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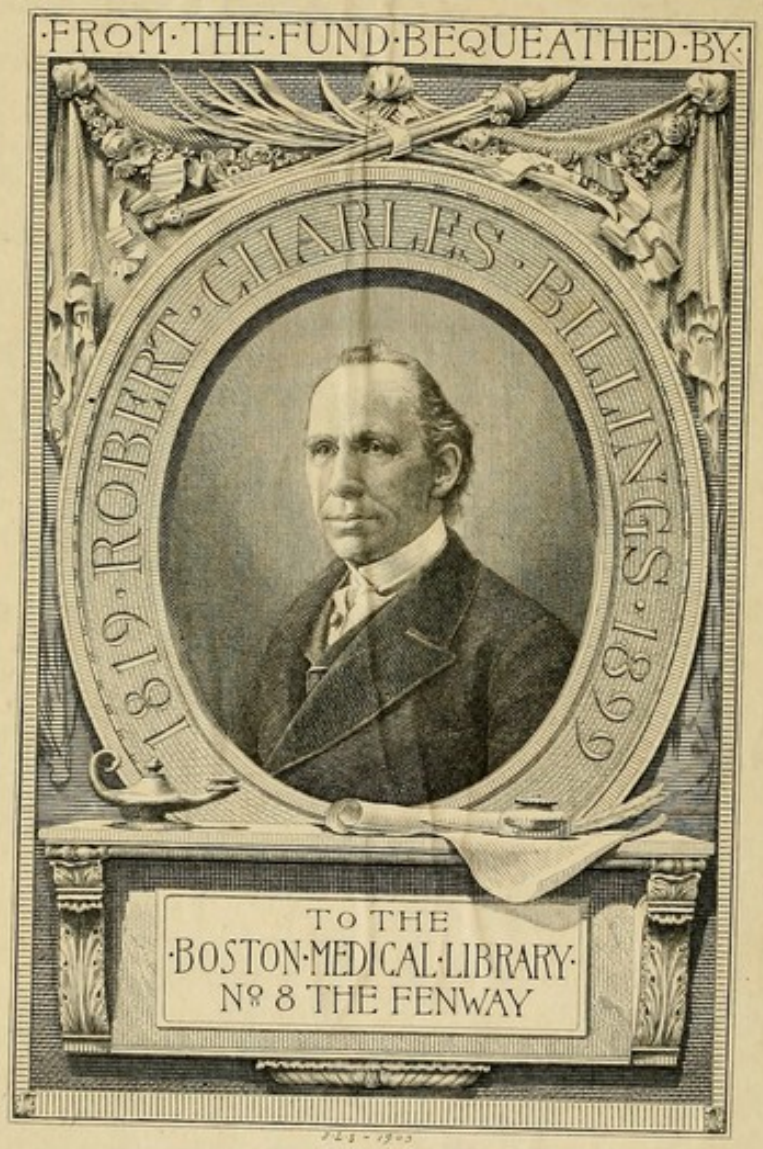


ELEMENTS OF ANATOMY;

DESIGNED

FOR THE USE OF STUDENTS

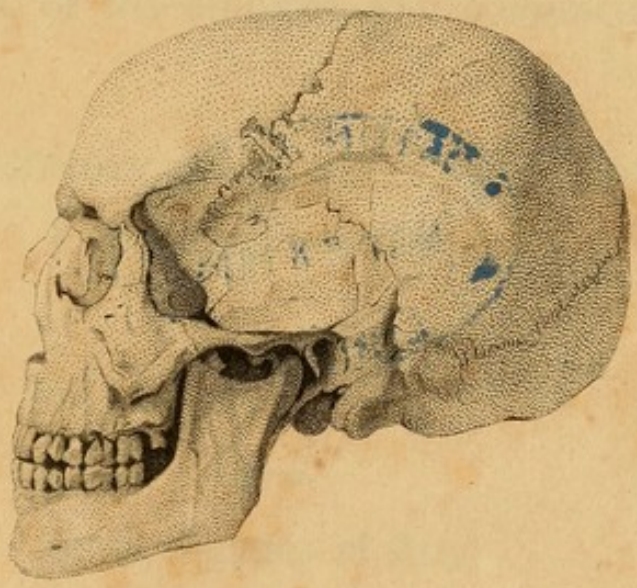
IN THE

FINE ARTS.

BY

JAMES BIRCH SHARPE,

MEMBER OF THE ROYAL COLLEGE OF SURGEONS, AND STUDENT IN THE ROYAL ACADEMY OF ARTS.



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TO

HENRY FUSELI, A. M.

ROYAL ACADEMICIAN,

KEEPER OF THE ROYAL ACADEMY OF ARTS,

PROFESSOR OF PAINTING,

&c. &c. &c.

This Work

IS INSCRIBED, AS AN HUMBLE TRIBUTE OF RESPECT

FOR

HIS EXALTED GENIUS,

A MEMORIAL OF HIS KINDNESS AND CONDESCENSION,

AND

AS A TESTIMONY OF THE GREAT ADVANTAGES

AND HIGH HONOUR

DERIVED FROM

HIS INVALUABLE INSTRUCTION,

IN THE

Royal Academy of Arts,

BY

HIS MOST OBLIGED SERVANT,

THE AUTHOR.

Hoxton, *Aug.* 24*th*,
1818.

ERRATA.

Page	5.	Line 14.	for obliqus, read *obliquus.*
——	26.	—— 20.	
——	27.	—— 18.	
——	12.	—— 12.	for grove, read *groove.*
——	25.	—— 14	
——	29.	—— 25.	
——	41.	—— 3.	dele *and.*
——	42.	—— 37.	for biceps, read *triceps.*
——	17.	—— 33.	for astragulus, read *astragalus.*
——	—	—— 38.	
——	59.	—— 8.	
——	63.	—— 18.	

Note.—*The description of Fig.* 4, *Plate* 5. *answers for Fig.* 6 *also.*

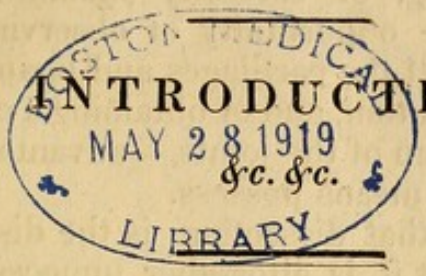
SECTION I.

INTRODUCTION,

AND

DEFINITIONS.

SECTION I.



INTRODUCTION,

&c. &c.

By anatomy is meant that art which teaches the physical composition and mechanical structure of animals. As applied to man it is called human: as applied to other animals it is termed comparative.

Anatomy is one of the great elementary principles of the art of design. Without anatomy the artist cannot determine the correctness of his outline, he will be ever involved in obscurities, and his figures must be destitute of character.

It is presumed no question will, in the present day, be raised upon the fact, that an intimate knowledge of the osteology, and of the muscles, which go to the formation of the exterior of the human figure, forms the basis upon which the superstructure of an artist's education and fame must be erected and established.

That dissection is necessary for the artist is yet with some a subject-matter for discussion. But if it be requisite for the artist to be able to distinguish bone from tendon, and tendon from muscle, he who can convey as perfect an idea of these parts by description only, as at present can be obtained by sight and touch alone, will not only succeed in performing that which all others have hitherto failed in attempting, but will in fact establish a royal road to science, and sweep our anatomic schools.

The student who imagines he will be able to obtain a competent knowledge of anatomy by reading alone, without dissecting, or examining dissections performed by others, will, when too late, experience the mortification of his error. Anatomy may be considered as a branch of experimental and demonstrative philosophy; and a knowledge of the component parts of the animal formation is no more to be obtained by description, than a knowledge of gold, silver,

or any other simple substance in nature. Independent of obtaining a complete idea of the things themselves, the student by dissecting, or carefully examining dissected bodies, will have the opportunity of observing the recent skeleton, of tracing all the cartilages and ligaments in their natural state and situation, and of obtaining a correct knowledge of the mechanism of the joints,—advantages which he cannot by any other means possess.

But some object that dissecting is the disgusting part of anatomy, and that it is altogether unnecessary for the artist. Is it not infinitely more painful to hear such an opinion promulgated in the lectures of a professor, appointed expressly to teach the elements of anatomy to artists, than disgusting to witness a dissection conducted by a sensible and intelligent mind, and to a philosophic purpose? Until a method of obtaining a similar knowledge of that elegant and beautiful piece of mechanism displayed in the composition of the human hand or foot is given to us without dissection, we may, without much injustice, conclude such disgust (in a professor at least) arises either from affectation or from indolence.

What more calculated to inspire the breast of man with gratitude for the great advantages he possesses over all the animal creation, or with veneration for the Author of those advantages, than a knowledge of his extraordinary organization, and a contemplation of the great and various powers with which this organization is endowed? And can any investigation into the nature of these things produce disgust? As well might it be said the labour of learning or investigating the theorems of our own Newton, of La Lande or La Place, by which we may obtain an accurate knowledge of the harmony of the celestial spheres, was disgusting, as that to obtain a knowledge of the harmony and admirable contrivance in animal organization, by means of dissecting, is only to produce disgust. He who considers the dissection of the human body as calculated to excite disgust, entertains very mistaken notions of philosophic investigations directed to purposes of science; and may, without much risk of error, be considered as utterly incompetent to decide the merits of the question. The idea that dissection is necessary for the student in the fine arts has prevailed in the mind of the author throughout the whole progress of this work.

Should the student be unable to obtain a human body to dissect, he may easily convert to his purpose some other animal. A dog or cat, if dissected with care, will convey a clear idea of the nature and arrangement of muscles: he will find the same means and the same component parts to produce motion as are required for the action of man; they differ but in the general form, number, position, and magnitude. But it is hoped there are indeed but few in London whose circumstances do not permit them to enjoy the fine advantages so liberally offered by Mr. Brookes. The permission which this gentleman gives to the students of the Royal Academy of Arts to visit and make use of his dissecting rooms, reflects upon him the highest honor, and deservedly places him amongst our noblest patrons of the fine arts.

It was intended on the first consideration of this work to have given a sketch of the general formation and composition of the human frame; but as such a task would necessarily occupy many pages in its performance, and extend this volume beyond its present limits, it must be omitted. The student may obtain information *tolerably correct* upon this head, in Paley's Natural Theology, Vol. I.*

The first great object is to obtain a competent knowledge of the anatomy of the limbs and the exterior of the body; after this is accomplished the student may proceed in the philosophic investigations of the general economy of animal organization. How deeply acquainted with anatomy the artist should be, is perhaps a matter of some difficulty to determine: that he may know too little admits of no dispute; but that he may know too much is yet a question. The great secret, however, is not how much he should know, but how much he should apply. This depends upon judgment and taste, for the attainment of which the statues of the antique give unerring rules.

The component parts of the human body are, by anatomists, divided into the hard and soft parts, and into fluids; by the hard parts are meant the bones and cartilages; by the soft parts are meant muscle, skin, tendon, fat, &c.; the

* There are in this work of Paley some incorrect statements, but not of any material consequence to the artist; and as to the moral and religious sentiments which attend the anatomic description, the student may dismiss them for a future occasion.

blood and other secretions and excretions comprehend the fluids; the bones constitute the skeleton, which forms the basis and frame-work of the fleshy superstructure. The skeleton is either recent or artificial; by the recent skeleton is meant that preparation by which the bones are kept in their relative and proper situations, by the means of the ligaments of the joints and other tendons; the artificial skeleton is understood to be the juxta position of the bones by the means of wires, leather, cork, and other materials, necessarily supplying the place of ligaments.

Every student should possess the artificial skeleton, so constructed as to remain in any position in which it may be placed, and not in the ordinary method of the present adopted parallelism, which gives to the skeleton the horrid appearance of a malefactor hung in chains, and renders it of little use to the artist.

The skeleton is divided into the *head*, the *trunk*, and the *extremities;* these divisions apply also to the figure.* *Cartilage* is a substance of an intermediate hardness, between bone and tendon: it is very smooth and delicate in its appearance, and is applied to the extremities of the bones to render them fit for the purposes of articulation and motion; it is sometimes loose and in a separate piece, placed between the bones at the joints, as at the knee-joint and the articulation of the lower jaw: sometimes it forms the connecting medium between the bones, as between the vertebræ of the spine; and in consequence of its elasticity admits of the motion, or rather yielding of the vertebræ one upon the other.

Muscle is formed by a fasciculus or bundle of fibres, united by a common medium; these fibres are as little threads of various lengths, thickness, and direction. A muscle is terminated at its extremities by a condensed fibrous structure called *tendon:* it is white, and forms in common language the leaders or strings, as are evident in the leg of a fowl. Every muscle is divided into a *body* or *belly* and *two extremities;* some muscles appear all fibre or flesh without tendon; others have a tendon but at one extremity, and some at both extremities; and these tendons are of various forms and lengths, as *round, flat, broad,*

* The common appearances of bone are too well understood to require any particular description.

short, or long. Ligament may be considered as a variety of tendon, having the properties of tendon in a higher degree. Muscles have obtained their names either from their discoverer, their use, situation, form or magnitude, and direction of their fibres, *as* the *sartorius* or taylor's muscle; the *flexors*, *extensors*, *abductors*, &c. the *tibialis anticus*, *and posticus before the tibia*, *behind the tibia*, *&c.* The *peroneus*, so called from its attachment to the fibula, which the French call the *Perone*, from its supposed resemblance to a musical instrument. The *deltoides*, from its resemblance to the Greek Delta. The *gracilis* from its supposed elegance. The *vastus externus* and *internus*, from their magnitude. The *glutæus magnus*, *medius*, and *minimus*, from their relative size and situation. The *rectus*, the *obliqus*, the *transversalis*, from the straight, oblique, and tranverse direction of their fibres. Some are called *penniforme*, *single*, or *double*, from their fibres taking a direction from a central or lateral line, like the feathers on a pen. Others are named from their situation and magnitude, as *pectoralis major*, the *greater pectoral muscle*, *serratus major anticus*, the *greater front saw-edged muscle.* Some also from their form and magnitude, as *teres major*, the greater round muscle, *rhomboideus major*, the *greater rhomb-like muscle*, &c. &c.

The terms *origin* and *insertion* have, in anatomy, a very limited signification. When it is said, as of the sartorius muscle, it *arises* from the ileum, and is *inserted* into the tibia, it is not meant that the muscle arises actually out of the one bone and is actually inserted into the other, as in the common acceptation of the terms would be inferred; but it being obvious the sartorius is to move the leg and not the body, the ileum is taken as the fixed point to which one of its extremities is attached, and the tibia as the moveable point to which the other extremity is attached; and in this and all other cases where the attachment of a part of a muscle is to a point or bone, which it is not by its action intended to move, that part or extremity is called *its origin*, and it is said *to arise* from that point; and in all cases, that extremity which is attached to the moveable bone, or point intended to be put in motion by its action, is designated by *its insertion*, and it is said *to be inserted* into that bone or point. By the terms *origin* and *insertion* nothing more is meant than the fixt and moveable points of attachment of any muscle. The attachment of muscle to

bone is generally expressed by a peculiar roughness, as in the *linea aspera* of the thigh-bone. The connexion of *mind* with *matter*, and the philosophy of muscular motion, are points necessarily excluded in a work of this nature; but it is necessary to observe upon a point or two relative to muscular action. Every muscle, when quiescent, or in a state of rest, has a form peculiar to itself; dissection, anatomic plates, and casts, will be adequate to give a certain knowledge of their appearance; but every muscle, in a state of action, assumes a different character and appearance; their forms vary as the force applied, and the energy of the will. A muscle, when put into action, is swelled or contracted in part or in the whole: to represent this accurately, in any given action, constitutes one of the greatest difficulties in the art of design. To obtain a knowledge of the various forms assumed by muscles in action, the artist should be very minutely acquainted with the mass and direction of their fibres, the nature and direction of their attachments and tendons, and their probable use and range of action, in conjunction with a constant study of the antique, and an attentive observation of nature. The muscles of men used to daily and laborious exercises, as hammering, lifting, pulling, &c. will, though in a state of rest, appear more strongly swelled or contracted, than the muscles of those unaccustomed to such exercises, even when in a state of action. A comparison of the arms of paviors and blacksmiths with those of watch-makers and scriveners will illustrate this fact. But the antique afford us a more beautiful and forcible illustration in the Farnesian Hercules entirely at rest, and the Discobolon, or Hæmon in a state of action. It matters not to the artist to know if a muscle has more or less blood circulating through it when in action or when at rest; all he has to observe is what part is shortened or extended, contracted or swelled. The tendons never vary, they have no power of motion, and are to the muscle what the rope is to the lever. A muscle attached but at its extremities may, when in action, be swelled throughout its whole length and contracted; but a muscle, as the vastus, which is attached, not only at its extremities, but along its whole course, cannot be shortened, but may be swelled in its action either in part or in the whole. The biceps brachialis et cruralis, the semi-tendinosus, the semi-membrinosus, and other muscles, attached but at their two extre-

mities, are called loose muscles, and when in action become swelled and shortened. No precise rule can be given for the delineation of muscles in action; study, with dissection and experiment, can alone give confidence, or lead to accuracy of design.

The Gladiator repugnans, as by some called, or more properly expressed by Fuseli, the "Warrior of Agasias," is, as a single figure, the best model of the antique which the young artist can select for anatomic study. In this celebrated figure the student will discover every muscle in motion, or eager to move. The energy of a most determined will animates the whole, and were it not for its colourless mass the spectator would be unable to separate the statue from real nature. Although every muscle is distinctly marked, and many even to their minutest fibres, yet none appear more prominent than living muscle will admit; each is in its proper place, and their swellings and contractions undulate and glide into each other in the curves and easy flow of nature; and, unlike the figures of the first sculptor of modern art, Michael Angelo, there is no ostentatious display, or capricious delineation of muscle. The author dares not venture his critique upon the character of this splendid relique of antiquity after the account and description given of it in the learned and comprehensive lectures delivered by the present eminent Professor of Painting in the Royal Academy of Arts.

The author cannot but view this figure as the chef d'œuvre of ancient art; be that however as it may, no one will dispute its high claim to the constant attention of the student, as a model of perfection in anatomic delineation and muscular action; and under this impression he has made frequent reference to it in the demonstration of the muscles.

The artist cannot study the figures of the antique too frequently, nor should any one presume to attempt the art of design without taking for his immediate model these unequalled productions of human genius. On contemplating the works of Phidias, Agasias, Glicon, and the chosen few, we behold for the first and only time models of the human race; and we exclaim with our immortal Shakspeare,

"What a piece of work is man!—how noble in reason!
"how infinite in faculties!—in form and moving how express
"and admirable!—in action, how like an angel!—in appre-

" hension, how like a god!—the beauty of the world! the " paragon of animals!"

The difficulty which the author constantly experienced in selecting from the anatomical works of surgeons, that portion which appeared to him necessary for his purpose, as an artist, and a knowledge that every student must necessarily contend with similar disadvantages, suggested to him the idea of this work.

In its composition he had to struggle with all the difficulties of a new undertaking, if therefore it carries with it the air of novelty, or claims the merits due to a first attempt, it possesses, no doubt, too many of the usual accompanying defects.

Utility being the grand object of all works of this description, the whole subject-matter has been compressed into its smallest compass, and perspicuity and conciseness have been the principal aim in the arrangement and descriptions.

In works of general science it will readily be admitted, much that is written cannot be new; and that which has been once well described, should not by any whim or caprice be altered.

The author, therefore, has borrowed from the anatomic works of others the greater portion of the demonstrative sections. The only originality to which he can lay any claim, is in the arrangement and application. The order of arrangment here adopted, is the course in which the artist should pursue this study; commencing with the bones, thence to a consideration of the muscles, and concluding with the joints, at the same time marking out their course and situation on the celebrated statues of the antique.

This work being an elementary treatise, nothing more has been given than is absolutely necessary to be well understood by the student in the fine arts, and all those who pursue any branch of that elevated line of study.

If this work should succeed in obviating the necessity, on the part of the student, of a laborious, difficult, and tedious research through anatomical works, written expressly for other sciences, for that knowledge which he is desirous of possessing in anatomy, or in any degree facilitate his advancement in the fine arts, the labours of the author will obtain their ample reward.

SECTION II.

OSTEOLOGY,

OR

THE DOCTRINE OF THE BONES.

SECTION II.

OF THE SKELETON.

The skeleton is anatomically divided into the

Head,
Trunk, and
Extremities.

The head is subdivided into

The Head, properly so called, and
The Face.

The extremities are further distinguished from each other, into

The Upper, or arms,
The Lower, or legs.

The trunk is composed of

The Thorax, or chest,
The Spine, and
The Pelvis.

Of the Bones of the Head.

Of the bones going to the formation of head, six only are necessary to be known by the artist;

1. The Os Frontis, or forehead,
2. Os Occipitis, or back of the head,
3 & 4. Ossa Parietalia, or side bones of the head,
5 & 6. Ossa Temporum, or bones of the temples.

These bones are connected together by particular joints, called *Sutures*, which may in some bald heads be traced on the living subject.

On every bone there are certain inequalities to be carefully attended to, and some of them are of great importance, since they take a considerable share in the contour of all the joints, and form points of attachment for the muscles. The particular parts to be observed are as follows:

A Process, or considerable projection from a bone.
A Tuberosity, or swelling, or nob upon the bone.
A Spine, or extended projection of bone in a line.

Every bone is either long, short, or extended. The long bones are divided into a

BODY, and
TWO EXTREMITIES.

The extremities of bones form the articulating surfaces, which from a supposed resemblance, are sometimes called the *head* of the bone; there are other parts, but the names sufficiently express their forms, such as

A RIDGE,
AN ANGLE,
A DEPRESSION,
A GROVE, &c. &c.

OF THE SKULL.

The skull is, of all the other parts of the skeleton, the most important and interesting. To the artist, the physiognomist, and the philosopher, it is an object which alike excites their highest interest, and demands their deep consideration.

Deprived of vitality, and deserted by the evanescent ornaments of life, it addresses itself powerfully to the senses; and though there remains but the bare and mouldering walls of the temple which held the sanctuary of a living soul, the νους, the mind, it yet bears the impress of divinity, and proclaims the great character and leading passions of its once inhabitant.

Nor is it merely because it is expressive of individual character that the artist should make it a particular object of his study. Independent of giving the particular character of an individual, it is in fact an ARCHETYPE of the nation to which it belongs, and thus becomes the standard of NATIONAL INDIVIDUALITY. The European and African skull compared, presents a difference not less than the eye distinguishes in the colour of their skins, or formation of the lips.

Every skull possesses a character *sui generis*, but its individual character is never so excessive as to obscure the greater lineaments of its national individuality; these are facts which the simple inspection of the two skulls will absolutely establish.

In the European skull (as in the vignette of the title page) the frontal and parietal bones are arched, and con-

siderably elevated above the basis, the occipital bone is elongated, and the temporal bones lie in a line, slightly dipping inwards towards the temporal fossa (or hollow).

The angle formed by two lines, the one drawn horizontally along the basis, and the other vertically along the profile of the face, is nearly a right angle;* and the whole presents an oblate or ovated appearance; this skull is evidently British. So various and so infinitely diversified are the forms of the human skull, and yet so constant in certain localities, that from *National* individuality the philosopher may trace the *provincial*, and from provincial the predominant characteristic of *families*.

This work being an elementary treatise will not admit of further illustrations of the subject, and from the facts already set forth, the importance of a complete knowledge of the human skull is sufficiently obvious.

On a view of the skull the student has to notice particularly those parts which give the individual character, and the following is the order of his studies. As a whole he must first notice its roundness or ovated form, the elevation of the crown of the head, and its general dimensions, smoothness, or asperity.

Of the *os frontis*,† he must observe its elevation, arch, width, angularity, and obliquity, with relation to a line drawn parallel to the basis of the skull, through the root of the nose. The presence and extent, or absence of the *frontal protuberances (or sinuses)*. The *orbitary ridge*, its extent, flatness, or arch, and its projection over the external angle of the eyes, proceeding as a ridge, or spine of bone, along the side of the os frontis, and gently continued along the os parietale, expressing the attachment of the *temporalis* muscle.

In the *os occipitis*, its elongation, width, and the crucial spine, which expresses the attachment of the strong muscles of the back and nape of the neck; the magnitude and obliquity of the great hole through which the spinal nerve (or marrow) passes, and the articulation with the first bone

* This angle in the Greek heads is generally a right angle, and in some instances exceeds it.

† For a reference to the particular processes enumerated in these and other bones, see plates I and II.

of the spine, upon which the nodding motion of the head is performed.

In the *ossa parietalia*, their arch, flatness, and obliquity; the elevation and extent of the attachment of the temporalis muscle.

In the *ossa temporum*, the obliquity of their position, flatness, and arch; the extent and magnitude of the mastoid processes, and the zigomatic process.

These are all important observations necessary to be noted in the formation of every skull, since these points form the essential difference of national and individual character and sex.

But it will now become more evident the student will not be able to make any progress in obtaining a knowledge of the bones, either relatively to each other, or particularly of themselves, unless he possesses a skeleton, or otherwise the separate bones; and he should also possess, for frequent observation, a set of skulls, commencing with those of infancy, and terminating with old age, of both sexes.

The bones of the face do not in a less degree contribute to the formation of these essential differences.

The width, length, arch, flatness, and obliquity of the bones of the nose are all of the utmost importance to be attended to; the distance and obliquity of the cheek-bones, and the projection and curve of the upper jaw; the extent and angularity of the basis of the lower jaw, and the length of its ramus, or that part which terminates at its articulation, must be particularly noted, since this bone presents one of the strongest tests of national character, and it is owing to its peculiar modifications in the antique statues that so much dignity and beauty is preserved in their heads; the Apollo affords the finest illustration.

Of the Trunk.

The *trunk* is formed by the *spine*, or back-bone; the *costæ*, or ribs; the *sternum*, or breast-bone; and the *pelvis*, or bones of the hip.

The *spine* is that long column of bones upon which the head is placed, and which terminates by a broad base upon one of the bones of the pelvis. The separate bones of the spine are called *vertebræ*, and are twenty-four in number; the *cervical vertebræ*, or vertebræ of the neck,

are seven in number; the *dorsal vertebræ*, or vertebræ of the back, are twelve in number; and the *lumbar vertebræ*, or vertebræ of the loins, are five in number.

The spine, when viewed in front, appears in a right line, but when seen in a lateral position, its true curvature is apparent; it first bends a little inward from the head to the neck; at the shoulders it is drawn very backward to allow room in the chest for the heart and lungs; and at the loins it again stands forward in support of the viscera.

Between each vertebræ is a cartilaginous and elastic substance, allowing motion in the spine. The motions of the spine are limited; the cervical vertebræ allow a small motion forwards, and a rotatory motion; the dorsal vertebræ admit still less a change of position; and the lumbar vertebræ allow a bending forwards in a small degree.

Each vertebræ is a ring of bone varying in strength and magnitude from the first, called the atlas, from supporting the globe of the head, to the last of the loins. These bones send out on each side and directly projecting backwards processes, called *spinous processes*, which give attachment to the muscles of the back.

The ribs are twenty-four in number, twelve on each side; they present a conoidal appearance, the apex of which is at the neck.

Each rib is attached, by one extremity, to a vertebræ, and all but the two last are, at their other extremity, attached to the sternum by means of their cartilages. The eighth, ninth, and tenth ribs are connected to the sternum by means of the cartilage of the seventh; and the tenth and twelfth are loose at their anterior extremity; they have, therefore, obtained the appellation of the floating ribs. The cartilage of each rib lengthens from the first to the last of the true ribs. The cartilage of the false ribs is short.

The *sternum* is that irregular long bone which is seen passing along the breast, and terminating in a cartilage, called, from its supposed resemblance to a sword, *the ensiforme cartilage*. It is composed of several pieces of bone, which in the adult become united; but as this bone is arched forward, and the action of respiration having, in a small degree, raised each bone before they became perfectly united, it retains several inequalities which accord with its original number of pieces, and therefore the artist should not fail to express them in the strong actions of muscular

men. These inequalities may be traced in the Laocoon and the Hæmon.

The pelvis, so called from its resemblance to a basin, completes the trunk; it is formed of two large bones, united at and forming the *pubis* in front, and connected behind by another bone of a triangular shape, called the *sacrum*, upon which the spine rests. The pelvis forms the connecting medium between the trunk and lower extremities, by the means of the hip-joints. The two large bones on each side are called *ossa innominata* (nameless bones) and are divided into three parts, the *ilium*, *ischium*, and *pubis*. (Vide plate I.) The upper margin is called the spine of the bone, and gives attachment to some of the abdominal muscles. The angles in front are called the spinous processes, and give attachment to the rectus and glutæus muscles, &c.

The ischium, or under part of the bone, forms that part on which the individual sits; it also forms the largest share in the acetabulum, or socket of the hip-joint, and gives attachment to a great proportion of the muscles of the thigh.

The *pubis* is formed by that part of the ossa innominata, which extends horizontally for about two inches on each side of their junction in the front; this bone also gives attachment to muscles.

Of the Lower or Inferior Extremities.

The inferior extremities are formed by
The Os Femoris, or thigh-bone,
The Tibia,
The Fibula,
The Patella,
} or bones of the leg, and
The Foot.

The *femur* or *thigh-bone*, is the largest of the long bones in the human skeleton, and forms the upper division of the leg. The upper extremity of this bone is formed into a ball, and is called its head; this is so constructed for the purposes of extended motion at the hip-joint; externally is a tuberosity called the *trochanter major*, or great trochanter. The student must constantly bear in mind this process, as it forms the contour in the hollow of the thigh at the hip-joint, and gives attachment to important muscles. Opposite to this and a little lower is situated a similar, but smaller, process, called the *trochanter minor*, or lesser trochanter. The femur is rounded and smooth in front, but is rough

behind. (Vide plate II.) This roughness is called the *linea aspera*, and gives attachment to several muscles. At the lower extremity this bone extends on each side, forming what are called its *condyles;* these are evidently for the purpose of articulation with the bone of the leg. It must be observed the inner condyle is the largest and longest, which occasions that inkneed appearance so conspicuous in the skeleton.

The *leg* is composed of two bones, named the *tibia* and largest, the *fibula* and smallest.

The *tibia* is a long angular bone, the larger extremity of which is the upper, so constructed as to receive the condyles of the femur; the front angle of the bone runs in a waved line, and is called its *spine;* it passes from a little projection of the bone, called the *tuberosity*, at its upper extremity, to the inner ancle: this bone at its lower extremity forms the *inner ancle;* the roughness on this bone is expressive of muscular attachment. At the knee-joint, and lying over the junction of the *femur* with the *tibia*, is placed the *patella*, or knee-pan; this is a small irregular and quadrilateral bone; it is kept in its place by means of a strong ligament attached to the tuberosity of the tibia.

The *fibula*, or smaller bone of the leg, lies on the outside of the *tibia*, and is attached to it at both its extremities by an articulating surface. The upper extremity, or head of the bone, may be felt on the living model, but its lower extremity projects considerably, and forms the *outer ancle.*

The *foot* is anatomically divided into the *tarsus*, *metatarsus*, and the *phalanges of the toes.*

The *tarsus* is composed of seven bones of irregular shape, and so constructed as to form an arch, the convexity of which constitutes the instep.

The *first*, and most important, is the *astragulus;* this bone is articulated with the *tibia*, and extends on to the instep.

The *second*, and next in importance, is the *os calcis*, or heel-bone, to which the *tendo achillis* is attached.

The *third* is the *os naviculare*, or boat-like bone; this is attached at the fore extremity of the *astragulus;* it is a flattened circular body, placed vertically in the instep.

The *fourth* is the *os cuboides*, or cubical bone; it is situated on the outer side of the astragulus, and very materially assists in the arch of the instep.

The three remaining bones are called *ossa cuneiformia*, or wedge-shape bones; these are placed like the key-stones of an arch, the largest is at the base of the great toe, the next in magnitude is at the base of the third toe, and the least is situated between the two former, and receives the metatarsal bone of the second toe.

The *metatarsus* is composed of five bones, long and slender; they spring from the tarsus, and are attached by means of separate articulations to the instep; their extremities at the tarsus are large, the bodies of these bones are small, and their extremities at the toes are rounded, to form joints for the purpose of the extended motion of the toes.

The metatarsal bone of the little toe projects considerably beyond the tarsus, and forms a conspicuous projection on the outer side of the foot.

The *toes* are five in number, and consist of three rows, or phalanges of bones, one before the other; these bones diminish in size as they approach to the extremities of the toes; the great toe has but two of these phalanges. The form of these bones, in the first rank, is similar to those of the metatarsus, in the second rank they are very short; and the last rank, or those forming the ends of the toes, which, not being adapted to the purposes of articulation, are rounded off to a thin flat termination.

Of the Superior Extremities.

The superior extremities are composed of three parts,

The Shoulders,
The Arms, and
The Hands.

The *scapula*, plate or shoulder bone: this is a thin, triangular bone, situated on the upper and back part of the chest, having its most acute angle placed downwards; one side is smooth and concave, adapted to the arch of the ribs upon which it moves; the outer side is convex and principally concerns the artist. The edges of this bone are called its *costæ*, the superior costa gives attachment to muscles which elevate the arm, the inferior costa is covered by muscles which depress the arm. The principal parts to be observed are its *spine*, terminating in a process called the *acromion*, its articulating cavity for the head of the arm-bone, and the *coracoid process*.

Just below the articulating cavity is called the *neck* of

the bone, from which proceeds the *coracoid process*, to which is attached the *coraco brachialis* muscle.

The *spine* crosses the scapula in an oblique direction, and hangs over the shoulder-joint, forming the acromion; to it is attached the trapezius muscle.

The clavicle, or collar-bone connects the scapula to the trunk. It is a thin long rounded bone, of the form of an italic *S*; one extremity is attached to the acromion, and the other to the upper part of the sternum, lying over the first rib. This bone gives attachment to a portion of the mastoideus and pectoralis muscles.

The *os humeri*, or bone of the arm. This bone is long and rounded; its upper extremity is called its head, being in part globular, for the purpose of allowing every degree of motion to the shoulder-joint. This bone has two tubercles situated anteriorly, and separated by a groove. These tubercles are for the attachment of muscles, and the groove receives the long tendon of the biceps muscle. Towards its lower extremity it is flattened, and extends laterally into two condyles for the purpose of affording attachment to the flexor and extensor muscles of the fore-arm; and also for the articulation of the ulna and radius.

The fore-arm is composed of two bones named the *radius* and *ulna*.

The *radius* is situated upon the outer part of the arm, and is articulated at each extremity with the ulna, upon which it is moved, performing the supination and pronation of the hand, and to which it is principally attached at its lower extremity. This bone is also articulated with the humerus, for the purpose of going along with the ulna, in the flexion and extension of the arm. At the upper extremity it is small, and a tubercle appears on its inner side, giving insertion to the biceps muscle. The lower extremity is extended for the purpose of articulation with the bones of the carpus.

The *ulna* lies on the inner side of the fore-arm; it is a long and rounded bone, becoming gradually smaller as it descends to the wrist. The upper end of this bone projects considerably backwards, forming that process called the *olecranon*. This process gives attachment to the triceps. A large cavity in the back part of the humerus receives the olecranon, when the arm is in a right line. At the

lower extremity of this bone, and on its outer-side, is a little projection called the styloid process, from it a ligament passes to the carpus, for the protection of the wrist-joint.

The *carpus*, or wrist, is composed of eight little bones, connected together in the form of an arch; two only of them are necessary to be remarked particularly by the artist. The first, called the *os pisiforme*, or pea-shaped bone, is that bone which may so easily be felt on the inner edge of the wrist; from it passes a strong ligament to the second of these bones, called the *trapezium*, it may be felt on the inner side, at the base of the thumb.

The *metacarpus* is formed of four bones, very similar but more slender than the bones of the metatarsus. They are articulated at one extremity to the bones of the *carpus*, and the other to the bones forming the phalanges of the fingers; these bones form the palm of the hand, and diverge from their bases towards their articulation with the fingers.

The *fingers*, like the toes, are formed of three rows or phalanges; and the same description answers to both: they are, however, longer and more stout. The thumb, by some, is said to possess but two rows of bones; but then, under these circumstances, there are reckoned *five* metacarpal bones: the thumb is not connected to the metacarpus, but is loose, and free to be moved in every direction, being attached only at its basis.

SECTION III.

MYOLOGY,

OR

THE DOCTRINE OF THE MUSCLES.

SECTION III.

OF THE NECK.

IMMEDIATELY in front of the neck is situated the organ of voice, a singular and beautiful piece of mechanism, formed principally of cartilage. It is this which causes the projection commonly called *Adam's apple:* a vulgar designation given to it in ignorance, and supported by superstition. On each side of the organ of voice, which anatomists term the *larynx,* is situated a muscle, termed

THE STERNO-CLEIDO-MASTOIDEUS,

So called from its attachments to the *sternum,* the *clavicle,* and the mastoid process of the *temporal bone.* This muscle, which gives so much beauty and elegance to the human neck, passes down from behind the ear to the sternum in a fine and gently waving line; at about two-thirds of its length from the ear it divides and sends off a similar column of flesh to the upper and anterior part of the clavicle.

Use.—When they both act, they bend the head forward. When one only acts, it turns the head to one side, and in this case the other will appear in an oblique line, from the ear to the sternum, very strongly marked, even in the female neck.

Over these muscles is another on each side, called

The PLATYSMA MYOIDES, or *musculus cutaneus,* or *muscle of the skin.* This muscle is composed of very slender fibres loosely united. It *arises* from the cellular substance covering the upper part of the *deltoid* and *pectoral muscles.* The fibres form a thin broad muscle, which runs obliquely upwards, and is *inserted* into the skin and muscles covering the lower jaw.

Use.—To draw the skin of the face downwards; and, when the mouth is shut, to draw the skin of the neck

upwards. This muscle gives a degree of softness to the markings of the former one.

The back of the neck is described along with the muscles of the back; but there is a small space between the upper attachment of the *trapezius* and the *sterno-cleido-mastoideus*; this space the artist may consider as filled up with fat, though a slight hollowness will always appear.

A vein will sometimes appear in the course of the *sterno-cleido-mastoideus*,—it is called the jugular vein.

Of the Muscles of the Head and Face.

One large and tendinous muscle, called the *occipito-frontalis*, covers the whole head.

A portion of another muscle, called the *temporalis*, is seen situated on the temples. And one strong and fleshy muscle called the *massetur*, descending from the cheek-bone to be attached to the side of the lower jaw, as far as its angle. This muscle forms a swelling on each side of the lower jaw when the mouth is firmly shut.

The muscles of the face are very slender and delicate, and, when in action, do not appear after the manner of the other muscles of the body. They lie under a considerable mass of fat, so that their form cannot be seen exteriorly. The character of the face does not depend entirely upon the soft parts: but it is necessary to shew these muscles, that the anatomical formation of the face may be understood.

These muscles are described in the table to the fifth plate.

Those who wish to go deeper into this subject may consult Mr. Bell's Treatise on the Anatomy of Expression.

It is nevertheless true, that the individual character is pourtrayed powerfully in the face; but unless the individual can be seen when alone, or when unconscious of being seen by any person, no certain judgment can be formed upon information drawn from this source.

It is in the osteology of the head and face that the true character of the individual is to be traced; and a judgment formed from this source is more likely to be correct, because over the bony structure of the physiognomy no

one can have the least control. But this is a subject foreign to the present purpose: the artist must consult the great work of the immortal Lavater, and compare his rules with nature, and well authenticated biography, if he means to pourtray the energies of the mind upon his canvas.

Of the Muscles situated upon the front of the body, between the Collar-bone and the Pelvis.

1. The Pectoralis Major—*Arises* from the whole external surface of the sternum, from the 5th, 6th, and 7th ribs, and from two anterior thirds of the clavicle. The fibres run obliquely across the chest, and, forming a flat tendon, is *inserted* into the ridge of the os brachii, on the outside of the grove of the long head of the biceps flexor cubiti.

Observations.—The tendon of this muscle is covered by the anterior edge of the deltoid; it forms the anterior fold of the arm-pit. In the living model it forms a rounded border to the arm-pit, arising partly from the twisted course of its fibres at this edge, and partly from a quantity of condensed cellular substance, and some fat. This should be very carefully dissected away, to expose the whole of the muscle. This muscle forms that mass of flesh which covers the entire chest on each side of the sternum, and upon which the breasts are situated.

Use.—To move the arm forwards and obliquely upwards, toward the sternum.

Next in order follow the rectus and oblique muscles on each side of a perpendicular line drawn from the sternum to the symphysis pubis.

2. The Rectus Abdominis—*Arises* by a flat tendon from the fore part of the os pubis; as it ascends, its fleshy belly becomes broader and thinner, and is

Inserted by a thin fleshy expansion into the ensiform cartilage terminating the sternum, and into the three inferior true ribs.

Observations.—There are two of these muscles, one passing on each side of a central tendon, called the *linea alba.* This line is gracefully disposed in the Mercury, and is most delicately delineated in all the antique. These muscles are intersected by four similar, but horizontally

disposed tendons, called *lineæ transversæ*.* One of these cross lines is situated at the navel, two above; and one not so strong as any of the others, below the navel. In the antique, however, the student will find these transverse lines represented but in three places; one at the navel, one between it and the chest, and the other below the navel, about one-third part distant from the pubis. It is thus delineated in the Farnesian Hercules, the Laocoon, the Torso, the Gladiator, and in the anatomical figure in the Royal Academy. But all the four-lines are expressed in the statue of a Faun, formerly in the Villa Borghese. These muscles are inclosed in a tendinous sheath, which gives them greater strength and a regular flow of outline.

Use.—To compress the fore-part of the abdomen, and to bend the body forwards, or to raise the pelvis.

Situated on each side of the recti, and separated from them by a narrow tendinous line on their exterior edges are two muscles, called

3. The OBLIQUS DESCENDENS.—The obliqus descendens—*arises* by eight triangular fleshy slips from the lower edges and exterior surfaces of the eight inferior ribs, at a little distance from their cartilages.—The *five superior slips* meet on the ribs an equal number of slips, being the attachments of the *serratus major anticus;* and the three lowermost slips are connected with the attachments which the latissimus dorsi has with the ribs. The muscular fibres proceed obliquely forwards and downwards, and terminate in that narrow tendinous line, which runs down on each side of the belly, called the *linea semi-lunaris.*

Inserted into the two anterior thirds of the upper edge of the os ileum, into *Poupart's ligament,** and into the os pubis.

Observations.—From the above description, the student cannot mistake the situation and connexions of these muscles. By the digitations of these abdominal muscles, and the projections of the ribs, the ancients produced that fine arch of the body below the breasts, giving a grandeur and beauty to their figures which nothing but an accurate

* Poupart's ligament, is a ligament which passes in a right line from the symphasis pubis to the upper angle of the os ileum.

knowledge of anatomy, regulated by a sound judgment and a most refined taste, could possibly accomplish.

The young artist is too apt to consider this arched formation in the antique to be more the result of a style peculiar to the ancients, and of an ideal beauty, than the legitimate imitation of beautiful nature. This erroneous idea, the result of a superficial knowledge of the osteology of the human frame, seems unfortunately to be possessed by too many of those who deem themselves proficients; and hence, for this elegant arch, is substituted in their figures a tortuous and broken line, amounting in fact to a complete deformity. On a first view of the skeleton, the meeting of the 6th, 7th, 8th, 9th, and 10th ribs make with the cartilage of the sternum, an appearance similar to a gothic arch: but, on a closer inspection, it will be found that the cartilages of these ribs are considerably flattened anteriorly, and the small motion allowed by the articulation of these cartilages with the sternum, together with the bony extremity of the ribs, form an obtuse angle. The action of the muscles of the belly completely press down these yielding cartilages, and the bony extremity of the ribs become in the living subject more apparent. Thus this obtuse angle, from the inflexible nature of the bone being fixed, produces, in conjunction with the coverings of the abdominal muscles, that fine elliptic arch in the antique statues.

The student, perhaps, should be informed that there are two other pair of muscles lying beneath these last described; but if he considers the obliqui as very thick and fleshy, his purpose will be answered.

Use.—To assist in respiration by drawing down the ribs, and to turn the body to one side.

There are two other little muscles situated on each side of the linea alba, at the lower extremity of the recti; they are said to assist these larger muscles: perhaps, in a very fleshy subject, they may, when in action, make more apparent the central division of the body; they are called

The PIRAMIDALES; they are attached to the os pubis, at their base about two inches wide, and terminate in an acute point, midway between the navel and the pubis.

Before proceeding to describe the muscles situated on the back, it will be proper to notice the serratus major.

The SERRATUS MAJOR or MAGNUS—*Arises* by nine fleshy slips from the nine superior ribs; these slips or digitations descend from the hollow of the arm-pit, and become more fleshy when they interlace with the five digitations of the obliqus descendens.

Inserted, under the latissimus dorsi to the base of the scapula.

Observations.—The only part of this muscle which concerns the student to know, is its connexion with the ribs. This muscle is called the *serratus*, or *saw-edged*, from its resemblance to the teeth of a large saw, at the point of its connexion with the ribs. The fine statue of the Laocoon will demonstrate this muscle: the Gladiator also, and the sleeping Faun.

Use.—To move the scapula forwards; and, when the scapula is forcibly raised, to draw the ribs upwards.

OF THE MUSCLES SITUATED ON THE BACK.

Two pairs of muscles cover nearly the whole external surface of the back, from the occipital bone to the pelvis; the first is called

1. The TRAPEZIUS.—It *arises*, by a *thick round tendon*, from the lower part of the protuberance in the middle of the os occipitis, and by a *thin tendinous expansion* from the superior transverse edge of that bone; it is attached, by the medium of a *strong ligament*, to the spinous processes of the five superior cervical vertebræ, and by the means of a tendon, to the two other cervical vertebræ, and to all the dorsal vertebræ. The fleshy fibres running downwards and upwards are

Inserted into the posterior third of the clavicle; into the acromion, and into the upper edge of all the spine of the scapula.

Observations.—Beneath this muscle is a fleshy mass, formed of many others, and appearing like a column on each side the neck; the names, and particular description of which, are not necessary to be known by the artist. The student should, however, be informed these concealed muscles are principally attached between the head, ribs, and vertebræ, filling up that deep chasm which appears in the skeleton between the vertebræ and ribs. Their use is

chiefly to maintain the head in an erect position, and to raise it when hanging forwards. Of course these fleshy columns (one on each side) should be very strongly marked in figures, where any resistance is made to the elevation of the head.

Use.—To move the scapula in different directions; the descending fibres elevating it, the ascending fibres depressing it, and those running horizontally will tend to move the scapula backwards. It is evident this muscle will contribute to the raising of the head, and will assist in its rotatory motions. The second muscle is called

2. The LATISSIMUS DORSI.—It *arises* by a broad thin tendon from the spinous processes of the *sacrum*, from the spinous processes of the *lumbar vertebræ*, from the *spine of the ileum*, and from the spinous processes of the seven inferior *dorsal vertebræ*; also, it is attached by four distinct fleshy slips or digitations, which intermix with those of the *obliqus descendens* of the abdomen. The inferior fibres ascend obliquely, and the superior run transversely: they pass over the inferior angle of the scapula, (to which this muscle is not unfrequently attached by means of a few fibres) to reach the arm-pit, where they are collected and twisted in a manner similar to the pectoralis major.

Inserted, by a strong flat tendon, into the inner edge of the grove in the os humeri, which receives the long head of the biceps.

Use.—To pull the arm backwards and downwards, and to roll the arm.

Observations.—The attachments of this muscle to the dorsal vertebræ are concealed by the trapezius; and it forms the posterior edge of the arm-pit. Beneath this muscle, as was observed of the trapezius, is (on each side of the spine) a fleshy mass forming a large column, extending from the loins upwards, till it is met by the muscles forming the columns in the neck. This mass of flesh is formed principally by one muscle, so very thick, as to place the spine, which in the skeleton appears prominent, in a deep groove; it is called the *longissimus dorsi*, and is attached very similarly to the latissimus dorsi, but confined to the spine and ribs. Its use is to place and to maintain the body in an erect position. In the Gladiator and Farnesian Hercules, it is forcibly expressed. The latissimus dorsi being a thin

muscle, the edge of the last ribs will be seen to swell it; and the longissimus dorsi appears almost as an external muscle.

There is yet a little space in the back that remains to be demonstrated. It is formed by the posterior edge of the *deltoid;* the external side edge of the *trapezius*, and the upper horizontal edge of the *latissimus dorsi.* In this space the inferior portion of the body of the scapula appears; but covered by muscles, three of which claim some attention.

1. The RHOMBOIDEUS;—of this muscle a very small portion is seen, and that only when the scapula is carried forward; it is attached to the base of the scapula and ribs, and becomes superficial at the angle formed by the lower point of the *trapezius*, and upper edge of the *latissimus dorsi.*

Use.—To draw the scapula obliquely upwards, and directly backwards.

2. The INFRA SPINATUS;—but a little more of this muscle is seen than of the former; it is attached to the scapula below the spine: the other attachment to the great tuberosity of the os humeri is concealed by the deltoid. This muscle appears between the *deltoid* and *trapezius.* It will assist in raising the arm, and in rolling it outwards.

3. The TERES MAJOR—*Arises* from a rough, flattened surface, at the inferior angle of the scapula. It forms a thick belly, which passes forwards and upwards towards the inside of the arm: to be

Inserted, by a broad and thin tendon, into the ridge of the os humeri, at the inner side of the grove of the long head of the biceps.

Observations.—This muscle is inserted along with the tendon of the *latissimus dorsi*, and its belly passes over the long head of the triceps; both these tendons pass under the coraco-brachialis and short head of the biceps. The tendon of this muscle extends a little lower down than that of the latissimus dorsi. Thus it forms with the latissimus the edge of the arm-pit. The Gladiator beautifully displays these muscles.

Use.—To roll the humerus inwards, and to draw it backwards and downwards.

Of the Thigh.

The student, in dissecting the lower extremity, will discover, on removing the skin, a strong ligamentous and tendinous covering closely embracing all the muscles of the thigh, called by anatomists the Fascia Lata Femoris, *the broad or great fascia of the thigh.* This fascia, on the outer part of the thigh, is very strong and tendinous, but becomes thinner and more delicate on the anterior and inner part; it dips down between the muscles, preserving to each its separate place and sphere of action. It is this fascia which so greatly contributes in forming that beautiful undulating line of the thigh, when at rest. Before proceeding to dissect the muscles, this fascia should be carefully removed. A large vein, called the Vena Saphena Major runs up the inside the knee and thigh immediately upon the fascia, and dips below it on arriving in the groin. It is necessary to observe, very accurately, the position of this vein, as in strong and active men it is generally very conspicuous, and should by no means be omitted in the naked figure.

This vein is beautifully delineated in the Farnesian Hercules, the Laocoon, the Gladiator repugnans, and the sleeping Faun.

Muscles situated on the Fore-part of the Thigh.

1. Tensor Vaginæ Femoris—*Arises* by a narrow, tendinous, and fleshy origin, from the external part of the anterior superior spinous process of the os ileum: it forms a considerable fleshy belly, and is

Inserted into the inner side of the great fascia, where it covers the outside of the thigh, and a little below the trochanter major.

Observations.—The origin of this muscle lies between the origin of the sartorius, and the anterior fibres of the gluteus medius; it descends between these muscles, and its insertion lies anterior to that part of the great fascia which arises from the tendon of the gluteus maximus.

Use.—To stretch the great fascia, to assist in the abduction of the thigh, and in its rotation inwards.

2. The SARTORIUS—*Arises* by short tendinous fibres from the anterior superior spinous process of the os ileum; soon becomes fleshy, extends obliquely across the thigh, and passes behind the inner condyle.

Inserted, by a broad and thin tendon, into the inner side of the tibia, immediately below its anterior tubercle.

Observations.—The origin of this muscle lies between that of the tensor vaginæ femoris, and the outer attachment of Poupart's ligament. It lies upon the muscles of the thigh, crossing them like a strap, about two inches in breadth; it runs down, for some distance, along the rectus femoris, crosses the vastus internus, and triceps. At the lower part of the thigh it runs between the tendons of the triceps and the gracilis: it is inserted above the tendons of the gracilis and semi-tendinosus, over which it sends an aponeurotic expansion.

Use.—To bend the leg obliquely inwards on the thigh, and to bend the thigh forwards.

3. The RECTUS FEMORIS—*Arises* by two strong tendons from the inferior anterior spinous process of the os ileum, and from a little above the acetabulum; the tendons uniting form a fleshy belly, completely penniform, which runs down over the anterior part of the thigh, and terminates in a strong flat tendon, which is

Inserted into the upper extremity of the patella; it then sends a thin aponeurosis over the fore part of this bone, and ultimately terminates in that strong ligament which connects the lower part of the patella to the tibia.

Observations.—To obtain a view of the exact origin of the tendons of this muscle, the tendons of the tensor vaginæ femoris and sartorius must be raised. This muscle lies superficially upon the vasti and cruræus; its upper part is covered by the sartorius, and to allow that muscle to slide over it, it is tendinous. Its insertion lies between the two vasti.

Use.—To extend the leg and thigh, to bend the thigh on the pelvis; to bring the pelvis and thigh on the leg, when the leg is the fixed point; that is, when the foot is firmly placed upon the ground.

Next in order, we have three large and extensive muscles tolerably distinct at their upper parts, but inseparably united a little above the patella; they are called the *vastus externus*, the *vastus internus*, and the *cruræus*. Now it is the

combined action of these three muscles, which form those rolls of flesh immediately above the patella, crossing the thigh obliquely upwards and outwards, and which are so distinctly to be seen in the Farnesian Hercules, the Gladiator repugnans, and more or less in all the antique statues, according to the energy of their actions. Of course they will be more prominent when the leg is straight or extended.

4. The VASTUS EXTERNUS—*Arises* tendinous and fleshy from the anterior surface of the root of the trochanter major, from the outer edge of the linea aspera; its whole length, from the oblique line running to the external condyle, and from the whole external flat surface of the thigh bone. The fleshy fibres run obliquely forwards.

Inserted into the external surface of the tendon of the rectus, and into the side of the patella, an aponeurosis is sent from a part of it (like the rectus) over the side of the knee, and is attached to the tibia and capsule of the knee-joint.

Observations.—This muscle forms the large mass of flesh on the outside of the thigh; it is in part concealed by the rectus, it laps over the cruræus, where it arises from the linea aspera. It is situated anterior to the tendinous insertion of the gluteus maximus, and to the origin of the short head of the biceps flexor cruris.

Use.—To extend the leg, or to bring the thigh forwards upon the leg.

5. The VASTUS INTERNUS—*Arises* tendinous and fleshy, from the fore-part of the root of the trochanter minor, from all the upper edge of the linea aspera, from the oblique line running to the inner condyle, and from the whole internal surface of the thigh-bone. Its fibres run obliquely downwards and forwards.

Inserted into the internal lateral surface of the tendon of the rectus, and into the side of the patella; it also sends off an aponeurosis, which is continued down to the leg on the inner side, similar to the vastus externus on the external side.

Observations.—This muscle forms the fleshy mass on the inside of the thigh, but smaller than its fellow on the outside; it is in part covered by the rectus. The sartorius passes obliquely over it, and it laps over the cruræus.

Use.—The action of this muscle is the same as the last.

6. The CRURÆUS or CRURALIS—*Arises* fleshy from between the two trochanters of the femur from the fore-part of the bone, and from the outside, as far back as the linea aspera.

Inserted into the back surface of the tendon of the rectus, and the upper edge of the patella.

Observations.—This muscle in no part forms the contour. But it particularly requires the attention of the artist, for otherwise it would be impossible to account for the swelling and rotundity of the front of the thigh, the rectus alone being insufficient to produce that effect.

Use.—It acts in conjunction with the two last.

7. The GRACILIS—*Arises* by a broad thin tendon from the under part of the symphysis pubis; it grows fleshy, and becoming narrower as it descends, it terminates in a tendon, which passes behind the inner condyle of the femur, and is reflected forwards; to be

Inserted in the inner surface of the tibia.

Use.—To bring the thigh inwards and forwards, and to assist in bending the leg.

Observations.—This muscle is so delicate, that its swelling, when in action, will not distinguish it from that large mass of flesh the triceps, in which it appears to be merged in the living figure. There is another muscle under similar circumstances, called the pectinalis; it is more deeply situated, and though its upper extremity is visible in the anatomical figure; yet, in the living model, it is entirely obscured by a number of glands, and a considerable quantity of accompanying fatty and cellular substance, which together fill up the hollow of the groin.

8. The TRICEPS, or TRICEPS ADDUCTOR FEMORIS, consists of three distinct muscles, which passing from the pelvis to the thigh, lie in different layers, one upon another, and have nearly the same use: for all useful purposes the artist may consider these as one muscle.

It *arises*, tendinous and fleshy, from the os pubis, near the symphysis, on the lower part, and from the descending ramus of the ischium. It forms a large triangular and fleshy belly, which, as it descends, becomes broader but thinner; the fibres running outwards and downwards, with various degrees of obliquity, to be

Inserted into the whole length of the linea aspera.

Use.—To approximate the thighs to each other, to roll them outwards: it assists in bending and extending the thigh.

Observations.—It is this muscle which forms that round and shelving mass of flesh at the upper and inner surface of the thigh, extending considerably backwards. It is beautifully displayed in the Torso.

Muscles situated on the Back-part of the Thigh.

1. The Gluteus Maximus—*Arises* fleshy from the posterior third of the spine of the os ilium, from the lateral surface of the sacrum, and from the lateral surface of the os coccygis, and is

Inserted by a strong flat tendon into a rough surface, at the upper and outer part of the linea aspera, immediately below the trochanter major; also, very extensively into the fascia lata.

Observations.—The consideration and accurate knowledge of this muscle is of considerable importance to the painter, inasmuch as it forms a part of the contour in almost any position of the body. The fleshy fibres run obliquely forwards and downwards, forming a thick broad coarse muscle, which, gradually converging, terminates in a strong flat tendon. This tendon slides over the posterior part of the trochanter major; and sends off a great quantity of tendinous fibres to be inseparably joined to the fascia lata of the thigh. Of course its situation is superficial, and it entirely covers a number of other muscles, except a portion of the gluteus medius. Were it not for a very considerable quantity of fatty substance, by which nearly the whole of this muscle is surrounded, it would appear, when in action, as a fasciculus of muscles, instead of that fine smooth rotundity, as invariably represented in the antique. Towards its insertion, however, its divisions are gently marked in the Gladiator and Farnesian Hercules.

Use.—To extend the thigh, and body, and to keep the thigh in its proper position when the body is erect. To rotate the thigh outwards.

2. The Gluteus Medius.—This muscle is similar (but

lower generally in its upper attachments or origin) to the gluteus maximus: and it is

Inserted into the upper and outer part of the great trochanter.

Observations.—The insertion of this muscle, and the posterior part of its belly, is concealed by the former; but the anterior, and largest part is superficial, and of course forms a part of the contour,

Use.—To draw the femur outwards, and to separate the thighs. Its posterior fibres will rotate the thigh outwards, and its anterior fibres inwards; and in walking it will assist in supporting the erect posture.

3. The BICEPS FLEXOR CRURIS—*Arises*, as its name imports, by two heads, the one short, the other long. The *long head* arises in common with the semi-tendinosus, by a short tendon, from the outer part of the tuberosity of the ischium, and descending forms a thick fleshy belly. The *short head* arises from the linea aspera, immediately below the insertion of the gluteus maximus; and from the oblique ridge running to the outer condyle. These two heads unite at an acute angle, a little above the external condyle, and terminate in a strong tendon which is

Inserted in a rough surface on the outside of the head of the fibula.

Observations.—The long head is concealed at its upper part by the inferior fibres of the gluteus maximus; below this it is situated quite superficially, running from the pelvis to the knee, between the vastus externus and semi-tendinosus.—*It forms the outer ham-string.*

Use.—To bend the leg, and to draw it a little outwards.

4. The SEMI-TENDINOSUS—*Arises* tendinous in common with the long head of the biceps, from the tuberosity of the ischium. It is connected for two or three inches in its descent to the inside of the tendon of the biceps; it forms a thick belly, and terminates in a long round tendon, three or four inches from the knee, and is

Inserted by a flat tendon passing under the head of the tibia into the anterior angle of that bone, some way below its tubercle.

Observations.—This muscle is covered above by the gluteus maximus. Its belly lies between the biceps and the gracilis, and it is entirely superficial. The tendon is

inserted below that of the gracilis. The belly of this muscle is intersected about its middle, by a narrow transverse tendinous line.

Use.—To bend the leg backwards and a little inwards.

5. The SEMI-MEMBRANOSUS—*Arises* by a strong round tendon from the tuberosity of the ischium; it forms obliquely a fleshy belly, which terminating in a flat tendon, is

Inserted into the inner and back part of the head of the tibia.

Observations.—This is a semi-penniform muscle; its belly is at first concealed by the two last muscles, but projects at its lower part; it lies in contact with the posterior surface of the triceps.

Use.—To bend the leg backwards.

The student who dissects should observe the fascia before mentioned proceeding from the thigh, and attached, like the great fascia, to every projecting point of bone, closely investing and binding down the muscles, and dipping between them. It is this fascia which, at its lower extremity becoming more condensed, forms what is termed the *annular* or *transverse ligament.* This ligament appears to proceed from the outer ancle across the instep, to the upper part of the inner ancle, and dividing upon the tendon of the proper extensor muscle of the great toe; it is also attached by a separate slip to the os calcis. This ligament seems designed for the purpose of binding down the several tendons of the muscles, extending the toes and foot, and which, but for such a restraint, would start up and form an unpleasant appearance to the eye, and very probably occasion considerable inconvenience to the individual. A knowledge of this ligament is important to the student in the fine arts, as in a general action of the extensor muscles, it will, of necessity, produce an enlargement and very apparent swelling at the bend of the instep. It is also necessary to observe another vein, called the saphena major, running up the inside of the tibia: in different individuals it runs in various directions, but generally its course is similar to the expression as given in the legs of the Farnesian Hercules. It is also conspicuously made out in the sleeping Faun.

Muscles situated on the Fore-part and Outside of the Leg.

In demonstrating these muscles, the course here pursued, is the order in which their tendons appear, commencing at the tibia, and terminating at the fibula. A consideration of the great importance of these tendons, forming, as they do, the greater part of the contour of the upper-part of the foot, in almost every point of view, led to the adoption of this plan.

1. The Tibialis Anticus—*Arises* from the exterior surface of the tibia, from its anterior angle or spine, and from two-thirds of the tibia. Its fibres descending obliquely terminate in a strong tendon, which crosses from the outside to the fore part of the tibia, passes through a distinct ring in the *annular ligament*, near the inner ancle, and running over the astragulus and os naviculare, is

Inserted into the *os cuneiforme internum*, and base of the metatarsal bone supporting the great toe.

Observations.—This muscle, throughout its whole course is superficial, and its tendon should be well studied.

Use.—To bend the ancle-joint, giving an inward turn to the foot.

2. The Extensor Proprius Pollicis Pedis, or the proper extensor of the great toe—*Arises* from a part of the smooth surface between the anterior and internal angles of the fibula; the fibres pass obliquely downwards and forwards into a tendon, which inclining inwards (under the annular ligament) passes over the fore-part of the astragulus and os naviculare, and over the junction of the os cuneiforme internum and medium, to be

Inserted into the base of both the falanges of the great toe.

Observations.—The belly of this muscle is concealed almost entirely; but the tendon is first presented to view about four or five inches above the bend of the instep.

3. The Extensor Longus Digitorum Pedis—*Arises* from the outer part of the head of the tibia, from the head of the fibula, and its anterior angle, during almost its whole length. Below the middle of the leg it splits into four round tendons, which pass under the annular ligament, and are

Inserted into the root of each of the three bones, forming the four small toes, passing along their upper surfaces.

Observations.—This muscle is entirely superficial, and lies close to the tibialis anticus, between it and the peroneus longus; but its tendons lie on the outer side of the extensor proprius pollicis pedis.

Use.—To extend all the joints of the four small toes, and of course to assist in the extension of the foot generally.

4. The PERONEUS TERTIUS, or NONUS VESALII.—This muscle may be considered by the artist as a part of the outer edge of the last described; but its tendon, after emerging from under the annular ligament, separates, at a very small angle, from the tendon of the extensor longus, to be attached to the metatarsal bone, which supports the little toe.

Observations.—The only claim which this muscle has upon the artist's attention is, that in very old or emaciated subjects, it is possible to trace its tendon from the annular ligament to its insertion.

5. The PERONEUS LONGUS—*Arises* from the fore-part and outside of the head of the fibula, and along one-third part of this bone; it is also attached in some small degree to the tibia. The fibres run obliquely down to a tendon which passes behind the outer ancle, through a groove in the extremity of the fibula, and passing along the inside of the calcis, is ultimately

Inserted into the metatarsal bone, supporting the great toe.

Observations.—The belly of this muscle is entirely superficial, and is closely attached at its upper extremity to the tibialis anticus, and passes down between the soleus and extensor longus. The tendon can scarcely be perceived, as it lies deeply in the hollow under the external ancle.

Use.—To extend the ancle-joint, and to turn the sole of the foot outwards.

There is yet another muscle, called the *peroneus brevis;* it is situated immediately under the *peroneus longus,* and its use is the same. It assists in making up the roundness of the leg from the back part of the outer ancle to the

tendo Achillis. Its tendon passes in a straight line from the bottom of the inner ancle to the metatarsal bone of the little toe; it therefore forms the contour of that part of the foot. The tendons of these two muscles, the peroneus longus and brevis, appear in the Farnesian Hercules combined as one strong tendon. In the left foot of the Gladiator, and in the feet of the Laocoon the tendon of the peroneus brevis is singly delineated; and in the other antique figures it is traced with greater delicacy. In the female foot it does not appear.

About a finger's breadth below the outer ancle, and situated upon the instep on the outer side of the long extensor of the toes is a very prominent swelling, which is formed by a muscle, called

6. The Extensor Brevis Digitorum Pedis, or *the short extensor of the toes.* It *arises* fleshy and tendinous from the upper part of the os calcis, cuboides, and astragulus; it sends off four slender tendons to the four toes, similar to the extensor longus.

Use.—To extend the toes.

Observations.—The student is reminded to draw frequently, and to study very attentively, the feet of the Farnesian Hercules; indeed it would be well to make finished drawings from them, until the memory could supply the place of the original. In this foot the fleshy part of the extensor brevis is forcibly expressed. The student will find it similarly made out in the left foot of the Gladiator, and in the feet of the Laocoon.

Of the Muscles situated at the Back of the Leg.

1. The Gastrocnemius—*Arises* by two heads; the first, or internal head, arises from the upper and internal condyle of the os femoris, and from the oblique ridge over that condyle. The second, or external head, arises in the same manner from the external condyle and ridge. Each of the heads forms a fleshy belly; the two bellies, of which the internal is the largest, are separated by a considerable triangular interval, but descending, unite a little below the knee-joint, in a middle tendinous line; and below the middle of the tibia they form a large tendon: this tendon is united with the tendon of a large muscle, called

2. The Soleus; *arising* immediately under the gastrocnemius, and concealed by it till it arrives below its belly, where it appears fleshy, of a triangular shape, and forms the lower calf. Its tendon uniting with that of the former muscle is, with it,

Inserted into the back of the os calcis, together forming the tendo Achillis.

Use.—To elevate the os calcis, and thereby to lift up the whole body, as a preparatory measure to its being carried forward in progression.

Observations.—The calf of the negro African is situated a little higher up than that of the European. In the Farnesian Hercules the calf is carried up too high upon the thigh-bone, producing, on a back view of the leg, an evident deformity. There is a tendon passing under the inner ancle to be attached to the os naviculare; it is the tendon of a muscle called the tibialis posticus, but the belly of this muscle is entirely concealed by the soleus. A portion of the belly of this muscle may be seen in the anatomical figure in the Royal Academy. This tendon, however, requires to be understood by the artist, as he will find it expressed more or less in all the antique figures. The use of the tibialis posticus is to extend the foot and to turn it inwards.

There are also two other tendons passing under the inner ancle; the tendons of the long flexor of the great toe, and the long flexor of the little toes.

Of the Muscles situated on the Arm.

1. The Deltoides—*Arises* from the posterior third of the clavicle; from the whole edge of the acromion, and from the whole spine of the scapula.

Inserted tendinous into a triangular rough surface upon the outer side of the os humeri, near its middle.

Observations.—This muscle is formed of strong coarse fibres, and frequently puts on the appearance of a double muscle, as may be seen in the Farnesian Hercules, and in the Hæmon. The direction of these fibres pass from the upper attachments obliquely downwards to form its tendon. The great bulk of the shoulder is formed by the

deltoides. The student will observe this muscle arises from the same extent of bone as the trapezius is inserted into: where the one terminates, therefore, the other takes its origin. This may be studied with most advantage in the Gladiator.

Use.—To raise the arm directly upwards, and to move it a little forwards and backwards, according to the different directions of its fibres.

2. The BICEPS—*Arises* by two heads; the first and outermost, called the long-head, arises by a strong tendon from the upper edge of the glenoid cavity of the scapula; and, descending along the groove in that bone, forms a fleshy belly, unites with that of the second or short head, which arises from the coracoid process of the scapula. The two forming one fleshy mass, terminate in a strong tendon, which is

Inserted into the rough part of the tubercle of the radius.

Observations.—In strong muscular men, the tendon of this muscle is to be traced from nearly one-third part of the arm, to its insertion in the hollow of the elbow-joint, and its fleshy belly seems always in a state of contraction. It is powerfully marked in the left arm of the Hæmon. Its position is in a direct line along the front of the os humeri.

Use.—To bend the fore-arm, and to turn the hand supine; and it will assist in raising the arm upwards.

3. The CORACO-BRACHIALIS—*Arises* from the coracoid process of the scapula, in conjunction with the *short-head* of the *biceps:* its fibres are attached to that tendon, and form a fleshy belly, to be

Inserted, tendinous and fleshy into a rough ridge in the middle of the internal part of the os humeri.

Observations.—This muscle is situated on the inside of the biceps, and is concealed by the pectoralis and deltoides, excepting a small part, which is seen between the biceps flexor and biceps extensor cubiti. It is inserted immediately below the tendons of the *latissimus dorsi* and *teres major.*

Use.—To move the arm upwards and forwards.

4. The BRACHIALIS INTERNUS—*Arises* by two fleshy

slips, one on each side of the insertion of the deltoid. Its belly passes over the fore-part of the os humeri, under the biceps, into the hollow of the arm; to be

Inserted by a short tendon immediately below the coronoid process of the ulna.

Observations.—But a small portion of this muscle is external, and it is seen as a narrow slip on the outer edge of the biceps. It is to be traced in the arm of the Gladiator.

Use.—To bend the fore-arm.

5. The Triceps Extensor Cubiti—*Arises* by three heads. The *first*, or *long-head*, from the inferior costa of the scapula, near its neck; and forms a large belly, descending down the back of the os humeri.

The *second*, or *short-head*, arises on the outer and back part of the os humeri, from a ridge which runs from the back part of the great tuberosity, towards the outer condyle.

The *third head*, called *brachialis externus*, arises acutely from the inside of the os humeri, above its middle, and from a ridge extending to the inner condyle. These three heads unite above the middle of the os humeri, and cover the whole back part of this bone; they form a thick strong tendon, which is

Inserted into the rough back part of the olecranon, and partly into the condyles of the os humeri.

Observations.—The origin of the long-head is concealed by the *deltoid*, and the teres major crosses it. The tendon of the short-head is also concealed by the deltoid. The brachialis externus, or third-head, begins to arise immediately below the teres major, and passes down between the long-head and coraco-brachialis. The Gladiator and the Laocoon will illustrate this muscle; and, generally, every external muscle is beautifully and elegantly displayed in those unequalled productions of human art.

Use.—To extend the fore-arm. The long-head will also assist in drawing the arm backwards. On each side of the arm, extending from the insertion of the deltoid to the condyle on the outer side, and from the opposite point, to the condyle on the inner side, a strong ligament runs; it gives origin to some muscular fibres, and serves as a line of separation between the muscles.

Of the Muscles situated on the inner and front of the Fore-arm, and arising from the inner Condyle of the Os Humeri.

The arm, like the leg, is covered by a strong fascia, which is attached to the condyles of the os humeri, and the olecranon. The fore-part proceeds principally from the tendon of the biceps, and the back part from the tendon of the triceps. Its use is the same as in the leg.

1. The Pronator Radii Teres—*Arises* from the anterior surface of the inner condyle, and from the coronoid process of the ulna. The fibres run outwards.

Inserted into a rough surface on the back part of the radius, about its middle.

Observations.—Of the muscles which pass from the internal condyle this is situated the nearest to the outer edge of the arm; it forms the margin of the hollow of the arm, and it passes under the belly of the *supinator radii longus*, which forms the outer margin of that hollow. It lies immediately on the inside of the tendon of the *brachialis internus*.

Use.—To roll the radius, and with it the hand inwards; that is, to produce a pronation of the hand.

2. The Flexor Carpi Radialis—*Arises* from the lower and fore-part of the internal condyle. It forms a thick belly, terminating in a flat tendon, which passes under the annular ligament of the wrist, to be

Inserted into the metacarpal bone of the fore-finger; of course this insertion is concealed.

Observations.—This muscle lies upon the fore-part of the arm, and is situated between the *supinator radii longus* and *palmaris longus*, below the insertion of the pronator.

Use.—To bend the hand, and to assist in its pronation.

3. The Palmaris Longus—*Arises* by a slender tendon from the fore-part of the inner condyle. It forms a short fleshy belly, which sends off a long slender tendon, to be

Inserted near the root of the thumb, into the annular ligament, and the strong fascia covering the palm of the hand.

Observations.—This muscle, *when present*, lies between

the former and the *flexor carpi ulnaris*, but it is sometimes wanting.

Use.—To bend the hand, and to stretch the palmar fascia.

4. The FLEXOR CARPI ULNARIS—*Arises* from the inferior part of the internal condyle, and from the posterior ridge of the ulna. The fibres pass obliquely forwards into a tendon, which passes over the fore-part of the ulna, and is

Inserted into the os pisiforme.

Observations.—This muscle arises behind all the former, and passes along the inner edge of the fore-arm, upon the extensor carpi ulnaris, at the back of the arm.

Use.—To bend the hand.

5. The FLEXOR DIGITORUM—*Arises* from the under part of the inner condyle, from the radius and ulna. It forms a strong fleshy mass, and divides into four long tendons, which pass under the annular ligament, and are

Inserted into the second phalanx of the fingers.

Observations.—The origin of this muscle is concealed, like its insertions; but it assists in forming the general mass of the arm, and a part of it is seen projecting towards the inner edge of the arm. When the fingers firmly clasp any object, or are bent closely to the palm of the hand, the tendons of this muscle will enlarge the wrist. To bend the fingers there is another assistant muscle placed beneath this, and their combined action form that enlarged appearance of the wrist in the left hand of the Apollo, and the right hand of the Gladiator.

Use.—To bend the fingers.

The annular ligaments of the wrist consist of two parts. The one is situated at the back of the wrist, and passes from the ulna to the radius: it is broad, and under it the tendons of the extensor muscles pass. The other is situated on the front of the wrist, passes in a similar way, but is attached to the bones of the carpus, and under it pass the tendons of the flexors. The use of these ligaments are to confine the tendons in their proper channel, and they greatly contribute to the convenience of the individual and beauty of the part.

Of the Muscles situated on the outer and back-part of the Fore-arm, and arising from the external condyle of the Os Humeri.

These muscles are more distinct at their origins than those of the inner condyle; and they will be found universally in the antique more distinctly marked towards the elbow-joint, than the former.

1. Supinator Radii Longus—*Arises* tendinous and fleshy from the external ridge of the os humeri, which leads to the outer condyle. It begins to arise nearly as far up as the middle of the bone, and does not adhere to it above two inches above the condyle. It forms a thick fleshy belly, which passes over the elbow-joint; becomes smaller, and terminates about the middle of the fore-arm, in a flat tendon, and is

Inserted into a rough surface of the inferior extremity of the radius.

Observations.—This muscle is situated upon the outer edge of the fore-arm, and forms the outer edge of the hollow at the elbow-joint. Its tendon is crossed by the extensors of the thumb.

Use.—To roll the radius outwards, and to turn the palm of the hand upwards; producing supination. Also to bend the fore-arm.

2. Extensor Carpi Radialis Longior—*Arises* from the external ridge of the os humeri, beginning below the origin of the *supinator radii longus.* It forms a thick, short fleshy belly, which passes over the side of the elbow-joint, and terminates above the middle of the radius in a flat tendon, which passes through a groove in the back part of that bone, to be

Inserted into the posterior and upper part of the metacarpal bone of the fore-finger.

Observations.—Only a part of the belly of this muscle is seen projecting under the supinator; and its tendon passes under the annular ligament.

These two muscles project from under each other similar in appearance to steps, but of course rounded. As a consequence of such a peculiarity of situation, they will, when in action, form deep furrows between them. This is in-

variably shown in the antique; and, indeed, from their almost constant use in every operation of the hand and arm, these furrows, or channels between them are sufficiently obvious when they are in a state of rest. Examples of this may be advantageously taken in the Cartoons of Raphael.

Use.—To extend the wrist: to move the hand backwards.

3. The EXTENSOR DIGITORUM COMMUNIS—*Arises* from the under part of the external condyle, and adheres to the ulna, where it passes over it. Its fleshy belly terminates in four tendons, which pass under the annular ligament, and are

Inserted into the posterior part of all the bones of the fingers by a tendinous expansion.

Observations.—This muscle forms the fleshy mass along the middle of the back part of the arm.

Use.—To extend all the joints of the fingers.

4. The EXTENSOR CARPI ULNARIS—*Arises* from the under part of the external condyle. It crosses towards the ulna, and arises fleshy from the back part of that bone. It terminates in a strong tendon, which passes under the annular ligament, to be

Inserted into the posterior and upper part of the metacarpal-bone of the little finger.

Observations.—This muscle lies the innermost of all the former, and is in contact with the *flexor carpi ulnaris.*

Use.—To extend the wrist, and to bring the hand backwards; but chiefly to bend the hand laterally towards the ulna, as will appear by pulling its tendon in a dissected subject.

5. The ANCONEUS—is a small triangular muscle, situated at the outer side of the olecranon. It *arises* tendinous from the posterior and lower part of the external condyle, forms a thick triangular fleshy mass, which adheres to the joint, and is

Inserted into the concave surface on the outside of the olecranon and posterior edge of the ulna.

Observations.—This muscle is situated between the upper part of the *extensor carpi ulnaris* and olecranon. It is partly covered by the tendon of the *triceps extensor cubiti,* and is enveloped in a fascia sent off from that ten-

don, so that it does not project when in action so materially as otherwise it would do.

Use.—To assist in extending the fore-arm.

In describing the *supinator radii longus*, it was observed the extensors of the thumb crossed it. The *extensors of the thumb* are three in number, and their origin lies deeply seated below the extensor of the fingers. The student has only to observe their tendons, with a small portion of their fleshy bellies, which pass over the tendon of the *supinator*, in an oblique direction, from the back of the arm to the edge of the radius, to proceed to their insertions into the back part of the metacarpal-bone, and the two bones of the thumb. In the extension of the thumb there is perceived a triangular space on the edge of the carpus and metacarpus, formed by the projection of these tendons: this is in consequence of one of the three being separated from the other two tendons. When the thumb is powerfully bent, a greater portion of the bellies of the extensors come into view, over the edge of the radius, just below the belly of the *supinator*, being brought forward in this action of the thumb to allow of complete flexion. The student is reminded of the situation of the muscles of the fore-arm. The pronator and flexors lie on the inner and fore-part of the arm, and arise from the inner condyle of the os humeri. The supinator and the extensors lie on the outer and back part of the arm, and arise from the external condyle of the os humeri.

Two veins are necessary to be observed by the artist with attention. The one takes its origin from the back of the hand, along the metacarpal-bone of the little finger, and may be traced running along the inside of the fore-arm near the ulna; it passes over the bend of the arm above the inner condyle, and is lost sight of near the middle of the arm. This vein may be seen in the left arm of the Hæmon, in the Farnesian Hercules, and the sleeping Faun: it is called the basilic vein. The other is traced in a similar manner from the base of the thumb, along the outside of the arm, and is seen till it arrives just above the insertion of the deltoid: it is called the cephalic vein.

Of the Palm of the Hand, and Sole of the Foot.

The palm of the hand, like the sole of the foot, is covered with a very thick, strong, and condensed fascia. Under this fascia a number of muscles are situated, small but powerful, for the purpose of giving strength and facility of action to the fingers and toes. To describe these muscles to the student in the fine arts is unnecessary. In order to obtain a correct knowledge of the form of the sole and palm, he must dissect, study nature, plaister casts, and the productions of the ancient masters.

But there is an eminent artist of the present day, an ornament and an honour to the age in which he lives, who possesses the unrivalled talent of giving to the hands and feet of his figures, the utmost power that human nature can be supposed capable of exerting, or calculated to possess: and to every figure that his able hand delineates upon the canvas, he seems to give a living soul.

The student, therefore, is earnestly recommended to study the anatomic composition of the hands and feet in the works of this eminent painter, immortalized by his Milton and Shakespeare Gallery.

Of the back of the hand it is necessary to observe the tendons of the extensors pass along the metacarpal-bones; at the articulation of the first bone of the fingers these tendons are connected to each other by little slips of tendon: it is this mechanism which gives the appearance of a ridge of bone passing from one knuckle to the other, when the fingers are powerfully bent. The appearances of the veins are as various as individual expression, and can only be learned by an attentive study of nature. The left hand of the Laocoon affords a beautiful example of the disposition of the veins: studies of this hand are as necessary to be made, as from the foot of the Hercules; they will teach the student the importance which the ancients attached to the minutest parts of anatomic expression.

SECTION IV.

OF THE JOINTS,

AND

THEIR SPHERE OF ACTION.

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AND

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SECTION IV.

OF THE MECHANISM OF THE JOINTS.

> " Raphael found, that in the construction of the body, the articulation of the bones was the true cause of ease and grace in the action of the limbs, and that the knowledge of this was the true cause of the superiority of the ancients.
>
> *Pilkington's Dictionary of Painters,*
> Note by Fuzeli. p. 482, edit. 1810.

The authority quoted at the head of this section is so highly esteemed, that nothing further need be stated to enforce the necessity of an attentive study of this subject on the part of the student in the fine arts. The works of Raphael, and his learned commentator, afford abundant proof of the value of a correct knowledge of the anatomy of the joints: but yet it appears a subject entirely neglected, or but very little attended to by the generality of students.

It is not within the powers of description to convey to the mind an adequate idea of the beauty, delicacy, or mechanical contrivance displayed in the structure of the joints: dissections only can satisfy the mind in these particulars. In the consideration of the joints, the artist has principally to attend to the extent and direction of their motions, and the prominent features of their composition. The joints are formed generally of the extremities of the bones, which are spread out into particular forms and surfaces, adapted to the peculiar nature of the articulation. These extremities are covered by a thin layer of cartilage, to allow of the easy friction of the bones upon each other. For the purpose of keeping the bones in contact, every joint is secured by strong restraining ligaments, which tie them in their places, and give additional strength. The

whole joint is surrounded and enclosed by a thin bursal ligament, as a sack, by which means a particular apparatus is retained in its proper place, for the purpose of affording an oily fluid; thus further reducing the quantity of friction, which otherwise would be constantly increasing, and finally impede all motion.

Such are the parts which go to the formation of the joints in general, but varied in form, strength, number, and direction, according to the nature of each particular articulation.

Of the Motions of the Head.

The motions performed by the head are that of nodding, and turning side-ways. No part of the mechanical apparatus of these joints appears in the contour; but the artist ought to be apprized of their nature, that he might not represent an impossible position. The nodding, (or bending) motions of the head may take place in *three* directions, forward, backward, and side-ways. The extent forward is limited by the chin touching the breast or upper extremity of the sternum; the backward motion is limited by the occiput lying upon the nape of the neck; and in the lateral bending, the ear cannot touch the body unless the shoulder is elevated. When the head is represented as touching the shoulder, which is not elevated, it is indicative of a total relaxation of muscular fibre, and is a consequent of the state of death: and in this case the head generally inclines forwards.

The bending motions of the head are performed upon the first vertebra.

The turning sideways is performed by the first vertebra turning upon the second, which is constructed with an upright pivot; it is called the *dentatus*, from its supposed resemblance to a tooth. This motion is limited by a quarter of a circle from the centre to each shoulder, so that when the figure is viewed in front, the face can be seen in profile on either side; but this is the utmost extent of motion, and can only be carried so far by considerable exertion. Therefore to show less than a profile face, when the figure is in full front, would be to represent an impossible position.

Of the Motions of the Spine and Body.

The motions of the spine are very limited, arising from its natural construction. The spinous processes extending on each side, and directly backward, obviously prevent any freedom of motion in those directions: and the intermediate substance, or that cartilaginous substance interposed between the bodies of the vertebræ, though very elastic, yet limits the motion forwards to a very small extent. The cervical vertebræ allow the greatest motion, and the utmost extent of this will not make an angle with the dorsal vertebræ of more than fifteen degrees forwards, and about five degrees backwards. The lumbar vertebræ admit a still smaller degree of motion. The dorsal vertebræ may be said to yield in a slight degree one upon the other, the ribs being attached to them at one extremity, and at the other the sternum, would independent of the natural formation of these vertebræ, tend to limit their motion. And in *all* positions and motions of the body, the *dorsal vertebræ* and the *sternum* must lie in the same plane.

Bowing, or leaning backwards or to one side, are motions performed upon the hip-joints; but in all these motions the spine yields a little, and forms a graceful line, flowing into the general form of the whole body.

The bones of the pelvis have no motion between each other, but the whole moves with the body in one mass.

Of the Motions of the superior Extremities.

The Shoulder-joint is composed of the scapula, the clavicle, and the humerus. On the scapula there is a shallow socket, in which the head of the humerus moves. The clavicle and acromion guard the upper part of this joint, and form the contour. When the shoulders are drawn backwards, forwards, elevated, or slightly depressed, the scapula enters into a considerable share of the motion, and always moves with the shoulder. The shoulder can be put into motion in every possible direction. The humerus may be carried upwards, or depressed; it may be brought close to the body, or extended outwards; it may be car-

ried forwards or backwards; and, finally, put into a circular or rotatory motion. The head of the humerus in no case forms any part of the contour, it is entirely obscured by the deltoides, the biceps, and triceps; and it is too far removed from the arm-pit, to project, even when the arm is elevated to its highest point.

The JOINT OF THE ELBOW is formed of the inferior extremity of the humerus, of the ulna, and of the radius. This joint admits of motion but in two directions, forwards, forming an acute angle, and backwards, extending in a right line: the former is termed flexion, the latter extension. This motion, resembling that of a door upon its hinges, is termed "a hinge-like motion." The olecranon process of the ulna projecting backwards beyond the joint effectually prevents the arm being extended much beyond a right line: but the cavity at the back of the inferior extremity of the humerus does very frequently admit a considerable depression of the ulna, so that the arm may be extended beyond a right line in a very small degree; thus presenting an extended cavity at the back of the elbow, when the figure leans upon the hand, the arm being extended in such a position to its utmost limit.

The processes which form the contour at this joint are the condyles of the humerus on each side, and the olecranon of the ulna at the back of the elbow.

So much of the radius as is concerned in this joint lies hid under the muscles of the fore-arm, and it does not take any important part in the construction of the joint: the radius moving upon the ulna at both its extremities performs the pronation and supination of the hand.

The WRIST-JOINT is complicated, being composed of eight small bones, and the inferior extremities of the radius and ulna. The points requiring the artist's attention, are the extremities of the radius and ulna; and two of the bones of the carpus, the trapezium, and the os pisiforme. The bones already have been introduced to his notice, it is here necessary to speak of the motions of the wrist. The principal motions are that of flexion and extension, but there is also a lateral motion; thus, when they are combined, the rotatory motion may be produced. The extent to which the flexion may be carried in infants, to an angle of ninety degrees, in adults, about eighty-five degrees. The exten-

sion may be carried to seventy or eighty degrees. The lateral motions will form an angle of about fifteen or twenty degrees.

The os pisiforme and the trapezium form the two prominent points upon the inner surface of the wrist, the annular ligament stretches across from one to the other; and between them pass the tendons of the flexors of the fingers. At the back of the wrist the ulna, on the outer edge, and the radius at the inner, form the contour; and between them pass the extensors of the fingers.

The metacarpus is attached to the carpus in such a way that nothing more than a yielding motion is allowed. The motions of the fingers are flexion and extension, and in a slight degree laterally; but the fore-finger has a more free motion, and may be moved in a circular direction.

The principal motion of the thumb is flexion, that it might be opposed to the flexion of the fingers. It has also a very extended sphere of action, and can be moved in any direction. The knuckles are formed by the extremities of the metacarpal bones; but the knuckle of the thumb is formed of the first bone, or (according to some) its metacarpal bone.

Of the Motions of the inferior Extremities.

The Hip-joint, like that of the shoulder, has a very extended sphere of motion. It is not so elegant in its composition, and no part of the bony structure of the articulation enters into the composition of the contour.

In some particular instances, but by no means generally, the thigh may be carried out at a right angle to the body in a lateral direction; the mass of the muscles will allow the thighs only to be crossed in the opposite direction, and as a consequent this extent will be in proportion to the delicate structure of the figure. The thighs may be extended forwards, in a right angle to the body; but backwards scarcely to an angle of twenty degrees, if the body is erect.

The Knee-joint is, to the artist, of great importance; so much of the beauty of the leg depending upon it. The whole of the inferior extremity of the *femur*, and the head of the *tibia* enter into its composition. The patella too

adds to its importance. This joint requires particular attention, and its parts should be well understood, or otherwise distortion of the limb will generally follow all attempts at its delineation.

When the figure stands upon one leg, as the Antinous for example, the patella equally covers the extremities of the two bones lying immediately upon their point of contact: it is this bone which forms the most prominent point upon the knee-joint. Immediately below the patella, a more gentle and rounder swelling occurs, somewhat similar in form but more pointed downwards. This is produced partly by the sack of the joint with its contents, and partly by the fascious productions* of the rectus and vasti muscles, going to the formation of the ligament of the patella.

Below this swelling, and terminating at the *tuberosity* of the *tibia*, is seen descending the important ligament of the patella. It forms a broad, smooth, and rounded strap, passing from the patella to the tuberosity, completing the three projections invariably seen in nature, and constantly expressed in the figures of the antique upon the front of this joint. The projections on each side are the *condyles* of the *femur*, of which the internal is the largest; and the head of the *tibia*. When the knee is bent, and carried in this state of flexion beyond a right angle, the patella, though still in the same relative position as to the tibia, yet appears to be considerably lower; this arises from the disappearance of the swelling beneath it, as the joint is bent to its utmost extent, and the skin is closely stretched upon the bones; and the thigh-bone resting upon the posterior part of its condyles, the whole of their base stands vertically and not horizontally, and the great cavity between them is distinctly seen. Thus in this position the knee-joint has two large protuberances of bone above the patella; and the ligament of the patella being more flattened, the tuberosity of the tibia is very conspicuous.

This joint, like the elbow, admits of motion but in two directions, forwards, bringing the tibia and femur in one right line, and backwards in an angle, to an extent determinate by the bulk of the muscles.

* These fascious productions were explained as an *aponeurosis*, when describing the *rectus* and *vasti* muscles on the thigh, page 32, 33.

The ANKLE-JOINT is complicated in its composition, being formed of the lower extremities of the tibia and fibula, and of the several bones of the tarsus.

The tibia forms the inner, and the fibula the outer ankle; the inner ankle is always considerably higher up than the outer, and by much the largest.

The flexion and extension of the foot is performed upon the astragulus, and the foot possesses a small degree of motion laterally.

The utmost extent of flexion forms an angle of about eighty degrees with the tibia, and the limit of its extension is about one hundred and thirty degrees. The artist will observe, that when the figure rests firmly upon the sole of the foot, this joint forms nearly a right angle; that flexion is performed by the bending upwards, and extension, by the pointing of the toes to the ground.

The lateral motion of the foot is very limited. The foot may be turned outwards to a greater angle than is admitted in the contrary direction; and, if the lateral motion is made when the foot is raised from the ground, it is always attended either with flexion or extension.

The most easy position in which the body can be placed is the recumbent, when the limbs are in a mid state between flexion and extension. If in any action the limbs are represented in too great a degree of flexion or extension, angularity is produced, and the figure will be destitute of ease or elegance, harmony of parts, or dignity in form. Ease, elegance, and grace, will never appear in the figures of that artist who cannot determine the precise points which form the contour of the joints, or is ignorant of their sphere of action.

Upon a complete knowledge of the bones, and their processes, the joints and their range of action, chiefly depends the power of the artist to express, with propriety, the human form, when put into action by the will, or when prostrate by the stroke of death.

APPENDIX,

DESCRIPTION OF THE PLATES.

PLATE I.

The Head.

A. The os frontis.
a, *a*. The external orbitar processes.
b, *b*. The frontal sinuses.
c. One of the sutures.
B. The os parietale.
a. The ridge, expressing the attachment of the temporalis muscle.
C. The os temporis.
a. The zigomatic process.
b. The mastoid process.
D. One of the ossa malarum, or cheek-bones.
e. The orbitar process of the cheek-bone.
E. The superior maxilla.
F. The inferior maxilla.
a. The ramus of the bone.
b. The apex at the front edge of the base.

The Trunk.

G. The cervical vertebræ.
H. The sternum.
1, 2, 3, 4. The several markings, expressive of the original pieces of the sternum.
1, 2, 3 to 12. The ribs, or costæ.
a, *a*, *b*, *b*. The two loose or floating ribs.

1, 2, 3, 4, 5. The lumbar vertebræ.
I. The pelvis.
a, *a*. The ossa innominata.
1. The anterior superior spinous process.
2. The anterior inferior spinous process.
b. The pubis.
c. The ileum.
d. The ischium.
e. The tuberosity of the ischium.

The superior Extremities.

K. The clavicle.
L. The scapula.
a. The acromion.
b. The coracoid process.
c. The articulating cavity.
d. The neck of the bone.
L. The humerus.
a. Its head.
b. Its body.
c. The internal condyle.
d. The external condyle.
e. The tubercle.
f. The groove for the tendon of the long head of the biceps.
M. The radius.
a. Its head.
b. The tubercle for the inferior attachment of the biceps.
N. The ulna.
a. The olecranon.
b. The styloid process.
O. The carpus.
a. The os pisiforme.
b. The os trapezium.
P. The metacarpus.
Q. The phalanges of the fingers.

The inferior Extremities.

R. The os femoris.
a. Its head.
b. The trochanter major.
c. The trochanter minor.
d. The body of the bone.
e. The inner condyle.
f. The outer condyle.
S. The patella.
T. The tibia.
a. The tuberosity.
b. The spine.
c. The inner ankle.
U. The fibula or perone.
a. Its head.
b. The outer ankle.
V. The tarsus.
a. The astragulus.
b. The os calcis.
c. The os naviculare.
d. The os cuboides.
W. The metatarsus.
X. The phalanges of the toes.
a, b. The two bones of the great toe.

PLATE II.

A. A. The ossa parietalia.
z. One of the sutures.
B. The os occipitis.
a. Its crucial spine.
C. The mastoid process of the temporal bone.
D. The orbitar process of the cheek-bone.
E. The lower jaw.
a. Its ramus.
P. The spine of the scapula.
R. The acromion scapula.
F. The cervical vertebræ.

X. Y. The spinous processes of the vertebræ.
Z. The dorsal vertebræ.
G. The pelvis.
H. The sacrum.
i. The termination of the sacrum or os coccygis.
S. The tuberosity of the ischium.
I. The olecranon of the ulna.
K. The cavity in the humerus for the reception of the olecranon.
L. The linea aspera at the back of the os femoris.
M. The os calcis.
N. The os cuboides.
O. The projection of the metatarsal bone of the little toe.

PLATE III.

Muscles of the Arm.

A, A. The deltoides.
B, B. The biceps.
C, C. The triceps.
D. The brachialis internus.
E, E. The pronator radii teres.
F, F. The supinator radii longus.
G, G. The edge of the extensors of the thumb.
H, H. The flexor carpi radialis.
I. The flexor of the fingers.
Z. Upon this spot is the palmaris longus, *when present.*
K, K. The flexor carpi ulnaris.
L, L. The ulna.
M, M. The internal condyle of the humerus.
N. Olecranon.
O. Brachialis externus.
P. The external condyle of the humerus.
Q. The anconeus.
R. The extensor carpi ulnaris.
S. The annular ligament of the wrist.

Muscles on the Front of the Neck and Body.

1. The organ of voice (or Adam's apple).
2. The sterno-cleido-mastoideus.
3. 3. The pectoralis major.
4. 4. The rectus.
5. 5. The obliquus descendens.
6. 6. The course of the linea alba.
7. 7. The linea semilunaris.
8. 8. 8. The lineæ transversales.
9. 9. The pyramidales.
10. 10. The course of Poupart's ligament.
11. 11. 11. 11. The digitations of the rectus and obliquus upon the ribs.
12. 12. The serratus major or magnus.
13. Part of the latissimus dorsi.
14. Part of the teres major.
15. Part of the infra spinatus.

Muscles situated on the Thigh and Leg.

x. The glutæus medius.
a. The tensor vaginæ femoris.
b. The sartorius.
c. The rectus.
d. The vastus internus.
e. The swelling produced by the rectus, vasti, and cruræus.
f. The patella.
g. The swelling under the patella.
h. The ligament of the patella.
i. The gracilis.
k. The triceps.
l. The hollow at the groin, occupied by fat and glands.
m. The gastrocnemius.
n. The soleus.
o. The tibialis anticus.
p. The peroneus longus.
q. The extensor proprius pollicis pedis.
r r. The annular ligaments.

PLATE IV.

Muscles situated on the superior Extremities.

A A. The deltoides.
B B. The triceps.
C C. The brachialis internus.
E E. The supinator radii longus.
F F. The extensor of the fingers.
G G. The extensor carpi ulnaris.
H. The extensor carpi radialis.
I I. The extensors of the thumb.
K K. The tendons of the extensors of the thumb.
L L. The anconeus.
M M. The ulna.
N N. Part of the flexor carpi ulnaris.
O. The external condyle of the humerus.

Muscles situated upon the Back.

1. 1. The trapezius.
2. 2. The latissimus dorsi.
3. 3. The infra spinatus.
4. 4. The teres major.
5. 5. The rhomboideus.
6. 6. The longissimus dorsi appearing through the latissimus dorsi.
7. Part of the obliquus externus.

Muscles situated on the Thigh and Leg.

A. The glutæus medius.
C. The glutæus maximus.
D. The tensor vaginæ femoris.
E. The vastus externus.
F. The biceps.
H. The semitendinosus.
G. The semimembranosus.
I. Part of the vastus internus.
K. The tendon of the sartorius.
L. Part of the gracilis.

M. The gastrocnemius.
N. The soleus.
O. The tendo Achillis.
P. The tendon of the peroneus longus.

PLATE V.

Fig. 1.

A. Occipito frontalis.
B. Attollens Aurem.
C. Anterior Auris.
D. Orbicularis palpebrarum.
E. Compressor naris.
F. Levator anguli oris.
G. Levator labii superioris alæque nasi.
H. Zigomaticus major.
I. Zigomaticus minor.
K. Masseter.
L. Depressor anguli oris.
M. Sterno-cleido-mastoideus.
N. Platysma myoides.
O. Depressor labii inferioris.
P. Orbicularis oris.

Fig. 2.

A. Supinator radii longus.
B. Flexor carpi radialis.
C. Palmaris longus.
D. Aponeurosis palmaris.
E. Abductor pollicis manus, one of the muscles of the thumb, making up the fleshy part of the palm.
F. Palmaris brevis.
G. The flexor of the fingers.
H. Flexor carpi ulnaris.

Fig. 3.

A. Extensor digitorum communis.
B. Extensor carpi radialis.
C. Extensors of the thumb.
D. Flexor of the fingers.

Fig. 4.

A. Tibialis anticus.
B. Extensor digitorum pedis.
C. Extensor proprius pollicis pedis.
D. Annular ligament.
E. Tendon of the tibialis posticus, and one of the restraining ligaments of the joint.

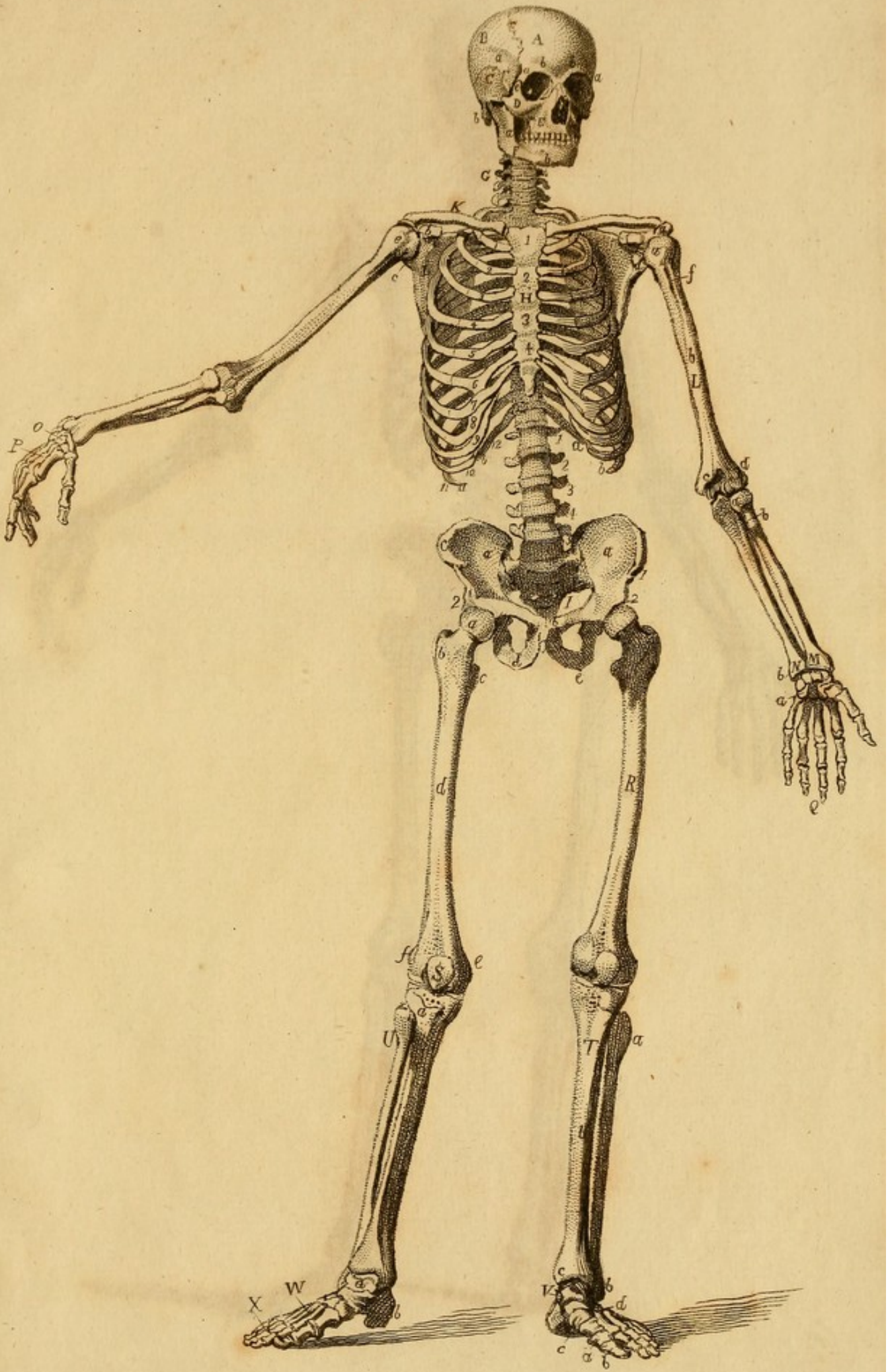
Fig. 5.

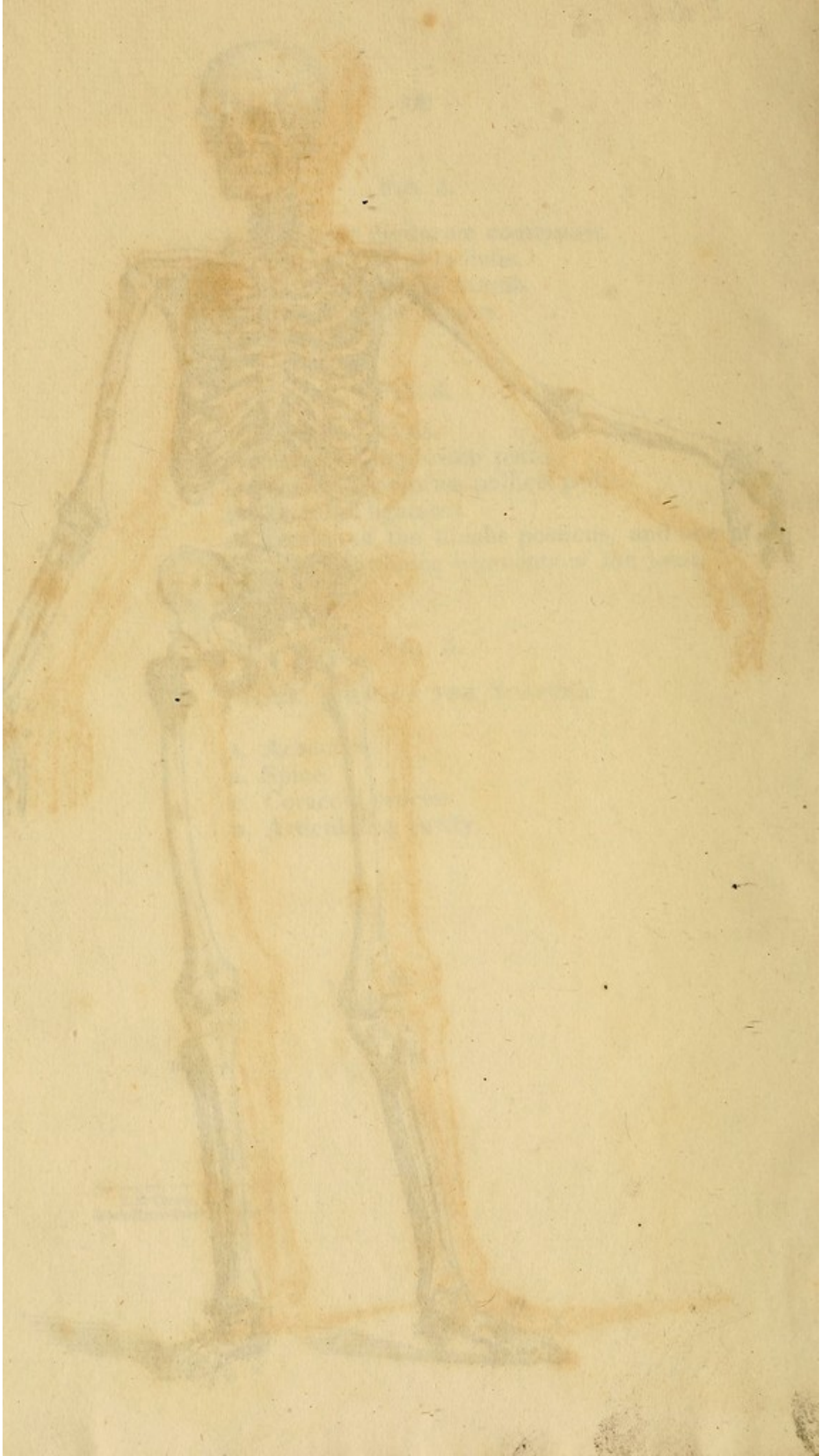
Back View of the Scapula.

A. Acromion.
B. Spine.
C. Coracoid process.
D. Articulating cavity.

J. M'Creery, Printer,
Black-Horse-Court, London.

Plate 1.





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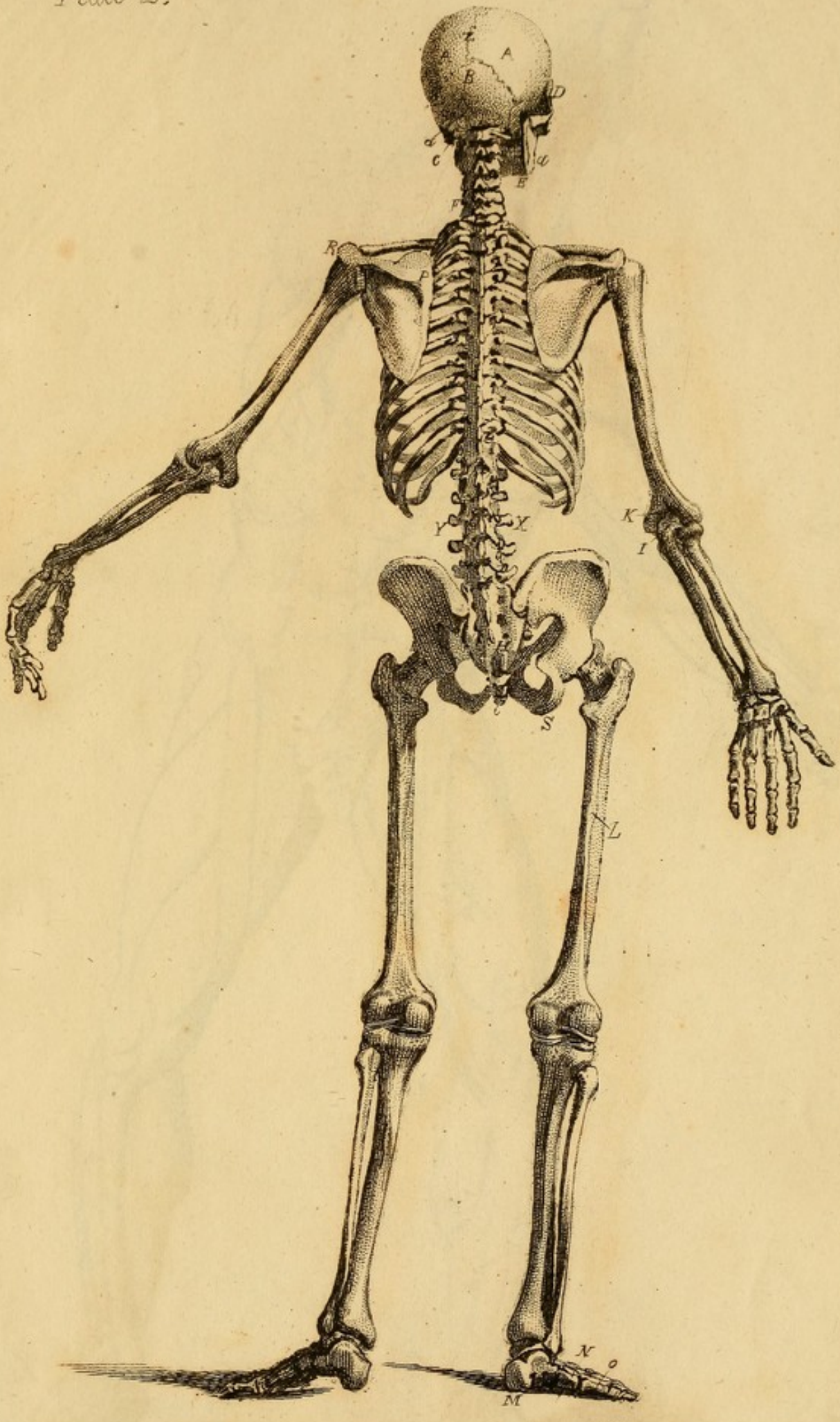
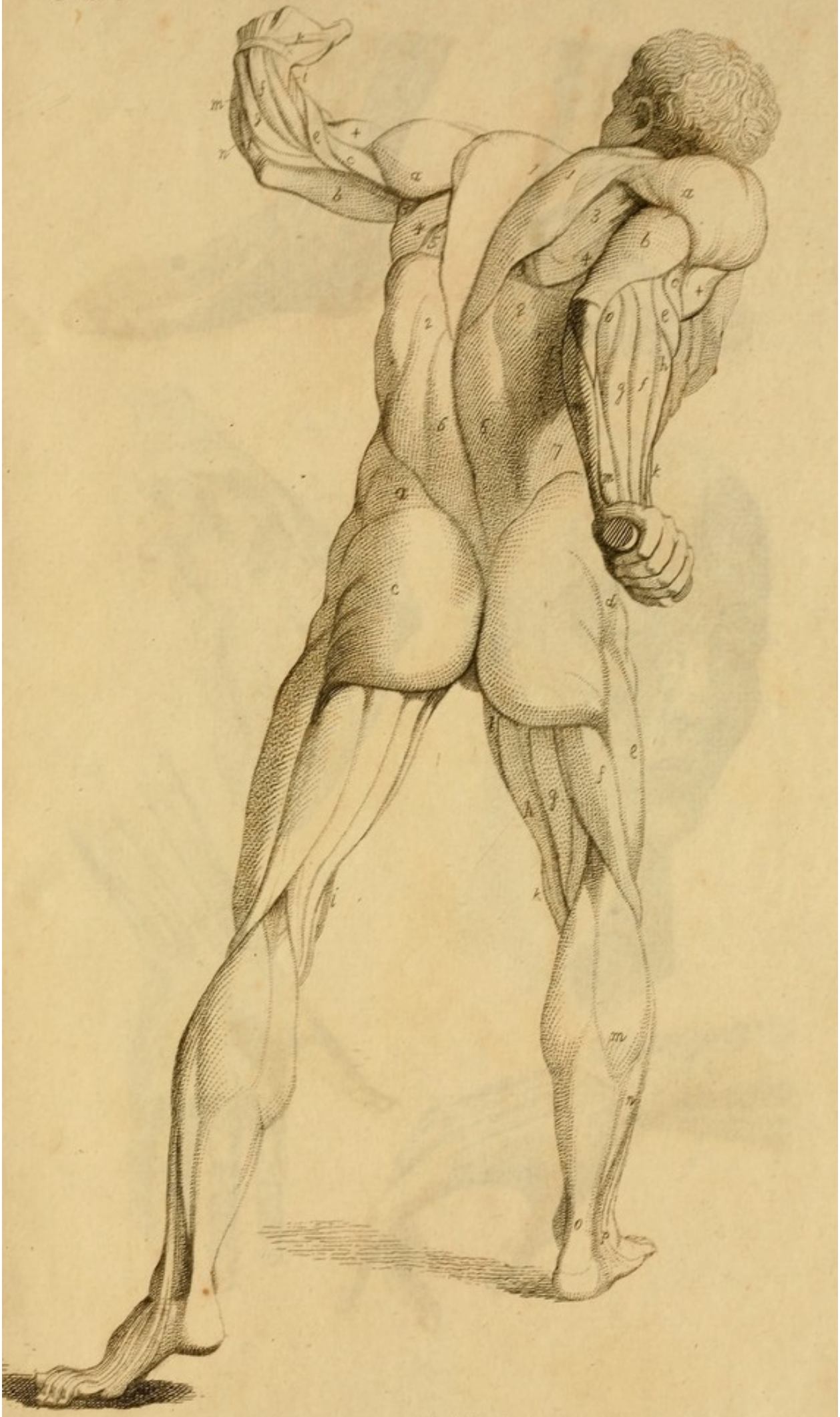


Plate 3.

Plate 4



+.+. Biceps

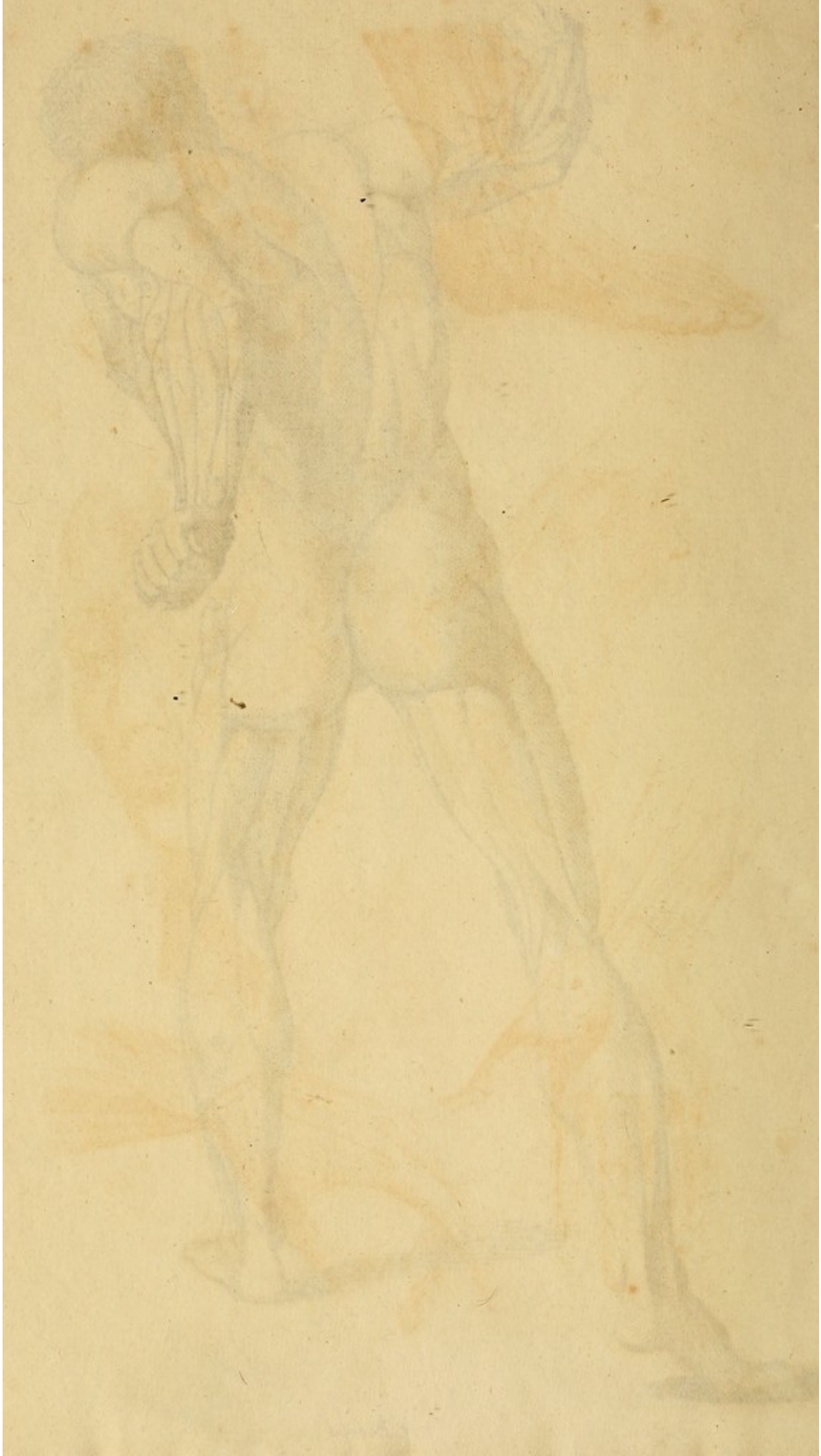
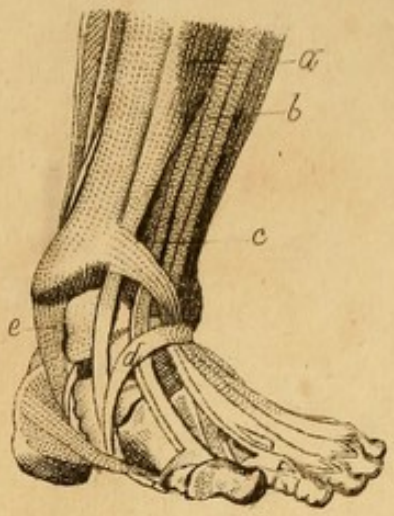


Plate. 5.

F. 4.

F. 6.



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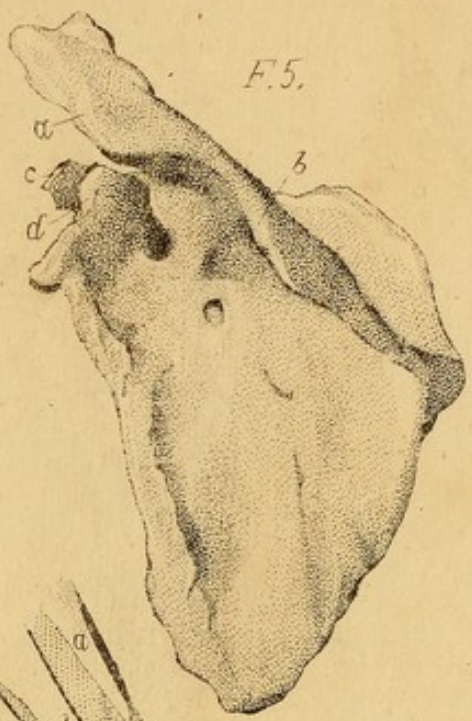
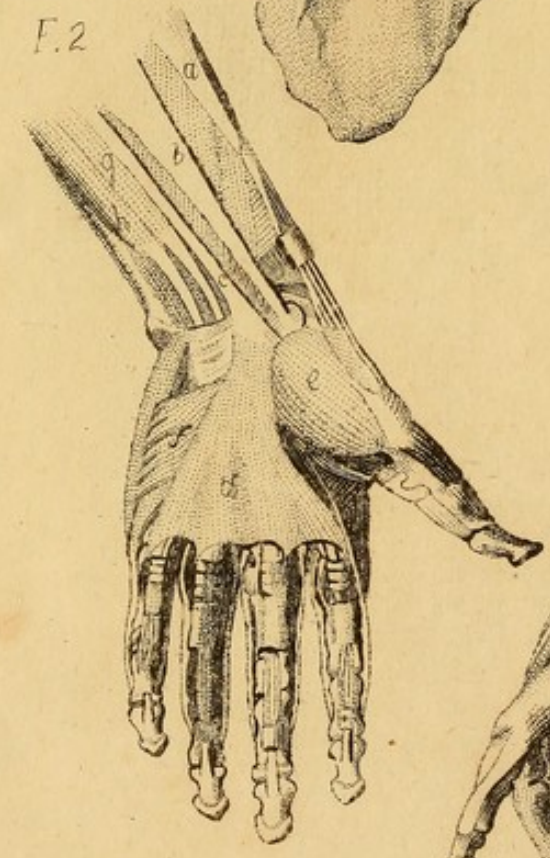


F. 1.

F. 2



F. 3.