Osteology 101: It's all in the Bones
(Adapted from Walker, S. 2005. *Exploring Physical Anthropology*)

Many subjects within the discipline of biological anthropology require the student to be familiar with the bones and features of the skeleton. The human skeleton is composed of bones and cartilage, assembled into a rigid framework that has variety of functions during life and can offer a wealth of information after death. Bone is a living, dynamic tissue that changes throughout life in response to forces placed upon it, including disease and injury.

Bones are part of the phenotype (physical appearance), and therefore are the products of both the genotype (genetic makeup) and the environment. Bones have a great deal of individual variation due to differences in age, sex, geographic origin, activity patterns, and diseases or injuries. The next few labs are designed to familiarize you with the bones and features of the human skeleton and how these relate to an individual's activity patterns, with a focus on locomotion.

Functions of the Skeleton
The skeleton has various functions, which are summarized as follows:

1. *Support*: structural support, framework for attachment of soft tissues, holds organs
2. *Protection*: protects vital organs (for example, the cranium protects the brain, the rib cage protects the heart and lungs)
3. *Movement/Leverage*: framework for muscle attachment, allows movement at the joints
4. *Mineral and Lipid (fat) Storage:* stores calcium and phosphate, which can be released as needed to maintain normal concentration of these ions in body fluids
5. *Blood cell formation and Storage:* blood cells are produced in red bone marrow

Features of Bone
The human body normally has 206 complete bones, each of which is influenced during life by the soft tissues that surround it. Raised areas or lumps on bone appear where the tendons of muscles attach. The bones may have grooves where blood vessels lie over the surface. These bumps, grooves, and so on, referred to collectively as *features*, provide us with important information. Features on bone can indicate the level of activity to which a limb was subjected during life, and they allow us to distinguish bones that came from the right versus the left side of the body.

What Bones Can Tell Us
The types of information that can be obtained from bone include age, sex, race, and physical activities that were important in an individual's life. By observing the form of bones and the joint surfaces of human and nonhuman remains, we can make inferences about how they moved around, whether bipedal, quadrupedal, climbing, or leaping.

Identifying Human Bones
Paleoanthropology, the study of our evolutionary history, is a central part of biological anthropology. Much of what we know about primates (including humans) of the past comes from our analysis of their fossilized bones and teeth. Thus, knowledge of the skeletal anatomy of the primates is essential to the anthropologist interpreting the fossil record. One of the essentials of paleoanthropology is to determine from what species skeletal and/or dental remains come. Therefore, the knowledge of the skeletal and dental structures are vital. The skeletal structure of primates, is a variation on the skeletal structure of mammals in general. You have already seen how the primate skeleton has some

unique features which reflect their adaptation to an arboreal way of life. The skeleton of hominids has also evolved a set of unique features relating to our increasingly terrestrial way of life.

Below is a list of anatomical terms. On the next three pages you'll find an illustration of the human skeleton. Follow the directions for each page below:

> **Page 1** - On the first page, I want you to label the drawing using the list below as a guide. DO NOT REFER TO YOUR ATLAS OR NOTES FOR ASSISTANCE! Do the best you can!

> **Page 2** - On the second page, use the "Atlas of Skeletal Anatomy" included in these lab worksheets to complete an accurate labeling of the skeleton.

> **Page 3** - On the third page, I want you to test your memory and give it another shot, this time labeling the drawing *without any references*! Do the best you can and good luck!
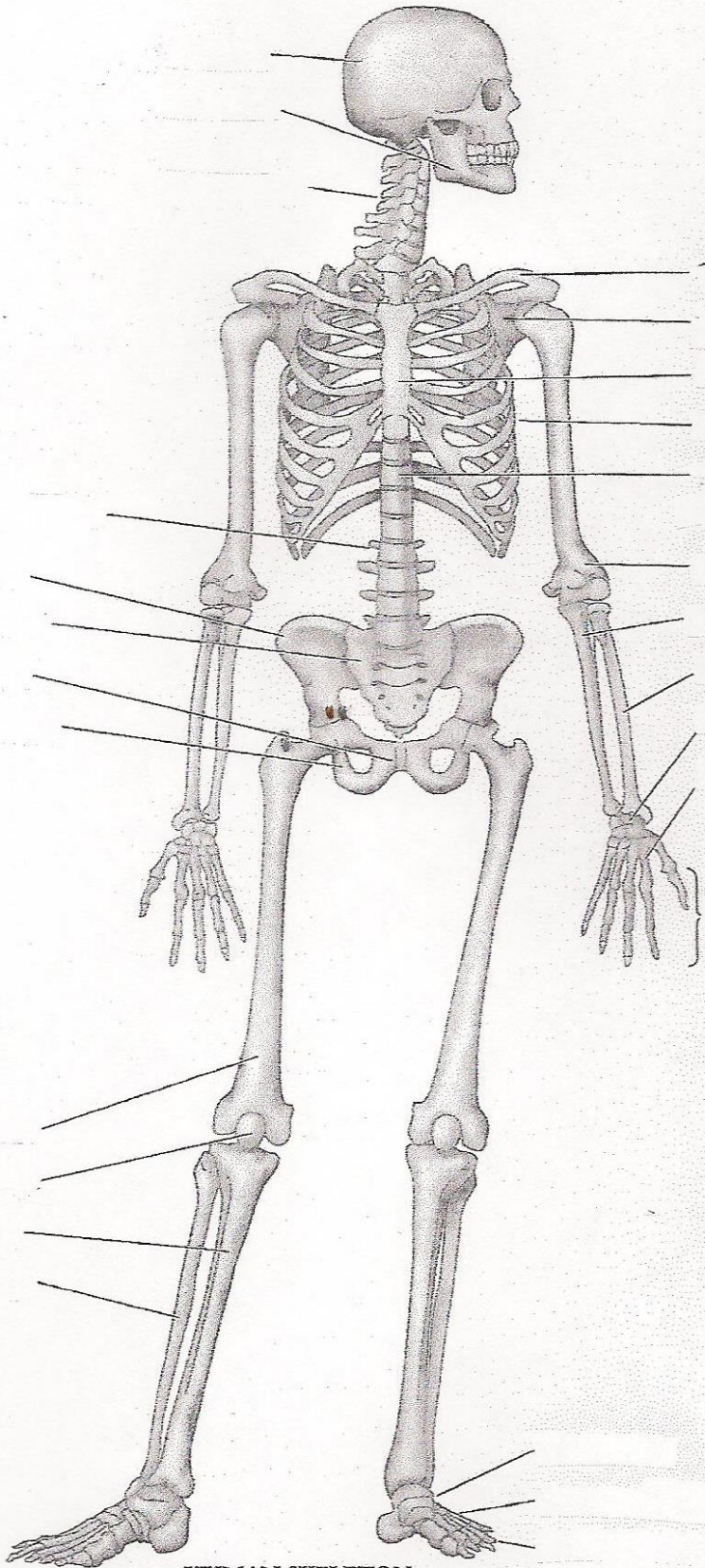
Lumbar vertebrae	Humerus	Mandible
Cervical vertebrae	Femur	Ribs
Thoracic vertebrae	Cranium	Maxilla
Radius	Ulna	Patella
Phalanges	Metatarsals	Sternum
Scapula	Clavicle	Fibula
Tibia	Tarsals	Carpals
Metacarpals	Pubis	Ischium
Ilium		

Skeleton 1: Label as many bones as you can on your own using the terms from the cover sheet.
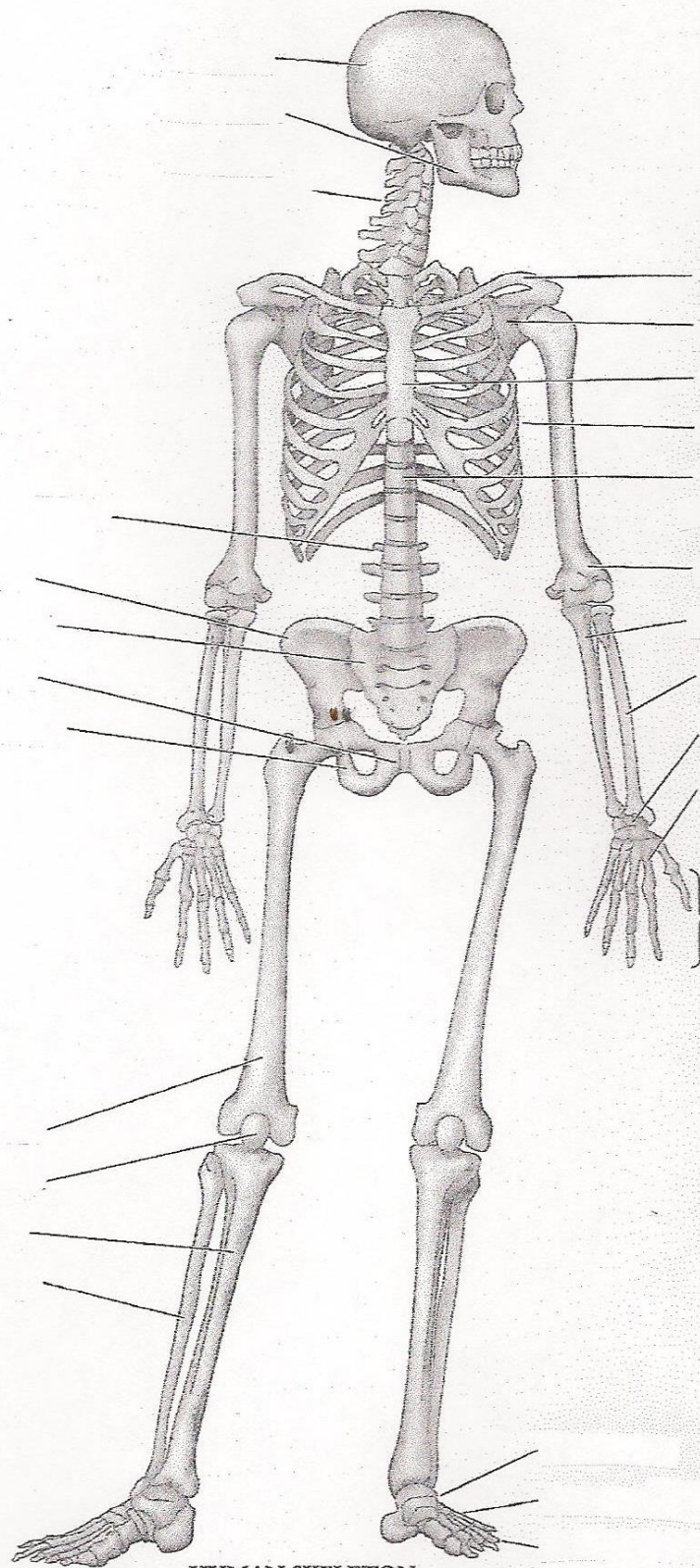
HUMAN SKELETON

Skeleton 2: Use the Atlas of Skeletal Anatomy on the next page to label all of the bones.

HUMAN SKELETON

Atlas of Primate Skeletal Anatomy

Parietal

Temporal
Zygomatic
Occipital

Cervical vertebrae (7)

Lumbar vertebrae (5)

Ilium

Sacrum

Pubis

Ischium

Femur

Patella

Tibia

Fibula

Tarsals (7)
Metatarsals (5)
Phalanges (14)

Frontal

Maxilla
Mandible

Clavicle

Scapula

Sternum

Ribs

Thoracic vertebrae (12)

Humerus

Ulna

Radius

Carpals (8)

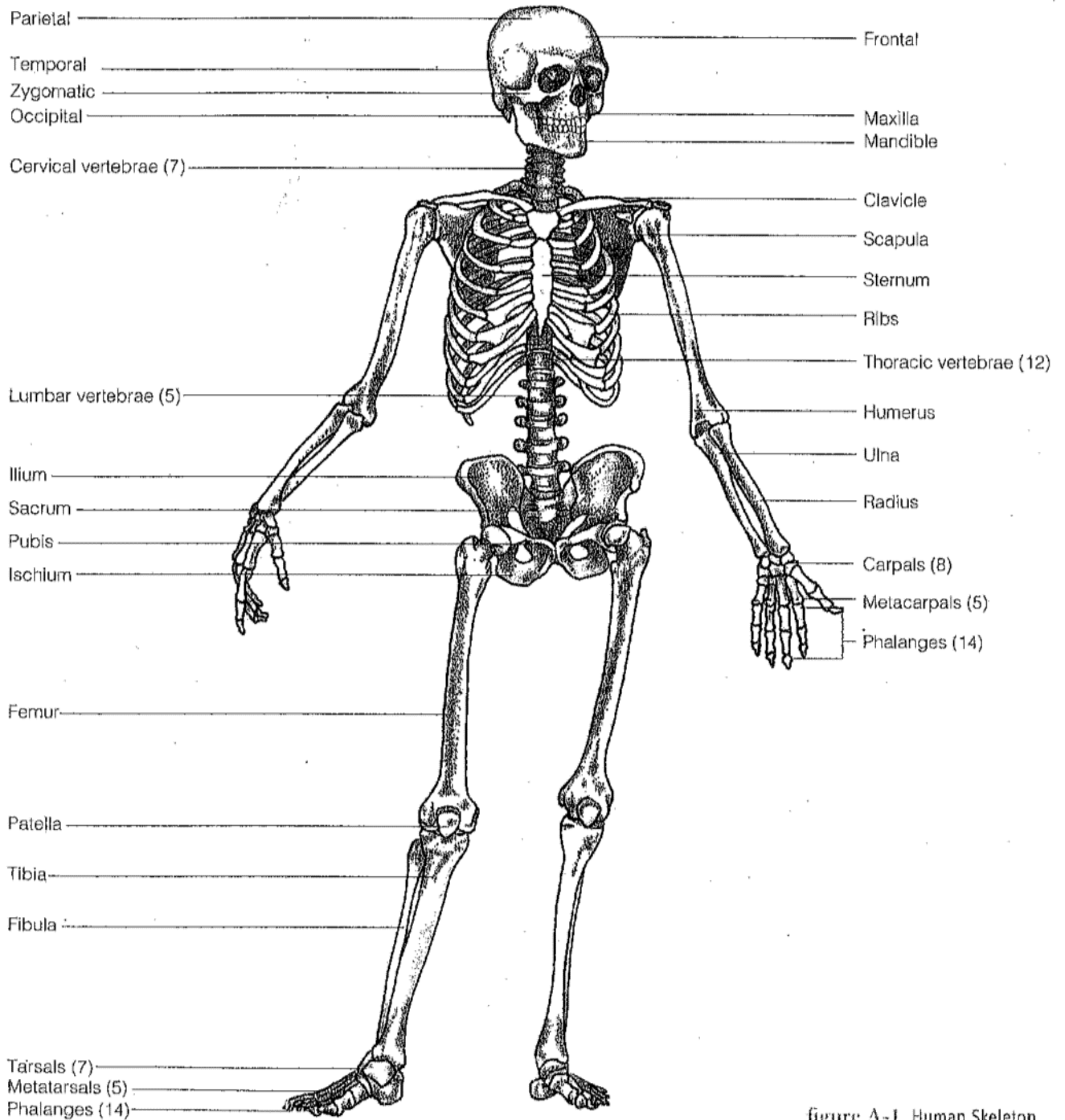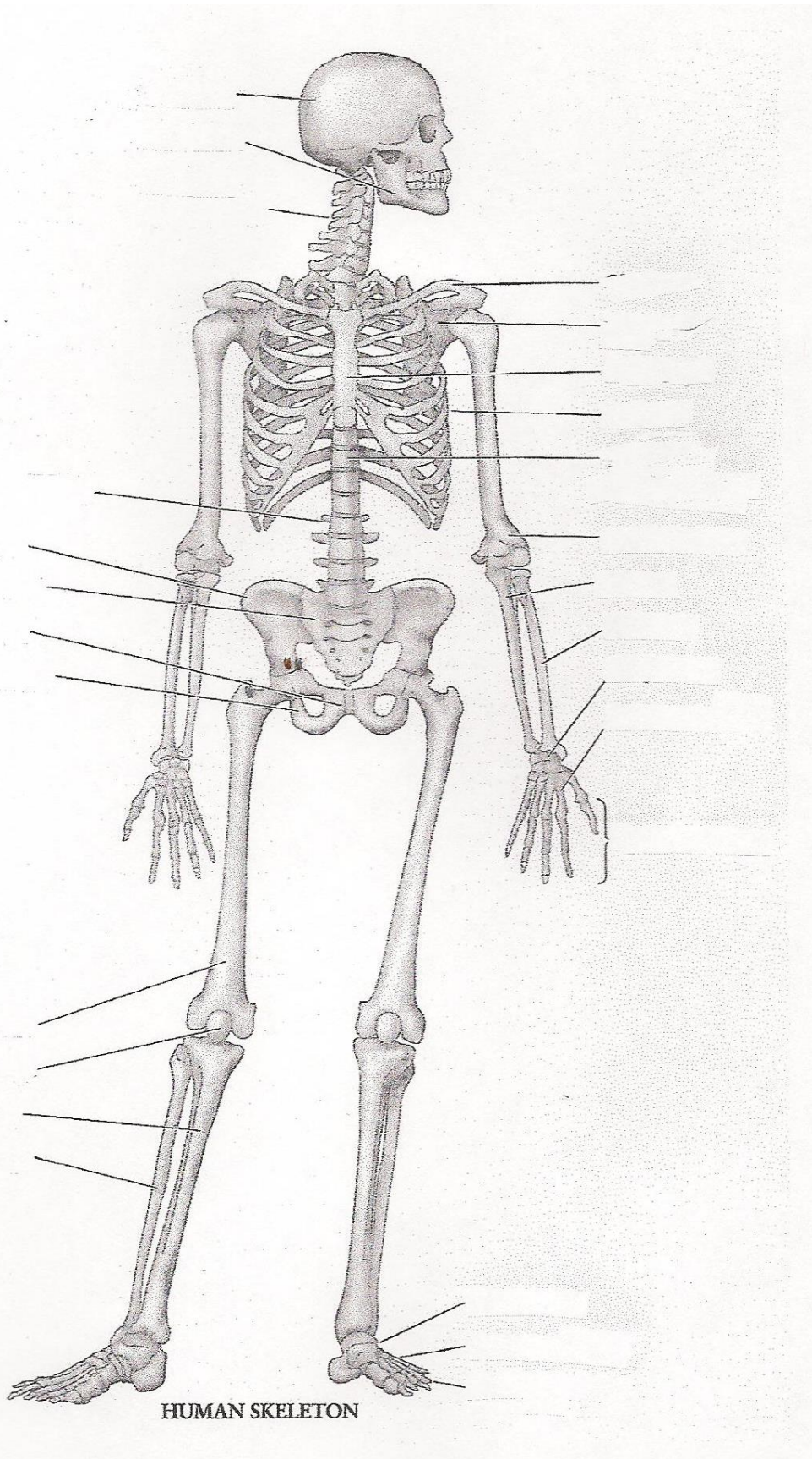Metacarpals (5)

Phalanges (14)

figure A-1 Human Skeleton
(*Homo sapiens*)—bipedal hominid.

Skeleton 3: Without reference to the Atlas or the cover sheet of this lab, label as many bones as you remember.

HUMAN SKELETON

Human Cranial Anatomy
Review the features of the human skull on this page and use this illustration to label the skulls on the following pages.

Frontal

Postorbital constriction

Supraorbital torus

Nasal

Zygomatic

Maxilla

Mandible

(a)

Parietal

Frontal

Supraorbital torus

Nasal

Zygomatic

Maxilla

Mandible

Temporal

Occipital

Mastoid process
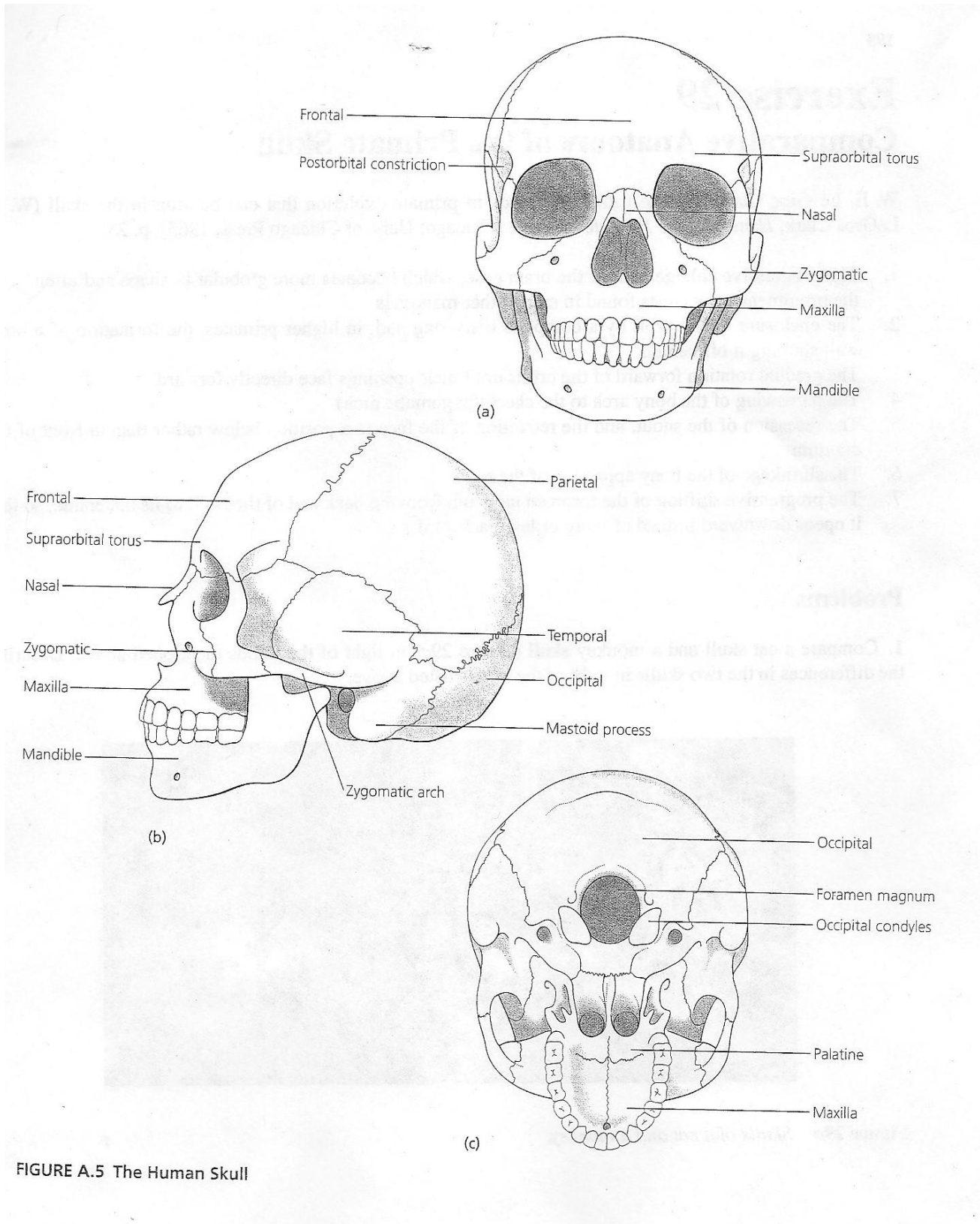
Zygomatic arch

(b)

Occipital

Foramen magnum

Occipital condyles

Palatine

Maxilla

(c)

FIGURE A.5 The Human Skull

(a)

(b)

(c)