普通高等教育“十一五”国家级规划教材

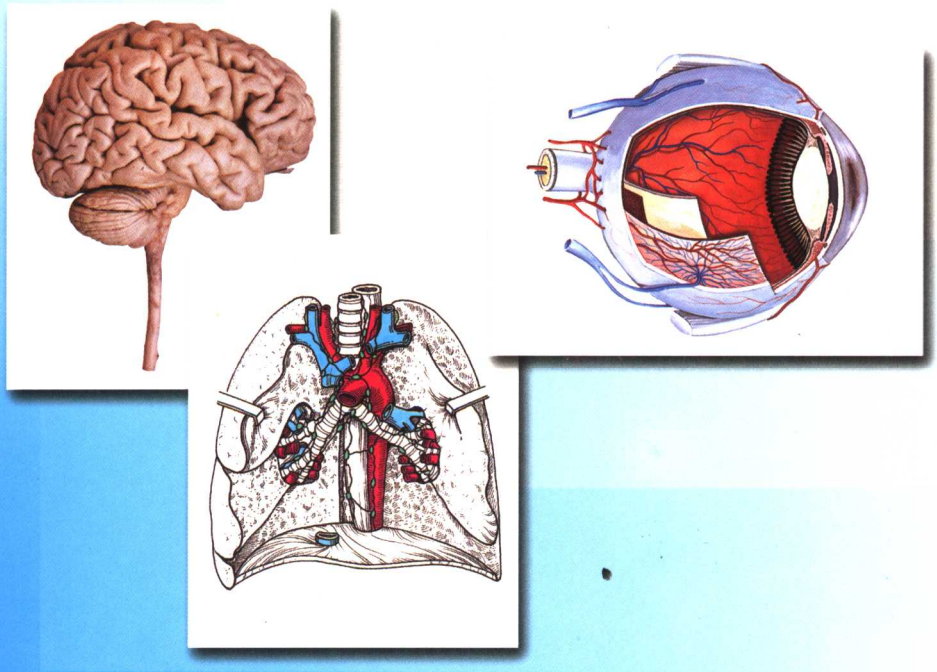
全国高等医学院校规划教材

（供医学院校长学制学生及研究生使用）

CHINESE-ENGLISH TEXTBOOK OF SYSTEMIC ANATOMY

系统解剖学

刘执玉　主编



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内 容 简 介

本教材中英文对照，按照组成人体的系统编写，包括运动系统、消化系统、呼吸系统、泌尿系统、生殖系统、脉管系统、感觉器官、神经系统、内分泌系统。上述的消化系统、呼吸系统、泌尿系统、生殖系统又可综合称为内脏学。系统解剖学将按照人体各个系统阐述其形态结构和临床应用。本教材还附有参考文献及中英文对照索引。

本教材除供医学院校八年制、硕士、博士研究生使用外，也是基础、临床、口腔、预防、护理、药学等专业的本科生、七年制、英语医学班及临床医生深入学习和提高、发展的中、英文对照的优秀教科书、参考书。

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前　言

近几年来，教育部对全国重点大学进行了一系列重大的改革举措，包括综合性大学的医学教学面向现代化，面向世界，面向未来，与世界医学教学模式接轨的教育战略策略。为适应教育部教学改革的要求，推动高等医学教育的改革与发展，贯彻教育部“教材建设精品化”，适应“多样化教学的要求”。我们应中国科学院医学教材建设委员会的邀请，编写了这部八年制英文版与中文版相互对照的系统解剖学教材。

我们经过与全国各重点大学的著名教授反复协商、讨论，一致认为本教材应适应教育部新时代高等医学人才培养模式需要，教材的编写要与时俱进，改革创新。教材内容既要体现严格的基础理论、基础知识、基本技能训练，又要加强思想性、科学性、先进性、启发性和适用性。编委们在五年制、六年制、七年制教学的基础上突出了“新、深、精”。本书突出对学生的创新意识和创新能力的培养，增强基础医学与临床医学的联系，几乎所有全国综合性大学和重点医科大学的著名解剖学专家教授参加了本书的编写。它是我国第一部中、英文相互对照的八年制《系统解剖学》普通高等教育“十一五”国家级规划教材。

本书在编写过程中参考了国内外许多重要的教科书和相关文献，并为便于教学的需要和学生查阅，将参考书和有关文献列于书后。特别某些章节在过去的传统教科书基础上，增加了一些新的内容。

本书的编委会议是在昆明医学院召开的，会议期间得到了昆明医学院领导和同仁们的热情接待和大力支持，在此表示衷心的感谢。

虽然编委们尽了很大努力，但由于首次编写八年制及硕、博研究生教材，尚缺乏八年制教学的具体教学经验，书中的疏漏和错误肯定在所难免，热情欢迎广大同仁和使用本教材的学生们提出宝贵意见。

刘执玉

2006 年 3 月

Preface

In recent years, Ministry of Education of the People's Republic of China had carried out great reforms on the key universities to keep coincidence with the modle of global medical education. In order to adapt the request of these reforms and push the reforms and development of medical education, we write this Chinese-English textbook under the invitation of The Expert Committee of Teaching Material Construct of Chinese Academy of Siences.

In this textbook, we culture the consciousness and capability to bring new ideas on foundation of strict rational and basic skill training. We enhance the connection of preclinical medicine and clinical medicine. The writers of this textbook almost contain all of the authority and famous anatomic specialists and professors in our country and it is the first programmed Chinese-English systemic anatomy textbook for doctorial graduate of eight-year system.

In the write of this textbook, we listed our referred textbooks and pertinent literature on the end of our book which made it easy to consult by students. We also corrected the wrong or inappropriate parts of the older textbooks and added some new contents.

The meeting of writers was hold in Kunming Medical College. During the meeting, we were entertained warmly and supported strongly by the leaders and colleagues of Kunming Medical College. Here we express our wholehearted appreciation.

This is the first textbook for doctorial graduate of eight-year system that was written in our country, so there are unavoidable oversight and mistakes in this book. We hope the reader of this textbook can offer us valuable advice and correct our mistakes.

Our textbook can be used by doctorial graduate of eight-year system, master, doctor, student under graduate, medical-english class. It is also a good reference book for the profound study and development of clinician.

Liu Zhiyu

2006. 3

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第一篇　运动系统 LOCOMOTOR SYSTEM

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绪论 Introduction

一、人体解剖学概述
General Description

人体解剖学 human antomy 是研究人体组织、器官形态结构的科学。为了医学生更好地掌握人体各器官的形态结构及其之间的相互联系，为学习其他基础医学与临床医学奠定良好的解剖学基础，为他们将来做内外科医师和其他医学专业人员的需要，对人体进行清晰而详细的解剖学习，是十分必要的。人体解剖学的研究越来越清楚地表明，人体的结构完美而奥妙，每一个零部件都反映了她的功能与结构的完美而密切的联系。医学生在学习解剖学时应该时常将功能和结构的研究联系起来，方能学以致用、融会贯通，易于理解和记忆。解剖学是医学专业的重要基础学科之一，医务工作中三分之一的医学术语来自解剖学，医学各个领域的研究学习都与解剖学有关，所以学习好解剖学对于从事医学及生命科学的研究工作就显得格外重要。

The study of **human anatomy** is the science considers the structures which make up human body. To serve the needs of surgeons, physicians and other medical specialties, anatomy must be the clear and sufficiently detailed analysis of human body. However, structures tend to reflex functions, so medical students must bind the study of functions with the study of structurs. Anatomy is one of the fundamental subjects in medical study, and one third of the medical terminology used by medical worker come from anatomy.

二、人体解剖学的分科
Classification of Human Anatomy

依照不同的研究方法和目的，人体解剖学可以分成不同的分支。举例来说，依照研究方法分类可以有**大体解剖学** gross anatomy、**显微解剖学** microanatomy 和**发育解剖学** developmental anatomy 或称**组织胚胎学** histology and embryology 等等；依照研究目的分类可以有 **X 线解剖学** X-ray anatomy、**临床解剖学** clinical anatomy 和**表面解剖学** surface anatomy 等等。大体解剖学还可以再分为**系统解剖学** systemic anatomy 和**局部解剖学** regional anatomy。系统解剖学按人体器官功能系统进行学习，而局部解剖学按照组织和器官的位置进行学习。本教材主要按照系统解剖学方法进行学习。

According to different methods and purposes of study, human anatomy can be classified into different branches. For example, there are **Gross Anatomy**, **Microscopic Anatomy** and **Embryology** according to study methods; there are **Radiographic Anatomy**, **Clinical Anatomy** and **Surface Anatomy** according to study purposes. Gross Anatomy can also be divided into **Systemic Anatomy** and **Regional Anatomy**. Systemic Anatomy studies each system on the basis of their common functions, while Regional Anatomy studies the organs and tissues on the basis of their positions. This anatomy book is written by the style of Systematic Anatomy.

三、人体的一般结构
General Structure of Human Body

人体基本的结构是细胞 cells，具有功能相同或分化相似的一群细胞结合在一起构成了组织。在人体中主要有四种组织，即**上皮组织** epithelial tissue，**结缔组织** connective tissue，**肌组织** muscular tissue 和**神经组织** nervous tissue。几种不同的组织相互结合构成了**器官** organ。依照功能为基础，若干个器官组成系统。人体由九个系统组成：**运动系统** locomotor system，包括骨、关节和骨骼肌三部分，执行躯体运动功能；**消化系统** alimentary system，主要功能是消化食物、吸收营养物质和排出代谢产物；**呼吸系统** respiratory system，主要功能是执行机体与外界环境间的气体交换，吸进氧气，呼出二氧化碳，还有部分内分泌功能；**泌尿系统** urinary system，主要是排出机体内溶解于水的代谢产物；**生殖系统** reproductive system，主要功能是生殖繁衍后代；**循环系统** circulatory system，包括心血管系统和淋巴系

统,心血管系统主要疏导血液在体内循环流动,淋巴系统为心血管系统的辅助部分,并具有免疫等功能;**感觉系统** sensory organs,是感受机体内、外环境刺激的装置;**神经系统** nervous system,是机体各器官、各系统的整合系统,调节各系统器官的活动协调;**内分泌系统** endocrine system,通过分泌激素调控全身各系统的器官活动。

The fundamental structure of human body is **cell**. Groups of cells with similar function or similar differentiation become **tissues** of human body. In human body, there are four tissues named: **epithelial tissue**, **connective tissue**, **muscular tissue** and **nervous tissue**. Different tissues are combined together to form organs. Systems are conformed by organs and structures on the basis of their function. Human body is composed of nine systems: **Locomotor system**, perform the function of body movement. **Alimentary system**, main function is food digestion and nutrient absorption. **Respiratory system**, have function of exchange gas between human body and environment. **Urinary system**, output metabolite dissolved in water from human body. **Reproductive system**, mainly function is reproduction of offspring. **Circulatory system**, including cardiovascular system and lymphatic system make blood flow as circulation in human body. **Sensory organs** (system), feel stimulation from human body or environment. **Nervous system**, integrate the coordination of each system and organ. **Endocrine system** control the activity of all organs in each system by means of secreting hormone.

四、解剖学的基本术语 Common Language in Study of Anatomy

(一) 解剖学的标准姿势 Anatomical Position

为了准确地描述人体各部结构的位置关系,特设定人体处于一种**标准姿势** standard position 的位置状态,称为**解剖学姿势** anatomical position:身体直立,两臂下垂于躯干的两侧,掌心向前,足跟并拢,足尖向前。解剖学中的方位术语大多是以这个姿势为标准描述的,因此我们在学习解剖学之前必须要掌握解剖学的标准姿势。此外,左右作为方位术语使用时,也是以被观察者的左右为标准,而不是观察者的左右。

In order to describe human body in a **standard position**, human body is supposed to be in the erect posture, with the pace and toes forward, the arms hanging by the sides and the palms of the hands directed forward, the heels near to each other. Most of the directional terminology are used in the anatomy with the premise of anatomy position, so it is necessary to learn the anatomical position. Furthermore, as terms of direction, right and left are also used according to anatomy position instead of the right and left sides of the observer.

(二) 方位术语 Terms of Direction

按照解剖学姿势,又规定了一些解剖学上的方位用语,根据这些标准的方位名词,就能够正确的描述人体各结构和器官的相互位置关系,解剖学中常用的名词有:

The terms of direction often used in anatomy are as follow:

前 anterior(腹侧 ventral)和**后** posterior(**背侧** dorsal),前(腹侧)是指靠近身体前面的部分,而后(背侧)则指靠近身体背面的部分。

Anterior (**ventral**) and **posterior** (**dorsal**) Anterior (ventral) means the location of this part near the front of the body, while posterior (dorsal) means its location near the back of the body.

上 superior 和**下** inferior 是用来描述器官和结构距离颅顶或足底的相对远近关系,比较靠近颅顶的是上,比较靠近足底的是下。有时,也可以用**颅侧** cranial 和**尾侧** caudal 来代替上和下。

Superior and **inferior** Superior means the upper part of a structure or body, while inferior means the lower part of a structure or body. However, cranial may replace superior and caudal replace inferior in the trunk sometimes.

内侧 medial 和**外侧** lateral 是指器官和结构靠近或远离正中矢状平面的远近,凡近正中矢状平面者为近侧,远离此平面者为远侧。根据解剖学标准姿势,拇指在手的外侧,然而踇趾则在足的内侧。

Medial and **lateral** Medial or lateral means structure nearer or farther from the median plane. So according to anatomical position, thumb is lateral

compare to little finger, yet big toe is medial compared to little toe.

内 internal 和**外** external 常用来描述结构距离体腔或空腔器官中心的远近。与内侧和外侧有显著区别，初学者一定要掌握这一点。

Internal and **external** Internal and external are often used to describe nearer or farther from the center of a body cavity or hollow viscera.

浅 superficial 和**深** deep，则是用来描述结构与身体表面的距离，距离近了是浅，远了是深。

Superficial and **deep** Superficial and deep are used to describe the relative depth from the surface of body.

在四肢，**近侧** proximal 和**远侧** distal 用于描述距离肢体根部的远近。上肢的**尺侧** ulnar 与**桡侧** radial，下肢的**胫侧** tibial 和**腓侧** fibular，则相当于**内侧**和**外侧**。手的前面为**掌侧** palmar，而足的下面为**跖侧** plantar.

所有这些方位术语都是以解剖学姿势为前提的。

Proximal and **distal** Proximal and distal mean nearer or farther from the attached end of the limb. Ulnar for upper limb and tibial for lower limb correspond to medial; radial for upper limb and fibular for lower limb correspond to lateral. Palmar means the anterior of hand and plantar means the inferior of foot.

All of these terms of direction are used under the premise of anatomy position.

（三）人体的轴和解剖切面 axis and planes（Fig. 1-1）

1. **轴** axis　人体解剖学上的三个轴分别是：**垂直轴** vertical axis，**矢状轴** sagittal axis 和**冠（额）状轴** coronal axis。垂直轴是自上到下与地面垂直而与身体的长轴平行的轴。矢状轴是从前向后与身体长轴垂直，而与地面平行的轴。冠状轴是由左向右与身体的长轴垂直，与地面平行的轴。

The axis in human anatomy are vertical axis, sagittal axis and coronal axis. **Vertical axis** is vertical with ground and parallel to long axis of body. **Sagittal axis** is vertical with long axis of body in the direction of anterior and posterior and parallel to ground. **Coronal axis** is vertical with long axis of body in the direction of left and right and parallel to ground.

2. **面** plane　在人体上按上述三个轴线移动，可形成常用的三个切面是：**矢状面** sagittal plane、**冠（额）状面** coronal plane 和**水平面** horizontal plane。

矢状面是与正中平面相平行的那些平面，一个矢状面可把人体分为左侧与右侧两部分。正中矢平面是一个垂直的前后方向上通过躯干中心的纵切面。

冠状面可把人体分为前后两个部分的面，它们有时被称为额状面。

水平面把人体分为上下两个部分，也常被称为**横切面**。

这三种平面中，每一个平面都与其他另外两个平面成直角。

这些轴和面在描述人体的某些结构的形态位置时很重要，在叙述关节的运动时，也有必要明确其运动轴的方位。

There are three kinds of planes often used in anatomy:

Sagittal planes are these planes parallel to median plane and can divide human body into left and right parts. **The median plane** is a vertical antero - posterior plane which pass through the center of trunk.

Coronal planes divide human body into anterior and posterior parts, and they are sometimes named frontal planes.

Horizontal planes divide human body into superior and inferior parts, and can also be called transverse planes.

Each of these three kinds of planes is at right angle to the other two planes.

Axis and plane are very important to describe the shape and location of some structurs. And they are also important in the description of the movement of articulation.

刘执玉（Liu Zhiyu）

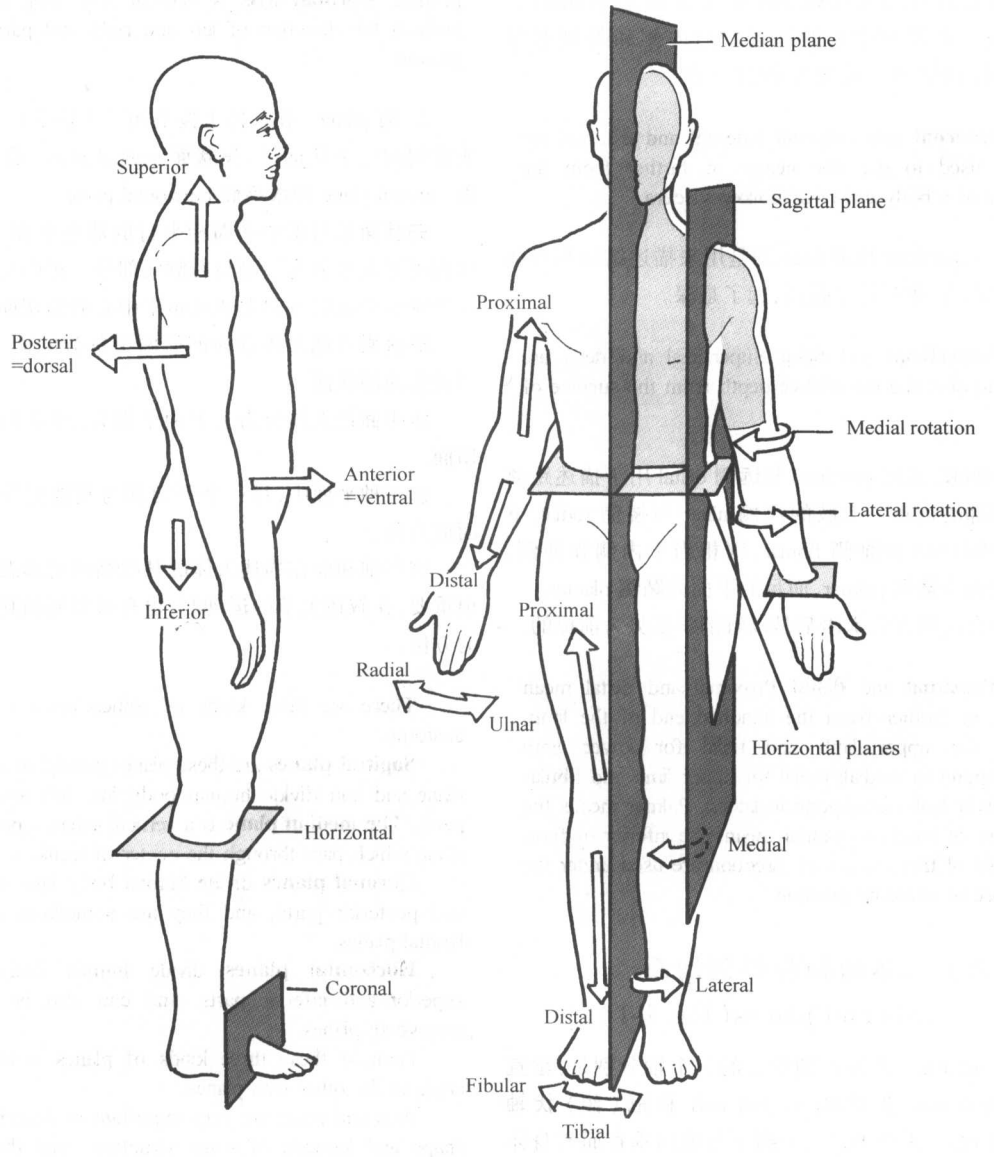

Fig.1-1 Diagram showing the chief terms of position and direction and the main planes of reference in the body

第一篇　运动系统
LOCOMOTOR SYSTEM

运动系统 locomotor system 由骨、关节和骨骼肌三部分组成，约占成人体重的 60%。全身各骨借关节相连形成骨骼，构成坚硬的支架，除了为软组织提供支持，供肌肉和其他组织附着外，还包绕脑、心、肺、肝和脾等诸器官，为这些器官提供一定的保护。

骨骼肌附着于骨，在神经系统的支配下收缩和舒张。收缩时，以关节为支点，牵引骨改变位置，产生运动。运动中，骨起着杠杆作用，关节是运动的枢纽，骨骼肌则是动力器官。

骨骼不仅为人体提供了支架，还具有运动、支持和保护的功能。

Locomotor system includes bones, joints and muscles, which constitute 60% weight of the body. Each bone is linked to another, or to several others, by joints or articulations, and constitutes the **skeleton.**

Where bones surround structures such as the brain, heart, lungs or other organs, they provide considerable protection. The bony skeleton can not be considered solely as a collection of variously shaped components. Apart from providing support for soft tissues, it act as a system of levers to which the muscles and other structures are attached. Movements at joints are controlled and produced mainly by muscles attached to bones. During the movement, the bone acts as a lever, the joint as a axis, and the muscles as motive power.

Therefore, the skeleton not only provides the framework for the body, but also carries out the functions of motion, support and protection.

第一章　骨学 Osteology

第一节　概论 General Description

骨 bone 是一种器官，由人体内最坚硬的骨组织组成。骨具有一定的形态和构造，含有丰富的血管、淋巴管及神经，不断进行新陈代谢和生长发育，并有修复、再生和改建的能力。活的骨是具有可塑性的组织，其形态和功能受到遗传因素、外环境和内环境的影响。年龄、性别、身材、习惯、健康、饮食、种族和内分泌状况都会造成骨的改变。经常锻炼可促进骨的良好发育，长期废用则出现疏松。骨的基质中有大量钙盐和磷酸盐沉积，是钙、磷的储存库，参与体内钙、磷代谢。骨髓具有造血功能。

Osteology is a Science to study on the bones, which are hard supporting tissues of the body. In human anatomy, the term skeleton is confined to the endoskeleton; The Sheleton is divisible into an axial part, which comprises the bones of the head and the trunk, and the appendicular part, which comprises the bones of limbs.

Each living bone is an organ. It has proper shape and carries out certain functions. It is a hard and resilient organ, and is abundant in blood and nerve supply. It possesses the ability or reconstruction, repairing and regeneration. In fact, living bone are plastic tissues with organic and inorganic components. Bones can be affected by genetic, external and internal environmental factors, thus, age, sex, stature, body habitus, health, diet, race and endocrinological conditions should be attended.

成人有206块骨。根据其位置，可分为三部分：颅骨（包括6块听小骨）、躯干骨和四肢骨（也称附肢骨），前二者统称中轴骨（Fig. Ⅰ-1-1）。

Bones in adult are 206 in number. According to their position, bones are divided into three parts: the bones of the skull (including 6 auditory ossicles), bones of the trunk (these 2 parts are axial bones), and bones of the limbs (the appendicular bones). (Fig.Ⅰ-1-1)

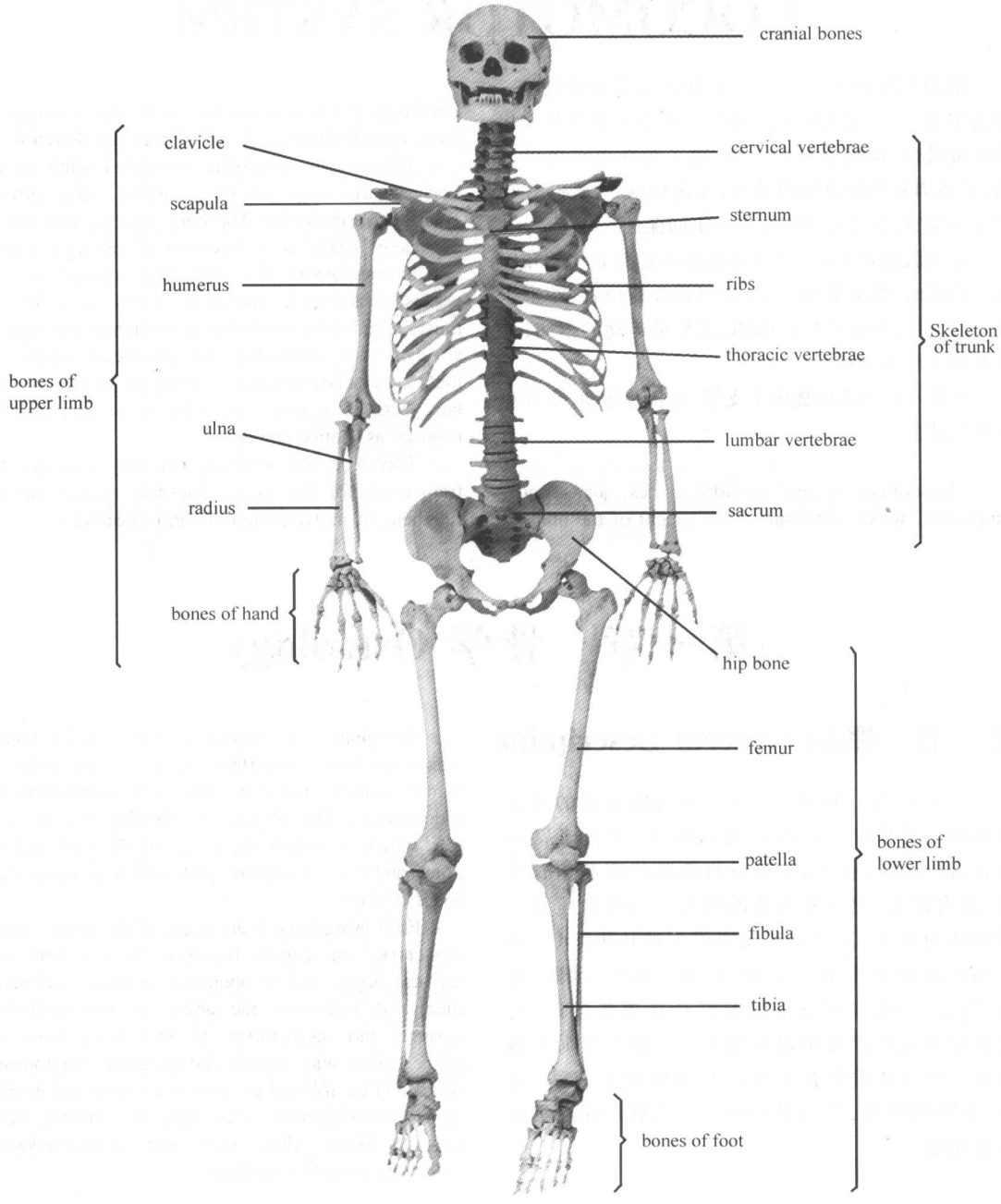

Fig. Ⅰ-1-1 The human skeleton (anterior view)

一、骨的形态和分类 Shape and Classification of Bones

根据功能的不同，骨的形态也有各种各样。从形态上，可以把骨分为4类：长骨、短骨、扁骨和不规则骨。（Fig. Ⅰ-1-2）

Bones are different in shape because of the disparity of their functions. According to their shape, four kinds of bones are classified. Those are long, short, flat and irregular bones.(Fig.Ⅰ-1-2)

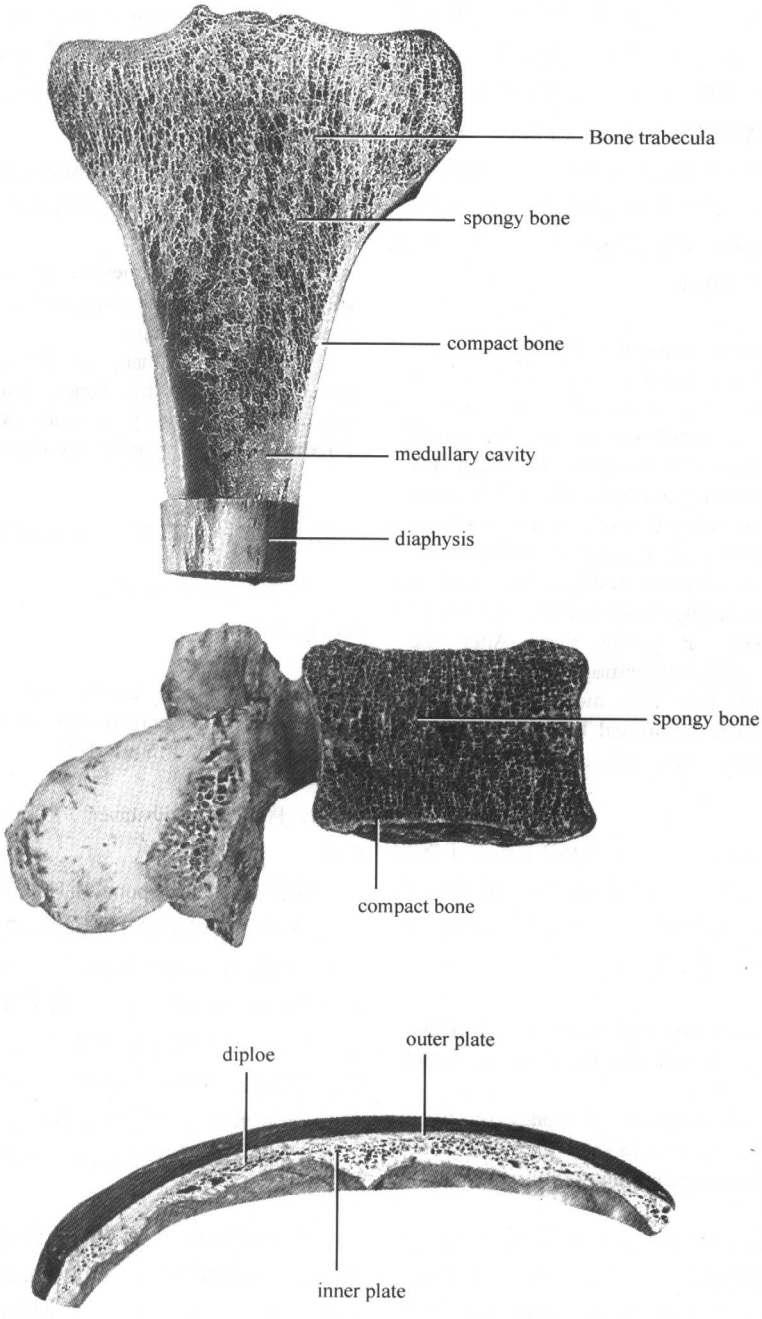

Fig. Ⅰ-1-2　The shape and structure of bone

1. **长骨** long bone　呈长管状，分一体和两端。体又称**骨干** diaphysis 或 shaft。骨干是由骨密质为主构成的细长管状结构，内有容纳骨髓的空腔，称**髓腔** medullary cavity。骨干的表面有1～2个血管出入的孔，称**滋养孔** nutrient foramen。骨两端的膨大称**骺** epiphysis，在一层薄薄的骨密质覆盖下，主要由骨松质构成。其光滑的、由关节软骨覆盖的面，称为**关节面** articular surface，与相邻骨的关节面构成关节。骨干与骺相邻的部分，称**干骺端** metaphysis，幼年和青少年时保留一片软骨，称**骺软骨** epiphyseal cartilage。骺软骨细胞不断分裂、繁殖和骨化，使骨不断加长。成年后，骺软骨逐渐骨化，骨干的干骺端与骺融为一体，其间遗留一骺线 epiphyseal line，骨便停止生长。长骨主要位于四肢，起运动杠杆的作用。

Each **long bone** consists of a shaft or body and two ends or extremities. The **shaft** is a slender tube of compact bone tissue. There is a cavity in the inner of the shaft, known as **medullary cavity**. The cavity contains bone marrow. The extremities are wider and known as **epiphyses**. They are made up of cancellous or spongy tissue covered with a thin layer of compact bone tissue, the smooth end is called articular surface, which is covered by articular cartilage. The shaft is connected with the epiphyses by cartilage known as **epiphyseal cartilage** in young men. After the ossification of the epiphyseal cartilages has finished in adult, the epiphyses fuse with **metaphyses** of the shaft, and become the **epiphyseal lines**. Long bones are found in limbs, they act as the levers in locomotion.

2. **短骨** short bone　形似立方体，主要位于腕部和足部，如腕骨和跗骨。短骨的表面是薄层的骨密质，内部由骨松质构成。短骨多成群分布于连结牢固且较灵活的部位，能承受压力和起支持作用。

The **short bones** are roughly in cuboid shape. They distribute in wrist and foot including the carpal and tarsal bones.

These bones are composed of spongy substance with a thin layer of compact substance. The short bones can bear stronger pressure and play the role of support.

3. **扁骨** flat bone　呈板状，由两层骨密质与它们之间的骨松质和骨髓组成。主要构成颅腔、胸腔和盆腔的壁，起保护作用，如肋骨、胸骨、肩胛骨和颅盖骨。扁骨的功能主要是保护脑、心、肺、肝和脾等重要器官。

The **flat bones** consist of two plates of compact bone with spongy bone and marrow between them.

They include the ribs, sternum, scapulae, and many bones of the skull. The functions of them are usually to protect the important organs such as the brain, the heart, the lungs, the liver and the spleen etc.

4. **不规则骨** irregular bone　在形状上很不规则，具有不同的功能，包括某些颅骨、椎骨和髋骨。有些不规则骨，如某些颅骨，内有充满空气的腔或窦，称**含气骨** pneumatic bone，如上颌骨。

发生在某些肌腱内的扁圆形小骨，称**籽骨** sesamoid bone，如髌骨和第一跖骨头下的籽骨。

The **irregular bones** are greatly varied in shape, carry out different functions, and can not be included in the preceding groups.

They include many of the cranial bones, the vertebrae, and the hip bones. Some cranial bones contain air-filled cavity or sinus and are known as **pneumatic bones**, maxillae are the example.

二、骨的结构 Structure of Bones

活的骨由骨质、骨膜、骨髓和丰富的血管、神经组成(Fig. Ⅰ-1-3)。

Living bones consist of bony substance, periosteum, bone marrow and are abundant in blood and nerve supply (Fig. Ⅰ-1-3).

1. **骨质** bony substance　由骨组织构成，分密质和松质。

骨密质 compact bone，质地致密，耐压性和耐弯性较大，配布于长骨的骨干、骺的外层和其他类型骨的外表面。**骨松质** spongy bone，呈海绵状，由相互交织的**骨小梁** trabeculae 排列而成，除了骨髓腔和气窦外，配布于骨骺和几乎所有骨的内部。骨小梁的排列方向适应它的功能，与骨所承受的压力线和张力线的方向一致，因而能承受较大的重量和张力。在X线片上，可以清楚地看到骨小梁形成的压力线跨过骨与骨之间的关节。

颅盖骨的内和外表层均为骨密质，分别称外板和内板。外板厚而坚韧，富有弹性；内板薄而松脆，颅骨骨折多见于内板。两板之间的骨松质，称为**板障** diploe，有板障静脉经过。