these 5 teeth.)

Questions for reflection:

- Which measurements strike you as the most significant? What do these measures get at?
- How might the introduction of more meat to the diet affect the characteristics of the skull?
- Judging from your readings, what is the ‘natural’ human diet?
- Why might brain evolution in humans be subject to intense directional selection, driving our brains to get larger?

Review terms:

- Abstract thought
- Allometry
- Autocatalytic
- Cerebral cortex
- Domain-specific
- Ecological dominance
- Encephalization
- Encephalization Quotient (EQ)
- Expensive tissue hypothesis
- External symbols
- General intelligence
- Learning
- Mirror Neurons
- Modular intelligence
- Mosaic Evolution
- Neocortex
- Neoteny
- Promiscuous interfaces
- Radiator hypothesis
- Scenario building
- Social brain hypothesis
- Symbols
- Theory of Mind (TOM)