A series of engravings, representing the bones of the human skeleton : with the skeletons of some of the lower animals / by Edward Mitchell, engraver ; the explanatory references by John Barclay.

Contributors

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Albinus, Bernhard Siegfried, 1697-1770.
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A

SERIES

OF

ENGRAVINGS,

REPRESENTING

THE BONES

OF

THE HUMAN SKELETON;

WITH THE

Skeletons of some of the Lower Animals.

By EDWARD MITCHELL, Engraver, Edinburgh.

THE

EXPLANATORY REFERENCES

By JOHN BARCLAY, M.D.

Lecturer on Anatomy,

Fellow of the Royal College of Physicians, and of the Royal Society of Edinburgh, &c. &c.

PART I.

EDINBURGH:

PRINTED FOR E. MITCHELL, BY OLIVER AND BOYD, HIGH STREET;

SOLD BY THEM, AND ALSO BY

G. AND W. B. WHITTAKER, LONDON; JOHNSTON AND DEAS, DUBLIN; AND WILLIAM TURNBULL, GLASGOW; AND BY ALL MEDICAL BOOKSELLERS.

1819.

PREFACE.

THE following Work originated entirely in the suggestion of the Engraver. From hearing the Students frequently complaining, that anatomical plates of approved excellence were either so rare or so high-priced, as seldom to be easily met with or purchased; while those published with a view to accommodate them, though abundantly numerous, were generally either on so small a scale, or so slovenly executed, as not to answer the purposes intended. Reflecting with himself upon these statements, MR MITCHELL thought that, by adopting a middle course with regard to the size of the engravings, and by studying to execute them in the best style of which he was capable, he might remove every objection, and produce a Work at once cheap, elegant, and useful.

HAVING formed his resolution, and cherishing a wish to produce, at the same time, something that was new, he procured a Work that was very little known, at least to anatomists, in this country,—a compilation, published at Rome in 1696, by DOMENICO de ROSSI, chiefly for the use of sculptors and painters. Many of the plates in that Work are excellent, accompanied with explanatory notes in Italian, borrowed from the eminent anatomist LANCISI. Having engraved some figures of this Work, he brought them to me, to know how far I approved of his plan. Upon seeing the Work, I told him frankly, that however much its figures might be calculated to suit the ideas of the painter and sculptor, they were certainly too limited in number to answer the greater variety of ends which anatomists have in view: that if he wished to begin with the bones, and illustrate any Anatomical Work upon that subject, there was no Work of the kind which I knew (and I knew many), that, upon the whole, was better entitled to the perusal and serious attention of the young anatomist than that of MONRO: that a French translation of that Work, in large folio, had been published at Paris in 1759, by the celebrated SUE, accompanied with engravings of every bone in the

human skeleton, which, in point of execution, were not inferior to those of CHESELDON, nor, in point of correct and accurate design, to those of ALBINUS: that the best advice which I therefore had to give him, was to lay aside the plates from DE ROSSI; to copy, with his utmost care and ability, the plates of SUE; and, upon condition that he would sell them at as low a price as he possibly could afford to the students of anatomy, I should engage to furnish the letter-press, and most willingly give him my labour for nothing. To these proposals he readily agreed; and what follows is a specimen of the work, and likewise of the progress which he has made in it.

THE three first figures of the Human Skeleton were copied from ALBINUS before he was acquainted with the Work of SUE, and allowed to remain as quite unexceptionable; though perhaps the side view, as given by SUE, be rather superior in respect of design. The three views of the Skeleton of the Horse were, at my suggestion, taken from STUBBS; the plate of the Teeth from a treatise of ALBINUS; and three or four figures, to show the changes and the varieties of the Lower Jaw, from some specimens in my collection.

IN the progress of the Work, without omitting any of the plates published by SUE, including even those of the Fœtal Skeleton, he intends to add several other figures, representing the Skeletons of the Lower Animals, as for instance, of quadrupeds, birds, and fishes. The object here will be fully attained, if such a varied and extended view of the animal structure, shall, in young men commencing their studies, have but a slight or partial effect in counteracting those narrow and unworthy ideas which some, on purpose to conceal their ignorance, too frequently encourage, on the vague pretence that a knowledge of the animal structure, in general, is of little importance, and that even a knowledge of the human structure is of no farther use than to afford a more steady light to those engaged in surgical practice, that they may the better be enabled to see how to perform difficult operations. Such illiberal and contracted ideas not only tend to degrade anatomy, but are an insult upon surgery itself, which, in the estimation of every enlightened and educated mind, is not a trade, but a liberal profession. A knowledge of anatomy, thus recommended by persons of low grovelling conceptions, can never with propriety be reckoned among the accomplishments of a gentleman or a man of letters,—can never be employed to reflect light on Natural

theology, on Natural history, or Medical jurisprudence,—never can assist the Painter or Statuary in their profession,—nor can ever be applied, as CUVIER has done it, to illustrate the past revolutions of the globe, or to form more correct theories of the earth.

IF it be asked, why I did not rather advise MR MITCHELL to copy from nature than from the engravings of first-rate artists? My reason was, that the human skeleton, so far as I know, has undergone no specific alterations since their time, and is not at present different in Britain from what it was in France in the life-time of SUE, or from what it was in Holland in the days of ALBINUS: that both these anatomists bestowed much time, labour, and expense, in having their engravings accurately executed; watched incessantly over the artists whom they employed; and, less intent on pecuniary emolument than lasting reputation, destroyed many plates that did not sufficiently convey the ideas suggested by nature: that, considering therefore their skill and their patience, and that of their artists, when combined and co-operating, it was not likely that MR MITCHELL, though an eminent artist, could, with all his exertions, produce any thing of the kind superior; and besides, I imagined him in less danger of falling into errors, with accurate designs and modes of execution constantly before him, than if he had copied from nature herself.

ON the other hand, if the question be put, why, instead of referring to Monro on the Bones, I did not publish a description myself? My answer is, that he has described them with such minuteness, accuracy, and method, and with such conciseness and clearness of expression, intermixing at the same time so many useful and important observations, that he evidently has surpassed all that preceded, has never yet been equalled by any that has followed, and, therefore, was not likely to be equalled by me. Besides, I had another object in view. I had no inclination to encourage that restless passion for novelty which leads the ignorant, the young, and unwary, into so many errors; and which, when connected with habits of indolence, as it frequently is, can be gratified with nothing that is not superficial, or that comes not recommended by the latest fashion. This silly passion, which attaches as much importance to trifles if they be new, as to facts and observations of acknowledged utility, which often is more attracted by the manner than it is by the matter, more by the shadow than the sub-

stance of the thing, has been too much studied by many of our late Anatomical compilers, who, attending only to the weak appetites, or the depraved tastes of their readers, adopt, in their descriptions, the vague and flowery style of the novel, for that of the sober, unadorned narrative, and sometimes by way of additional seasoning, substitute a few idle speculations, for the accurate results of laborious research.

If it be true what Portal has asserted, that many modern Anatomical compilations are even inferior in point of information, to the Anatomical writings of Galen; or, if we can believe what Haller alleged, that the Anatomy of the Human Body was better understood forty years before, than at the period when he wrote,* it is to be feared that Anatomy, if thus gradually deprived of its best friends and ablest supporters, and daily coming more under subjection to the control and caprice of a fashion that originates in indolence, selfishness, and vanity, may, in time, be retrograde rather than progressive; and that ignorance, trusting not only to the number, but to the effrontery of her adherents, may at last throw the gauntlet, set learning at defiance, and be generally successful in persuading her followers, that what is the newest is always the best, and that, whatever she pronounces antiquated, is unworthy of attention. Certain it is, and a pity it is so, the example of Harvey, Haller, Albinus, Winslow, and Monro, and of many other eminent Anatomists that have now left the stage, is but seldom followed in regard to learning, ardour, enthusiasm, or unwearied perseverance; it is much to be wished that it were otherwise, and yet still, as their names are generally talked of, and even their works known to a few, it is fondly to be hoped that, where any of their fame continues to live, and where the Work of Monro Primus continues a text-book in the schools of medicine, this passion for trifling, unsubstantial novelties, and this growing taste for superficial and limited views of the human structure, will, if not entirely checked in their progress, be, at least for a while, somewhat retarded.

To check this progress, so far as I could in that very circumscribed sphere where alone I could hope to possess any influence, I already have prevailed with my friend Dr Kirby to edit two late editions of Monro, and also most earnestly recommended it to my pupils as the best text-book on the subject of the Bones which they

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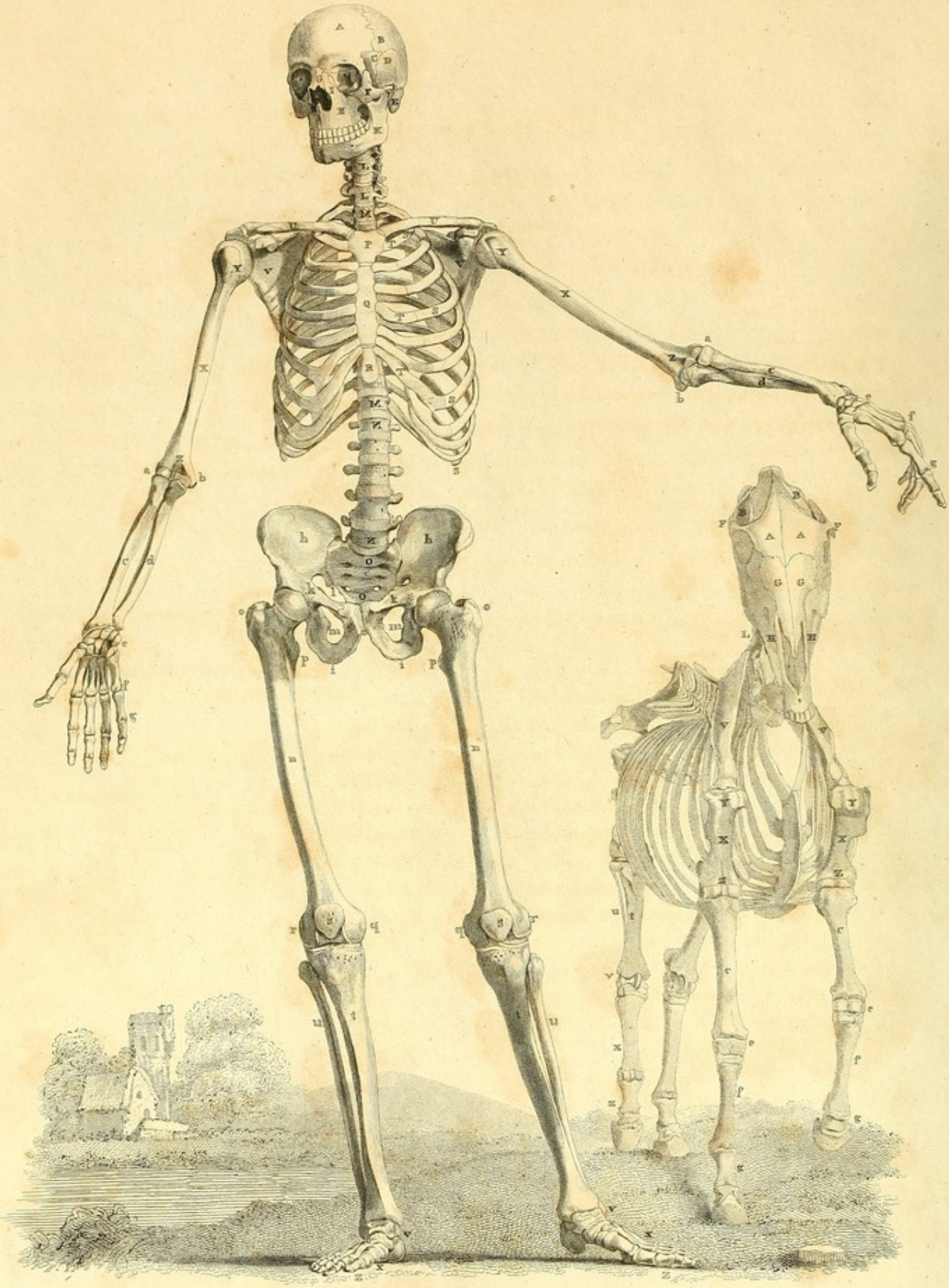
* See the Preface of Portal to his History of Anatomy and Surgery.

possibly could have. But on these occasions I little expected to have ever seen it, in this country, accompanied with a regular and complete series of Elegant Engravings, and such, I imagine, never was expected by MONRO himself, for to say truth, he, as well as HARVEY, who studied from Nature, had no very high opinion of such aids. Yet be that as it may, if they only contribute to enhance his Work, and perpetuate his memory in that University of which he was once the ornament and pride, happy shall I be. The apology is, supposing them correct, that they elucidate verbal descriptions, assist the fancy in forming its conceptions, and the memory in recalling past recollections, when the originals are imperfectly remembered, or cannot be procured. And it may be added, that, in representing the Bones, and the Muscles, and other parts of a steady character, they are much less apt to mislead than in representing the Veins, Arteries, Nerves, and Lymphatics, organs that, in their minuter divisions, exhibit varieties in every individual. In no other light are they meant to be viewed, but merely as auxiliaries, and, for that reason, are never to be called to interpret for Nature, where Nature is at hand to interpret for herself.

JOHN BARCLAY.



J. Walsh sculp.

PLATE I.—From ALBINUS.

The Horse, from Stubbs.

THE HEAD.

A Frontal Bone
B Parietal Bone
C Temporal process of the Sphenoidal Bone
D Squamous portion of the Temporal Bone
E Mastoid process of the Temporal Bone
F Malar, or Cheek Bone
G Nasal Bones
H Superior Maxillary Bone
I Nasal process of the Maxillary Bone
K Inferior Maxillary Bone

NECK AND TRUNK.

L Cervical Vertebræ, 7
M Dorsal Vertebræ, 12, connected with the Ribs
N Lumbar Vertebræ, 5
O Sacral Vertebræ, 5
Coccygeal Vertebræ concealed
P First Bone of the Sternum, articulated with the two Clavicles, with the first pair of Ribs, and with one half of the second pair
Q Second Bone of the Sternum, articulated with the remaining half of the second pair of Ribs, with one half of the seventh pair, and with all the intermediate pairs
R Third Bone of the Sternum, articulated with one half of the seventh pair of Ribs
S The twelve Ribs on each side
T The Cartilages of the first seven or true Ribs, articulated with the Sternum; the Cartilages of the five succeeding or false Ribs not extending so far

ATLANTAL EXTREMITIES.

U The Clavicle
V The Scapula
X The Humerus
Y Proximal Extremity of the Humerus
Z Distal Extremity of the Humerus
a Radial Condyle of the Humerus
b Ulnar Condyle of the Humerus
c The Radius
d The Ulna
e The Carpus, 8 Bones
f The Metacarpus, 5 Bones
g The Digital Phalanxes, three in each Finger, and two in the thumb

SACRAL EXTREMITIES.

h The Ilium
i The Ischium } the three forming the Os Innominatum
k The Pubis
l A part of the Ischiadic notch
m Foramen Obturatorium
n The Femur
o Its large Trochanter
p Its small Trochanter
q Its tibial Condyle
r Its fibular Condyle
s The Rotula, or Patella
t The Tibia
u The Fibula
v The Tarsus, 7 Bones
x The Metatarsus, 5 Bones
z The Digital Phalanxes, three in the small Toes, and two in the great Toe

PLATE II.—From ALBINUS.

The Horse, from Stubbs.

THE HEAD.

A Frontal Bone
B Parietal Bone
C Mastoid process of the Temporal Bone
D Malar Bone
E Occipital Bone
F Inferior Maxillary Bone

NECK AND TRUNK.

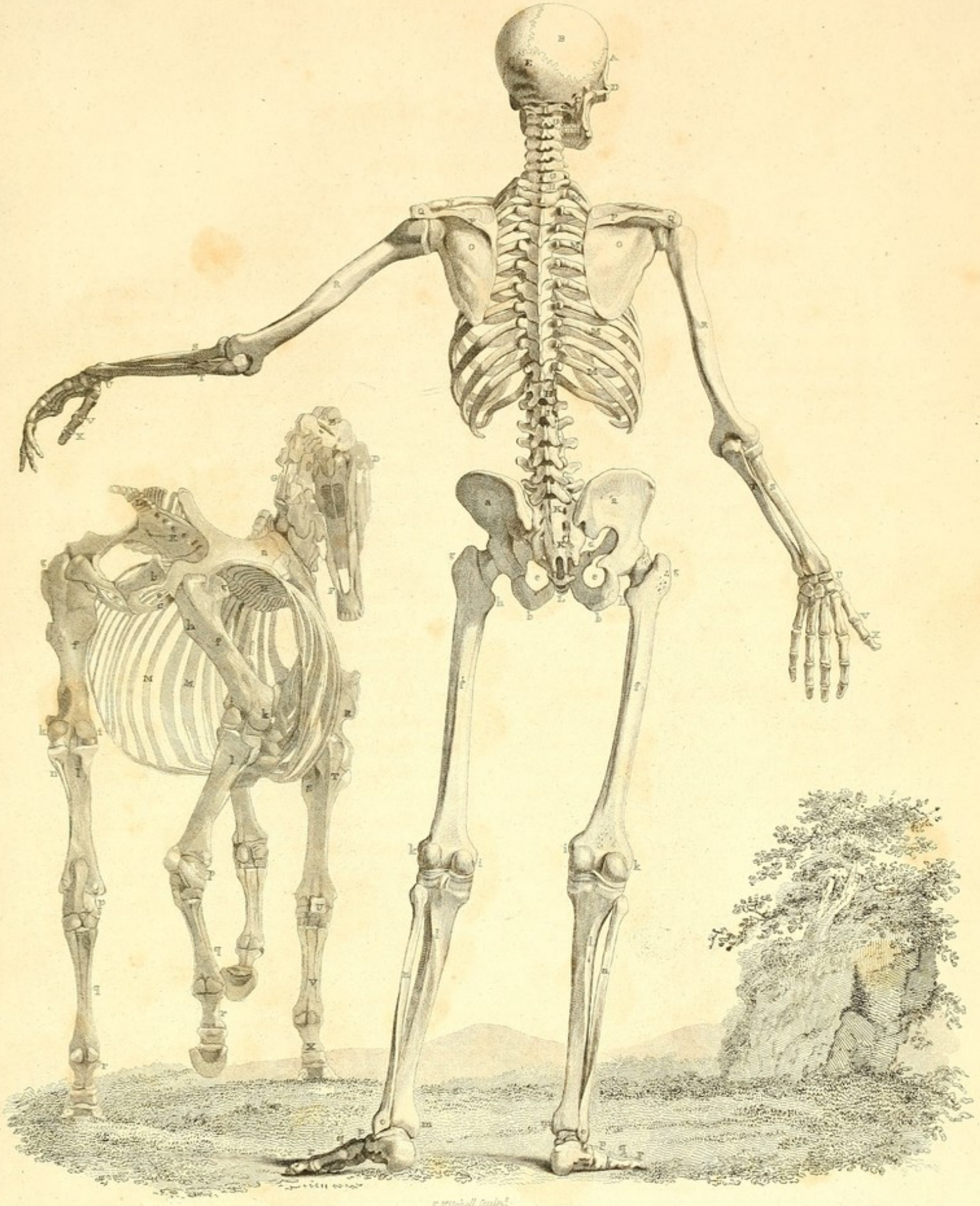
G Cervical Vertebræ
H Dorsal Vertebræ
I Lumbar Vertebræ
K Sacral Vertebræ
L Coccygeal Vertebræ
M The Ribs

ATLANTAL EXTREMITIES.

N Clavicle
O Scapula
P Its Spine
Q Its Acromion Process
R Humerus
S Radius
T Ulna
U Carpus
V Metacarpus
X Digital Phalanxes

SACRAL EXTREMITIES.

a Ilium
b Ischium } forming the Os Inominalum
c Pubis
d Ischiadic Notch
e Foramen Obturatorium
f Femur
g Its large Trochanter
h Its small Trochanter
i Its tibial Condyle
k Its fibular Condyle
l Tibia
m Malleolus Internus
n Fibula
o Malleolus Externus
p Tarsus
q Metatarsus
r Digital Phalanxes



E. Mitchell Sculpt.

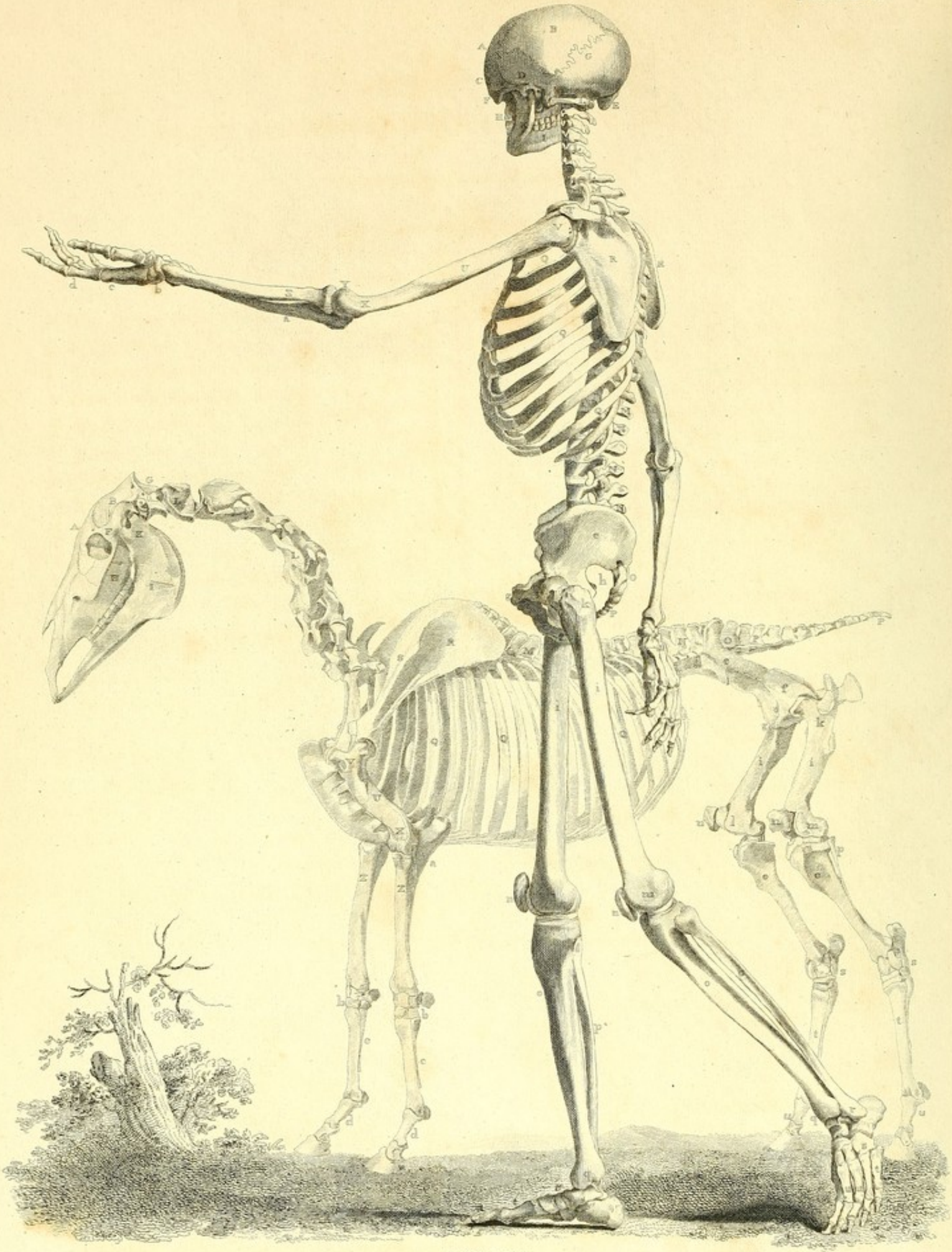


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PLATE III.—From ALBINUS.

The Horse, from Stubbs.

THE HEAD.

A Frontal Bone
B Parietal Bone
C Temporal process of the Sphenoidal Bone
D Squamous portion of the Temporal Bone
E Mastoid process of the Temporal Bone
F Malar, or Cheek Bone
G Occipital Bone
H Snperior Maxillary Bone
I Inferior Maxillary Bone
K Ramus of the Inferior Maxillary

NECK AND TRUNK.

L Cervical Vertebræ
M Dorsal Vertebræ
N Lumbar Vertebræ
O Sacral Vertebræ
P Coccygeal Vertebræ
Q Ribs

ATLANTAL EXTREMITIES.

R Scapula
S Spine of the Scapula
T Acromion Process
U Humerus
V Proximal Extremity
X Distal Extremity
Y Radial Condyle
Z The Radius
a The Ulna
b The Carpus
c The Metacarpus
d The Digital Phalanxes

SACRAL EXTREMITIES.

e The Ilium
f The Ischium
g The Pubis
h Ischiadic Notch
i The Femur
k Proximal Extremity
l Tibial Condyle
m Fibular Condyle
n Rotula, or Patella
o Tibia
p Fibula
q Malleolus Internus
r Malleolus Externus
s Tarsus
t Metatarsus
u Digital Phalanxes

PLATE IV.—The FEMALE SKELETON, from SUE.

The Ostrich, from Cheselden.

THE HEAD.

A The Frontal Bone
B Parietal Bone
C Temporal process of the Sphenoidal Bone
D Squamous portion of the Temporal Bone
E Mastoid process of the Temporal Bone
F Malar, or Cheek Bone
G Superior Maxillary Bone
H Nasal process of the Superior Maxillary Bone
I Nasal Bones
K Inferior Maxillary Bone
L Ramus of the Inferior Maxillary Bone

NECK AND TRUNK.

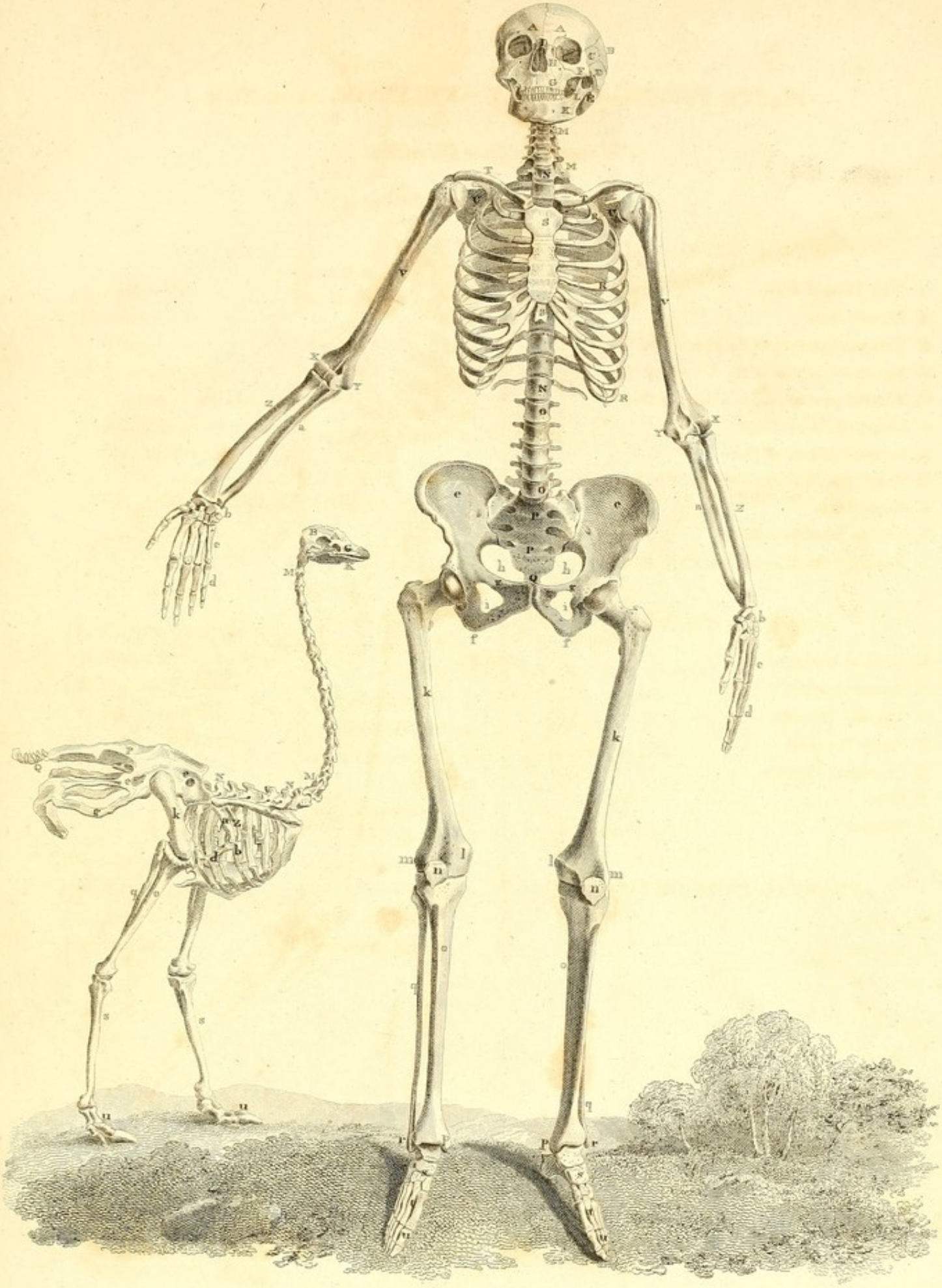
M Cervical Vertebræ
N Dorsal Vertebræ
O Lumbar Vertebræ
P Sacral Vertebræ
Q Coccygeal Vertebræ
R Ribs
S Sternum

ATLANTAL EXTREMITIES.

T Clavicle
U Scapula
V Humerus
X Its Radial Condyle
Y Its Ulnar Condyle
Z Radius
a Ulna
b Carpus
c Metacarpus
d Digital Phalanxes

SACRAL EXTREMITIES.

e Ilium
f Ischium
g Pubis
h Ischiadic Notch
i Foramen Obturatorium
k Femur
l Tibial Condyle
m Fibular Condyle
n Rotula, or Patella
o Tibia
p Malleolus Internus
q Fibula
r Malleolus Externus
s Tarsus
t Metatarsus
u Digital Phalanxes



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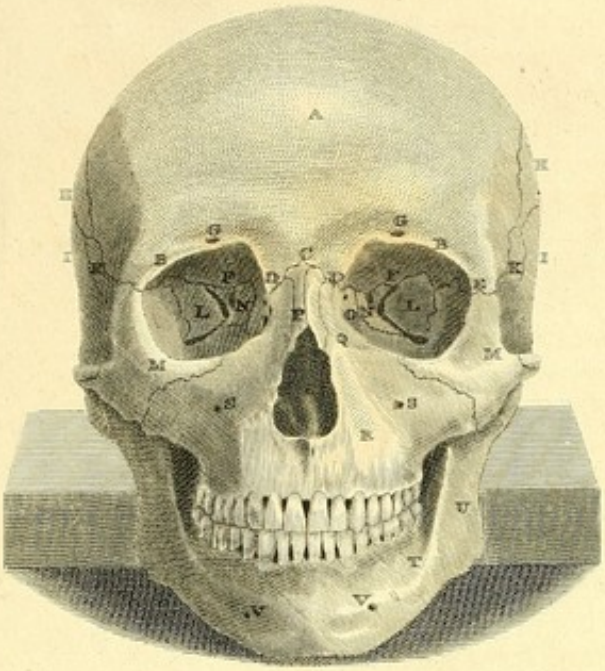

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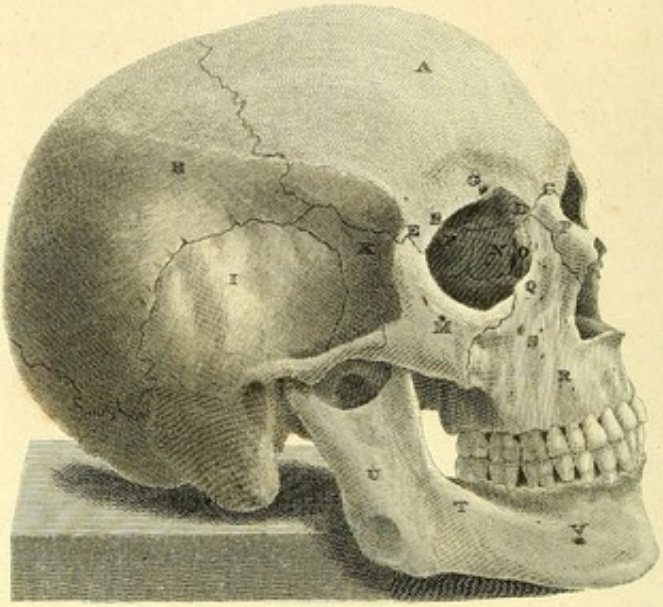

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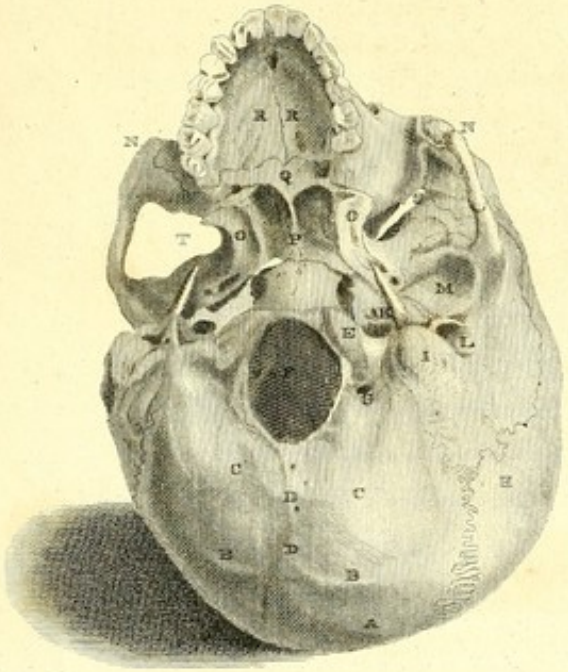

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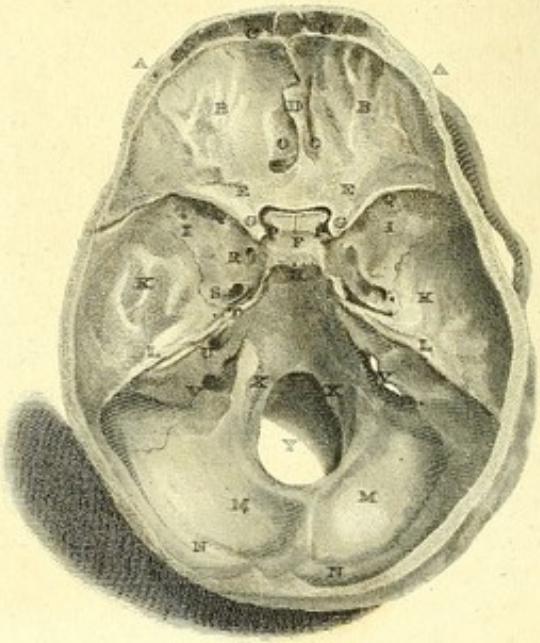

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PLATE V.—From SUE.

FIG. I.

A Frontal Bone
B Superciliary Ridge
C Glabella
D Internal angular process
E External angular process
F Orbitary process
G Foramina Supraorbitaria
H Parietal Bone
I Squamous portion of the Temporal Bone
K Temporal process of the Sphenoidal Bone
L Orbitary process of the Sphenoidal Bone
M Malar, or Cheek Bone
N Os planum
O Os Unguis
P Nasal Bones
Q Nasal process of the Superior Maxillary
R Superior Maxillary
S Foramina Infraorbitaria
T Inferior Maxillary
U Ramus of the Inferior Maxillary
V Foramina Menti

FIG. II.

A Frontal Bone
B Superciliary Ridge
C Glabella
D Internal angular process of the Frontal
E External angular process
F Orbitary process
G Foramen Supraorbitarium
H Parietal Bone
I Squamous portion of the Temporal Bone
K Temporal process of the Sphenoidal Bone
M Malar, or Cheek Bone
N Os planum
O Os Unguis
P Nasal Bone
Q Nasal process of the Superior Maxillary
R Superior Maxillary
S Foramen Infraorbitarium
T Inferior Maxillary
U Ramus of the Inferior Maxillary
V Foramen Menti

FIG. III.

A Occipital Bone
B Superior transverse Ridge
C Inferior transverse Ridge
D Perpendicular Ridge
E Condyloid Process
F Foramen Magnum
G Posterior Condyloid Foramen
H Parietal Bone
I Mastoid Process
K Styloid Process
L Meatus Auditorius Externus
M Articular Cavity
N Malar, or Cheek Bone
O Pterygoid process of the Sphenoidal
P Vomer
Q Palatin Plate of Palate Bone
R Palatin Plate of the Superior Maxillary
S Spheno Maxillary Fissure
T Temporal Fossa

FIG. IV.

A Frontal Bone
B Orbitary processes of the Frontal
C Frontal Sinuses
D Crista Galli of the Ethmoidal Bone
E Transverse Orbitary processes of the Sphenoidal
F Sella Turcica
G Anterior Clinoid processes
H Posterior Clinoid
I Temporal process of the Sphenoidal
K Squamous portion of the Temporal
L Petrous portion
M Occipital Bone
N Situation of transverse Sinuses
O Foramina Cribriformia
P Foramina Optica
Q Foramina Lacera Anteriora
R Foramina Rotunda
S Foramina Ovalia
T Foramina Spinosa
U Meatus Auditorius Internus
V Foramina Lacera Posteriora
X Foramina Condyloidea Anteriora
Y Foramen Magnum

PLATE VI.—From SUE.

A Coronal Suture

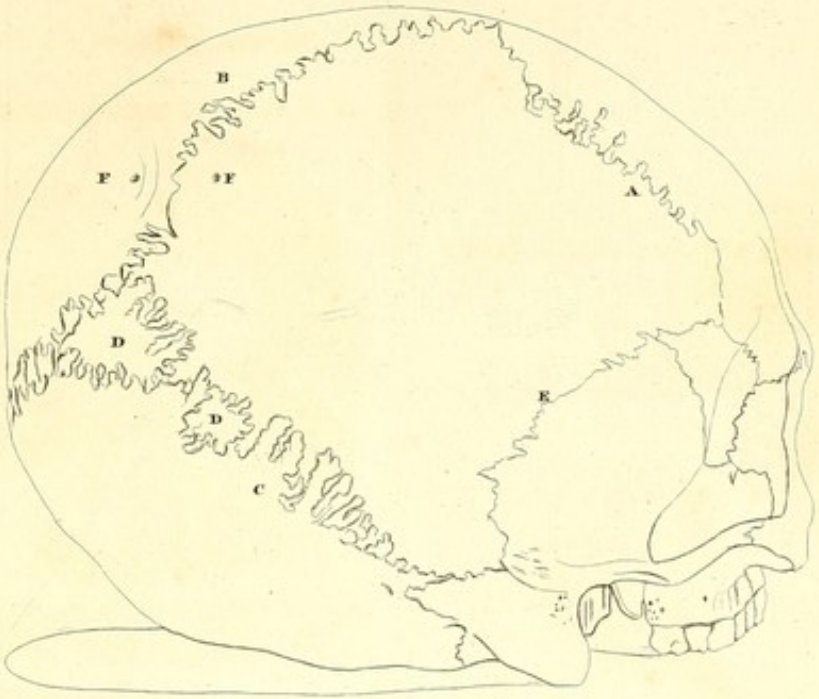
B Sagittal Suture

C Lamdoidal Suture

D D Ossa triquetra, or Ossa Wormiana in the Lambdoidal Suture

E Squamous Suture

F F Parietal Foramina, occurring frequently, but not always



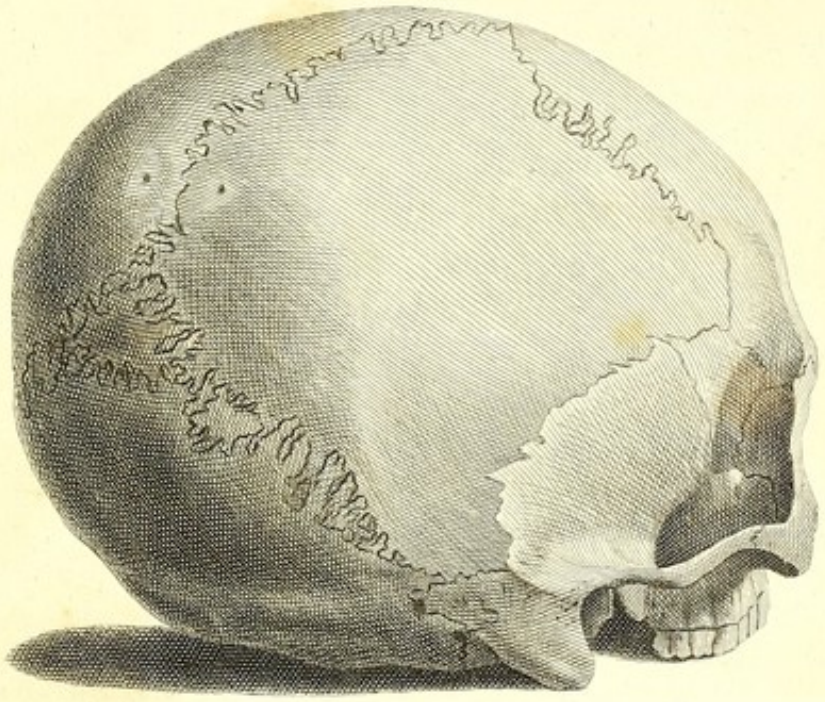


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Fig. 1.

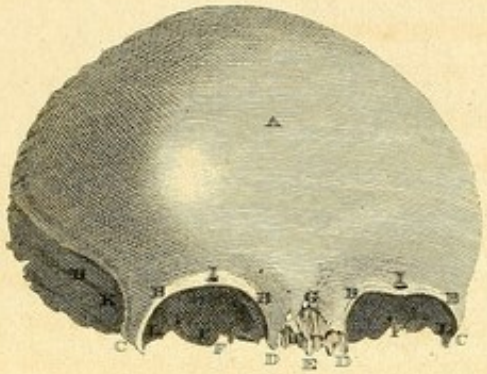


Fig. 2.

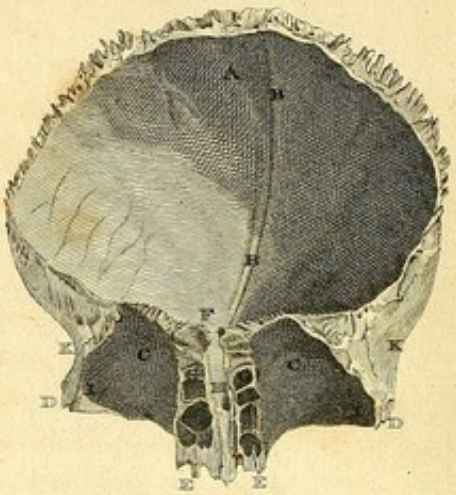


Fig. 3.

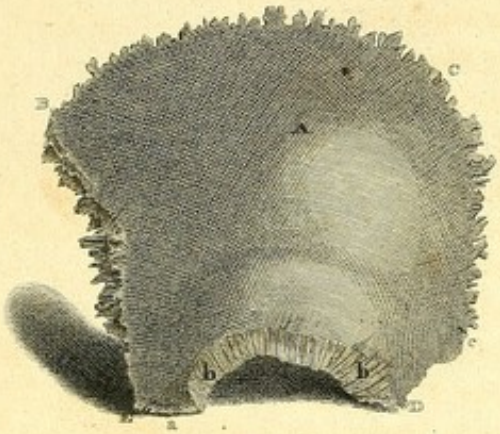


Fig. 4.

Fig. 5.

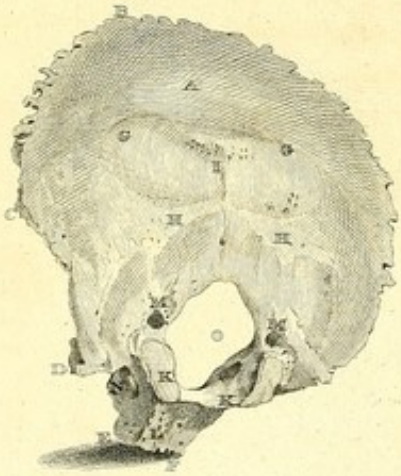


Fig. 6.

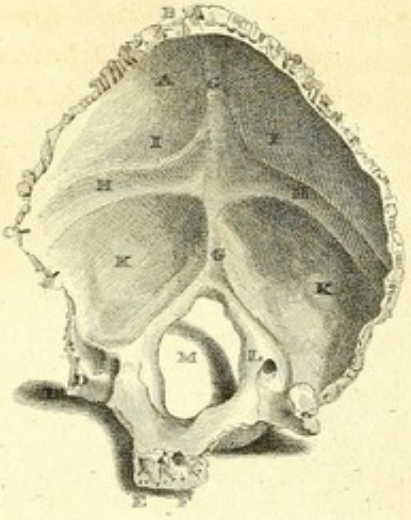


PLATE VII.—From SUE.

FIG. I.

A Frontal Bone from Without
B Superciliary Ridges
C External angular processes
D Internal angular processes
F Orbitary processes
G Glabella
I Foramina Supraorbitaria
K Temporal Fossa
L Lacrymal Fossa

FIG. II.

A Frontal Bone from Within and Below
B Spinous process
C Orbitary processes
D External angular processes
E Internal angles of Orbitary processes
F Foramen Cæcum
G Orifices of the Frontal Sinus
H Space for the Ethmoidal Bone
I Lacrymal Fossa
K Temporal Fossa

FIG. III.

A Left Parietal Bone from Without
B C Its Coronal Margin, where it joins its fellow at the Sagittal Suture
E D Its Basilar Margin. a. Where it joins the Temporal process of the Sphenoidal Bone. bb. Where it joins the Squamous portion of the Temporal Bone.
B E Its Glabellar Margin, where it joins the Frontal Bone at the Coronal Suture
C D Its Inial Margin. C c Where it joins the Occipital Bone; and, c D where it joins the Mammillary portion of the Temporal Bone at the Lambdoidal Suture

FIG. IV.

A Left Parietal Bone from Within
F Arborescent impressions of the Meningeal Artery
B C and the other letters indicate the same parts as in figure third, which see

FIG. V.

A Occipital Bone from Without
B C Margin connected with the Parietal Bone. C D Margin connected with the Mammillary portion of the Temporal Bone. D E Margin contiguous to the Petrous portion of the Temporal Bone
E F Margin where separated from the Sphenoidal Bone
G Superior transverse Ridge
H Inferior transverse Ridge
I Perpendicular Ridge
K Condyloid processes
L Cuneiform process
M Posterior Condyloid Foramen
N Anterior Condyloid Foramen
O Foramen Magnum

FIG. VI.

A The Occipital Bone from Within
B C. C D. D E. and F, denote the same Margins as in the last figure, which see
G H Cruciform Ridges
G G To which is attached the Falciform process of the Dura Mater, which forms, by an interstice between its Laminæ, the Longitudinal Sinus
H H To which is attached the Tentorium Cerebelli, forming, by the interstices between its Laminæ, the transverse Sinuses. The grooves in the Ridges from the action of the blood that flows in the Sinuses.
I Impressions corresponding to the posterior lobes of the Cerebrum
K Impressions corresponding to the two lobes of the Cerebellum
L Posterior Condyloid Foramen from within
M Foramen Magnum

PLATE VIII.—From SUE.

FIG. I.

LEFT TEMPORAL BONE from WITHOUT.

A Squamous portion
B Mammillary portion
C Petrous portion
D Mastoid process
E Styloid process
F Vaginal process
G Auditory process
H Zygomatic process
I Meatus Auditorius Externus
K Situation of the Foramen Stylomastoideum
L Fossa of the Biventer Maxillæ
M Articular Fossa
N Fissure of Glasserus
O Temporal Fossa

FIG. 2.

LEFT TEMPORAL BONE from WITHIN.

A Squamous portion
B Mammillary portion
C Petrous portion
D Mastoid process
E Styloid process
F Meatus Auditorius Internus
G Groove of the transverse Sinus
H Groove of superior-petrous Sinus
I Portion of the Foramen lacerum Posterius
K Part of the Jugular Fossa

FIG. 3.

SPHENOIDAL BONE from ABOVE.

A Temporal processes, or larger wings of Ingrassias
Transverse Spinous, or transverse Orbitary processes, or the lesser wings of Ingrassias
C Anterior Clinoid processes
D The Processus Olivaris
E Posterior Clinoid processes
F Spinous processes
G Styliform processes
H Pterygoid processes
a External Plates of
b Internal Plates
I Unciform processes, or extremities of the Internal Plates
K Foramina Optica
L Foramina Lacera Anteriora
M Foramina Rotunda
N Foramina Ovalia
O Foramina Spinosa
P Sella Turcica
Q Depressions corresponding to the convexities of the middle Lobes of the Cerebrum

FIG. 4.

SPHENOIDAL BONE from BEFORE.

A Temporal processes
B Parts of the Temporal processes pointing to the Orbits, and thence termed Orbitary processes
C Transverse Spinous, or transverse Orbitary processes
D The Spinous processes
E Pterygoid processes
a External Plates
b Internal Plates
c Unciform processes
F Azygous process
G Triangular processes
H Foramina Lacera Anteriora, or Sphenoidal Fissures
I Foramina Rotunda
K Foramina Ovalia
L Foramina Pterygoidea, or of Vidus Vidius
M Sphenoidal Sinus
N Spaces between the Plates of the Pterygoid processes for receiving the Pterygoid processes of the Palate Bones

PLATE VIII.—*Continued.*

FIG. 5.

ETHMOIDAL BONE from ABOVE.

A Cribriform Plate

B Crista Galli

C Triangular Bones, as connected with the Ethmoidal. See also Fig. 4. G G. and Figures 6, 7, and 8.

D Part of the Ethmoidal Cells

E Part of the Right Os Planum

FIG. 6.

ETHMOIDAL BONE from BELOW.

A Nasal Plate, forming a part of the Nasal Septum and continued Basilad, or downwards from the Crista Galli to the Vomer. See Fig. 24 of the following Plate

B Superior Spongy Bones

C Triangular Bones

FIG. 7 and 8.

TRIANGULAR BONES DETACHED.

A Ethmoidal process

B Anterior Sphenoidal process

C Posterior Sphenoidal process. See it in connexion Fig. 4, 5, and 6.

FIG. 9 and 10.

THE OSSEOUS CIRCLE of the EAR,

To which the Membrana Tympani is attached, and the only part of the Meatus Auditorius Externus that is Ossified in the Fœtus. In Fig. 9, seen from without, in Fig. 10, from within

A The Larger and Posterior Extremity

B The Anterior or Smaller Extremity

C Part of the Groove into which the Membrana Tympani is inserted

D D The same Groove seen to a greater extent

FIG. 11, 12, 13, 14.

THE FOUR BONES of the TYMPANUM.

11. The Malleus or Hammer

12. The Incus or Anvil

13. The Stapes or Stirrup Bone

14. The Os Orbiculare

FIG. 15, 16, 17, 18.

THE SAME BONES MAGNIFIED.

FIG. 15.

A The Head of the Malleus

B The Handle of the Malleus

C The Processus Brevis, or short process of the Malleus

D The Processus Gracilis, or the Process of Raw

E The Cervix, or Neck of the Malleus

F Articular Surface, where it rests on the Incus

FIG. 16.

A The Body of the Incus

B Its short process

C Its long process, which rests on the Head of the Stapes, with the Os Orbiculare interposed

D The Articular Cavity for receiving the Head of the Malleus

E The Os Orbiculare attached to the Incus

FIG. 17.

A The Head of the Stapes

B The Base

C The Long Limb

D The Short Limb

Both the Limbs and the Base are grooved on the sides where they point to one another for the insertion of a thin membrane

E Part of that Groove seen in the Base

PLATE VIII.—*Continued.*

FIG. 18.

Os Obiculare, when in connexion, situated between the Head of the Stapes and the long process of the Incus. See it attached to the Incus at E, Fig. 16.

FIG. 19.

These four Bones in Situ or Connexion

FIG. 20, 21.

Semicircular Canals and Cochlea, cut out and prepared from the Petrous portion of the Temporal Bone; these, with the Vestibule or Cavity in which the Semicircular Canals begin and terminate, constitute what is called the Labyrinth of the Ear

FIG. 20.

A The part of the Cochlea which points to the Meatus Auditorius Internus
B The Superior Canal
C The Horizontal
D The Vertical

FIG. 21.

E A part of the Superior Canal
F A part of the Horizontal
G The whole of the Vertical
H The Fenestra Ovalis
I The Fenestra Rotunda
K The outward, or Convex part of the Cochlea

FIG. 22.

The Vomer, which forms a part of the Nasal Septum
A B Coronal or Upper Margin, grooved for receiving the Nasal Plate of the Ethmoidal Bone
B C Margin pointing coronad and iniad, or upwards and backwards; and also grooved for receiving the Azygous process of the Sphenoidal Bone
A D Basilar or Inferior Margin, pointing downwards or Basilad, and resting on the Spinous processes of the Superior Maxillary Bones, and the Palate Plates of the Palate Bones
C D The Free Edge of the Vomer, pointing Iniad and Basilad, or backwards and downwards. See it in connexion, Fig. 24, Plate X.

FIG. 23, 24.

The Left Malar or Cheek Bone from Without and from Within

FIG. 23.

FROM WITHOUT.

A Superior Orbitary process
B Inferior Orbitary process
C Internal Orbitary process
D Maxillary process
E Zygomatic process
F A Foramen not always very regular

FIG. 24.

FROM WITHIN.

E The Temporal Fossa. See the last Figure, where the same letters refer to the same parts

FIG. 25, 26.

Palate Bones of the Right Side under different aspects
A Palate Plate, on the same Plane with the Palate Plate of the Superior Maxillary Bone
B Nasal Plate, rising from the Palate Plate at nearly a right angle
C Termination of the Nasal Plate in the Orbit, called its Orbitary process

PLATE VIII.—*Continued.*

D Pterygoid process of the Palate Bone, situated, when in connexion, between the two Plates of the Pterygoid process of the Sphenoidal Bone

FIG. 26.

E Part of the Spheno Palatin Foramen

F Part of the Pterygo Palatin Canal

FIG. 27.

NASAL BONES from WITHOUT.

FIG. 28.

NASAL BONES from WITHIN.

A Where they rest on the Frontal Bone at the Glabella

B Where the two unite in the Mesial Plane, by what is improperly called an Harmonic Suture

C Where they join the Nasal processes of the Superior Maxillary Bones

D Where they join the Cartilaginous Alæ of the Nose

FIG. 29.

LEFT SUPERIOR MAXILLARY BONE from the External or Lateral aspect, along with the PALATE BONE.

A Nasal Process

B Orbitary process

C Malar process

D Alveolar process

E Tuberous process

F Part of the Spinous process

G Foramen Infraorbitarium

H A part of the Palate Bone

FIG. 30.

The same Bone from the MESIAL ASPECT, along with the PALATE BONE.

A Nasal process

a a Ridge, showing the place of junction between it and the Inferior Spongy Bone

B Spinous process

C Palatin process

D Suture between the Palate and Maxillary Bones

E Pterygoid process of the Palate Bone. e Foramen Gustatorium, or termination of the Pterygo-Palatin Canal

F A Sinus in the Orbitary process of this Palate Bone

G Orifice of the Maxillary Sinus, the Maxillary Antre, or the Antrum Highmorianum

H Groove, forming part of the Nasal Duct

I A Groove, forming half of the Canal that terminates in the Foramen Incisivum

FIG. 31.

OS UNGUIS, or OS LACRYMALE of the Right Side, viewed from the ORBIT.

A Part of the Groove for lodging the Lacrymal Sac, the remaining part being formed by the Nasal process of the Superior Maxillary Bone

FIG. 32.

The same Bone from the NASAL ASPECT.

FIG. 33.

INFERIOR SPONGY BONE of the RIGHT SIDE.

A Its Anterior or Antinial Margin

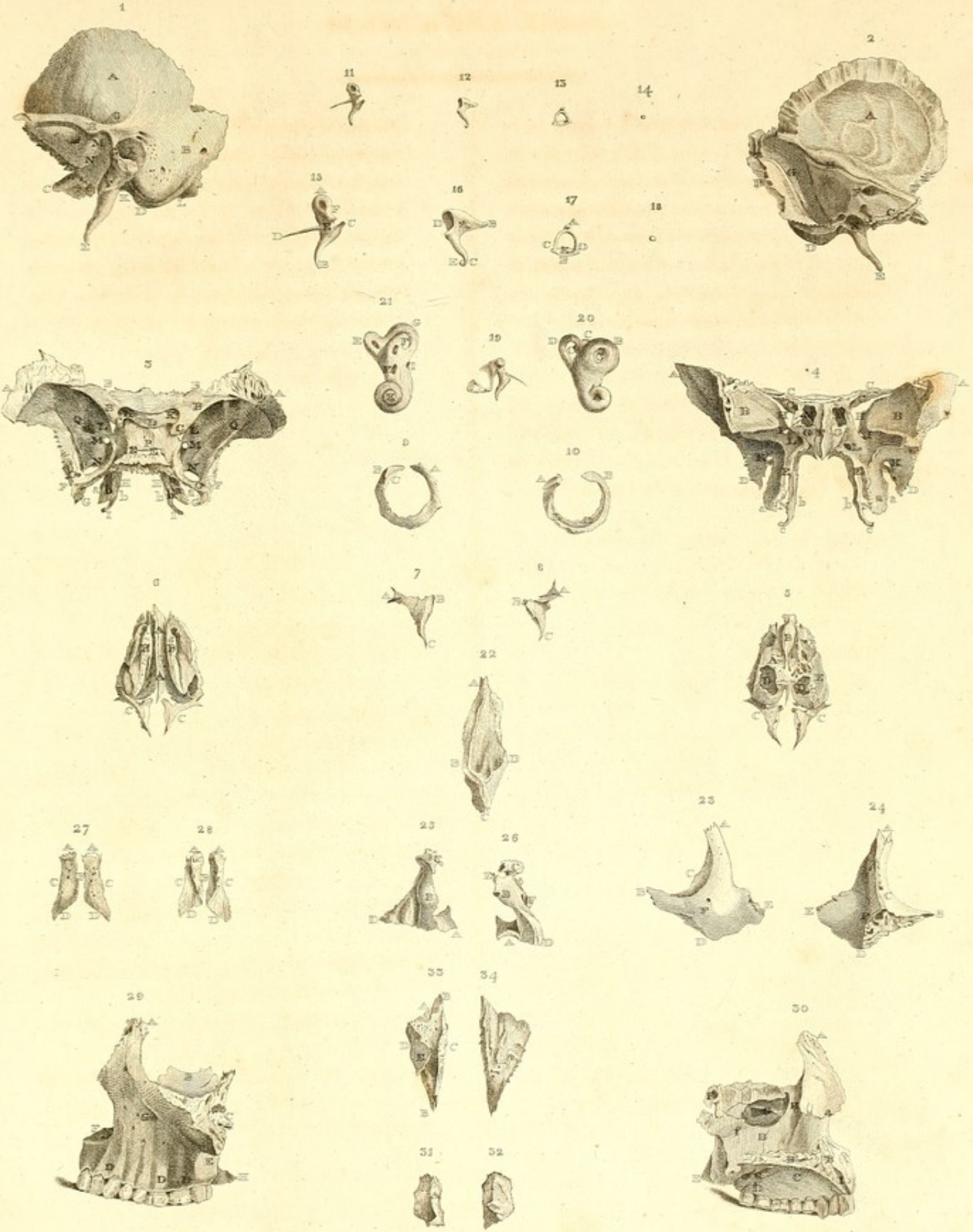
B Its Inial or Posterior Margin

C Its Inferior or Basilar Margin

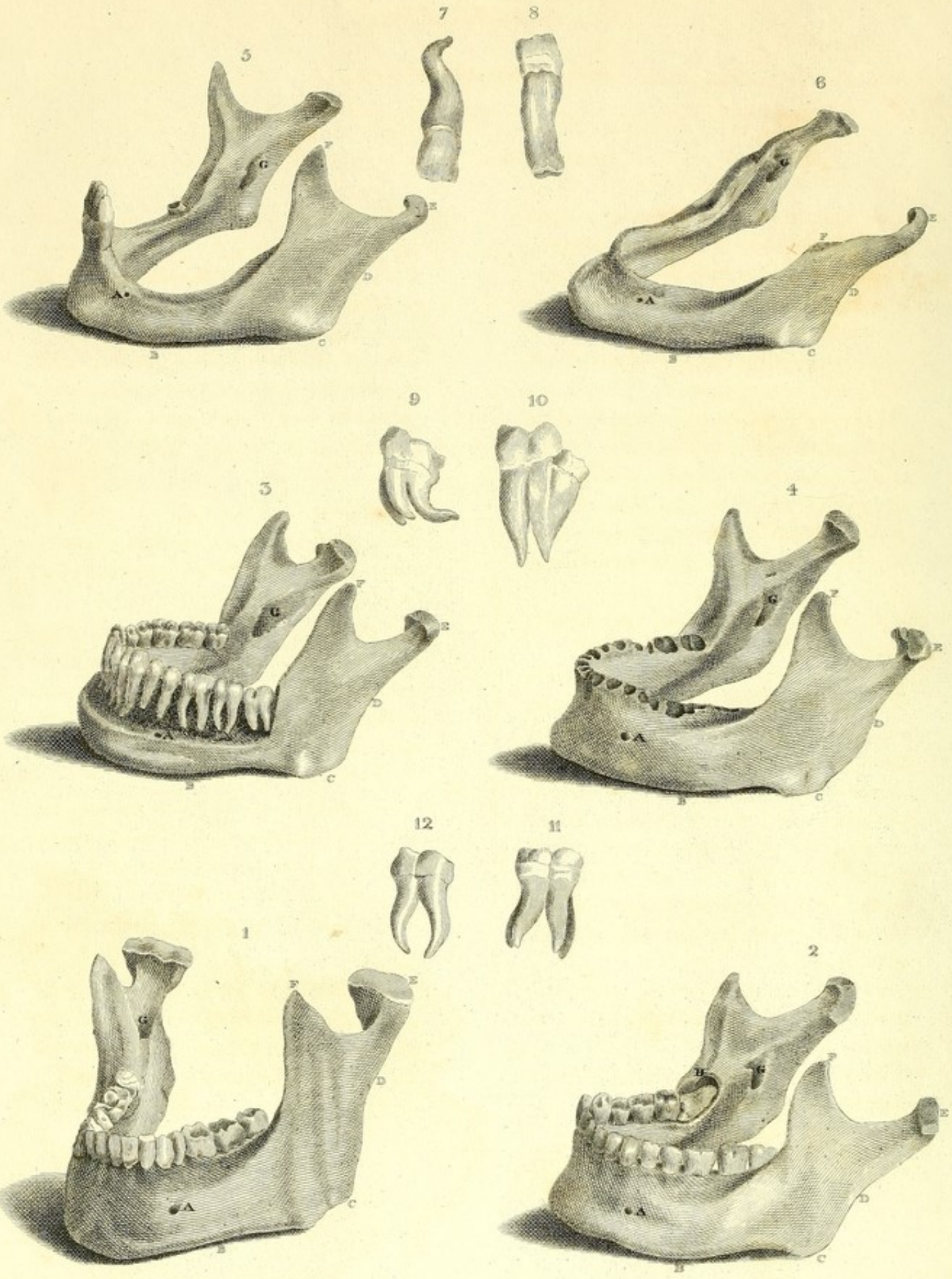
D Its Superior or Coronal Margin

When in connexion it extends. See Fig. 30, from a. In the Nasal process of the Superior Maxillary Bone, iniad or backward along the Ridge. f. in the Nasal Plate, of the Palate Bone, and in the adult, adheres firmly to these parts. While

in connexion, therefore, it must necessarily cover a part of the Nasal Groove, H Fig. 30, and contribute to the formation of the Nasal Duct, which is continued from the Lacrymal Groove in the Orbit. In passing over the Groove, it regularly sends off, towards the Orbit, a thin lamina or process, covering the Groove till it reaches the Orbit, in this way completing the Duct. This process, however, is not represented in the Figure before us. As it extends iniad or backward to the Nasal Plate of the Palate Bone, it covers also a part of the Orifice of the Maxillary Antre G, reflecting laterad from its Superior Margin the process E, by which, seeming to hang as it were by a hook from the Orifice of the Antre. That process has been termed its Unciform process



E. Mitchell sculpt.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E. Mitchell sculp.

PLATE IX.

This Plate exhibits different Representations of the Basilar Maxilla, or Lower Jaw. The one at the bottom towards the left, marked 1. *is copied from* Sue ; *the rest from Specimens in* Dr Barclay's *Museum.*

A In each figure, shews the situation of the Foramen Menti on the left side. The space between the two Foramina is what in Anatomy is strictly called Mentum, being here of a more determinate meaning than in classical writers. The curvature of the Jaw between the Foramina undergoes little change from birth to maturity. At birth, this Jaw is in two pieces, united, at the middle of the curvature between the Foramina, by a junction which is termed the Symphysis Menti, seen in a line marked a b, in figure 1. From the Symphysis, the sides lengthen and diverge iniad or backwards, to receive the increasing number of Teeth

B The Margin on which the Jaws are appearing to rest, is termed the Base

C Points out the part which is termed the Angle. This angle varies several degrees in different jaws, and is generally more obtuse in the infant than in the adult, if the teeth be remaining; or, in other words, is more obtuse before all the teeth have sprung up, or after they have all dropped out, than when they are full grown and present. See Fig. 5, where they have partly dropped out; Fig. 6, where they have all dropped out; and Fig. 23 of the following Plate, where they have not all sprung up

D The part which rises from the Angle, is termed the Ramus or Branch, and ends Coronad in two processes in

E The Condyloid, by which it is articulated with the Temporal Bone; and in

F The Coronoid for the insertion of the Temporal Muscle. In Fig. 6, where the teeth have dropped out, this process is almost obliterated, in consequence of absorption

G In the Inner or Mesial Aspect of the Ramus, shews the Orifice of the Inferior Maxillary Canal, by which the Nerve and Blood-vessels enter to supply the teeth. The opposite extremity of this canal is the Foramen Menti of the same side

The Sockets in which the teeth are inserted are termed Alveoli, from their resemblance to honeycomb, and constitute what are called the Alveolar Processes

These Alveoli, with the teeth, are complete in Fig. 1 and 2; without the teeth in Fig. 4; with the teeth, and laid open on one side, in Fig. 3; partly absorbed, and partly remaining, in Fig. 5; totally absorbed in Fig. 6, and not filled up as Dr Monro has it

From the absorption of the alveolar processes, the depth of the jaw becomes less from the alveolar margin to its base; the face, consequently, when the mouth is shut, appears shorter, and the neck, from the jaw receding upwards, appears longer

When the sides of the jaw do not lengthen backwards so fast as the permanent Dentes Molares spring up, these teeth are sometimes observed emerging from the inner side of the Ramus, as in Fig. 23 of the following Plate. In Fig. 2 of

this Plate, one of these teeth is seen growing horizontally forward at letter H.

The following Figures are copied from Sue:

Fig. 7. An Incisor with a curved Fang

Fig. 8. An Incisor with a Fang uncommon as to shape and size

Fig. 9. A Grinder with curved Fangs

Fig. 10. A Grinder with two Coronæ attached to one Fang

Fig. 11. A Grinder with two Fangs converging

Fig. 12. A Grinder with two Fangs diverging

As Fig. 9. has three Fangs; so some opposite to the Maxillary Antre in the upper jaw have four, while Mr Fox gives the figure of a tooth that had five, and a figure of two contiguous Molares with their Fangs interwoven.

PLATE. 10.


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E. Mitchell sculp.

PLATE X.

Every Tooth, as described by Anatomists, has a Corona, a Cervix, and a Fang or Fangs. The Corona is the part that projects above the Socket, the Fang the part that is lodged in the Socket, and the Cervix the line of demarcation between them. The ossification of the pulpy substance of which a tooth is formed, begins in the Corona, and at its commencement exhibits the appearance of a thin shell or crust; extends superficially over the pulp towards the extremity of the fang, and then centrad towards the axis of the tooth, leaving at last no part unoccupied, but that which serves as a passage for the nerve and blood-vessels. In short, a tooth grows from the corona towards the fang, or from the head towards the root, and from the circumference towards the centre, instead of from the centre towards the circumference, like most other bones. The pulp itself derives its origin from a thin vascular sac in which it is enclosed.

All the figures of the following plate, excepting the last, are carefully copied from two plates in the Second Book of the Annotationes Academicæ of Albinus. Their object is to shew the progress of growth and ossification in the different teeth.

Few perhaps require to be informed, that the first teeth which appear in the jaws are deciduous or temporary, and that those which succeed are called permament. In the following plate, Albinus not only alludes to this distinction, but to another; by which both the temporary and the permanent teeth are divided into Dentes Incisivi, Front or Cutting Teeth (*a*), four in each jaw; into Dentes Canini, or Tearing Teeth, two in each jaw, and termed Canini (*b*) from being conspicuously large in the dog, as they rise on each side of the Incisivi; and into Dentes Molares (*c*), or Grinding Teeth, four in each jaw if temporary teeth, and ten in each jaw if they be permanent: the complete number of temporary teeth in both jaws being twenty, and the permanent teeth in both jaws, when they are completed, being thirty-two.

1. The first series shews the progress of ossification in the first Incisores of the upper jaw
2. A similar progress in the first Incisores of the lower jaw
3. A like progress in the Dentes Canini
4. —— in the first deciduous Molares of the upper jaw
5. —— in the second deciduous Molares of the upper jaw
6. —— in the first deciduous Molares of the lower jaw
7. —— in the second deciduous Molares of the lower jaw
8. Longitudinal sections of these teeth at different periods of ossification; the five first—of the Dentes Incisivi; the seventh and eighth—of the Dentes Canini; and the ninth—of a Molaris or Grinder.

(*a*) Synonymes. Incisores. Tomici. Risorij. Quaternij. Anteriores. Acuti. Τομεις. Τμητικοι. Δυχαστηρις. Κῖονις. Γιλαστικοι. Οξεις.

(*b*) Oculares. Fractorij. Collaterales. Columellares. Cuspidati. Κυνοδοντες.

(*c*) Maxillares. Clavales. Genuini. Dentes Buccarum. Μυλαι. Μυλίδαι. Γομφιοι. Παλλεις. Φραστηρις. The two first next the Canini being termed Bicuspides, or Bicuspidati, by Mr Hunter, and some others; while the last are usually known by the appellation of Dentes Sapientiæ, or Wisdom Teeth. σωφρονιστηρις, in the language of Hippocrates, and κραδιαρις, in that of Aristotle, απο τε κρανιον και απο της πλευρας της ηλικιας.

PLATE X.—*Continued.*

9. Appearances of temporary Incisivi after being shed
10. —— of temporary Canini after being shed
11. —— of temporary Molares after being shed
12. The first deciduous Incisor retiring
13. The first permanent Incisor commencing
14. The second deciduous Incisor retiring
15. The second permanent Incisor commencing
16. The second deciduous Incisor on the left of the lower jaw
17. The second deciduous Incisor on the right of the lower jaw
18. A section of the jaw, in which the second Incisors, the deciduous and permanent, appear at the same time

19 and 20. Sockets of the Dentes Molares, after the teeth had dropped out

21. The Sockets of the deciduous Incisores and Canini, with a permanent Incisor and Caninus springing up

22 and 23. Sections of the upper and lower jaws, showing the deciduous and permanent teeth at the same time in distinct Sockets; and at A, Fig. 23, the orifice of the inferior Maxillary Canal, as in young subjects, situated near to the angle of the jaw, and pointing iniad or backwards

24. From Dr Barclay's Museum. A vertical section of a part of the Face, showing the formation of the Nasal Septum, so far as it is constructed of bone

A The Crista Galli of the Ethmoidal Bone, continued basilad, or downwards, into

B The Nasal Plate of the Ethmoidal Bone, which Nasal Plate is received by

C The Vomer, into a groove at cc; the remaining part of its groove, between c E, receiving the Azygous Process of the Sphenoidal Bone, while at its lower or basilar margin, dd, it rests upon

D The Spinous Process of the superior Maxillary Bone. To complete the Septum, the dark triangular space marked

FFF Is occupied by cartilage in the recent subject.

G A part of the Frontal Sinus

H A part of the Sphenoidal Sinus

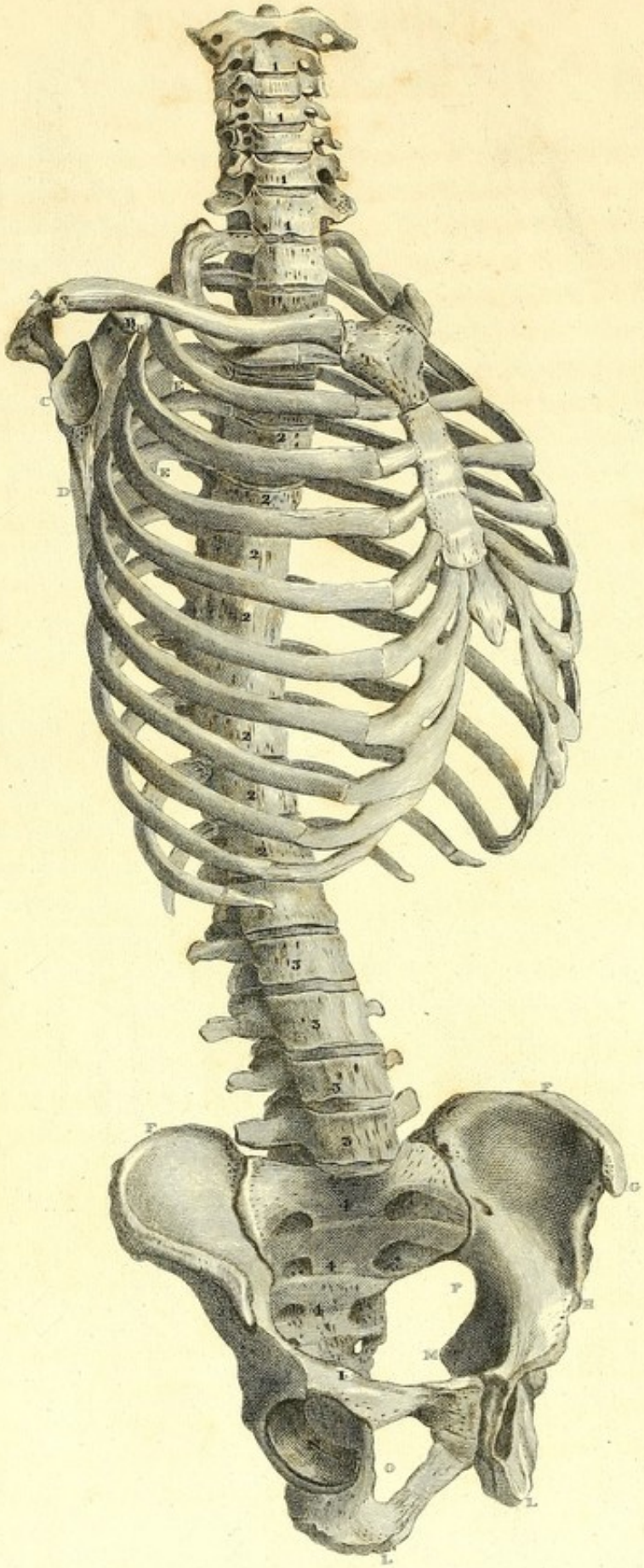
II The two plates of the Pterygoid Process of the Sphenoidal Bone

K The Unciform Process, or termination of the internal plate

L The Spinous Process of the Sphenoidal Bone, and

M Its Slyliform Process, projecting basilad

N The Palate Plate of the superior Maxillary Bone



E. Mitchell sculp.

PLATE XI.—From SUE.

This Plate represents a Front View of the Trunk, with some inclination to the Left Side. The parts seen are the different Curvatures of the Vertebral Column, the Sternum and Cartilages of the Ribs, the whole Clavicle, and most of the Scapula of the Right Side.

The Curvatures of the Vertebral Column are four: The Cervical, Thoracic, Lumbar, and Sacral; designated by the numbers, 1, 2, 3, 4; and are alternately Sternad and Dorsad, from the Atlas, or First Vertebra of the Neck, to the farther extremity of the Os Sacrum; or, if the Coccygeal Vertebræ be included as a part of the Column, the number of its Curvatures will then be five.

All the Bodies of the true Vertebræ, with the exception of the Atlas and Atlantal aspect of the Vertebra Dentata (the First and Second Vertebræ of the Neck), are united by means of Ligaments and Cartilages, termed Inter-Vertebral. The five Vertebræ of the Os Sacrum are inseparably united by Ossification.

The Atlas, on one side, is articulated with the two Condyloid processes of the Occipital Bone. The Vertebra next the Atlas, is the Vertebra Dentata, and so named from a peculiar tooth-like process, called Processus Dentatus, or Processus Odontoides. Besides this peculiar process, it has also the processes which are common with the rest of the true Vertebræ. These processes are seven. Each Vertebra having a process projecting dorsad, which is called the Spinous; two laterad, which are termed the Transverse; and four Articular, by two of which it is connected with the Vertebra; immediately atlantad or above, and by the remaining two with the Vertebra, immediately Sacrad, or below.

The Transverse processes of the Cervical Vertebræ are here seen perforated, for the transmission of the Vertebral Artery.

The Transverse processes of the Thoracic, or Dorsal Vertebræ, are imperfectly seen in this Figure, from their being nearly in a line with the Ribs with which they are articulated. Those of the Lumbar Vertebræ are conspicuous, particularly on the right side, while those of the Sacrum, like the bodies of its Vertebræ, are entirely united by Ossification.

The Thoracic or Dorsal Vertebræ, with the Ribs, their Cartilages, and the Sternum, constitute what is called the Cavity of the Thorax, in which are contained the Lungs and the Heart, included together under the name, 'Vital Organs.'

This Cavity, in man, quadrupeds, birds, and cetaceous animals, is always somewhat of a conical form, and contrary to what we observe in fishes, widens from the neck downwards or sacrad. The Ribs lie in planes, inclined towards the Vertebral column, with which they are articulated, and the inclination is seen gradually increasing from the first Rib towards the last. What are usually termed the depression and elevation of the Ribs, in respiration, are merely changes produced in the inclination of their planes.

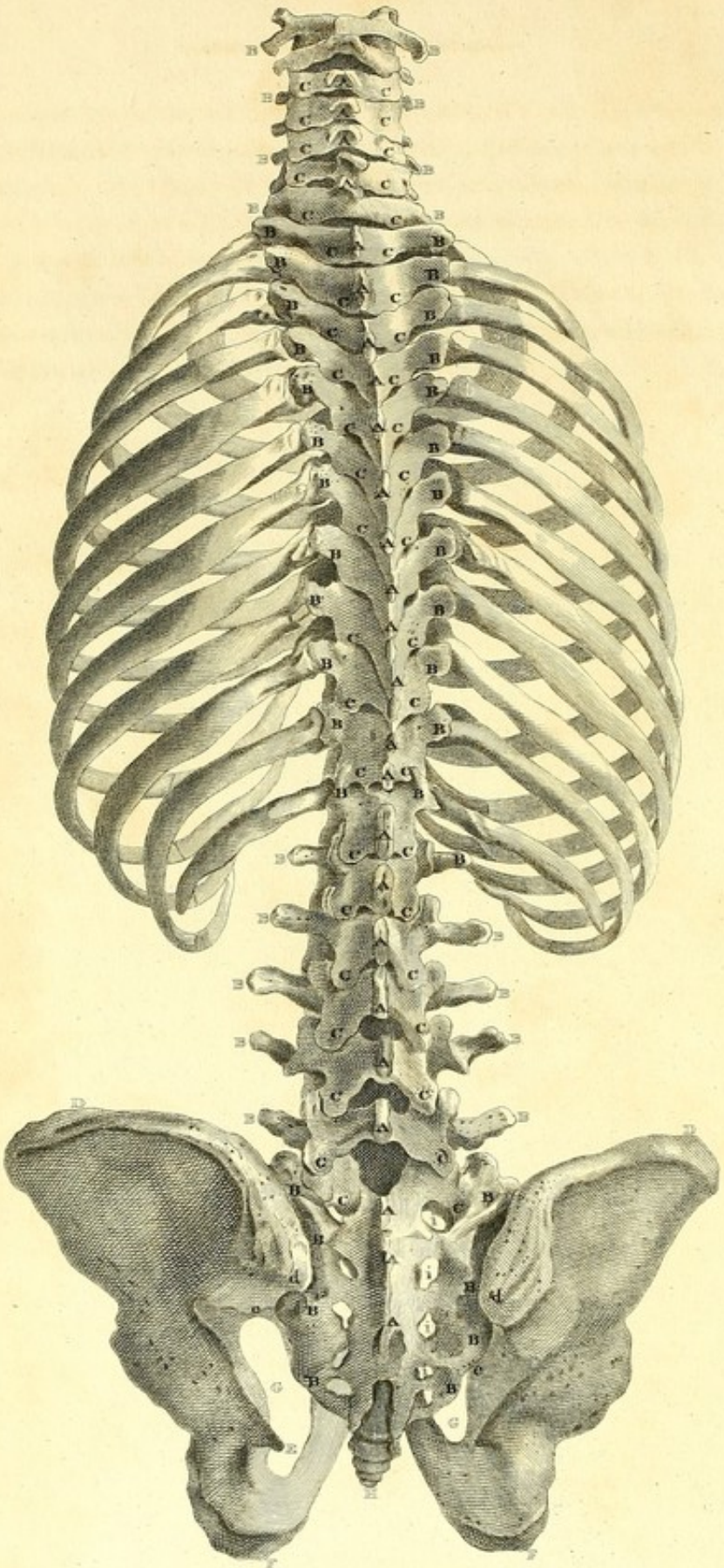
The Transverse Lines in the Middle Bone of the Sternum, show the junctions of the four separate Bones of which it is composed.

The Clavicle of the Right Side is here seen through its whole extent, articulated with the Acromion process of the Scapula at A, and crossing the Coracoid process of the same Bone at B. The superficial, or Glenoid Cavity of the Scapula, in which the Head of

PLATE XI.—*Continued.*

the Humerus moved, is seen at C. Its inferior, or Sacral Costa, at D. Its Base, at E. Its superior, or Atlantal Costa, is concealed.

In the lateral Bones of the Pelvis, the Crest of the Ilium is seen at FF. Its anterior and superior Spinous process at G. Its anterior and inferior Spinous process at H. The Os Pubis at I. The Symphysis Pubis at K. The Tuberosity of the Ischium at L; and its Spinous process at M. The Acetabulum or Cavity, in which the Head of the Femur is lodged, may be seen at N. This Cavity is formed of the Ilium, Ischium, and Os Pubis. O, shows the Foramen Obturatorium, formed by the Os Pubis and Ischium; and P, the Notch, called Sacro-Ischiadic.



E.Mitchell sculp.

PLATE XII.—From SUE.

The DORSAL ASPECT of the TRUNK.

AAA The Spinous processes of the different Vertebræ, the Spinous processes of the Cervical Vertebræ, with the exception of the first and the last appearing bifurcated

BBB The Transverse processes of the Vertebræ

CCC The Oblique, or Articular processes of the Vertebræ

DD The Crest of the Ilium

dd Its Posterior and Superior Spinous process

ee Its Posterior and Inferior Spinous process

E Spinous process of the Ischium

F Its Tuberous process, or its Tuberosity

G Sacro-Ischiadic Notch

H Os Coccyx

I i Dorsal Foramina of the Os Sacrum, for the transmission of Nerves and Blood-vessels

PLATE XIII.—From SUE.

The Vertebral Column, with its four Curvatures, falling alternately sternad and dorsad of the centre of gravity. These Curvatures, when viewed along with the inflections of the Sacral Extremities, that are alternately rotulad and poplitead, or forwards and backwards, from the Hip Joint to the Toes, show how the animal that walks erect can thus more easily preserve its balance.

The Ribs, Extremities, and other parts situated Laterad of the Mesial Plane, supersede the necessity of such Curvatures and Inflections towards Right and Left. But the Curvatures of the Column are wanting in animals accustomed to move with the body horizontally, as not being necessary in that position to preserve an equilibrium; while diseased Spines of the human species, when bent to one side, have, by way of compensation, a correspondent Curvature on the other.

The Transverse processes of the different Vertebræ are seen distinctly in the Front View, Fig. 1, at AA, and the Spinous processes in the Lateral View, Fig. 2, at BB. The Spinous processes of both the Cervical and Thoracic Vertebræ showing a greater inclination sacrad than those of the Lumbar, some of which appear even to incline atlantad.

Upon a comparison of the Vertebral Columns of different species, the processes, when inclined, seem to be inclined to that point, or to those points where the Column is most frequently or extensively inflected, as may be seen in the skeleton of the Dog, and in a variety of other quadrupeds, in which, not only the Spinous processes, but the Transverse processes of the Lumbar Vertebræ, upon one side, and the Spinous processes of the Dorsal Vertebræ, upon the other, are seen inclined, though in opposite directions, towards a Point or Centre of Motion, that is near to the last of the false Ribs but one.

In several quadrupeds, where the neck is long and the head heavy, as, for instance, in the Deer ornamented with horns, the Sacral inclination in the Spinous processes of two or three of the most atlantal of the Dorsal Vertebræ is less marked than in the Spinous processes that follow; and from this circumstance, that the first are near a Centre of Motion towards the Sacral Extremity of the Neck, and on which the Neck, along with the Head, is not only frequently, but extensively inflected.

In like manner, from the inflections of the Vertebral Column in the human species, near to the last of the false Ribs, and from the inflections which also take place near to the Head of the Os Sacrum, the inclinations of the Spinous processes of the Lumbar Vertebræ, as situated between two Centres of Motion, are less distinct than they are in quadrupeds, where the Spine is inflected extensively and frequently, and more decidedly upon one point.

In both Figures are seen at EE, towards the extremities of the Transverse processes, certain Pits or Depressions, corresponding to the smaller Heads of the Ribs with which they were articulated; and at FF, Fig. 2, Lateral depressions in the bodies of the Vertebræ, where the larger Heads of the Ribs were articulated. All these depressions, excepting the first and the two last, being opposite to intervertebral spaces, and a like mechanism being observed in quadrupeds and birds, curiosity becomes naturally excited to know the

PLATE. 13.

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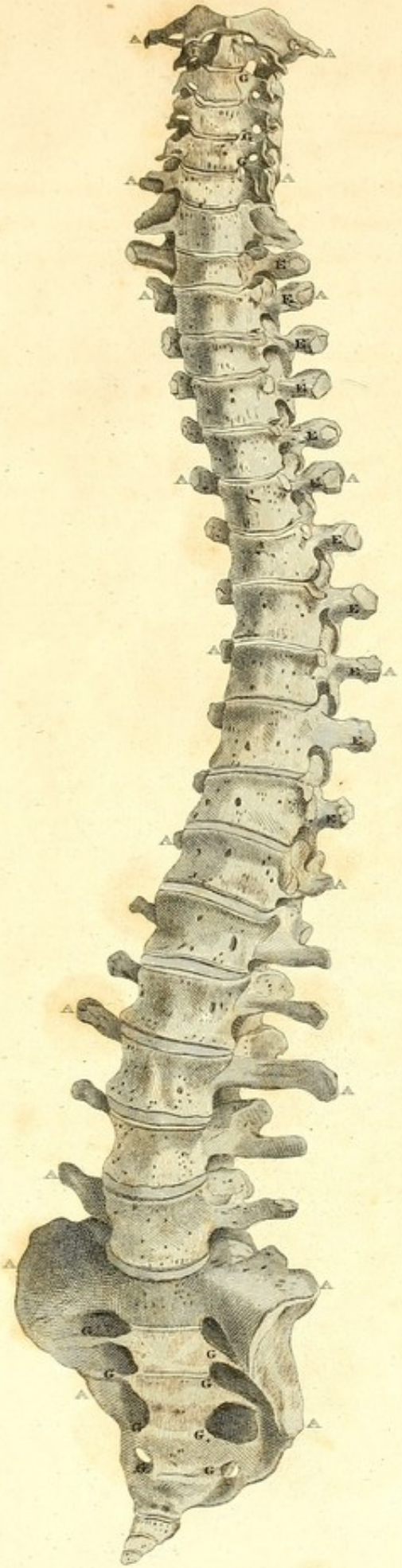

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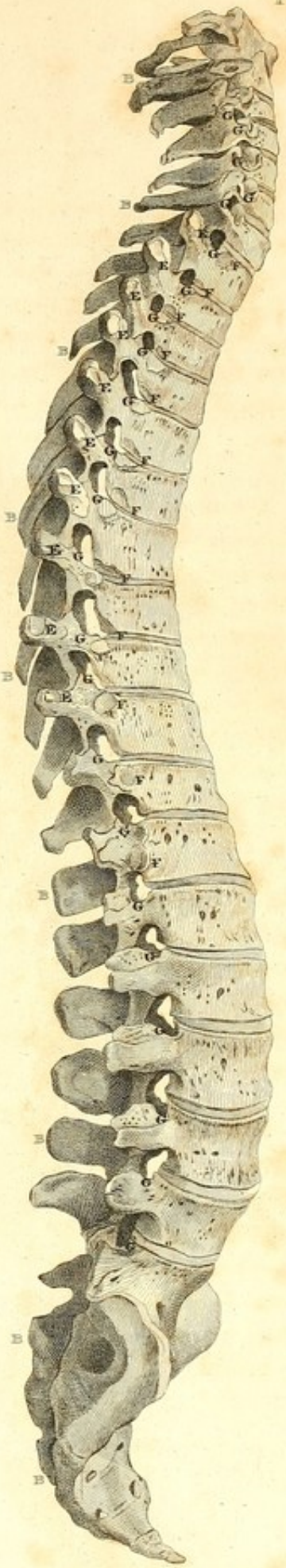

E. Mitchell Sculpt.

reason. But without pretending to assign every cause, as there may be more causes than one, it is obvious, that the vertebral extremities, from resting opposite to the centres of motion on which the contiguous Vertebræ move, must be less disturbed, in their functions and relative positions, by the inflections of the Vertebral Column, than if they were attached like the first and two last, each to the body of a single Vertebra, and compelled to follow it in all its movements.

The letters CC show the Foramina through which the nerves issue from the Spinal Marrow to supply the Neck, Trunk, and extremities. These Foramina are formed by the junction of two notches belonging to the contiguous Vertebræ. Each Vertebra has therefore a notch upon its atlantal and its sacral aspect, and the notch will be largest on that aspect where the nerves press most, that is to say, on the atlantal aspect of the Cervical Vertebræ, where the nerves press as they pass to the Trunk and Atlantal Extremities, and on the sacral aspect of the Thoracic or Dorsal Vertebræ, where they likewise press in passing obliquely atlantad to the ribs. In the Cow, sometimes the notch found in the sacral aspect of these Vertebræ is so very deep, that the whole passage for the nerve seems formed in it; nay, in some of the Vertebræ, the notch at times may be seen converted into a canal, and the nerve issuing through the body of the Vertebræ, instead of the intervertebral space.

A difference also may be observed between the atlantal and the sacral notches of the Lumbar Vertebræ, but not so well marked as in the Vertebræ of the Thorax and Neck.

In the Os Sacrum, the Foramina for the nerves are not found on the Lateral, but upon the Sternal and the Dorsal Aspect, as the nerves could not well pass out laterally through the junction of the Os Ilium and Sacrum, nor between the transverse processes of the Sacrum, which are closely united by ossification. In old draught horses, where the transverse processes of the Lumbar Vertebræ, like those of the Sacrum, are frequently united by ossification, we see the Foramina for the passage of the nerves, in the same way as they are in the Sacrum, instead of opening dextrad and sinistrad, opening regularly sternad and dorsad.

The size of these Foramina, it should also be observed, is not wholly regulated by the size of the veins, arteries, or nerves, that are seen to pass through them, but partly also by the range of motion to which these are subjected, arising either from inflections of the Spine, or changes of position in the several organs on which they are ramified.

PLATE XIV.—From SUE.

Containing different Views of Cervical, Thoracic, and Lumbar Vertebræ.

A The Body of each Vertebra
BB Its Transverse Process
CC Its Oblique or Articular Processes
D Its Spinous Process
E Denoting that it is seen from the Atlantal or Superior Aspect, and
F From the Sacral or Inferior Aspect

In the middle row are three views of the Atlas, or first Vertebra of the Neck. This Vertebra has not a body that resembles, either in size or form, any of the rest, and therefore by some is said to want a body entirely.

In Fig. 1. it is seen from the Aspect where it is articulated with the two Condyloid Processes of the Occipital Bone

In Fig. 2. —— from the Sacral Aspect, where it is articulated with the Vertebra Dentata

In Fig. 3. —— from the Dorsal Aspect, where it exhibits, on the inner side of the body, A, the depression, b, where it was articulated with the Toothlike Process of the Vertebra Dentata

Fig. 4. The Vertebra Dentata, from the Atlantal Aspect. d, Its peculiar process, called Processus Dentatus. This process, passing atlantad through the ring of the Atlas, becomes the axis, round which the Head, along with the Atlas, are observed to move in their rotatory motions. It is retained in its situation by a transverse ligament passing behind it from one side of the Atlas to the other.

Fig. 5. The Atlas and Vertebra Dentata, seen in connexion from their Sternal Aspect

Fig. 6. The same seen in connexion from their Dorsal Aspect

Fig. 7. The Vertebra Dentata, seen unconnected, from its Lateral Aspect

Fig. 8 and 9. Two views of one of the Thoracic or Dorsal Vertebræ, towards the Atlantal Extremity of the Trunk

Fig. 10 and 11. Two Views of another Vertebra of the same order, towards the Sacral Extremity of the Trunk. These two Vertebræ are brought into comparison to show that their bodies are gradually enlarged, as they recede from the Cervical Vertebræ, and approach towards the Lumbar.

From this difference in the size of their bodies, Dr Monro takes one of the characters by which he distinguishes the different Vertebræ, though a character thus founded on comparison be of no use when the comparison cannot be instituted. A more obvious character may be derived, and has been derived, from the aspects of their articular surfaces. In the Cervical Vertebræ, these point Atlantad and Sacrad; in the Thoracic, Sternad and Dorsad; and in the Lumbar, Dextrad and Sinistrad. Yet even this character has been found imperfect; for towards the Sacral Extremity of the Neck, the articular surfaces begin to point, like those of the Thoracic, towards the Sternal and the Dorsal Aspect. At the same time, in directing our views to the more varied and extensive field of comparative anatomy, it soon appears that no common or general characters, distinguishing these classes of Vertebræ, are to be found in either their forms, their relative magnitudes, or their number of processes,—every order and genus

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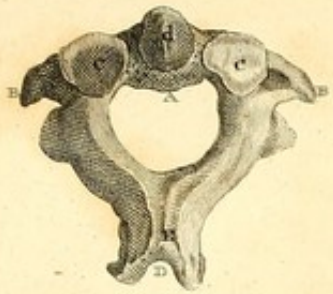

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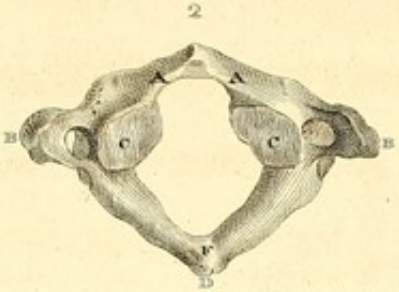

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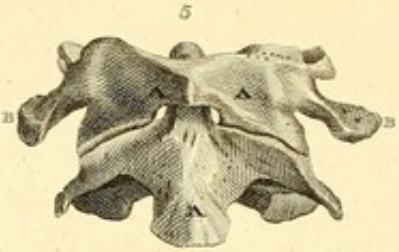

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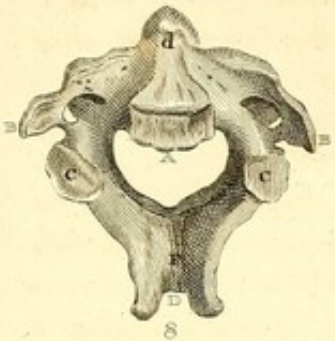

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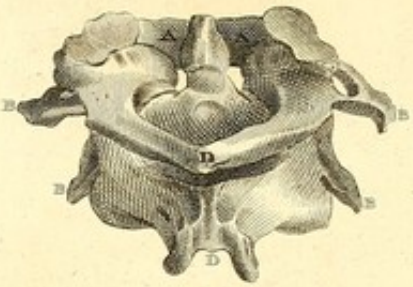

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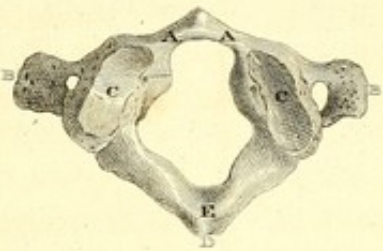

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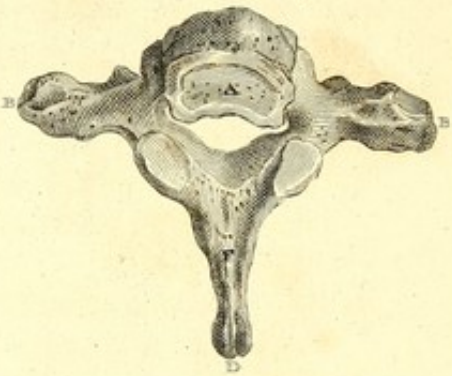

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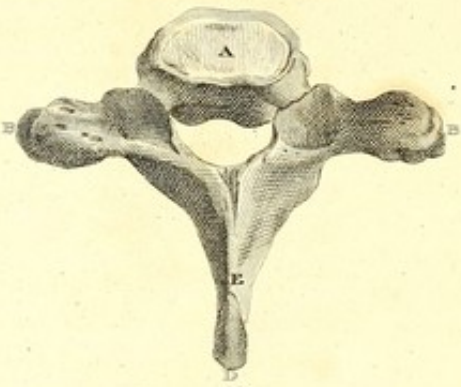

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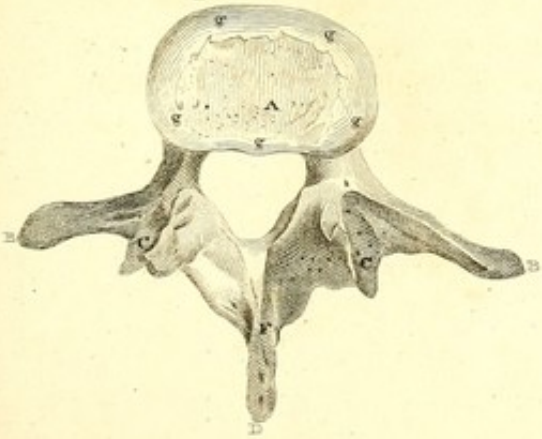

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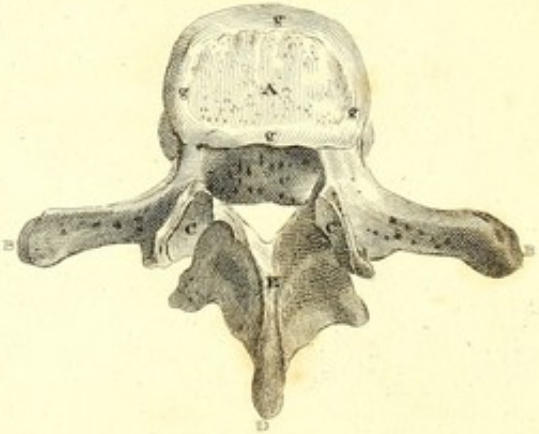


E. Mitchell sculp.

of animal exhibiting many and obvious diversities in these respects; diversities, indeed, that contribute much to facilitate zoological arrangements, though they rather tend to confound the anatomist in trying to discover general characters for distinguishing the different classes of vertebræ in different animals. Some characters, however, may be found; for not only in man, but in quadrupeds and birds, whatever may be the forms of their vertebræ, their relative magnitudes, or their number of processes, their cervical vertebræ seem to be distinguished by perforations in their lateral aspects for the transmission of vertebral arteries; their thoracic vertebræ by articular surfaces, either on their sides or their transverse processes, where they join with the ribs; and their lumbar vertebræ, by neither perforations on their lateral aspects, like the cervical vertebræ, nor articular surfaces, like the thoracic.

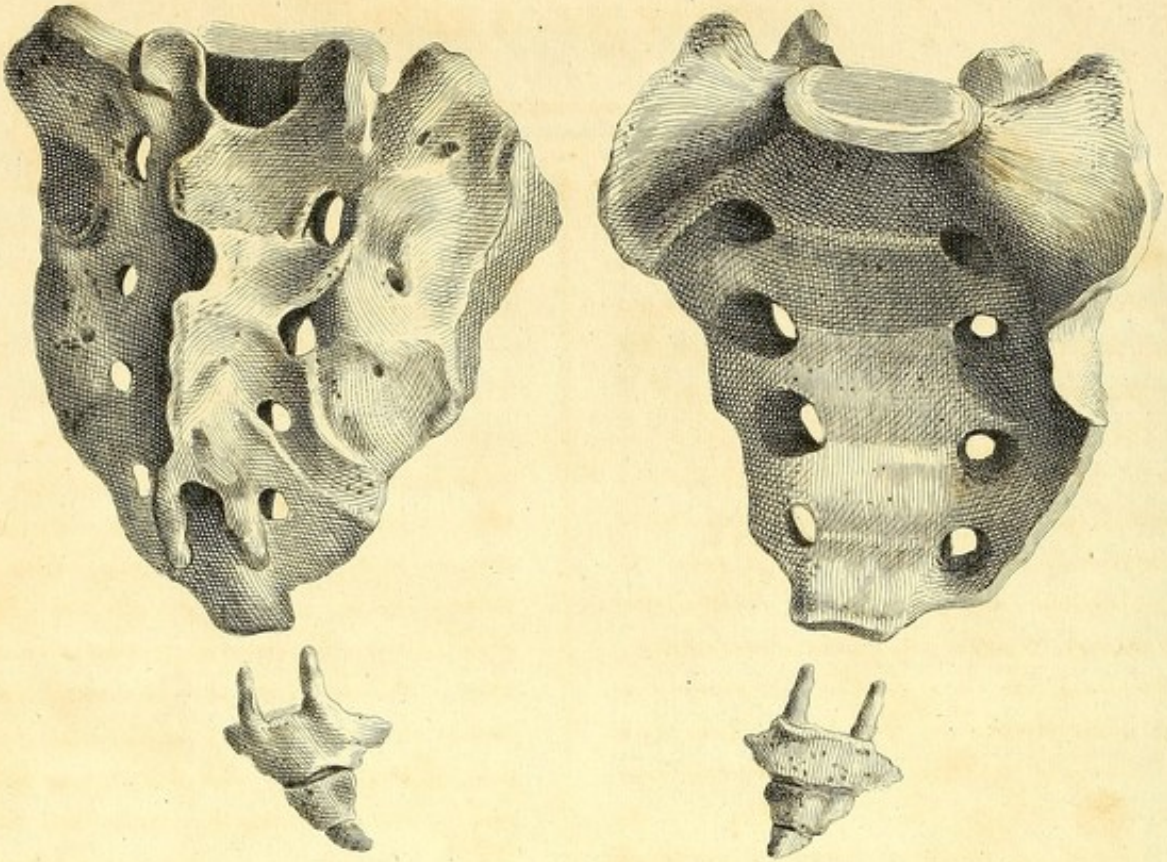
If some, occasionally, of the cervical vertebræ, towards the sacral extremity of the neck, be without perforations in their transverse processes, they may, notwithstanding, be easily distinguished from lumbar vertebræ by the small extent of lateral projection in their transverse processes. On the other hand, if the transverse processes of the lumbar vertebræ in the feathered tribes usually present articular surfaces from their connexion with the Ossa Ilia, that extend atlantad as high as the ribs, their articular surfaces are easily distinguished from those by which the thoracic vertebræ are joined with the ribs, and independent of form and magnitude, as easily distinguished from a few of the last thoracic vertebræ in cetaceous animals, that have the ribs articulated only with the extremities of their transverse processes.

Fig. 12 and 13. Two Views of a Lumbar Vertebra.

In this Vertebra may be seen, more distinctly than in the preceding, a sort of ring, gg, resting upon the body of the Vertebra, and to which the intervertebral ligament was attached. This ring is of a denser or closer texture than the substance of which the body is composed. In young animals it is easily separated by maceration in water, and at that period is what anatomists term an Epiphysis.

Within the ligament is found a mixture of ligament and cartilage, which, as it proceeds inwards to the centre, gradually passes into a sort of a glairy matter. From the nature of this intervening substance, the contiguous vertebræ reciprocally move upon one another with very little friction; and in order to contain it in the greater quantity, the atlantal and sacral aspects of the vertebræ present superficial or glenoid cavities. When this intervertebral substance is compressed, the bodies of the vertebræ approach nearer, and the length of the column is somewhat diminished: in man, who preserves it erect through the day, it is shorter in the evening than it is in the morning. But in old age, when the fluids that supply it become scanty, it decreases in bulk, and the bodies of the vertebræ approach so near, that the column not only becomes shorter, but is bent forward,—a circumstance usually remarked by anatomists. The same kind of articulation, though not followed by the like consequences, is carried much farther in the order of fishes, where a thinner fluid is contained between the vertebræ in two hollow cones, united at their base by means of an intervertebral ligament. These cones are formed in the bodies of the vertebræ; and each vertebra has therefore two cones, one in each of its opposite aspects, atlantad and sacrad. A ball and socket-joint of a different kind, less moveable, but certainly stronger, may be observed in the neck of the horse and

the vertebral columns of land serpents: the balls and the sockets are there formed entirely of bone; each vertebra exhibiting a ball on one of its aspects, and a socket on the other, to receive the ball of the vertebra that follows. A third kind of articulation, between two contiguous vertebræ, may be observed, between some of the last of the coccygeal, in the horse, the dog, and other quadrupeds, as well as in cetaceous animals. These vertebræ present to one another, convex surfaces, of which only a very small portion can be brought into contact at the same time.



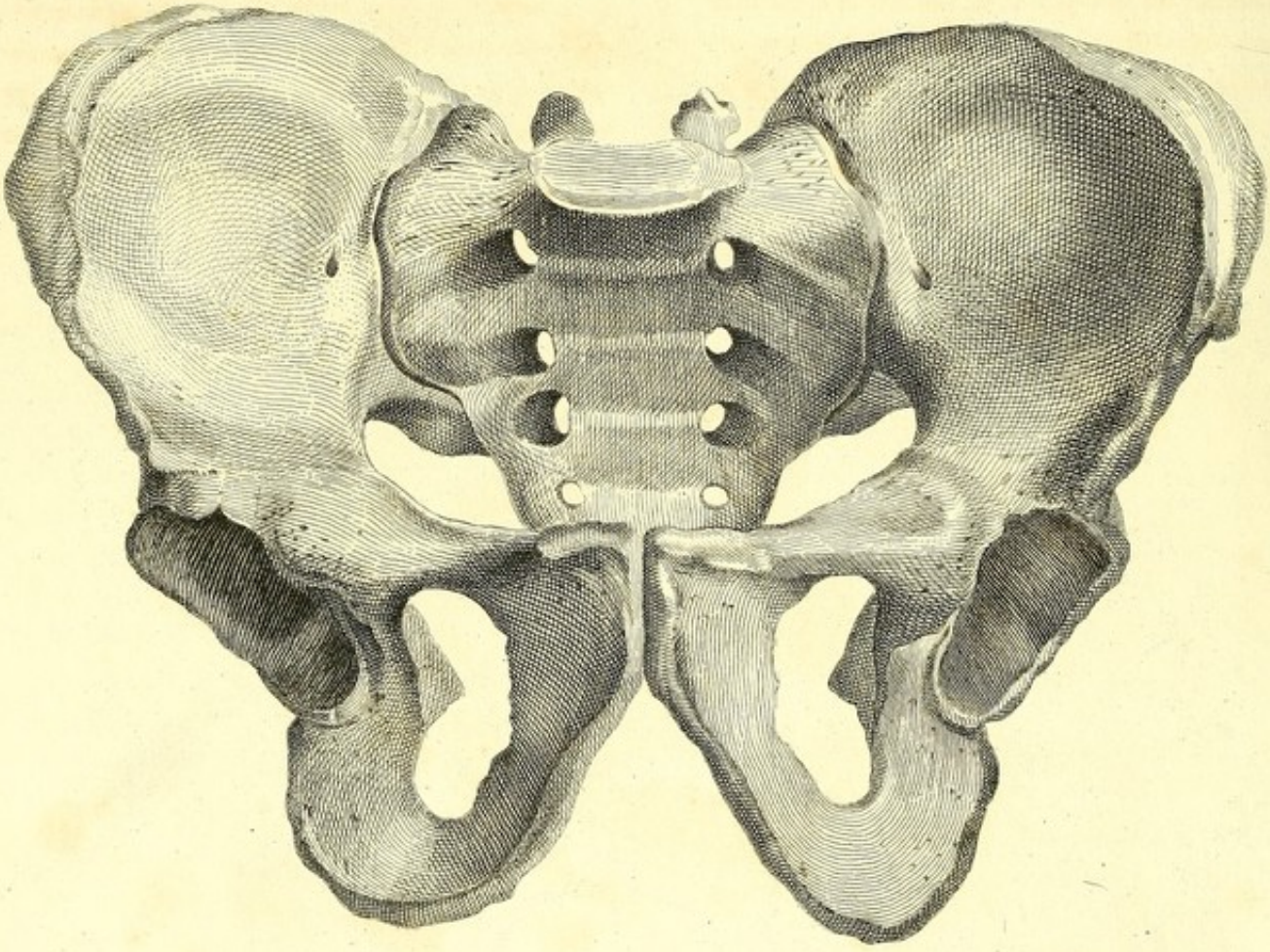


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PLATE XV.—From SUE.

This Plate presents nothing new of any importance, in addition to what has already been seen in connexion with the Trunk and the Vertebral Column. The view of the Pelvis, and the two views of the Os Sacrum, are exhibited only on a larger scale. The two small Figures representing the Sternal and Dorsal aspects of the Os Coccyx, consist here only of three bones, although the number be frequently four. In the human body, it narrows the lower aperture of the Pelvis, and thereby contributes to support the Viscera. In youth, it is pliable, in old age, rigid, and sometimes ossified through its whole extent, when those muscles, called Coccygeal, can have no effect in changing its position. Its Vertebræ are distinguished from those of the Column, by not being perforated for the transmission either of Nerves or of Spinal Marrow. In many, however, of the lower animals, a number of its Vertebræ towards the Os Sacrum have a passage for the Nerves of the Cauda Equina, and not only Spinous, but even Transverse and Articular processes, resembling those of the Lumbar Vertebræ. In these animals it is termed the Tail, and as that generally tapers to a point, those Vertebræ which resemble the Lumbar, differ from them also in one respect, that their bodies are narrower or of less diameter at one extremity than at the other, while the following Vertebræ, towards the Apex, are without perforations and articular processes.

In some animals, as for instance the Rat, and those which, in some Zoological arrangements, are termed Monkies, this Coccyx or Tail is longer than the Body, while, in others, it is found not proportionally longer than it is in Man; and in the Frog, wanting entirely. But its form and its length are not only various in various animals, but its uses almost as various as its forms. By some employed as a weapon of defence, to protect themselves against troublesome insects. By some as a hand to lay hold of objects, as Monkies employ it when suspending their bodies from the branches of trees. By Lizards and Serpents as a kind of pole, to assist in pushing their bodies forward. By Birds, as a rudder to regulate their motions upwards and downwards when flying in the air. By the Beaver, as a trowel in carrying and preparing mortar for his buildings. By the Kangaroo, as a kind of support when he is resting, and an instrument of motion when he is leaping.

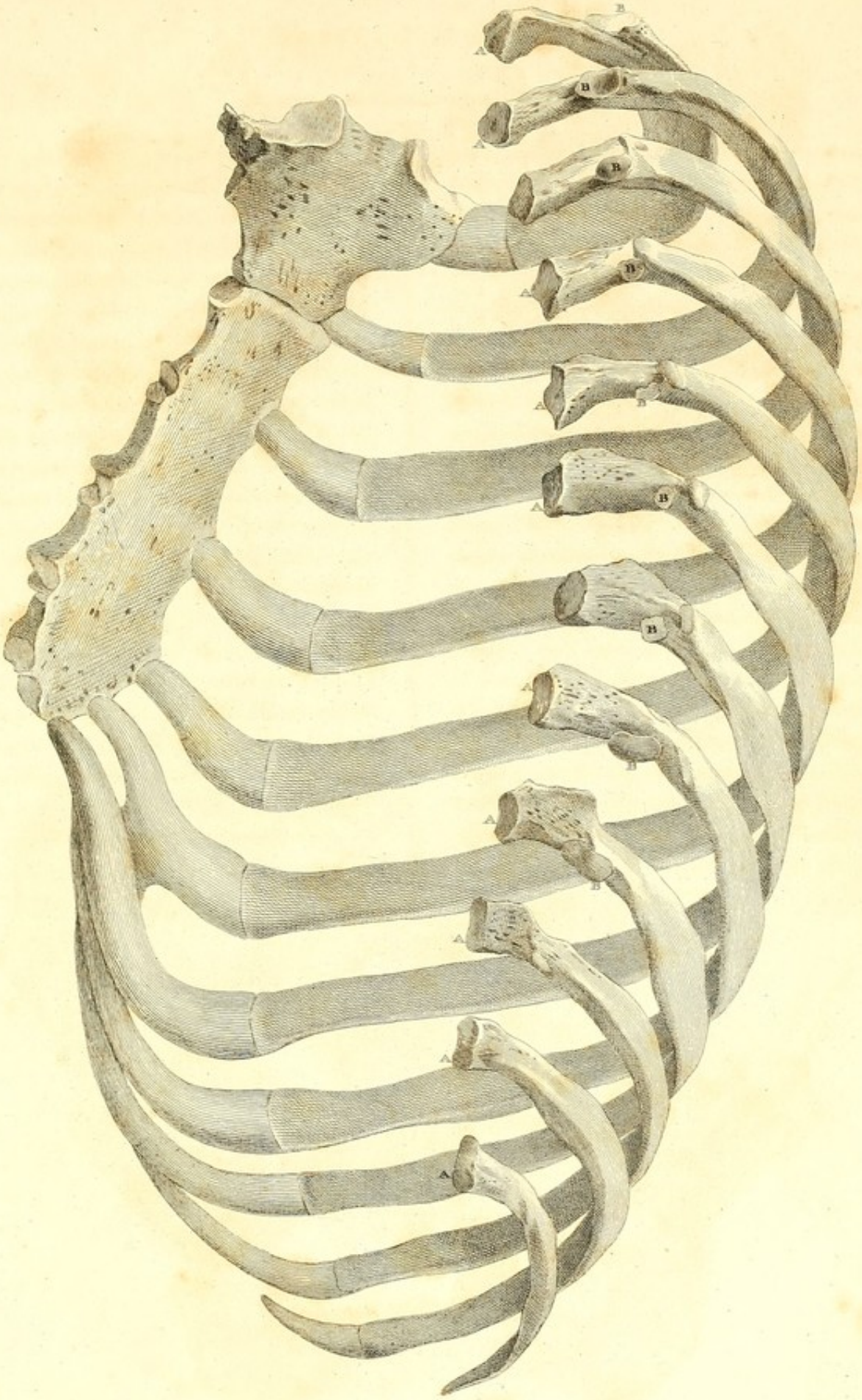
PLATE XVI.—From SUE.

This representation of the Ribs and Sternum, though well designed, and even well executed, has, notwithstanding, from the unavoidable imperfection of the art, fallen short of nature. All the Ribs have two sides, and also two edges or margins, but all the corresponding sides and margins have not, as in this Figure, the same aspects. The first Rib, from being more horizontal than the rest, has its edges pointing peripherad and centrad, or outwards and inwards, while its sides point atlantad and sacrad, or upwards and downwards. The second Rib is somewhat intermediate between the first and the rest that follow, which, instead of their edges, have their sides pointing peripherad and centrad, and their edges pointing atlantad and sacrad. The cartilages of the two last are isolated, not connected either with the rest, or the sternum.

All of them are more or less moveable on the Vertebral Column; and the most atlantal being the most fixed, the rest, during the time of inspiration, are rather drawn more towards them, than they towards the rest. The atlantal, besides, from being nearer, not only to the apex, but the axis of the Cone, it follows that the rest must necessarily be drawn in a direction atlantad and centrad, or upwards and inwards, which explains how the margins that point atlantad, are also observed to point a little centrad or inwards. From this compound motion, the Ribs are observed to roll a little on their Vertebral extremities, which rotatory motion being prevented at the opposite extremity by the Cartilages of the Sternum, several of the long Ribs in time become twisted, a twist which is increased by the differences of resistance which they have to encounter towards their extremities and that part of their Curvature where they happen not only to be more moveable, but where the muscles are enabled to act with the greater force, as possessing a more advantageous lever.

A Shows the Heads by which they were connected with the bodies of the Vertebræ

B The smaller Heads by which they were articulated with the Transverse processes. The space intermediate is termed their Cervix, while the place where they exhibit a sudden or rapid change in their Curvature, is termed their Angle.



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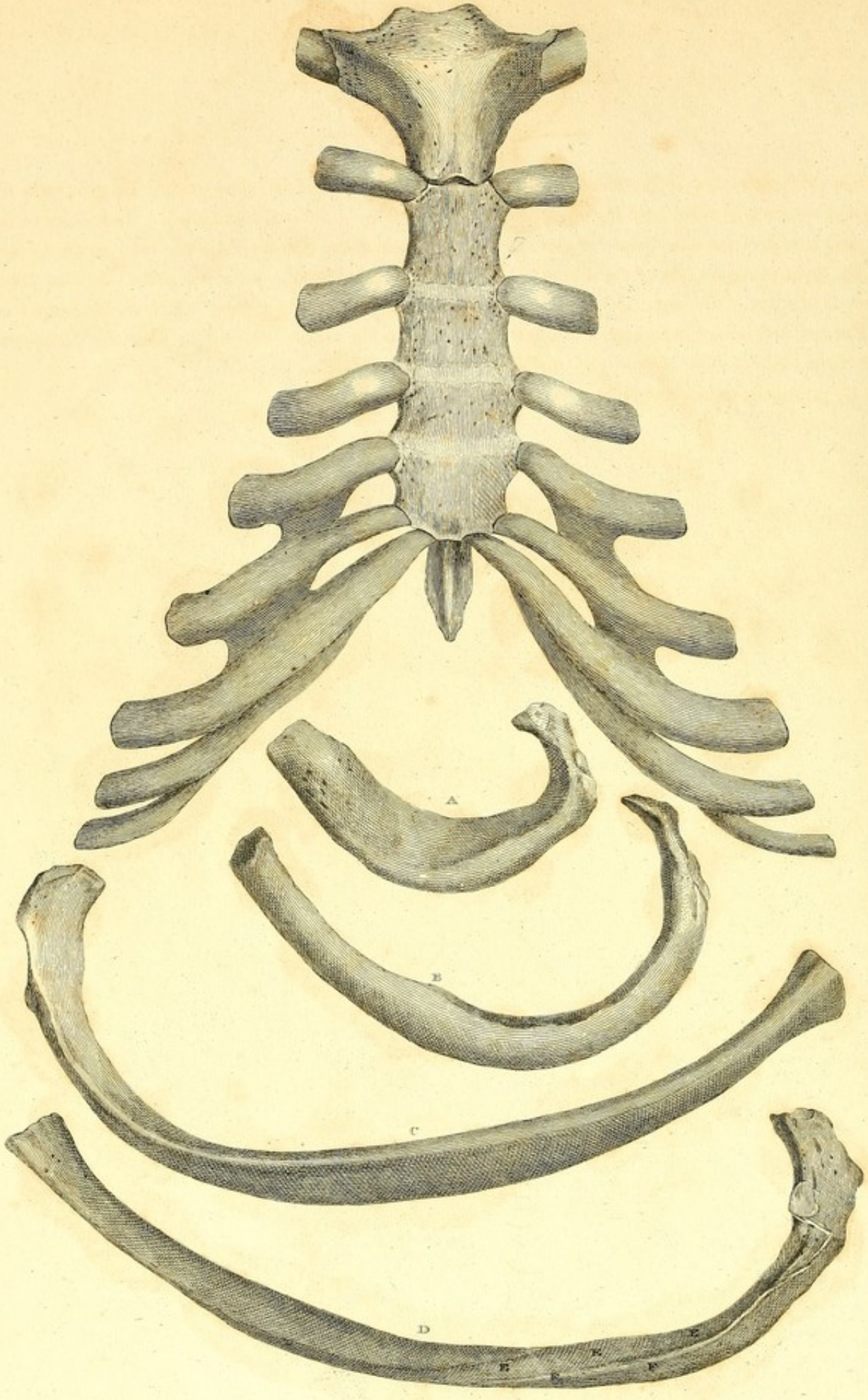

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PLATE XVII.—From SUE.

This Plate exhibits a view of the Sternum, of the Cartilages of all the true Ribs, with the Cartilages of the first and second of the false Ribs. A view, likewise of the first and second Rib of the left Side, and two views of the last of the true Ribs on the right Side. The first and second Rib, marked A and B, are seen from above. The last of the true Ribs, marked C, principally from without, or from its convex side; and the same marked D, principally from within, or from its concave side. In both views there is an attempt to represent the twist mentioned in the references to the preceding plate. And in Rib D, may be seen the Groove EEE, on its concave side, near the Sacral Margin FF, where lay the intercostal artery and nerve.

A

SERIES

OF

ENGRAVINGS,

REPRESENTING

THE BONES

OF

THE HUMAN SKELETON;

WITH THE

Skeletons of some of the Lower Animals.

By EDWARD MITCHELL, Engraver, Edinburgh.

THE

EXPLANATORY REFERENCES

By JOHN BARCLAY, M. D.

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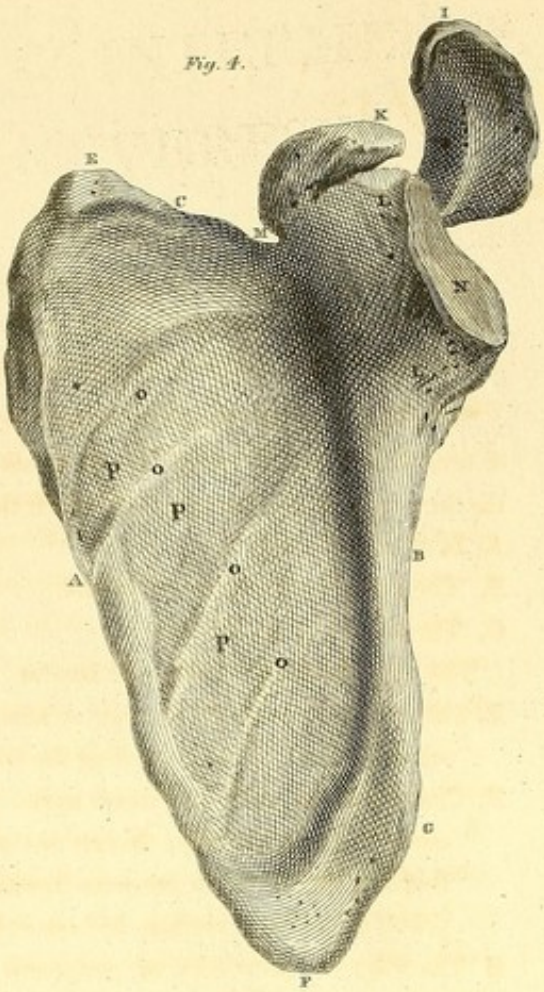
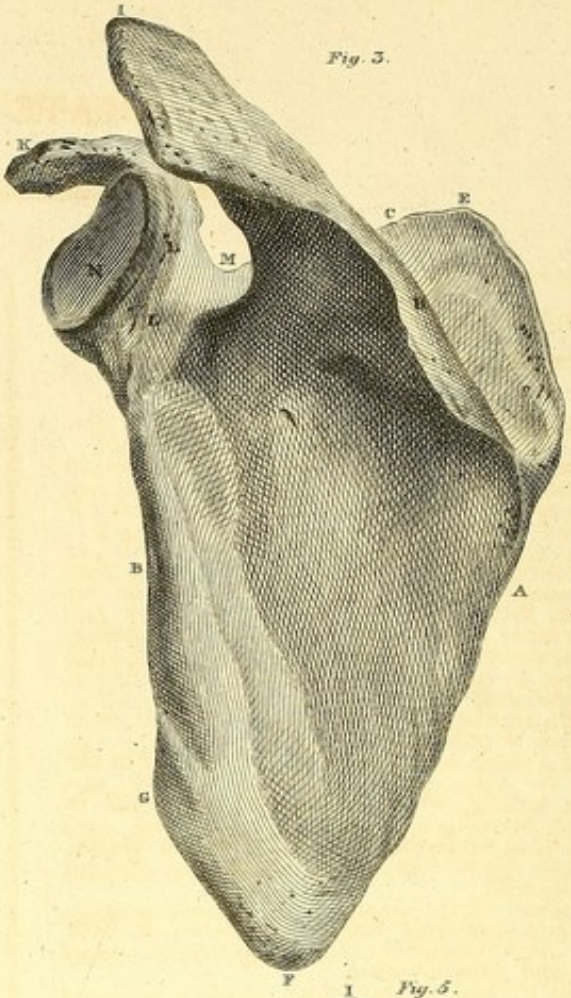
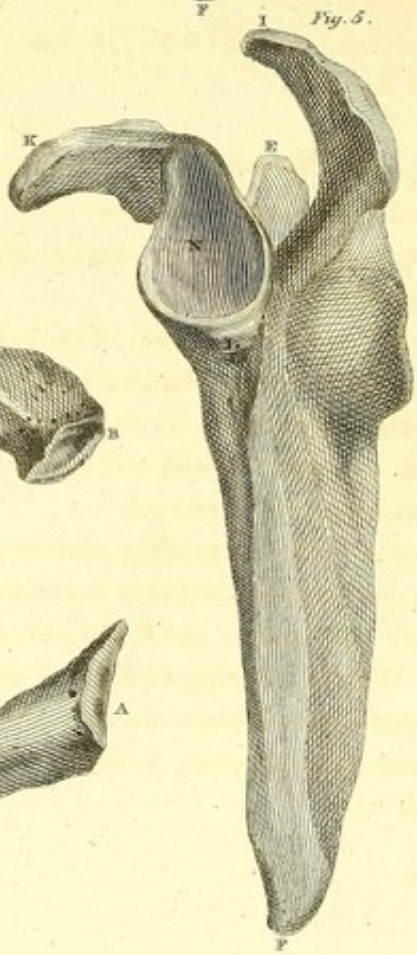
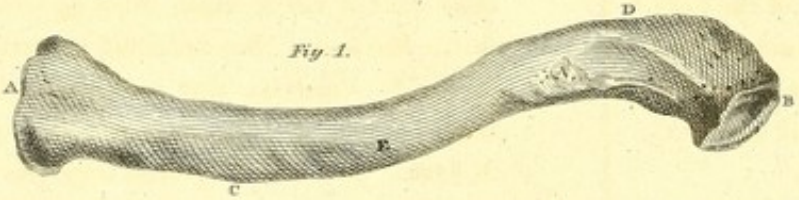








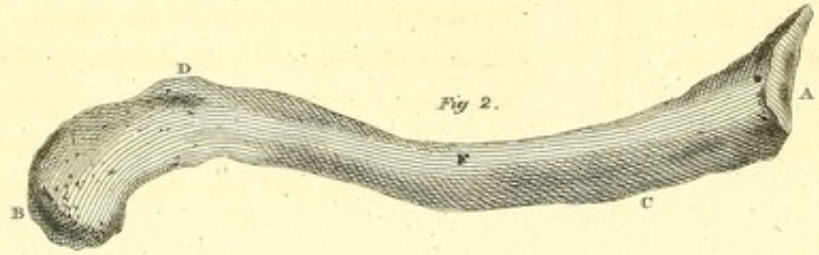


PLATE XVIII.

FIG. 1, 2.

VIEWS OF THE LEFT CLAVICLE.

The clavicles are bones which stretch between the sternum and scapulæ. Such bones are regularly found in the human species, in all birds, and in those quadrupeds which extend their atlantal extremities laterally, or which can employ them in some measure as we do our hands. In other quadrupeds they are either wanting, or their place is occupied by something appearing in the form of a cartilage, in the form of a ligament, or in the form of a small bone imbedded transversely in the body of a muscle, which corresponds somewhat in function to what we denominate, in the human species, the *Cleidomastoid.*

Fig. 1. Is a view from before and above, or from the sternal and atlantal aspect.

Fig. 2. A view from before and below, or from the sternal and sacral aspect.

A, The extremity connected with the sternum is somewhat rounded in the form of a cylinder

B, The extremity connected with the scapula, considerably flattened.

As the whole has somewhat the form of an italic *S*, bending alternately forward and backward, or sternad and dorsad, the first curvature, C, in proceeding from the sternum, is convex forward, and the next, D, towards the scapula, convex backward.

Of the two aspects,—the one pointing atlantad or upward, and the other pointing sacrad or downward,—E, the first, is a little convex, and F, the second, a little concave. Without attending to this last distinction, which cannot be well seen in the engravings, the left clavicle may not unfrequently be mistaken for the right, and *vice versa.*

FIG. 3. 4. and 5.

VIEWS OF THE SCAPULA OF THE LEFT SIDE.

The scapula, when viewed from either the peripheral or central aspect, as in figures 3, and 4, has somewhat the form of a scalene triangle. Of which the side,

A, Is termed the base.

B, The superior or atlantal costa, and

C, The inferior or sacral costa.

The superior costa, meeting the base at

E, forms what is called the superior or atlantal angle; while the inferior costa, meeting the same at

F, Constitutes the inferior or sacral angle. This last costa is very generally, though not always, inflected a little from its previous direction at the point, G, before it reaches the base at F.

H The ridge on the convex or peripheral aspect of the scapula, which is named its spine.

I, The termination of that ridge at the extremity farthest from the base, is what has been called the acromion process, or simply the acromion, a word of Greek origin, which literally signifies the top of the shoulder.

K indicates the process which is named coracoid, another word of Greek origin, implying something that is like a crow, but restricted by anatomists to signify something that resembles only the beak of a crow, and the beak of a crow only in its form. This coracoid process originates in

L, the part which is termed the head of the scapula,

M, The supra-scapular notch, forming a part of what is called the neck or cervix of the scapula. This notch is destined for the transmission of an artery and nerve; in the recent subject, a ligament is observed extending across it, affording support to the parts above, and protection to the parts be-

neath; Sometimes the ligament is converted into bone, when, instead of a notch, we observe a perforation; Sometimes, again, the superior costa converges so gradually towards the base of the coracoid process, that we observe neither a notch nor a perforation.

N The superficial cavity in the head of the scapula, which anatomists have chosen to denominate the glenoid or the eyelike cavity. It is destined to receive the head of the humerus, and, in the human species, is always of an ovate form, an appearance which is best seen in Fig. 5.

The ridges and depressions marked o. p. are owing partly to the actions of the *subscapular muscle.* Similar appearances, but not so conspicuous, may sometimes be seen on the opposite aspect, occasioned by the muscle called the *infraspinatus.* In aged individuals, the bone in some places becomes so thin between these muscles, as to be diaphanous; and even some scapulæ exhibit perforations, where the osseous matter had been quite absorbed, and nothing left interposed between the muscles except the periosteum.

Fig. 5. A view from the head towards the base, and from the sacral towards the atlantal costa.

Though the scapulæ of quadrupeds, like the human scapulæ, be generally of a triangular form, yet that form exhibits varieties in different genera, and furnishes a number of distinctive characters of use to the naturalist; besides, though these scapulæ have all a spine, yet many of them want a coracoid process, and an acromion. The spine, at the same time, has different directions in different genera, and exhibits in some, as for instance in the elephant, peculiar processes. The scapula of the ursus meles, or badger, is among the few exceptions to the triangular form; it is nearly quadrangular, and its spine is observed extending diagonally, from corner to corner.

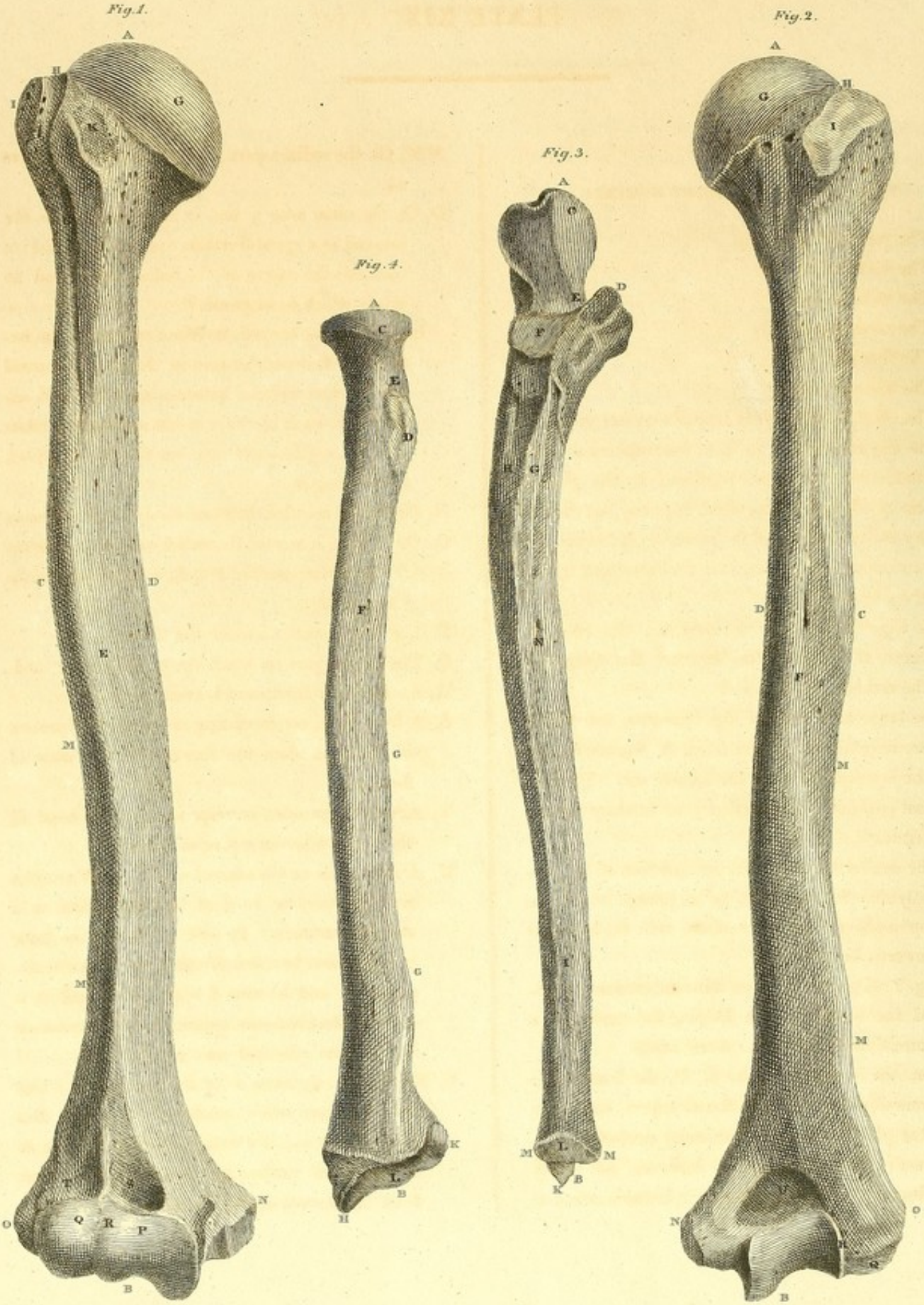


Fig.1.
Fig.2.
Fig.3.
Fig.4.

PLATE XIX.

FIG. 1, 2.

TWO VIEWS OF THE RIGHT HUMERUS.

A, The proximal extremity.

B, The distal extremity.

C, The radial aspect.

D, The ulnar aspect.

E, The thenal aspect.

F, The anconal aspect.

G, The head, exhibiting the articular surface presented to the scapula, is in form hemi-spherical; and therefore its shape not regulated by the glenoid cavity of the scapula, which is ovate, but defined by the extremities of the coracoid process and the acromion, which enter into the formation of the shoulder joint.

H, A slight depression, denominated the neck or cervix of the humerus, between the margin of the articular surface, and

I, The larger tuberosity of the humerus, into which are inserted the muscles called the *supraspinatus*, the *infraspinatus* and the *teres minor*. The two last confined almost entirely to rotatory motion outwards, or radiad.

K, The smaller tuberosity for the insertion of the *subscapular muscle*, which, as an antagonist of the *infraspinatus* and *teres minor*, rolls the humerus inwards, or ulnad.

L, Fig. 1, A groove between these tuberosities, termed the bicipital, from lodging the tendon of a muscle called the *biceps flexor cubiti*.

From the head or neck, to C, D, the humerus is somewhat convex on its thenal aspect, and from that point to its distal extremity somewhat concave: these appearances, however, not easily observed in the Engravings: it is also concave at

MM, On the radial aspect: this concavity commences at

D, On the ulnar aspect, and is continued across the anconal in a spiral direction towards the radial: it indicates the course of the radial nerve, and an artery which accompanies it.

In approaching towards its distal extremity, the humerus is flattened between its thenal and anconal aspects, and widened between its radial and ulnar. On each of the two last aspects it exhibits a ridge or spine—the one on the ulnar aspect, terminating in

N, Or in what is called the ulnar condyle—the other in

O, Or in what is termed the radial condyle. The articular surface marked P Q R, is named the trochlea or pulley;

P, The hollow part on which the ulna moves;

Q, The convex part on which the radius moves; and

R, An eminence interposed between them.

S, A depression, corresponding to the coronoid process of the ulna when the fore arm is in a state of flexion.

T, Another depression corresponding to the head of the radius when in a state of flexion.

U, A depression on the anconal aspect, which receives the olecranon or head of the ulna, when in a state of extension. In man frequently the bone is diaphanous between this and the opposite depressions, and in some few the osseous matter is entirely absorbed—an appearance not uncommon in the feline tribe and some other animals.

V, Fig. 2. The appearance of the passage by which the medullary artery penetrates the bone: But I have never seen the artery entering so near to the proximal extremity, nor entering, as here, from the anconal aspect: it most commonly en-

ters from the thenal aspect, and nearly the situation of V, Fig. 1.

FIG. 3.

Is a view of the ulna of the right side from the thenal aspect. The term ulna is derived from the Greek word ωλενη, which signifies the arm, hence Λευκωλενος Ηρα, the white armed Juno. It was used by the Romans to signify a measure equal to an arm's length, and hence the English word ell: With anatomists it signifies that bone of the fore arm which is on the same side with the little finger. At its proximal extremity, A, is the process.

C, Termed the olecranon, the ωλενης κρανον, or head of the ulna in which the anconei, or extensor muscles of the αγκων, or elbow joint, are inserted. At

D is seen the coronoid process, in which the *brachieus internus*, a flexor muscle of the joint, is inserted. Between the extremities of these two processes is the sigmoid, or semilunar cavity,

E, exhibiting an articular surface, corresponding to the ulnar part of the trochlea which is seen in the humerus. At

F, Another articular cavity, in which the head of the radius rolled. Beyond these processes and articular surfaces, the bone for a while presents three sides, one of which, on the thenal aspect,

G, which is concave, on meeting with another, marked

H, which is convex, form between them an acute salient angle on the radial aspect, for the attachment of what is termed the interosseous ligament. Towards the distal extremity, at

I, The bone assumes more of the cylindrical form, and terminates ultimately in the slyliform process

K, and the transverse articular surface

L.

From the process K, a ligament extends to two bones of the carpus, the *cuneiform* and *pisiform*; but as the ulna itself does not reach to any bone of the carpus, a moveable cartilage is interposed between its transverse articular surface and the cuneiform bone. Another articular surface of an annular form, and surrounding the edge of the transverse surface, is imperfectly seen at

MM. This surface corresponds to a lateral cavity of the radius at K, where the ulna at times rolls upon the radius: not that the ulna has any rotatory motion of its own, but is forced to roll along with the humerus.

The letter N shews the passage by which the medullary artery enters the bone. The course of this artery, and the corresponding arteries of the radius, is recurrent, while the course of the medullary artery in the humerus is progressive. This difference, in the course of these arteries, has never been satisfactorily explained; and what adds to the difficulty of the explanation is, that the course is different in the corresponding bones of the atlantal and sacral extremities: In the humerus progressive, in the femur recurrent, in the radius and ulna recurrent, and in the tibia and fibula progressive. It, indeed, has been observed that, in a standing or a sitting posture, the position of the humerus, tibia and fibula, where the course is progressive, is somewhat perpendicular to the horizon, while that of the femur, radius and ulna, where the course is recurrent, is rather more in a parallel direction. But these temporary positions will not account for the course of the arteries, as that course had

received its direction before we were born, and before we were capable of sitting or standing. If the course, therefore, is to be referred to any positions, it should be to those which the bones had while they were in utero. As a means of remembering the particular course in these several bones, it may be observed, that it is progressive in the three bones which are inflected dorsad, or backwards, and recurrent in the three which are inflected sternad, or forwards. Aristotle, I think, was the first who remarked that, beginning from the trunk, the successive inflections of the bones which correspond in the atlantal and sacral extremities are in opposite directions, the humerus bending backwards, the femur forwards, the radius and ulna forwards, and the tibia and fibula backwards, and that inflections in the same extremity are found to be alternately backwards and forwards, or forwards and backwards. Comparative anatomy, so far as I know, has not been consulted to any extent with a view to throw light upon the course of these medullary arteries. So far as my inquiries have led me, I have met with nothing on which reason or judgment can repose with confidence. In referring it to a position of the bones while they were in utero, I naturally thought of the veins and arteries which are ramified on the testicles, and which have their origin as high as the kidnies, where the testicles had lain previous to birth.

FIG. 4.

A view of the radius of the left side from the thenal aspect. As the joint of the elbow owes more of its security to the ulna than to the radius, and the joint of the carpus more of its security to the radius than to the ulna, the ulna is observed to decrease gradually, and the radius to increase in its dimensions as they approach towards the carpus. The fore arm, therefore, throughout its extent, is nearly every where of an equal strength. Where the ulna has three sides, the radius is of a cylindrical form, and where the ulna becomes cylindrical, the part of the radius which is opposite to it becomes triangular.

In all birds, and in several quadrupeds, the radius is the smaller bone of the fore arm; yet, in all, it extends from the humerus to the carpus, while the ulna, in many species of quadrupeds, is not above half the length of the radius, and in some adheres to it merely as a process.

A, The proximal extremity of the radius. B, The distal. C, An annular articular surface which rolled in the lateral cavity of the ulna at F. The concave articular surface, corresponding to the convex trochlea of the humerus, is not seen. D, The tuberosity into which the tendon of the *biceps flexor cubiti* is inserted, a muscle which is not only a flexor of the elbow joint, but a supinator of the carpus, and an extensor of the humerus. E, Shows a space between the tuberosity D and the proximal extremity A, which is termed the cervix or neck of the radius. F, Shows the course of the medullary artery; and GG, the acute angle formed by two of the sides, and to which the interosseous ligament is attached. H, The styliform process, from which a ligament extends to the carpus. I, The articular surface, corresponding to the os scaphoides, and the os lunare of the carpus. K, An articular cavity corresponding to the annular articular surface of the ulna at MM.

PLATE XIX.—*Continued.*

At the distal extremity, and upon the anconal aspect of the radius, are several eminences and depressions which are not observable in this view from the thenal aspect. On the radial side of the anconal aspect is a depression for lodging the tendons of *the first and second extensors* of the thumb; ulnad of that, another depression for the tendons of the two *extensores carpi radiales;* ulnad of that again, a small eminence with a depression on its apex for the third *extensor* of the thumb; and, lastly, a fourth depression ulnad of the last, for the tendons of the *extensor communis digitorum manus.*

BONES OF THE CARPUS.

Scapheides. *Lunare.* *Cuneiforme.* *et Pisiforme.*

Trapezium. *Trapezeides.* *Os Magnum.* *et Unciforme.*

Fig. 1.

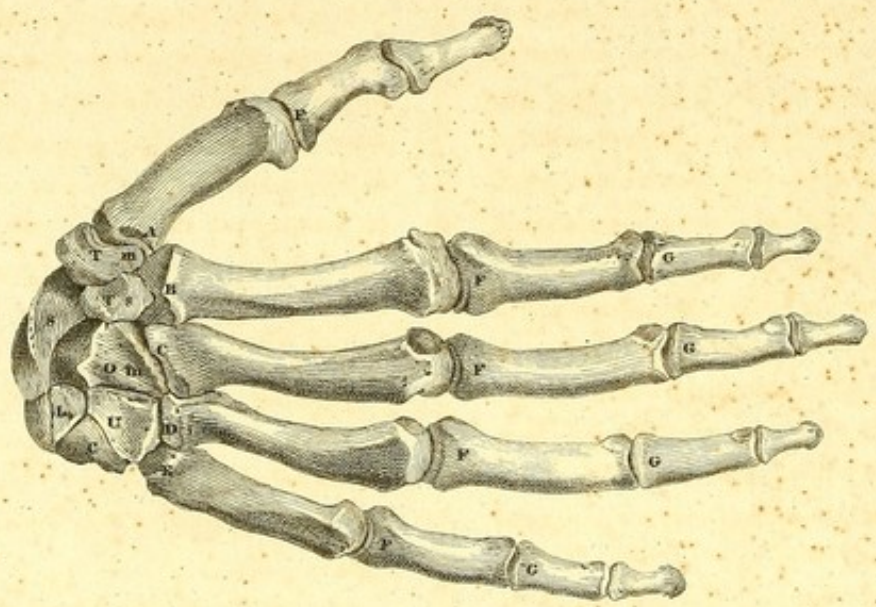


Fig. 2.

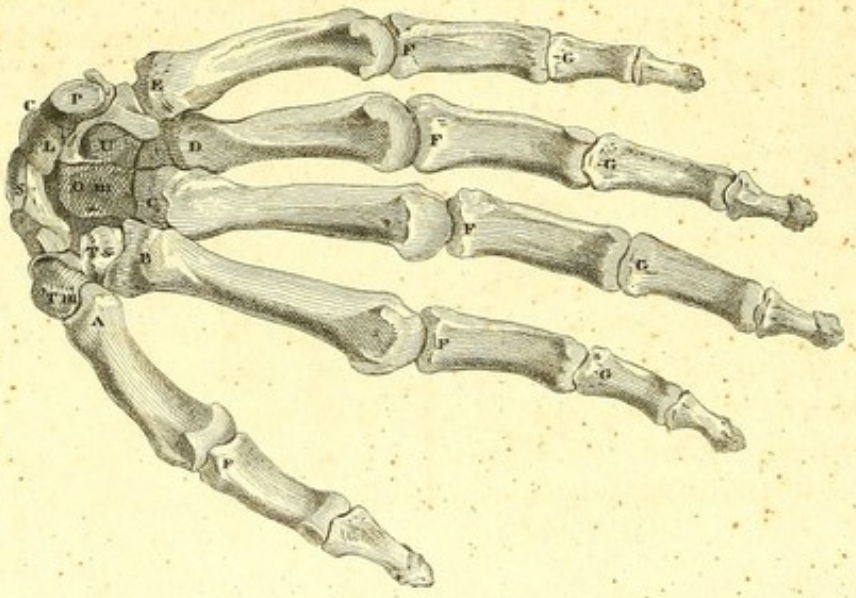


PLATE XX.

BONES OF THE CARPUS.

The carpus consists of a number of bones in two rows, each row in the human species consisting of four. Such a cluster of bones in man, and in quadrupeds of the larger size, is always found in connexion with the distal extremity of the radius; while in those animals that walk upon tiptoe, as the horse, the cow, the sheep, and the goat, it forms what is called the knee of the fore leg. To hazard a conjecture concerning the use of this cluster of bones, besides other uses mentioned by anatomists, it appears to be of essential service in diffusing the forces of pressure and percussion. Thus the force which impels a nail into a board, when its impulse is concentrated into a point, would have little effect upon the object against which it is aimed, were a substance or substances to be interposed, that by bulk, number, or elasticity, would rapidly diffuse it in a variety of lateral directions. Such is one of the important offices which the bones of the carpus seem to perform to the parts which are situated proximad and distad. For, if we attend either to their forms, or to the manner in which they are articulated, in the human hand, we shall find, that seldom can any force, ascending from the fingers, or descending from the radius, fall perpendicularly on any of their surfaces; embedded amidst elastic substances, receiving the impulse in a slanting direction, and yielding at the time that they receive it, they transfer it readily, without suffering an injury themselves, and without occasioning an injury to those with which they are connected, the bones in connexion being equally adapted to meet and diffuse a concentrated shock with the like safety and the like facility. Yet though such a cluster of bones may be requisite at the distal extremities of the radius and tibia, in the larger animals that walk on land, or that swim in water, where shocks are transmitted between heavy bodies and dense elements, which are not elastic,—it does not appear to be equally requisite in the feathered tribes, whose wings, in flying, receive the shock only from the soft and elastic air, while the natural lightness and buoyancy of their bodies may serve to explain why a single bone in their sacral extremities may answer all the purposes of a tarsus. A still greater lightness of body appears to supersede the use of a carpus and tarsus in insects, I mean here a carpus and tarsus in the sense of the anatomist, and not in the sense of the entomologist. The like reasoning, if we reflect on the habits of the animal, may serve to account for the numerous bones in the carpus of a mole, and also to explain why so few bones are to be found in the tarsus of a frog, compared with the number of bones in its carpus; the tarsus in this species of animal being the part which communicates the impulse, and the carpus one of the parts which receives it, not only when the animal springs to the leap, but when it alights from it.

Another way of diffusing the shock of concentrated forces, when it passes along the arm or the leg, is observable in the motions of the long bones. When a shock of this kind reaches the radius, after passing through the carpus, the radius instantly moves on the humerus, the humerus on the scapula, and the scapula upon the side of the trunk; each of these bones being found ready to move on the next, and the next to move upon the succeeding; while the succeeding, acting as a fulcrum to the one which precedes, is at the time moving on a fulcrum, which, as well as itself, is moving in a curve. Hence no force, in proceeding along the line of the extremities, can arrive at the trunk without altering its course at each articulation, and without passing through a number of curves; nor even when

it reaches the scapula or pelvis, can it enter the trunk without passing off, at nearly right angles, to what was the last of the numerous lines of its previous direction. Every person in the least acquainted with comparative anatomy must know, that when all the muscles are present, he can neither bend nor extend a joint in the wing of a bird, nor in the leg of a bird or a quadruped, without instantly bending or extending nearly all the rest at the same time. And hence it is, that animals, when alive, may fall from a height without an injury, where machines of their form, bulk, and weight, though constructed of iron, would be dashed to pieces.

In other cases, where the effects of pressure and percussion cannot be so easily or readily diffused, the mechanism of the animal structure to resist them appears to be not less ingenious and wonderful. In viewing the entire skeleton of an animal, in relation to the circumstances in which it had previously been destined to live, we find that all the parts are protected, not only in proportion to their vital importance, but in proportion also to the risk to which they are exposed; and that therefore all bones, in order to resist pressure and percussion, which come in a direction not to be readily or easily diffused, are observed to be generally convex on the aspect from which the shock was most likely to arrive. Besides, being either porous or hollow, they have increase of bulk without increase of weight, the requisite strength without being clumsy, and the requisite lightness without being feeble; a remark, I believe, for which anatomists were first indebted to the celebrated Galileo. In short, the mechanism of an animal body is not less wonderful than those admirable displays of wisdom by which its chemical processes are conducted, —displays which the ablest of our modern chemists are so far from being able to imitate, that there is not any who has yet been endowed with sufficient intelligence to comprehend them.

It was originally the practice with anatomists to distinguish the bones of the carpus by numbers,—a practice which, had they always agreed to commence their enumeration from the same bone, and to continue it in the same order, would have been attended with little inconveniency. But as that was not the case, Lyserus, an eminent practical anatomist, a native of Leipsic, and a pupil of Bartholin, who has written an excellent treatise on the art of dissection, invented the names by which they are now generally known. These names are in Latin; and, when made to form that rude verse which is seen accompanying the figures in the plate, may be easily remembered as well as the order in which they are enumerated. Lyserus, it appears, also intended that these names should be descriptive, but the description of a complicated form is not easily expressed in a single word; and besides, the ideas which he meant to communicate are conveyed by comparison, and by a comparison between objects where the analogy is extremely imperfect. The first bone of the proximal row, commencing from the radial aspect, he termed *scaphoides*, from its having some fancied resemblance to a boat. It has a concave articular surface on one side, and a convex articular surface on the opposite, the last surface divided longitudinally, though somewhat obliquely, by a scabrous line, supposed to represent the keel of a vessel.—The second he termed the *os lunare*, from its supposed resemblance to a crescent. It has a concave articular surface on one side, and a convex articular surface on the opposite; and when held to the eye, with the horns of the crescent towards right and left, it appears to have somewhat the figure of the moon in

her first quarter.—The third bone in this row he termed *cuneiforme*, or wedgelike bone, from its being impacted between the *lunare*, and one of the bones of the distal row called the *os unciforme*. It is known from the other bones of the carpus by two articular surfaces meeting at less than a right angle, and by a third articular surface lying in a plane at right angles to the other two, but not coming into contact with either.—The last bone of this row is the *os pisiforme*, and so named from its being in general about the size of a pea. It has only one articular surface.

The first bone of the second or the distal row, commencing also from the radial aspect, he termed *trapezium*, though it will be difficult to discover a resemblance between its form and that of the figure to which it is compared. It has three articular surfaces; two of them meet at an obtuse angle; the third, which is not in contact with either, is concave and oblong, but protuberant in the middle between side and side.—The second bone of this row is the *os trapezoides*, a name also implying an analogy between its form and that of the trapezium, an analogy which certainly has been imagined, but surely cannot be easily seen. This bone has four converging articular surfaces, extending between two scabrous surfaces, which, if not parallel, are nearly so. Sue calls it the pyramidal bone, and it certainly is more like to an obtruncated pyramid than to a trapezium.—The third bone of this row is the *os magnum*, from being the largest bone of the carpus. It is easily distinguished from all the rest by having a rounded articular head, resembling the distal articular extremities of the metacarpals.—The fourth bone of this row is the *os unciforme*, so named from a hooklike process, which forms a well marked character of distinction.—In this account of the bones of the carpus, I have purposely declined making any reference to the engravings, as they do not represent the different characters to which I have alluded.

The whole of these bones are seen in connexion in the two figures representing the hand of the right side. The first a view from the anconal, and the second from the thenal aspect. In these figures the *trapezium* is marked T. m., the *trapezoides* T. s., and the *os magnum* O. m. The rest are distinguished by merely the initials of their names. The *os pisiforme*, which cannot be seen from the anconal aspect in fig. 1. is seen from the thenal in fig. 2. and is marked P. The manner in which each is articulated, will serve to explain how much they are calculated to diffuse any concentrated force.

The scaphoides is articulated with the radius, the trapezium, the trapezoides, the os magnum, and the os lunare.

The os lunare with the radius, the scaphoides, the os magnum, and the os cuneiforme.

The os cuneiforme with the os lunare, the os magnum, the os unciforme, and the os pisiforme.

The os pisiforme with the os cuneiforme.

The trapezium with the os scaphoides, the os trapezoides, and the metacarpal bones of the thumb and forefinger.

The trapezoides with the trapezium, the scaphoides, the os magnum, and the metacarpal bone of the fore finger.

The os magnum with the os scaphoides, the os lunare, the os trapezoides, the os cuneiforme, the os unciforme, and the metacarpal bone of the middle finger.

The os unciforme with the os magnum, the os cuneiforme, and the metacarpal bones of the ring finger and the little finger.

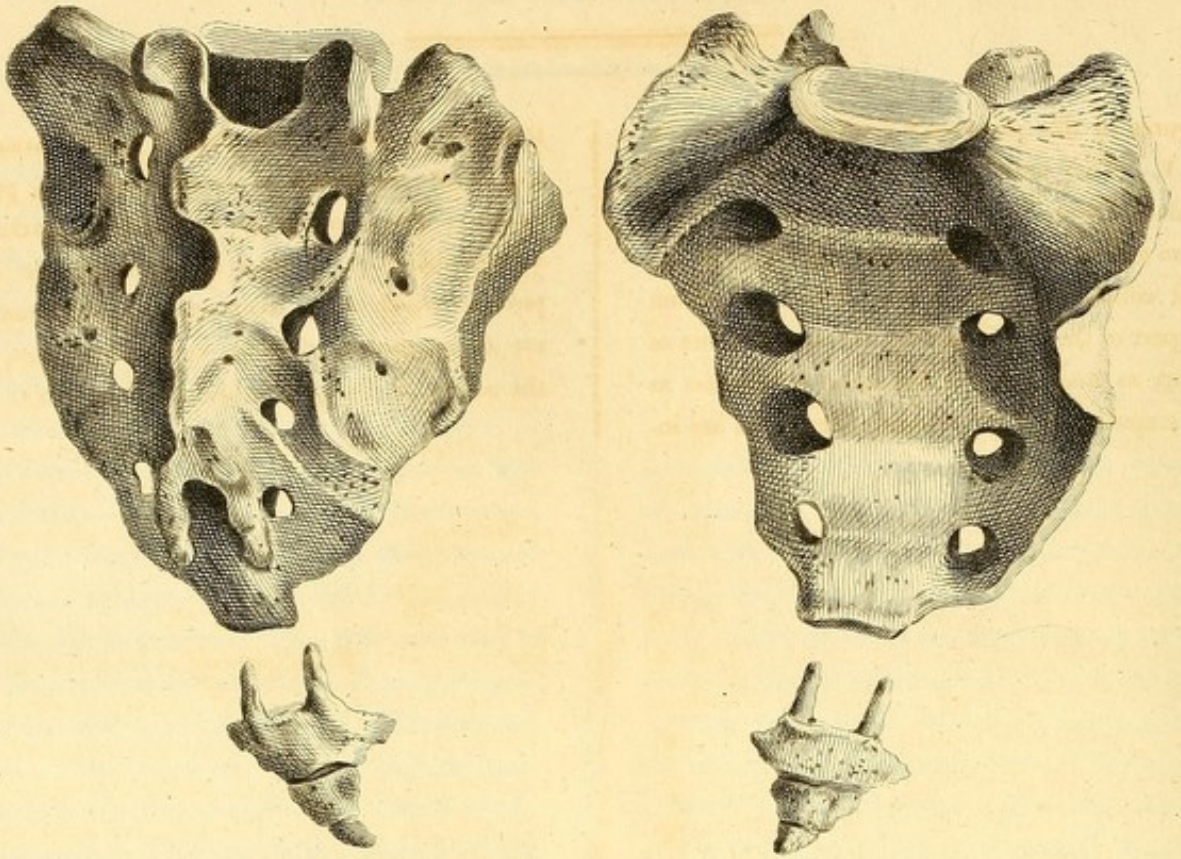
PLATE XX.—*Continued.*

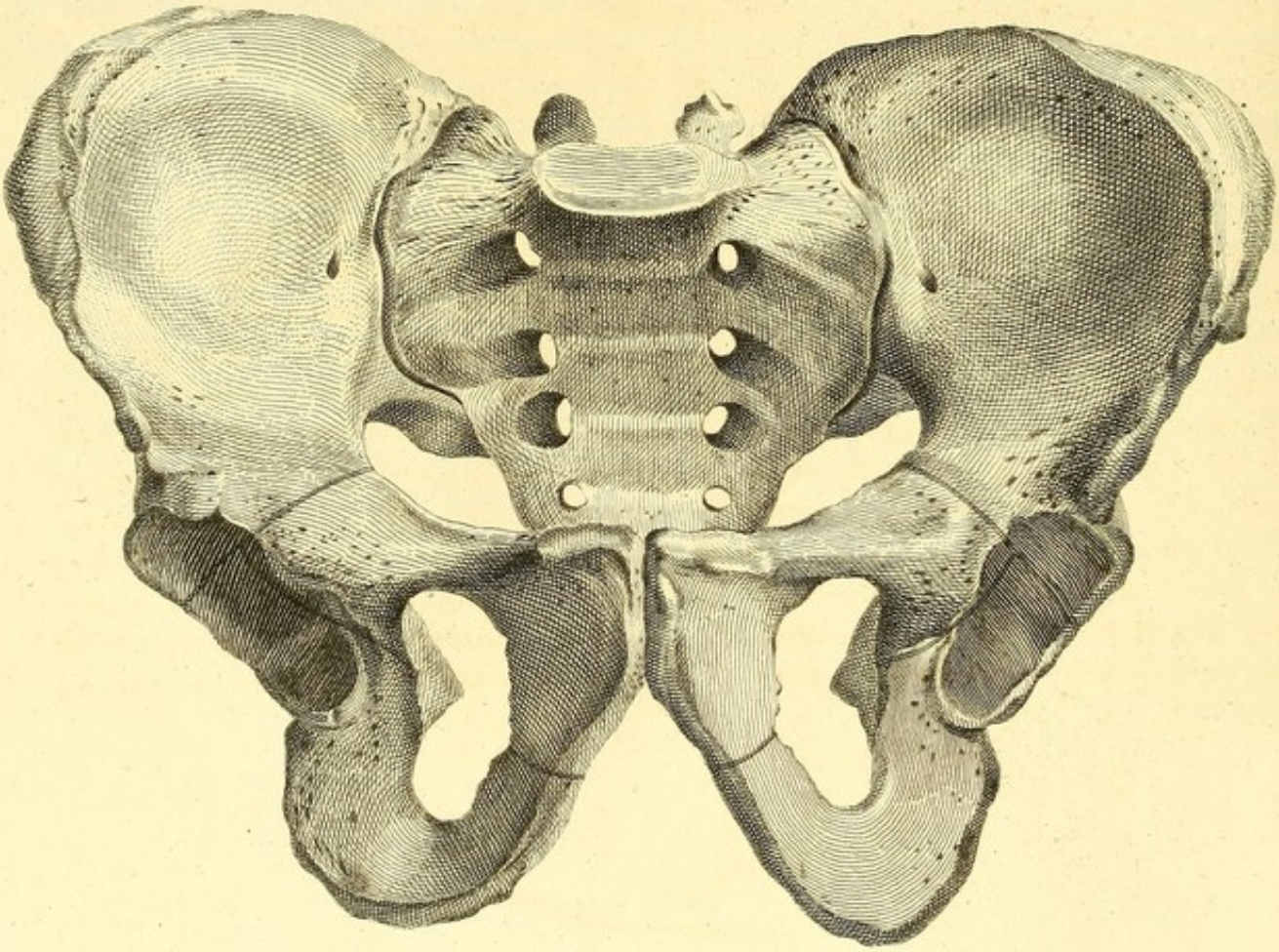
BONES OF THE METACARPUS.

The long bones immediately distad of the carpus are termed the bones of the metacarpus, and are five in number. They are all concave on the thenal aspect, and proportionally convex on the anconal; are all thicker towards their extremities than towards the middle, where they often exhibit the impressions of muscles called *interossei;* are all much alike at their distal extremity, where they terminate in a round condyloid head, but differ considerably at their proximal extremity, where each is distinguished by its mode of articulation with the carpus. The metacarpal bone of the thumb by a concave articular surface A, extending from its radial to its ulnar aspect. The metacarpal bone of the fore finger by a deep angular notch B, extending from the anconal to the thenal aspect, for receiving the salient angle of the trapezoides. The metacarpal bone of the middle finger by an articular surface C, obliquely transverse to the axis of the bone. The metacarpal bone of the ring finger by an articular surface D, directly transverse, or nearly so. The metacarpal bone of the little finger by an articular surface E, rounded from the thenal aspect. These several characters best represented in figure first.

BONES OF THE FINGERS.

Immediately distad of the metacarpus are the bones of the fingers, and two remaining bones of the thumb. Viewing the bones of the fingers across from the radial to the ulnar aspect, they present three rows, which anatomists have chosen to denominate phalanxes, or as some would rather have it, phalanges, preferring the Greek plural to the English. The row next to the metacarpal bones is the proximal phalanx; the row beyond it the middle phalanx; and the last row, which terminates the fingers, the distal phalanx. The bones of all these phalanxes taper from their proximal to their distal extremities, and at their proximal extremities, though the bones belonging to the same phalanx be alike in form, and only differing slightly in magnitude, yet the bones of each are easily distinguished from those belonging to any other phalanx. At its proximal extremity F, each bone of the first or proximal phalanx exhibits a hollow orbicular surface, for receiving the round condyloid head of the corresponding metacarpal bone. The joint which is formed in this way being a ball and socket joint, admits of motion in different directions, as motion radiad, and motion ulnad, besides the motions of flexion and extension. The bones of the second or middle phalanx, at their proximal extremity G, present each an articular surface, which has two lateral depressions, and an eminence between them. The articulation which is thus formed admits only of flexion and extension. The bones of the last or the distal phalanx have a similar appearance at their proximal extremities, but are easily distinguished from any of the bones of the other two phalanxes, by having no articular surface at their distal extremities. A bone corresponding to those of the middle phalanx is wanting in the thumb.





E. Mitchell sculp.

PLATE XXI.—From Sue.

The figures in this plate are a repetition of those in Plate XV. They are seen in connexion with those of the trunk in Plates XI. and XII.; the views of the os sacrum and coccyx in connexion with those of the vertebral column in Plate XIII. From the sacrum being a part of the pelvis, and the two lateral bones of that cavity as much parts of the sacral extremities as the two scapulæ are of the atlantal, they again are introduced to preserve the ideas of general connexion, and to save the trouble of turning back to the previous figures. The lateral bones are, besides, marked here with double lines, to shew in connexion the several pieces of which each is composed, and which anatomists are accustomed to describe as separate bones, under the names, os ilium, os ischium, and os pubis.

PLATE XXII.—From Sue.

The two lateral bones of the pelvis have been termed by anatomists the *ossa innominata;* the present plate exhibits two views of the *os* innominatum of the right side, the first view from the external or peripheral aspect, and the second from the internal or central. An os innominatum, at the time of birth, and for some years after, continues in three separate pieces, united only by means of cartilage, at the places marked by the double lines. Of these three, the os ilium is the largest, and the only one articulated with the sacrum.

OS ILIUM.

The parts noticed in this bone are A, its anterior and superior spinous process, from which a ligament, called Poupart's ligament, extends across to the lateral parts of the symphysis pubis, forming what is commonly called an arch. Under this arch two muscles, the *psoas magnus* and *iliacus internus* pass to the femur. The crural artery and the crural nerve to be ramified on the thigh, and the crural vein, with several lymphatics conveying their fluids back to the heart. B, an anterior and inferior spinous process, affording an origin to one of the heads of a muscle, called the *rectus cruris*, a flexor of the hip joint, and extensor of the knee joint. C, a posterior and superior spinous process, and D, a posterior and inferior spinous process between which, as in a notch, were lodged the lateral parts of the sacrum. The part of the margin between A and E is usually termed the crest of the ilium, to which are attached, at one of their extremities, the *external oblique*, the *internal oblique*, and the *transverse muscles* of the abdomen. At F is seen a part of what is called the ischiadic notch, or the ilio-sacro-ischiadic notch, as not only the Ischium, but the Ilium and Sacrum regularly enter into its formation; this notch is a passage for a muscle towards the femur, named the *pyriform* or *external iliac;* a passage also for the great sciatic nerve, the gluteal artery, the ischiadic, and the pelvien pudic, and for accompanying veins and lymphatics. From the central aspect G, fig. 2. arises the *iliacus internus* muscle; this aspect is regularly concave, and, although the muscle be interposed, is in every part equably pressed by the viscera within. The peripheral aspect H, fig. 1. presents both eminences and depressions, an appearance which is partly owing to the actions of muscles. In some individuals advanced in life, this bone, like the scapula, is found to be remarkably thin towards the middle of the concavity, and in others to be in that place absorbed between the muscles of the opposite sides. I, fig. 2. shews the irregular surface where it was articulated with the os sacrum, and that union strengthened partly by ligament, and partly by cartilage.

OS ISCHIUM.

The parts noticed in the os ischium are its spinous process K, and what is usually termed its tuberosity L. From each of these processes one of the muscles, named *Gemelli*, extends to the larger trochanter of the femur, and to each is attached one of the ligaments, called the Sacro-sciatic or Sacro-ischiadic. Between these ligaments, the artery termed the pelvien pudic returns into the pelvis, and the tendon of the *obturator internus* passes out to the femur, surrounded in its course by the two *Gemelli*. The lower part of the tuberous process is the part on which we are supported while sitting; this process affords an attachment to several muscles, and, among others, to the long head of the *biceps cruris* to the *semitendinosus*, and the *semimembranosus*, which at once are extensors of the hip joint, and flexors of the knee joint. From M, which is termed the ramus of the Ischium, one of th-

Fig. 1.

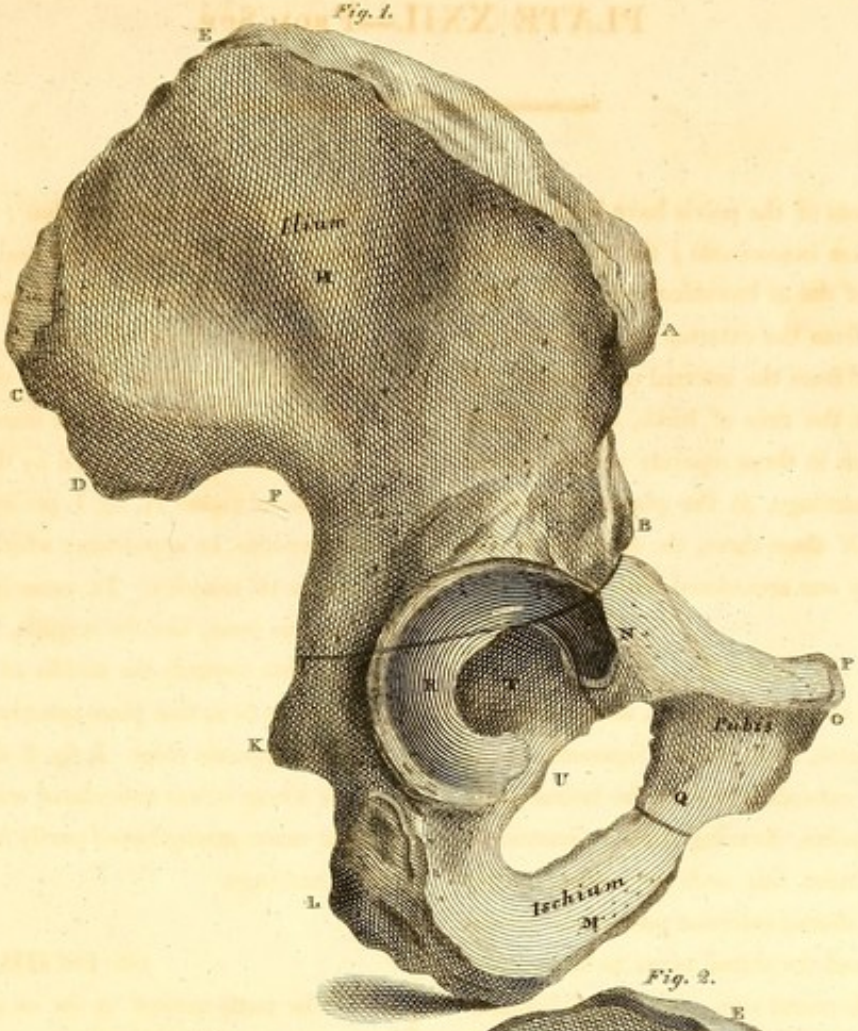
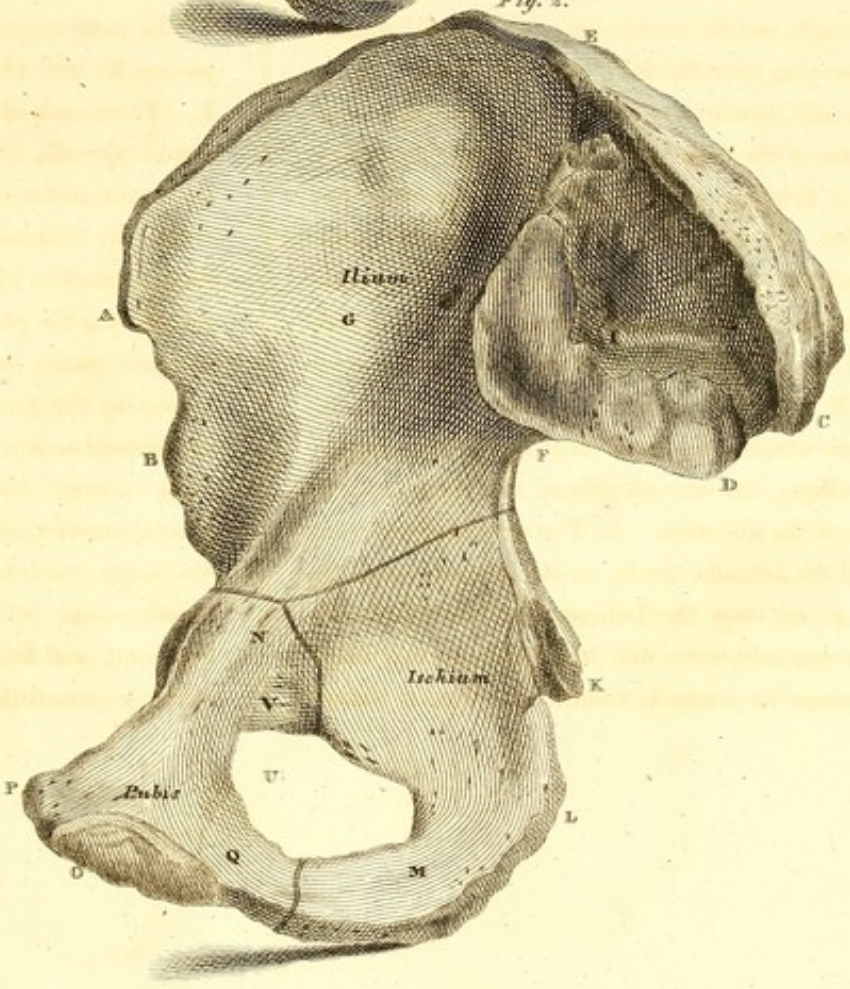


Fig. 2.



corpora cavernosa penis, and one of the muscles named *erectores penis* are known to take their origin; and a little beyond them, towards the adjoining ramus of the pubis, two of the heads of the muscle called the *triceps adductor femoris*.

OS PUBIS.

Pubis here is the genitive of pubes, and, therefore, os pubis, literally translated, is not the bone pubes, but the bone of a part which is called the pubes, and hence, this word, in the classical sense, implying somewhat more than the bone, anatomists, in speaking of the bone only, have been led to employ the genitive pubis instead of the nominative pubes. N shows the body of the pubis, where it forms a junction with the ilium and ischium at the acetabulum, or the cavity in which the head of the femur rolls. O, the tuberosity, where it forms a junction with its fellow of the opposite side through the medium of a ligamento-cartilagenous substance. This junction is what has been termed the symphysis pubis. To the part P, and to a spine which extends from it laterad towards the ilium forming a part of the boundary of the pelvis, is attached the tendon of the *rectus abdominis;* to the spine in particular, what has been termed the ligament of Gimbernat, a part of the thin tendon of the *internal oblique*, and also a part of what has been denominated the fascia of the *transversalis*. These several attachments diminish the aperture by which the crural vessels pass from the pelvis to the sacral extremity. The part Q is the ramus of the pubis, forming a junction with the ramus of the ischium, at the place marked by the double line.

THE ACETABULUM.

R, the acetabulum in which the head of the femur rolled, is better seen in the preceding Plate. It appears from the double lines that it is formed by the ilium, ischium, and pubis; the ischium forming the greatest part, and the pubis the least. It is deeper above than below, as the femur is more liable to be luxated upwards than downwards. At the lower part, towards the foramen U, there is a deficiency of bone, at which part, the blood-vessels enter to supply the organs that were lodged within the cavity. In the recent subject, the whole is deepened by a ligamento-cartilagenous brim, which protects the thin osseous margin; and which, extending across the notch, affords also protection to the blood-vessels that run under it. The whole of the bottom, excepting at T, the seat of an interarticular gland, is covered with cartilage. This gland assists the capsular ligament in supplying the joint with the necessary quantity of lubricating fluid: and from a ligament passing through it to the head of the femur, a ligament affected by every change of relative position between its opposite points of attachment, the excitement of the gland, and consequently its secretion, is in ordinary cases always proportioned to the quantity of motion. Yet the ligament, besides, performs another office in contributing to the security of the joint; when the femur is impelled upwards and outwards, this ligament changes its direction; and when the impulse is not too great, forces back the head into the acetabulum, producing the effect, not so much by its physical strength, as by a happy mechanical contrivance. This effect, as well as the contrivance by which it is produced, may be seen by removing the capsular ligament, by then dislodging the head of the femur, and afterwards pushing it upwards and outwards.

FORAMEN THYROIDEUM.

U, the foramen thyroideum, is formed entirely by the os ischium and os pubis. In the recent subject it is

occupied by a thin but dense aponeurotic membrane termed the *obturator ligament*. From the opposite sides of this ligament arise two muscles which are afterwards inserted into the femur—one named the *obturator internus*, and the other the *obturator externus*. At V, a sinuosity in the os pubis a small space is left for the passage of an artery called the *obturator artery*, and for the passage of a vein and nerve distinguished also by the epithet *obturator*. As the ligament, therefore, the two muscles, the artery, the vein, and the nerve considered as related to this foramen, are all distinguished from those of their species by the epithet *obturator*, would there be any great impropriety in calling the foramen the *foramen obturatorium* instead of the *foramen thyroideum?* The name *foramen ovale* is objectionable, as that name is already appropriated to a passage between the auricles of the heart.

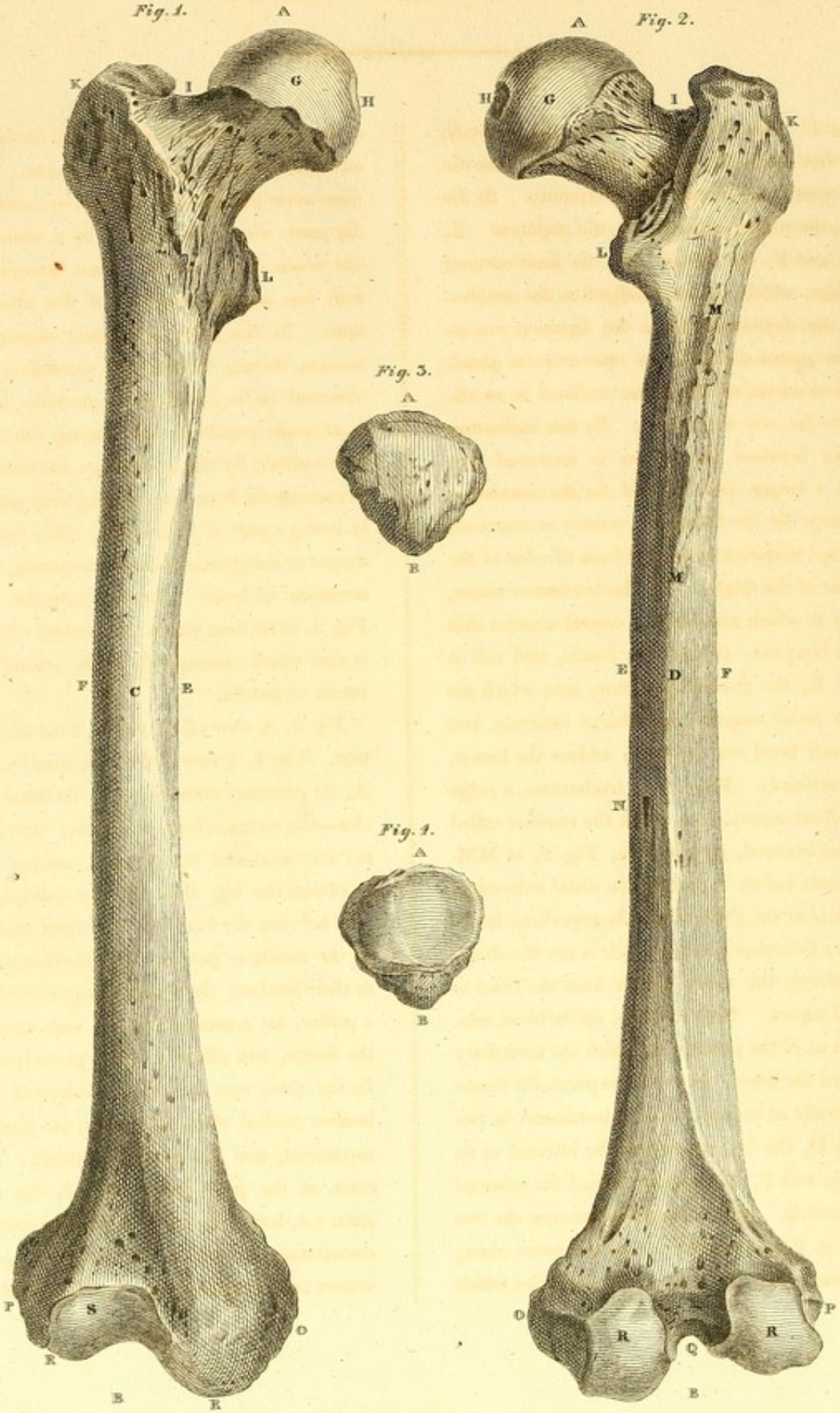


Fig. 1.
A
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I
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S
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R
B
R
Fig. 3.
A
B
Fig. 4.
A
B
Fig. 2.
A
H
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M
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D
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N
D
R
Q
R
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B

PLATE XXIII.—From Sue.

Fig. 1 and 2. Two views of the femur of the right side; the first from the rotular, the second from the popliteal aspect. A, the proximal extremity. B, the distal. C, the rotular aspect. D, the popliteal. E, the tibial; and F, the fibular. G, the head covered with cartilage, which had been lodged in the acetabulum. H, the depression where the ligament was attached that passed through the interarticular gland. I, the neck or cervix of the femur inclined at an obtuse angle to the axis of the bone. By this inclination the distance between the femora is increased (see Plate IV.), a larger space allowed for the muscles, a freer discharge for the fœcal and urinary evacuations, and an abrupt transition prevented from the size of the trunk to that of the thighs. K, the trochanter major, a tuberosity to which are attached several muscles that extend the hip-joint, abduct the femur, and roll it outwards. L, the trochanter minor, into which are inserted the *psoas magnus* and *iliacus internus*, two muscles which bend the hip-joint, adduct the femur, and roll it outwards. From these trochanters, a ridge termed the *linea aspera*, into which the muscles called adductors are inserted, may be seen, Fig. 2, at MM. this line ceases before it reaches the distal extremity, and terminates at the place where the superficial femoral artery, by following a course which is not the shortest, but evidently the safest, passes from the tibial to the popliteal aspect. Near this line, on its tibial side, may be seen at N the passage by which the medullary artery entered the bone. Beyond this point, the femur begins gradually to enlarge, until it terminates in two tuberosities, O, the larger, termed the internal or tibial condyle, and P, the smaller, named the external or fibular condyle. Q, a depression between the two condyles, Fig. 2, corresponds to an eminence rising from the tibia. RR, the parts of the condyles which came successively into contact with the tibia, are covered with cartilage in the recent state. The parts in view were brought into contact by a state of flexion; the parts which are rotulad, by a state of extension: the whole could not have been brought into contact with the articular surfaces of the tibia at the same time. In this joint, as in many others, the centre of motion, during flexion and extension, is constantly observed to be changing its position; in flexion here it advances poplitead, and during the time of extension rotulad; by this mechanism, the muscles employed in moving the bones are, during their action, constantly losing a part of their lever, while those which moderate or antagonise them are acquiring a proportional accession of lever. Another articular surface at S, Fig. 1, at no time comes into contact with the tibia; it is that which corresponds to the central aspect of the rotula or patella.

Fig. 3, A view of the rotula, from its peripheral aspect. Fig. 4, A view of the same from its central aspect. A, its proximal extremity; B, its distal. Four muscles—the *rectus cruris*, the *vastus externus*, the *vastus internus*, and the *crureus*, uniting their tendons to extend the leg, these become ossified, where they pass between the condyles, and from what is here called the rotula or patella. By this change of structure in their tendons, the muscles acquire the advantage of a pulley, an accession of lever, slide more easily upon the femur, and afford a better protection to the joint. In the same way the flexor tendons of the great toe become ossified when opposite to the joint between its metatarsal, and its proximal phalanx: in large animals, as the polar bear, not only the flexor of the great toe, but of all the toes, become ossified in similar circumstances; while in the horse, a large animal well known to walk upon tiptoe, the flexor tendons of the di-

gital phalanxes are ossified not only at the usual place, but ossified likewise at the last joint, constituting there what is commonly known by the name of shuttle-bone. These regular ossifications of tendons, when opposite to joints, are generally termed sesamoid bones, from the smallness of their size, although the pairs which belong to the several toes of the elephant be as large as many human patellæ. The remarks of Monro on these bones are excellent, and display at once the soundness of his judgment, the extent and the accuracy of his observations.* Be the name of these bones, therefore, what it may, it must be obvious, from their origin and use, that they and the rotulæ, if they are to be classed by the nature of their functions, decidedly belong to the same genus. The united tendon of the four muscles, after being ossified opposite to the knee-joint, is usually called the *ligament of the patella*, and passes onward to be inserted into the rotular aspect of the tibia, at a small distance from its proximal extremity.

* See the last page of his Anatomy of the Human Bones.

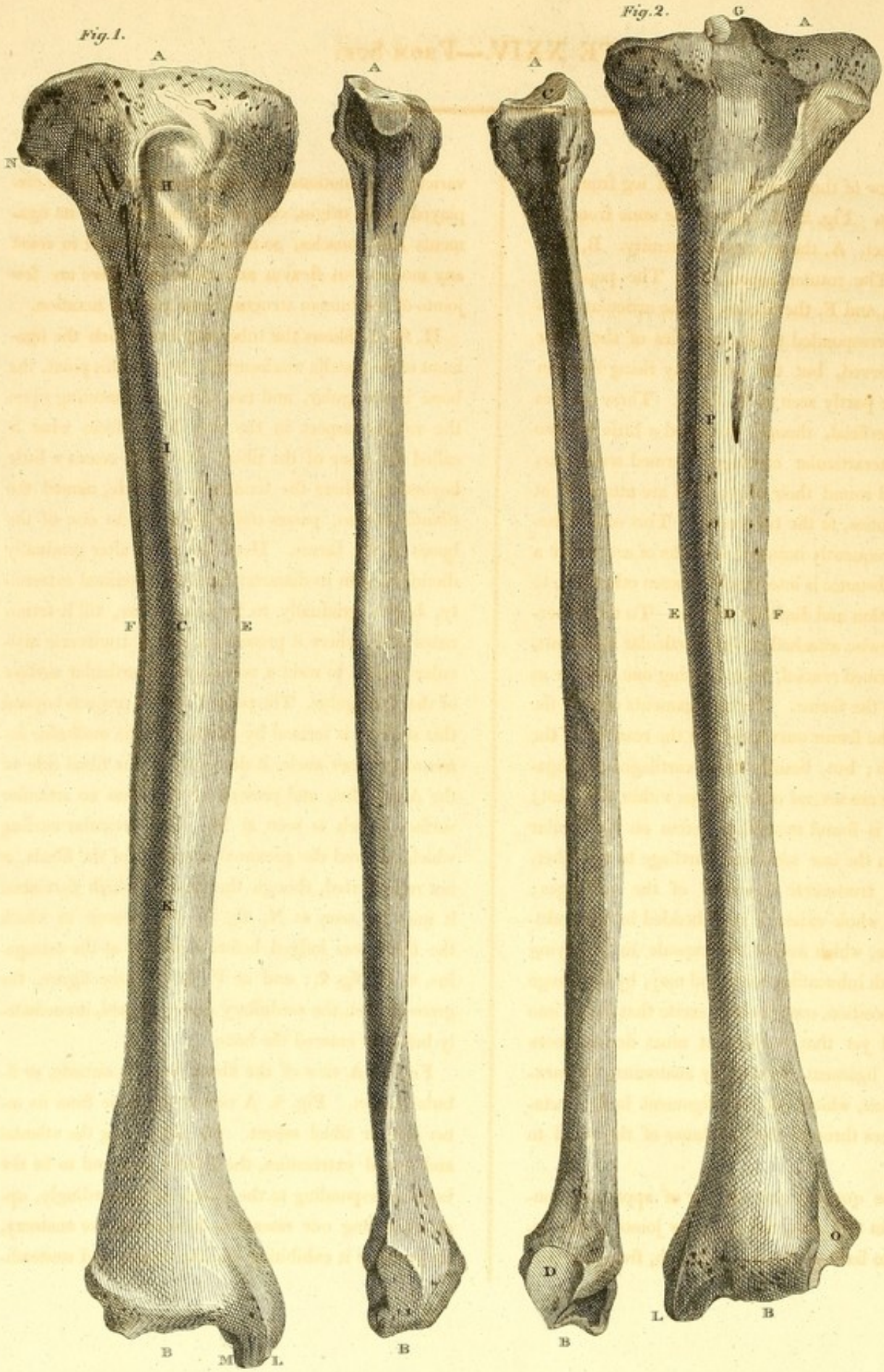
Fig.1.
A
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H
I
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C
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K
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M
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D
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Fig.2.
G
A
P
E
D
F
O
L
B

PLATE XXIV.—From Sue.

Fig. 1. A view of the tibia of the right leg from the rotular aspect. Fig. 2. A view of the same from the popliteal aspect. A, the proximal extremity. B, The distal. C, The rotular aspect. D, The popliteal. E, the tibial, and F, the fibular. The articular cavities which corresponded to the condyles of the femur are not observed, but the tuberosity rising between them may be partly seen at G, fig. 2. These cavities are very superficial, though deepened a little by two moveable interarticular cartilages, termed *semilunar*, which extend round their edges, and are attached, at their extremities, to the tuberosity. This sort of mechanism is frequently imitated in works of art, where a moveable substance is interposed between other two, to facilitate motion and diminish friction. To this tuberosity are likewise attached two interarticular ligaments, which are termed *crucial*, from crossing one another as they pass to the femur. These ligaments oppose the rotation of the femur outwards, and the rotation of the tibia inwards; but, besides these cartilages and ligaments, there are several other organs within this joint; a ligament is found extending across on the rotular aspect, from the one semilunar cartilage to the other, this is the *transverse ligament* of the cartilages; through its whole extent it is imbedded in a glandular substance, which assists the capsule in supplying the joint with lubucating fluid, and may, by its change of relative position, contribute to excite that gland into action: and yet that excitement must depend more on another ligament, termed by anatomists *ligamentum adiposum*, which, like the ligament in the acetabulum, passes through the substance of the gland to the femur.

From the quantity and variety of apparatus contained within this joint, there are few joints in the human body so liable to disease, although, from the little variety of its motions, and the singular mechanism displayed in the origin, course, and insertion of its ligaments and muscles, so admirably calculated to resist any motion but flexion and extension, there are few joints of the human structure less liable to luxation.

H, fig. 1. Shews the tuberosity into which the ligament of the patella was inserted; beyond this point, the bone is triangular, and two of its sides meeting upon the rotular aspect in the line I K, form what is called the spine of the tibia; this spine ceases a little beyond K, where the tendon of a muscle, named the *tibialis anticus*, passes obliquely across to one of the bones of the tarsus. Here the tibia, after gradually diminishing in its diameter from the proximal extremity, begins gradually to increase in size, till it terminates at B, where it presents a hollow transverse articular surface to meet a corresponding articular surface of the Astragalus. The point L, which projects beyond this surface, is termed by anatomists the *malleolus internus* or inner ancle, it descends on the tibial side of the Astragalus, and presents to that bone an articular surface, which is seen at M. The articular surface which received the proximal extremity of the fibula, is not represented, though the process which furnished it may be seen at N, fig. 1., the groove in which the fibula was lodged before it arrived at the astragalus, at O, fig. 2.; and at P, in the same figure, the groove which the medullary artery formed, immediately before it entered the bone.

Fig. 3. A view of the fibula from its outside, or fibular aspect. Fig. 4. A view of the same from its inner side or tibial aspect. On comparing the atlantal and sacral extremities, the Fibula is found to be the bone corresponding to the Ulna; and accordingly, upon extending our researches to comparative anatomy, we perceive it exhibiting the like variety and unsteadi-

ness of character, sometimes large, sometimes small, and sometimes merely a process of the tibia, sometimes forming a part of the knee joint, but not of the ancle joint, and sometimes, as in man, a part of the ancle joint, but not of the knee joint.

A, Its proximal extremity. B, Its distal. C, The articular surface, and nearly transverse, where it was connected with the process of the tibia at N, fig. 1. D, The articular surface, where it moved upon the side of the astragalus. Having passed beyond the groove in the tibia, it becomes flattened, and forms what is called the *malleolus externus* or outer ancle.

Fig. 1.

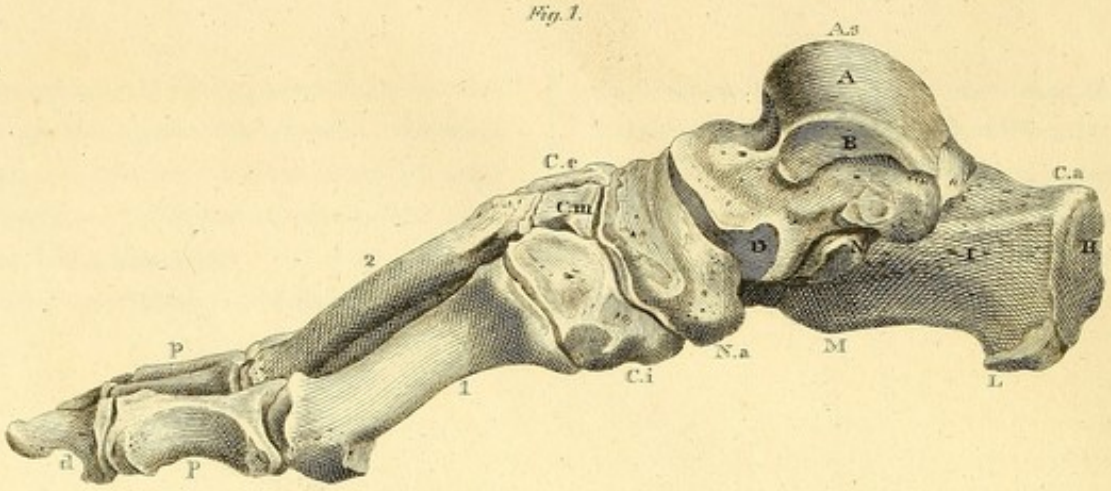


Fig. 2.

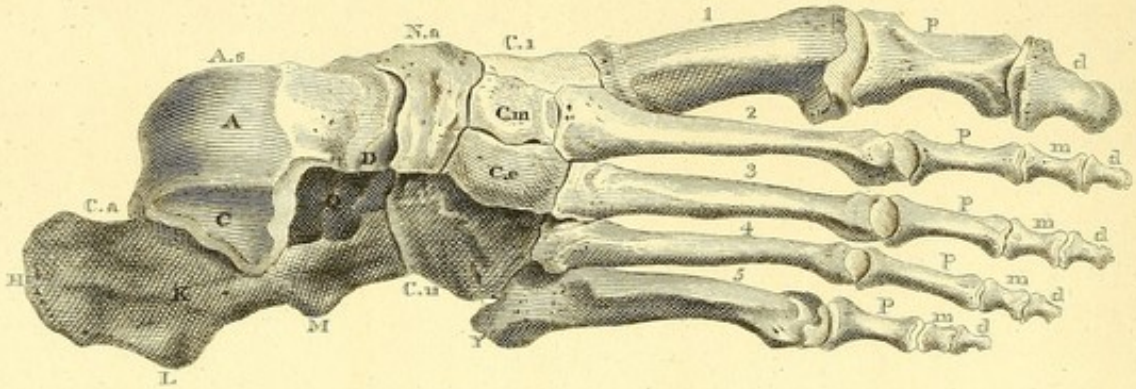
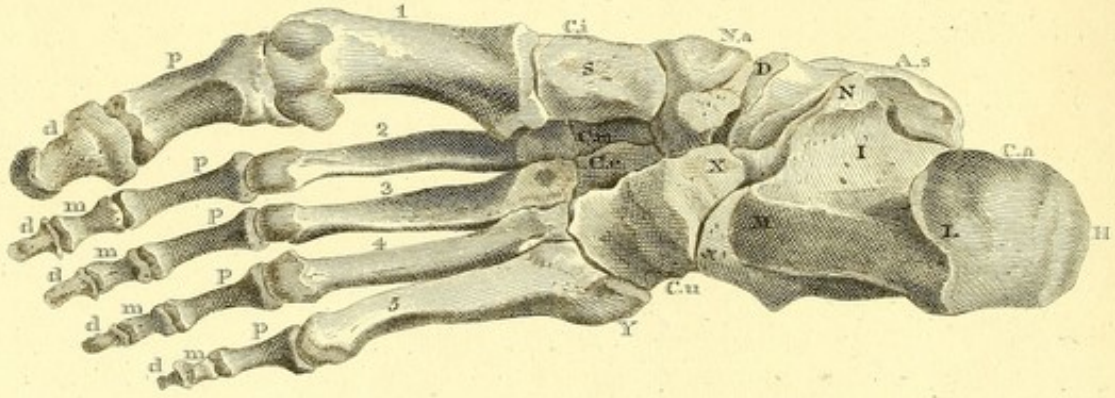
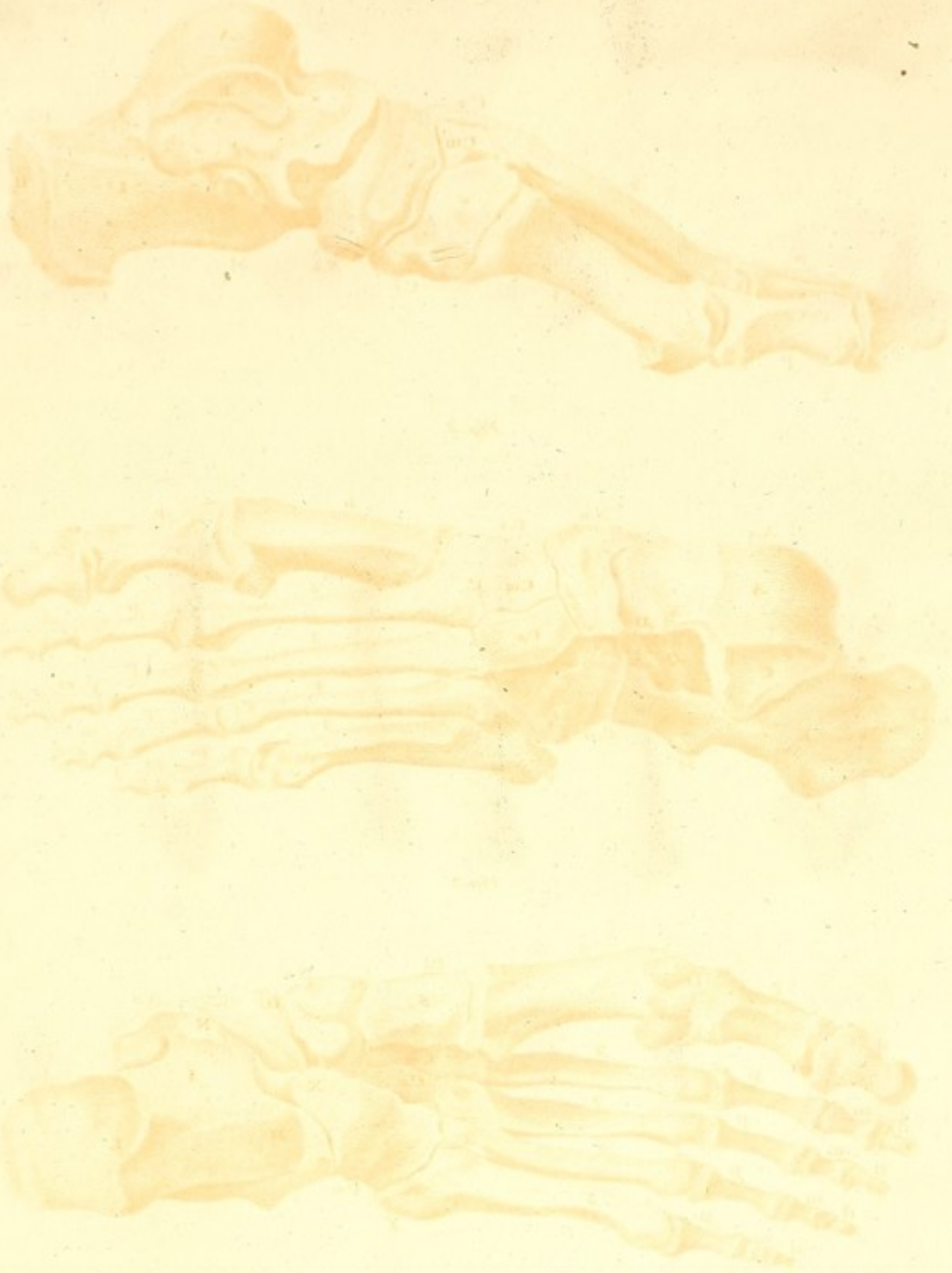
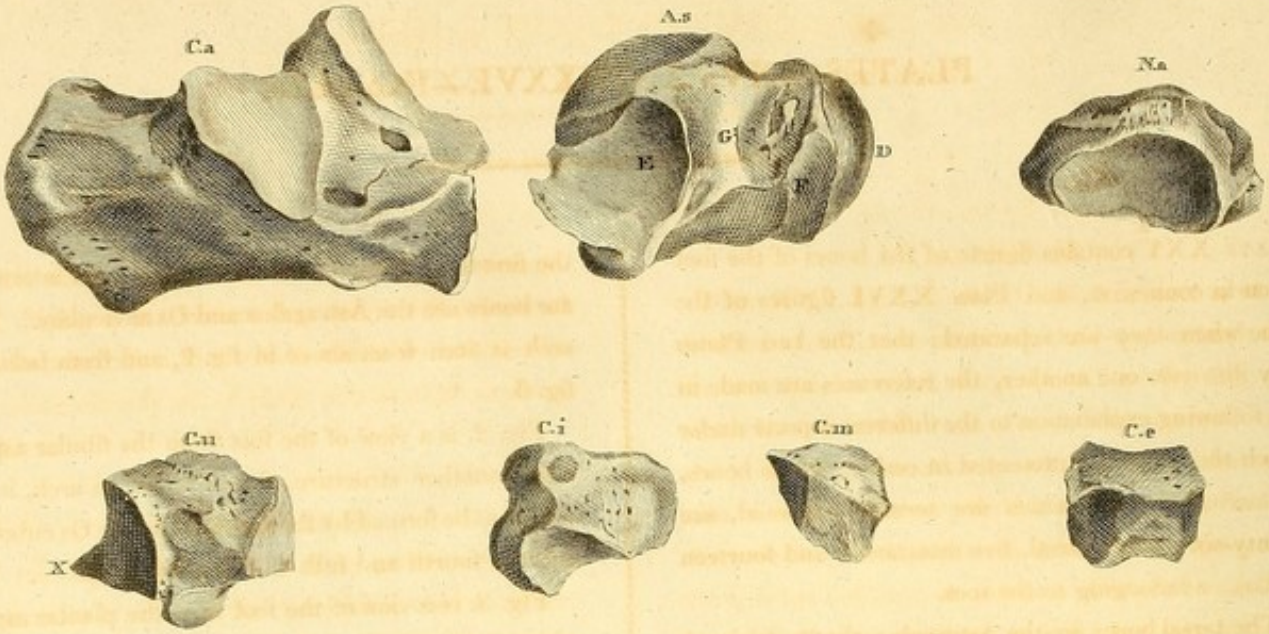


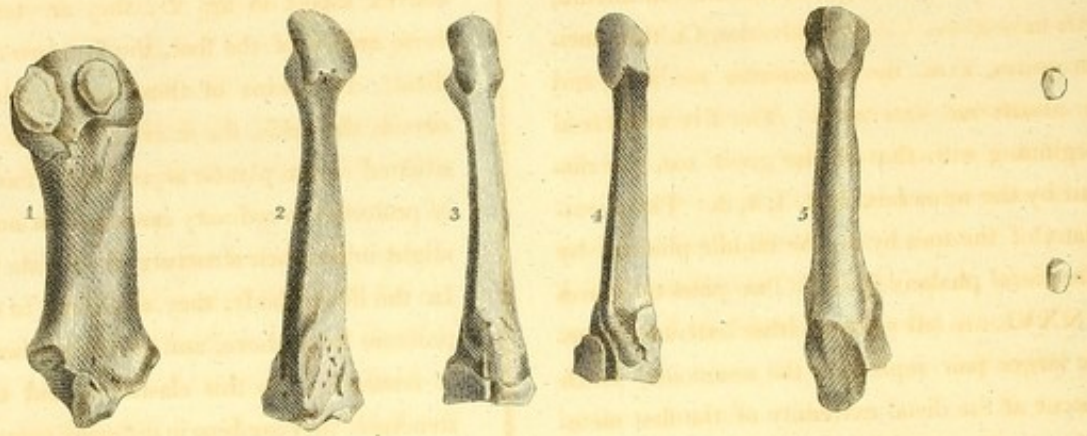
Fig. 3.







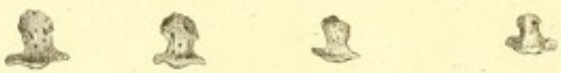
Bones of the Metatarsus



Digital Bones of the proximal Phalanx

Digital Bones of the middle Phalanx

Digital Bones of the distal Phalanx



PLATES XXV. AND XXVI.—From Sue.

Plate XXV contains figures of the bones of the foot when in connexion, and Plate XXVI. figures of the same when they are separated; that the two Plates may illustrate one another, the references are made in the following explanation to the different aspects under which the bones are presented in each. These bones, exclusive of those which are termed sesamoid, are twenty-six: seven tarsal, five metatarsal, and fourteen digital, or belonging to the toes.

The tarsal bones are the Astragalus, the Os calcis, or the Calcaneum, the Os naviculare, the Os cuboides, the Os cuneiforme internum, the Os cuneiforme medium, and the Os cuneiforme externum. In the several figures, As. denotes the Astragalus, Ca. the Calcaneum, Na. the Os naviculare, Cu. the Cuboides, Ci. the cuneiforme internum, C.m. the cuneiforme medium, and C.e. the cuneiforme externum. The five metatarsal bones, beginning with that of the great toe, are distinguished by the numerals, 1, 2, 3, 4, 5. The proximal phalanx of the toes by p. the middle phalanx by m. and the distal phalanx by d. Two pairs of figures in Plate XXVI. are left without either letters or numerals: the larger pair represents the sesamoids, which usually occur at the distal extremity of the first metatarsal; the smaller pair the two sesamoids which, in some individuals, are found at the distal extremity of the metacarpal bone of the thumb. An account of the use and origin of such bones has already been given, Plate XXIII. in the description of the rotula or patella.

Plate XXV. fig. 3. is a view of the foot from the internal or tibial aspect; it represents one of the appearances which anatomists denominate arches of the foot. The arch seen here extends from the proximal extremity of the Calcaneum to the distal extremities of the first three bones of the Metatarsus; the intermediate bones are the Astragalus and Os naviculare. This arch is seen from above in fig. 2, and from below in fig. 3.

Fig. 2. is a view of the foot from the fibular aspect, where another structure, denominated an arch, is observed to be formed by the Calcaneum, the Os cuboides, and the fourth and fifth of the metatarsals.

Fig. 3. is a view of the foot from the plantar aspect, where a transverse arch is observed to be formed by the Os cuboides, and the three cuneiforme bones; and another arch in the same direction by the five bones of the Metatarsus: these two may be seen from their convex aspect in fig. 2.; they are termed the transverse arches of the foot, the first two are the longitudinal. By means of these arches, the muscles, the nerves, the veins, the arteries, and the other soft parts situated on the plantar aspect of the foot, are sufficiently protected in ordinary cases against any pressure that might injure their structure, or impede their functions. In the living body, they are found to expand during pressure from above, and to recoil when that pressure is removed. By this elasticity, and their admirable structure, they combine in diffusing concentrated forces, and in causing each part to sustain a proportional share of their effects. The want of such arches, and their elasticity, is readily perceived, and severely felt by those persons whose feet are flattened on the plantar aspect, where the soft parts are exposed to a pressure which impedes their functions, and where there is no springiness of the foot to afford any aid in rising from the ground. The forms of these arches are principally owing to the shapes of the bones of which they are composed, and to the manner in which these are arranged, while the forms are preserved by ligaments and

muscles, whose origin, insertion, course, and arrangement, display a mechanism that seems well calculated to excite admiration, but which, unless we indulged in digressions entirely out of place, admits of no explanation here.

ASTRAGALUS.

In treating of the bones of these arches separately, we naturally begin with the Astragalus, the one which, in the order of regular succession, is next to the leg, and the only one of the tarsal bones that is articulated with the tibia and fibula. Plate XXV. fig. 1, 2. A, The convex articular surface on which the end of the tibia moved, where the point of pressure between the two bones was necessarily varied by every change of relative position, and its effects suddenly diffused over a wider extent of surface. B, fig. 1. The lateral articular surface corresponding to that part of the tibia called the *malleolus internus*. C. fig. 2. Another lateral articular surface of greater extent, corresponding to that part of the fibula, named the *malleolus externus*. As these two lateral surfaces are not parallel, the foot, besides flexion and extension, is permitted to enjoy a considerable degree of lateral motion, tibiad and fibulad. A fourth articular surface D, partially seen, fig. 1, 2, and 3, is more fully displayed in the separate figure, Plate XXVI. where the figure of the Os naviculare, on the right, presents the cavity into which it was received. In this last plate, the Astragalus rests on its tibial aspect, and exhibits those articular surfaces by which it was connected with the Calcaneum. These surfaces are marked E. F. between which there is a deep fossa, marked G, for lodging an interarticular gland, and a strong ligament, which, passing through it to the Calcaneum, stimulated the gland and strengthened the connexion between the two bones.

CALCANEUM.

Plate XXV. fig. 1, 2, and 3. H, The part to which the *tendo Achillis* was attached, the common tendon of the two muscles which form the calf of the leg, and which have therefore been named *Gastrocnemii;* they are principally the muscles which extend the ancle joint, receiving but very little assistance from the *tibialis gracilis*, which, although it be inserted along with them, is too deficient in physical strength to produce much effect as an auxiliary, and also but very little assistance from the *tibialis posticus*, the *peroneus longus*, the *peroneus brevis*, the *flexor longus pollicis pedis*, or the *flexor longus digitorum pedis*, which, though muscles of great physical strength, yet, from passing near to the centre of motion, are by that means deprived of the necessary lever for extending this joint in opposition to any of the ordinary causes of resistance; hence it is, that when the *tendo Achillis* is ruptured, these muscles are found to produce scarcely any sensible effect in the way of extension. I, fig. 1. and 3. is a sinuosity on the tibial aspect, along which the nerves and the blood vessels pass in safety to the sole of the foot, where they are again sufficiently protected by the concavities of the four arches. K, fig. 2. A view of this bone from its fibular aspect, where it is convex. L, fig. 1, 2, and 3, a tuberosity on its plantar aspect, from which the *aponeurosis plantaris* and the *flexor brevis digitorum pedis* were observed to take their origin. M, another tuberosity on the same aspect, which afforded an origin to the plantar ligament, and to the *adductor pollicis pedis*. N, fig. 1. and 3. The astragalar process, upon one side, supporting the Astragalus, and, upon the other, forming a part of the sinuosity. At its distal extremity, the Calcaneum terminates by an articular transverse surface, where it was connected with the Os cuboides; this surface is not ex-

hibited in any of the figures, but its edge may be seen, Plate XXV, fig. 2 and 3, and in the figure of the separate Calcaneum, Plate XXVI.: this last figure represents the Calcaneum from its fibular aspect, and from above, and was principally intended to show those articular surfaces by which it was connected with the Astragalus: these surfaces are marked OO, and PP is a deep scabrous depression between them, uniting with the fossa of the Astragalus, in affording a sufficient space to the gland, and to the ligament already mentioned. The extremities of both the depression and fossa, as forming parts of the same cavity, may be seen on the fibular aspect of the foot, at Q, fig. 2, Plate XXV. These articular surfaces do not extend horizontally distad, but exhibit a slight degree of inclination plantad or downwards. When any impulse, therefore, from above is communicated from the Tibia to the Astragalus, the Astragalus not only presses downwards upon the Calcaneum, but slides forwards, communicating a large portion of the impulse to the Os naviculare, which, from different points, transmits it to the three Cuneiform bones, which, in their turn, diffuse it through the first three of the Metatarsals.

OS NAVICULARE.

The Os naviculare is seen in connexion with the Astragalus, at the letter D, Plate XXV. fig. 1, 2, and 3; and that cavity into which it received the round head of the Astragalus at R, Plate XXVI. On the side opposite to this cavity, there is a convex articular surface presenting three facets, to meet the three Cuneiform bones. These facets are not represented in any of the figures; but some general idea may be formed of them by returning to fig. 1 and 2, Plate XXV, where this bone, and the three Cuneiform, may be seen in connexion.

OS CUNEIFORME INTERNUM

Is seen in connexion, Plate XXV, fig. 1, 2, and 3; and separately, at fig. 1, Plate XXVI. It is flattened between two surfaces; one of them concave, partly articular, and partly scabrous, where it points to the Os cuneiforme medium; the other convex, and entirely scabrous, where it points to the tibial aspect of the foot. Towards the convex aspect of the foot they gradually converge so as to form an acute angle; and towards the plantar aspect of the foot, they terminate in a rounded scabrous tuberosity, as at S, fig. 3, Plate XXV. At their other extremities they are bounded by two articular surfaces which are nearly parallel; the largest corresponding to one of the facets of the Os naviculare, and the smaller to the transverse articular surface of the first Metatarsal. In the separate figure, Plate XXVI, the concave surface is seen at T, the tuberosity at U, and the surface by which it was articulated with the first Metatarsal at V.

OS CUNEIFORME MEDIUM,

Seen in connexion, Plate XXV, fig. 1, 2, and 3. It has two broad articular surfaces which converge to an angle on the plantar aspect, and two triangular articular surfaces nearly at right angles to these. Towards the rotular aspect, these four surfaces enclose a scabrous quadrangular space, whose opposite sides are nearly parallel, and whose angles approach nearly to right angles. The separate figure, Plate XXVI, represents it imperfectly.

OS CUNEIFORME EXTERNUM,

Seen in connexion, Plate XXV, fig. 1, 2, and 3. It presents the same general characters, nearly as the Os Cuneiform medium, but only the rough quadrangular space on its rotular aspect is much longer in proportion to its breadth, while the lines which terminate

its longer sides are less straight; the one pointing to the neighbouring Cuneiform, being somewhat concave; and that pointing to the Os cuboides, angularly convex.

OS CUBOIDES,

Seen in connexion, Plate XXV, fig. 2 and 3, and also separately in Plate XXVI, where it is seen from the fibular aspect, and from above, and where it exhibits the process X, that filled up the space between the Calcaneum and the Os naviculare, Plate XXV, fig. 3. Of all the six sides ascribed to this bone, no two of them are equal or parallel. It is somewhat flattened between the two that appear on its rotular and plantar aspect, while that on the last, or the plantar aspect, is very easily distinguished from the other by a transverse ridge. Of the other four sides, the longest and thickest, partly articular, and partly scabrous, is that which points to the Cuneiform bones, while the opposite side, the shortest and thinnest, is entirely scabrous, pointing to the fibular aspect of the foot. The remaining two sides, opposite also to one another, are wholly articular—the larger adapted to the distal extremity of the Calcaneum—and the smaller of the two to the proximal extremities of the fourth and the fifth of the Metatarsals. By these characters may the different aspects not only be known, but the Os cuboides of the right foot readily distinguished from that of the left.

BONES OF THE METATARSUS,

Seen in connexion, Plate XXV, fig. 1, 2, and 3; and also separately in Plate XXVI. Between their proximal and distal extremities they are all concave on their plantar aspect, Plate XXV, fig. 1 and 3, and all, except the first, proportionally convex on their rotular aspect, fig. 1 and 2. What is denominated their transverse arch, is best seen near their proximal extremities, where the second, third, and fourth, exhibit each two lateral articular surfaces, that converge from the rotular to the plantar aspect, like the converging sides of a wedge, and thus contribute to constitute the arch. See fig. 2, where they appear on the rotular aspect, and fig. 3, where again they appear on the plantar aspect. The first and the fifth, from occupying the sides of the foot, have only one lateral articular surface, by which they are easily distinguished from the rest, and from the position of these surfaces cannot well be mistaken for the 1st and the 5th of the other foot; for, suppose them articulated with the other foot, their lateral articular surfaces must be turned from the rest, or their concave sides made to point upwards. The remaining three, though not so well marked, yet distinctly show what had been their tibial and fibular aspects, by their two sides, between which they are somewhat flattened, always converging, fibulad and plantad, towards a kind of a rounded angle that lies between their fibular and concave aspects: these characters, conjoined with others which are obvious at a glance, distinguish them from the analagous Metatarsals of the other foot. To distinguish those of the same foot, it is to be observed, that the first is triangular, having one of its angles directed rotulad, and the other two laterad, forming the sides of its plantar aspect; that the breadth of the second, from its proximal extremity on the convex aspect, gradually diminishes between its lateral articular surfaces; that the breadth of the third, on the same aspect, and between its lateral articular surfaces, is either increased or continues the same; that the fourth being articulated on its tibial aspect, not only with its fellow, but with the Os cuneiform externum, has longitudinally a greater

extent of articular surface upon one side than upon the other; and that the fifth is easily distinguished by its single lateral articular surface; and by Y, a tuberosity with a scabrous surface projecting proximad, and exhibiting a large articular surface, obliquely transverse, by which it was connected with the Os cuboides.

The five, as viewed from their plantar aspect, are presented separately in Plate XXVI.; compared with those of the Metacarpus, all, except the first, are more slender in proportion to their length, and also exhibit at their distal extremities a somewhat greater proportional extent of articular surface. At the distal extremity likewise of the first may be seen in their place the ossified parts of the flexor tendons, which are termed its sesamoid bones. The several bones of the digital phalanxes, compared with those of the atlantal extremity, are not only more slender, but proportionally shorter. As to their forms, and their several modes of articulation, they are similar, and therefore require no separate explanation.

PLATE XXVII.—From Sue.

Bones internally are generally of a loose cellular structure, exhibiting cells formed either by osseous spicula, or thin laminæ crossing one another at different distances. In the bones of the Cranium, such a structure is termed *Diploe;* in other bones where the spicula, or laminæ, are slender and yielding, intersecting one another at small distances, and in various directions, they form what is called the *spongy structure;* or, when more rigid and at greater distances, the *reticulated* or *cancellated* structure of bones. All these cells, whether large or small, are lined with a membrane, which has been termed the *internal periosteum;* they can be seen only by sections of the different bones in which they are contained.

Fig. 1. represents a section of the basilar maxilla, or lower jaw, passing through several sockets of the teeth, and along the inferior maxillary canal, the regular course of the artery and nerve that supplied them with nourishment and vital energy. Fig. 2. and 3. are two transverse sections of the femur. Fig. 4. a section of the rotula or patella. Fig. 5. a section of the Astragalus. Fig. 6. a section of the Calcaneum. Fig. 7. a section of four of the lumbar vertebræ; and fig. 8. a section of the Os sacrum and Coccyx. In the last two figures at AAA, is also seen a section of the vertebral canal, in which the spinal marrow, or that part of it called the *cauda equina*, was contained; and at BB, fig. 7. a section of those intervertebral spaces, where a substance intermediate in point of consistence, between pulp and cartilage, is, towards the edges, surrounded by the intervertebral ligaments.

Fig.1.

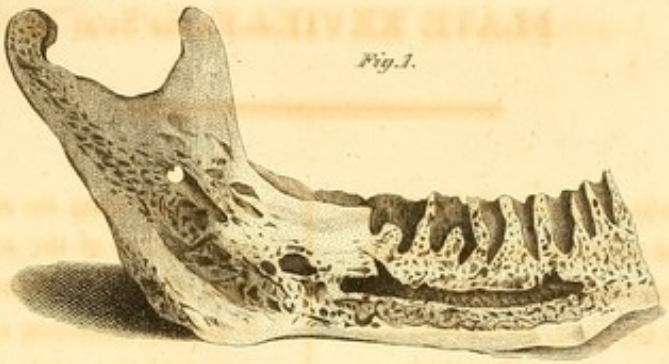


Fig.2.

Fig.3.

Fig.4.

Fig.5.

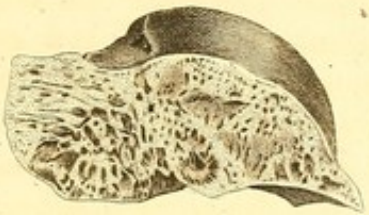


Fig.6.

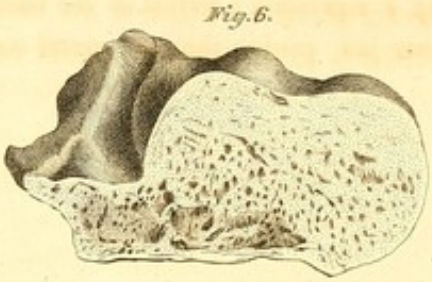


Fig.7.

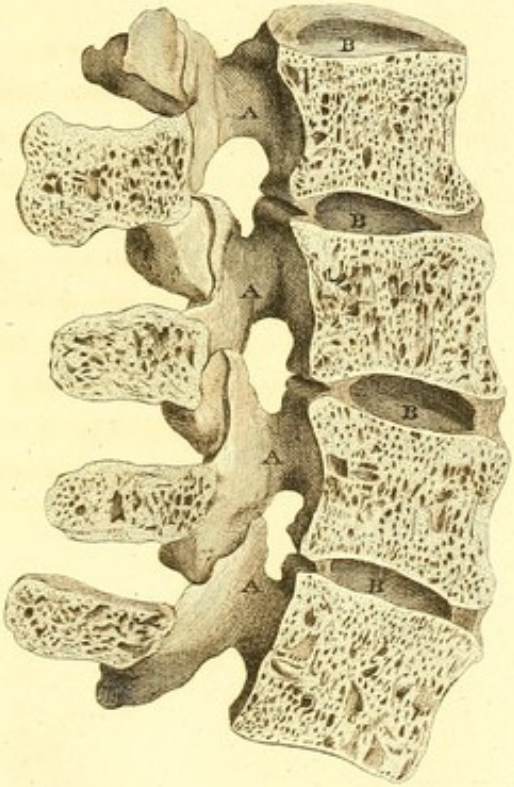
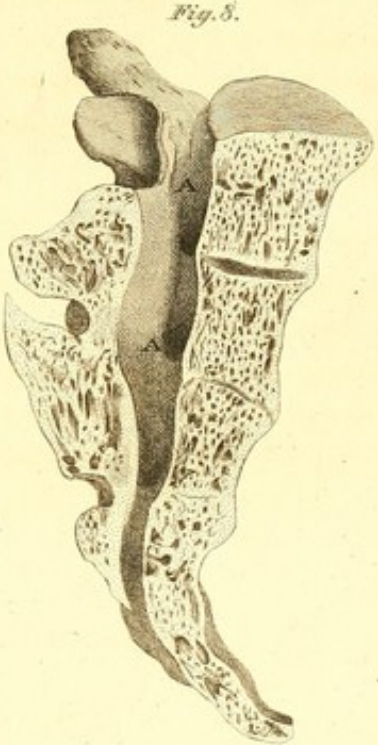


Fig.8.



E.Mitchell foulp.

Fig. 1.

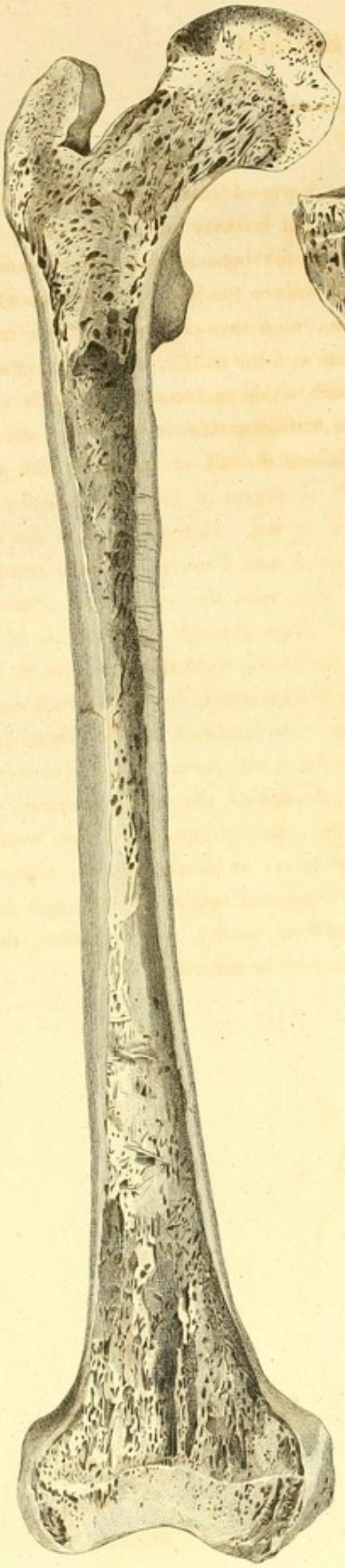


Fig. 2.

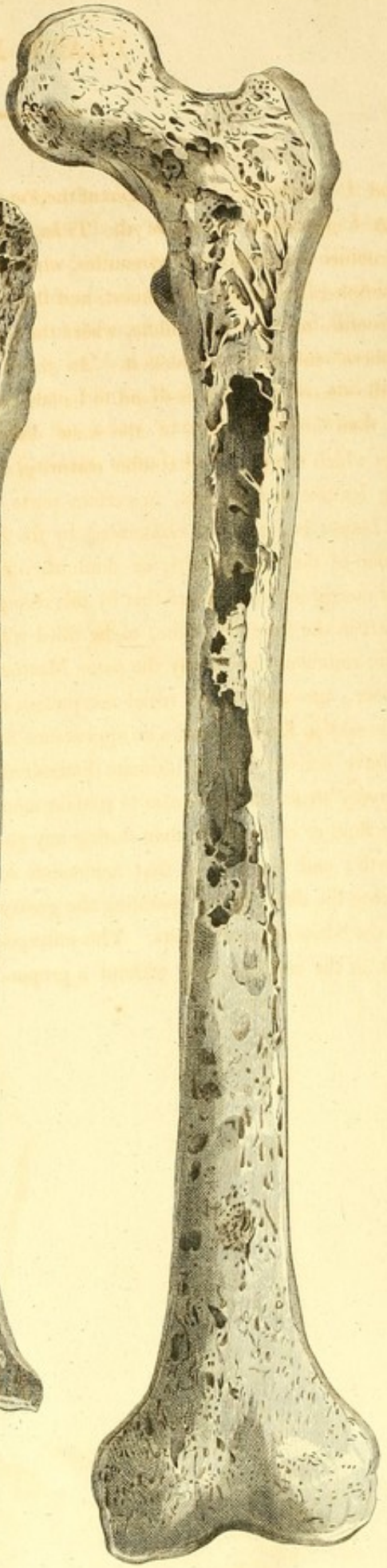


Fig. 3.

E. Mitchell Sculp.t

PLATE XXVIII.—From Sue.

Fig. 1. and 2. Two longitudinal sections of the Femur. Fig. 3. A longitudinal section of the Tibia. The spongy structure is towards the extremities, where the compact peripheral substance is thinnest, and the cancellated structure towards the middle, where the compact peripheral substance is thickest. In this last structure the size of the cells is found to be larger in old bones than in young ones of the same dimensions; from which it appears, that after maturity, the intersecting laminæ and spicula, in certain parts of the round bones, begin to be obliterated by the increased action of their absorbents, or diminished action of their nourishing vessels, and that by this change a space is left in the form of a tube, to be filled with the substance commonly known by the name Marrow. This substance, agreeably to the usual acceptation of the terms, is seldom found to make its appearance till the bones have arrived at their ultimate dimensions, when the spongy structure begins also to contain more of medullary fluid or oily matter, than during any period of growth; and hence it is that anatomists so often experience the difficulty of separating the greasy matter from the bones of aged adults. This enlargement of cells in the round bones, without a proportionate degree of enlargement in their other dimensions, is not however peculiar to them. The large cavities in the bones of the cranium, known by the terms Antres or Sinuses, are indications of the age of the bone, more than of its size. These cavities communicate with the nostrils, and, instead of marrow, are filled with a thin vaporous fluid, which seems to be the case with all cavities in the osseous structure, that communicate directly or indirectly with any of the channels or organs of breathing, whether in round bones or in flat. Hence it is that the cavities of the Humeri and Femora of birds, accustomed to remain long upon the wing, from communicating with the lungs through the medium of air cells, are, in the adults, regularly filled with air instead of marrow, while feathers, deprived of such communications, seem to be furnished, like the swimming bladders of certain fishes, with particular organs for secreting air. In short, throughout the animal structure, wherever bulk, agility, and lightness are at once required, we regularly observe an increase of bulk, without a proportional increase of weight, and a strength depending more upon form, quality, and mechanism, than upon the quantity of the materials.

PLATE XXIX.—From Sue.

This figure represents the form, the several proportions, and the progress which ossification has made in the fœtal skeleton at the usual time of birth. The head proportionally larger than in the adult, but the bones of the Face, compared in size with those of Cranium, proportionally smaller. The depth of the lower jaw, and elevation of the thorax towards the chin, proportionally less, and the distance between them, on that account, proportionally greater. The cavity of the thorax proportionally smaller. The atlantal extremities, compared with the sacral, proportionally longer. The pelvis proportionally much less, the Ilium, Ischium, and Pubis united, at this time only, by cartilage. The Sutures of the cranium not yet formed. The extremities of the cylindrical bones, as the Humerus and Femur, the Tibia, Fibula, Radius, and Ulna, and the margins of the flat bones, excepting those which belong to the Cranium, entirely cartilaginous.

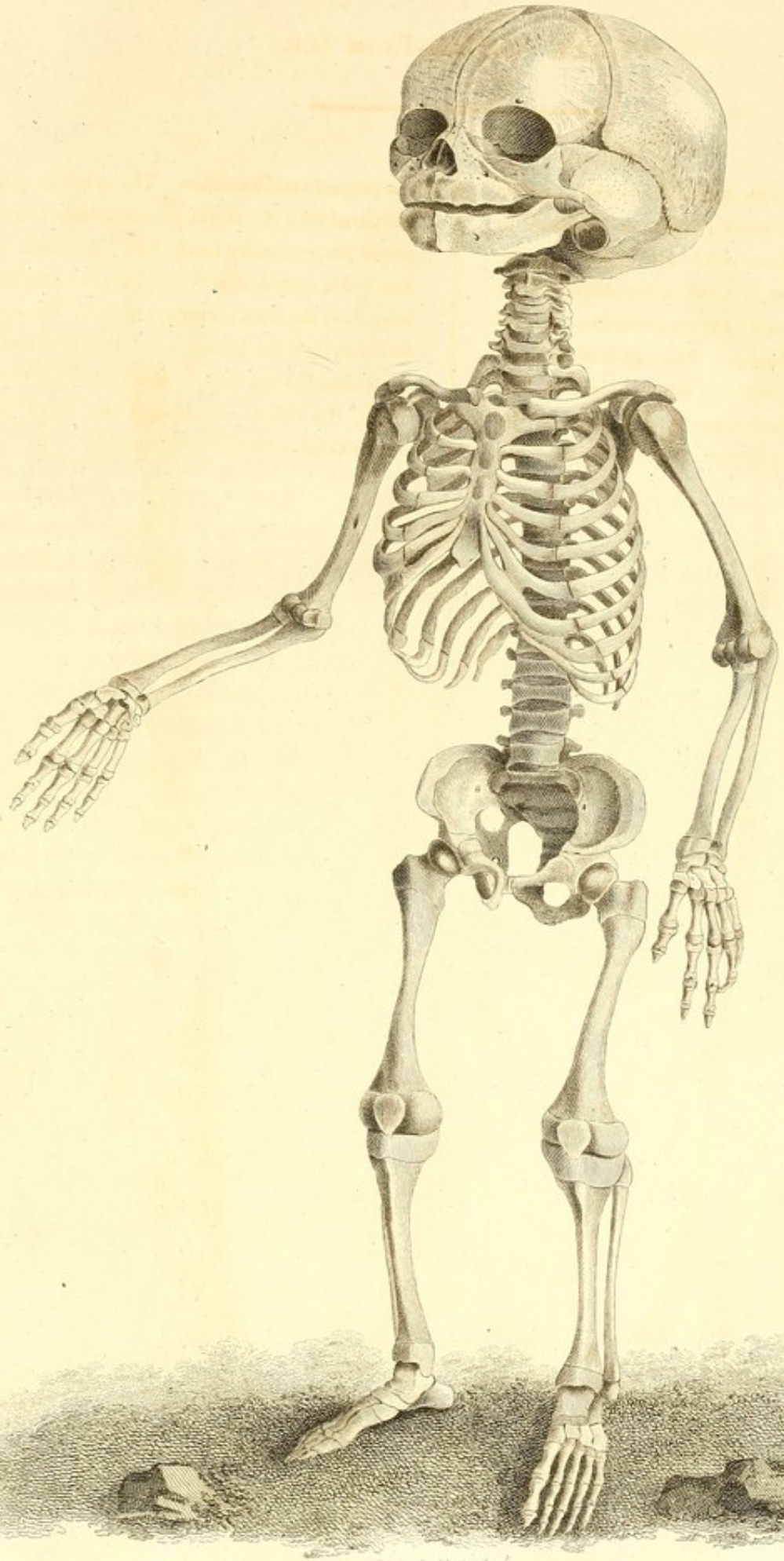


Fig. 1.

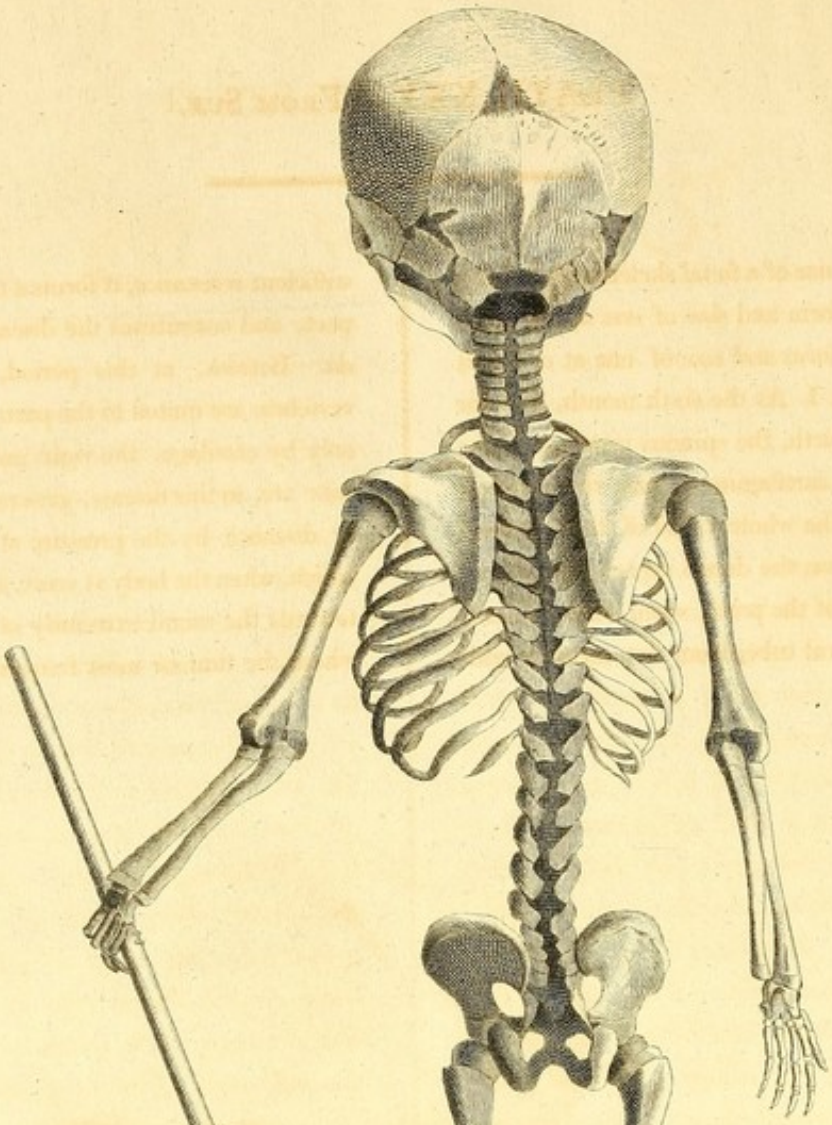


Fig. 2.

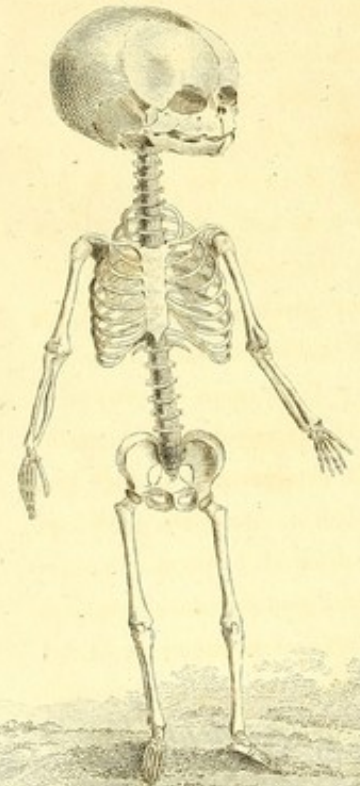


Fig. 3.

E. Mitchell sculpt.

PLATE XXX.—From Sue.

Fig. 1. The form and size of a fœtal skeleton of the sixth month; fig. 2. The form and size of one of the third month; fig. 3. The form and size of one at or about the tenth week. Fig. 1. At the sixth month, and for some time even after birth, the spinous processes of the several vertebræ are cartilaginous, and the cartilage here being removed, the whole Canal of the vertebral column appears open on the dorsal aspect; it is hence that during this state of the parts, when water is accumulated in the vertebral tube, from not meeting with sufficient resistance, it forms a tumour on the dorsal aspect, and constitutes the disease called the *spina bifida*. Besides, at this period, as the bodies of the vertebræ are united to the parts forming their processes only by cartilage, the right and the left halves of the tube are, in this disease, generally separated to a greater distance by the pressure of the water, a pressure which, when the body is erect, must always be greatest towards the sacral extremity of the column, the place where the tumour most frequently appears.

PLATE XXXI.—From Sue.

All the solids of plants and animals being formed out of fluids, the first state of the visible parts of every living organized structure which has yet been discovered, is that of a liquid secreted from certain vessels of the parent. In this liquid, an invisible agent, residing within, or acting from without, commences the processes of organization; proceeds to arrange the seemingly homogeneous particles; to produce a variety of different forms, colours, consistencies; and to construct a complicated system, similar to that which secretes the materials, materials which certainly are no more the causes of the form and mechanism, than the stones, bricks, and mortars of a building, are the authors of the plan or constructors of the architect by whom they are arranged. Accordingly, when the first materials are withheld by the separation of the offspring from the parent, the agent, notwithstanding, continues the processes of organization without interruption, completes the structure out of materials furnished by various species of food, prescribes not only the kind and the quantity, but the time when, and the manner how, it is to be received; or, if its structure be one that is sensitive, and formed for locomotion, employs it in frequently moving about, and in searching for what materials may be requisite. In considering these singular phenomena, if we proceed upon the hypothesis, that they are the effects of subordinate agents residing in the structures, and that a difference in the effects implies a corresponding difference in the cause; we must also suppose, with many of the ancients, that such invisible organizing substances belong not to any of the four elements, but to a separate and a fifth class of substances, totally distinct from any that are known in the science of chemistry, and that their genera and species are as numerous as the genera and species of the animal and vegetable structures which they form; in short, that there is in every living body, whether plant or animal, a *quintum genus*, or a *quinta essentia*, distinct from those elements of which the visible structure is composed. But, upon a subject that may lead to controversy, we must not enter farther at present, our business here being rather to describe the manner in which the bones are formed, than to investigate the cause or causes of their organization. So far then as the senses enable us to form an opinion, each bone, or, speaking more accurately, each species of bone, has its own specific mode of formation, some commencing from a single point to be gradually extended; some again, from a number of points, to be first extended, and afterwards united; some exhibiting their number of points at the same time; some in a regular order of succession. All begin in the form of a cartilage nearly transparent, and of little consistence; this consistence gradually increases, when, sooner or later, an osseous matter is observed to be deposited; in some cases, as the cartilage is formed and acquires a certain degree of consistence; in others, again, not so immediately, but after a considerable time has elapsed. In the bones of the cranium, in certain parts of the vertebræ and ribs, and of the flat and the round bones of the atlantal and sacral extremities, the ossification seems rapidly to follow the formation of the cartilage. A human skeleton in my collection not fully an inch and a half in length, and the figure of one which is much smaller, depicted in the works of the celebrated Kerkringius, are proofs that the formation of the cartilage in these bones, and these parts of bones, could not long have preceded the deposition of the osseous matter. As this deposition is, however, modified by various circumstances, we can hardly suppose that the progress or extent of ossification will be

Fig. 9.

Fig. 1.

Fig. 2.

Fig. 10.

Fig. 3.

Fig. 5.

Fig. 4.

Fig. 13.

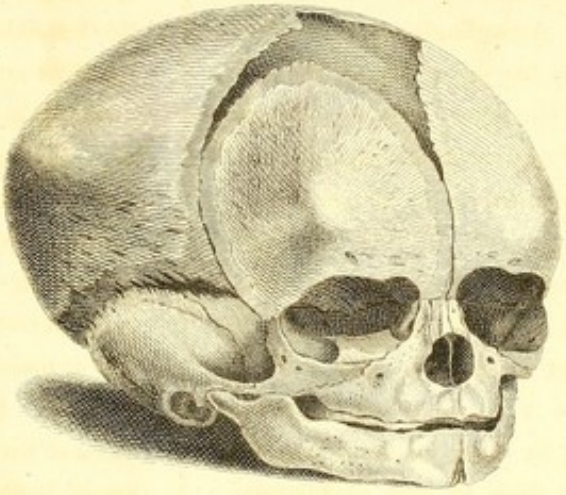
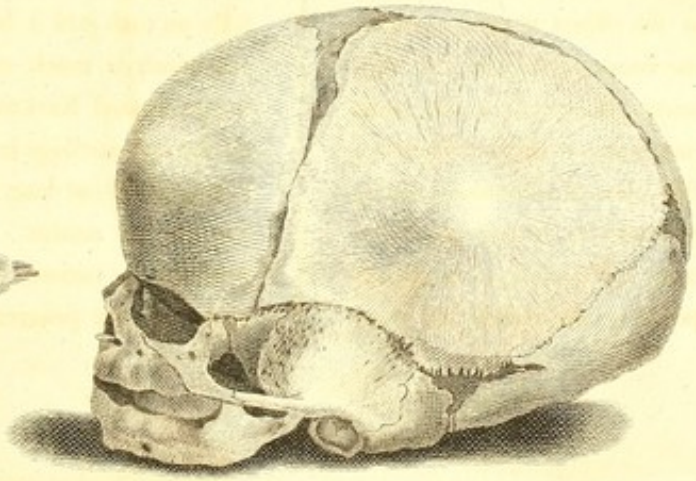


Fig. 15.

Fig. 14.



E. Mitchell sculpt.

PLATE XXXI.—*Continued.*

the same in all children of the same age. It is well known, that, at the time of birth, some are weak, sickly, and small, while others are comparatively vigorous, healthy, and large. In the bones, therefore, as well as in other parts of the system, we may naturally expect, at this period, to see the growth and the organization in very different stages of their progress. The whole bones of the healthy fœtus of the ninth month are admirably represented in the work of Albinus, entitled, *Icones Ossium Fœtus Humani*, while a few are depicted with equal accuracy in the following plate, which is copied from Sue. At this early period the frontal bone is always divided at the mesial plane into similar halves towards right and left, leaving unoccupied a large portion of that space which is termed the *bregma*, and over which it is afterwards extended, fig. 1, 2, and 13. The parietal bones are seen as if formed of osseous spicula, radiating all from a common centre, fig. 3, 4, and 14.—The occipital bone is in four pieces, united at the time only by cartilage; these pieces are the two lateral parts of the foramen magnum, fig. 6. and 7.; the cuneiform process, fig. 8.; and the largest portion partially subdivided into four parts, fig. 5. which filled up the space between the two parietal bones, the temporal bones and foramen magnum.—The temporal bone is then in three pieces, the squamous portion, the rudiments of the meatus auditorius externus in the form of a ring, and lastly, the petrous portion, fig. 11. and 12. which are seen here from different aspects.—The small bones of the Tympanum, at this period, are in general completely ossified, and even proportionally large in size,* while the basilara maxilla, or the lower jaw, is divided into two similar halves, at the mesial plane, or at what is termed the symphysis menti, fig. 13. In fig. 15. it is seen with some of the rudiments of the teeth beginning as it were to emerge from their sockets.

Sue has not deemed it necessary to give any more figures of the separated bones of the fœtal skeleton, although every bone, at the period of birth, presents an appearance considerably different from that which it afterwards assumes in the adult. The sphenoidal bone is then in five pieces, which are, the two temporal processes, the two halves of the transverse orbitary process, and the body of the bone, which also, at a somewhat earlier period, is divided into two similar halves at the mesial plane.—The ethmoidal bone is in two pieces, the crista galli, and that portion which forms a part of the nasal septum, being then cartilaginous. None of the vertebræ are found in fewer than three pieces, which are the body and the two lateral halves of their processes. The extremities and processes of the long bones, as the Humerus, Femur, Tibia, Fibula, Radius, and Ulna, are not only cartilaginous, but when they are ossified, are ossified separately, and, in some individuals, continue for years as distinct bones, connected, with their principals only, by cartilage, and known in anatomy by the term *Epiphyses*. A similar process of ossification is observable likewise in the metacarpal bones, in the metatarsal, in the digital phalanxes, and the marginal parts of the two scapulæ, and the two lateral bones of the pelvis; on the other hand, the two clavicles and the two halves of the basilar maxilla begin each from a single point of ossification, which extends gradually, and without interruption, till the whole is completed; these bones, like the bones of the Tympanum, are ossified early. The small bones which fill up the spaces which the cranial bones

* Ante maturitatem fœtus jam tota ossea hæc ossicula sunt, mireque perfecta, præcoci et magnitudine, et forma, et soliditate.—*Albinus. Icones Oss. Fat. Human.*

in some individuals leave unoccupied, are not reckoned in the number of epiphyses; they in general continue distinct through life. They are named ossa triquetra, from their occasional shapes, ossa Wormiana, from Olaus Wormius, who was thought by some to be their discoverer, and supernumerary bones by the French. These bones are not ossified at birth, and even the bones of the Carpus and Tarsus have made very little progress at that period.

Fig. 1.

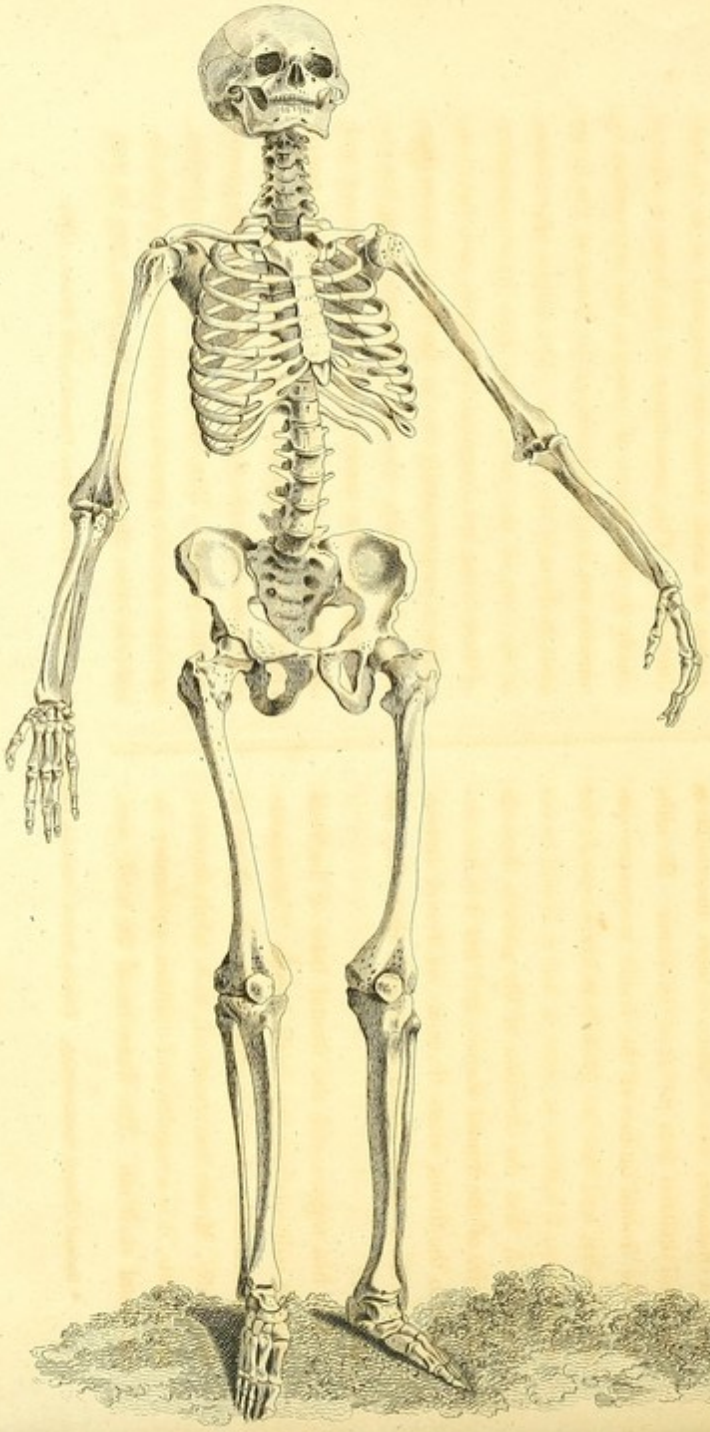
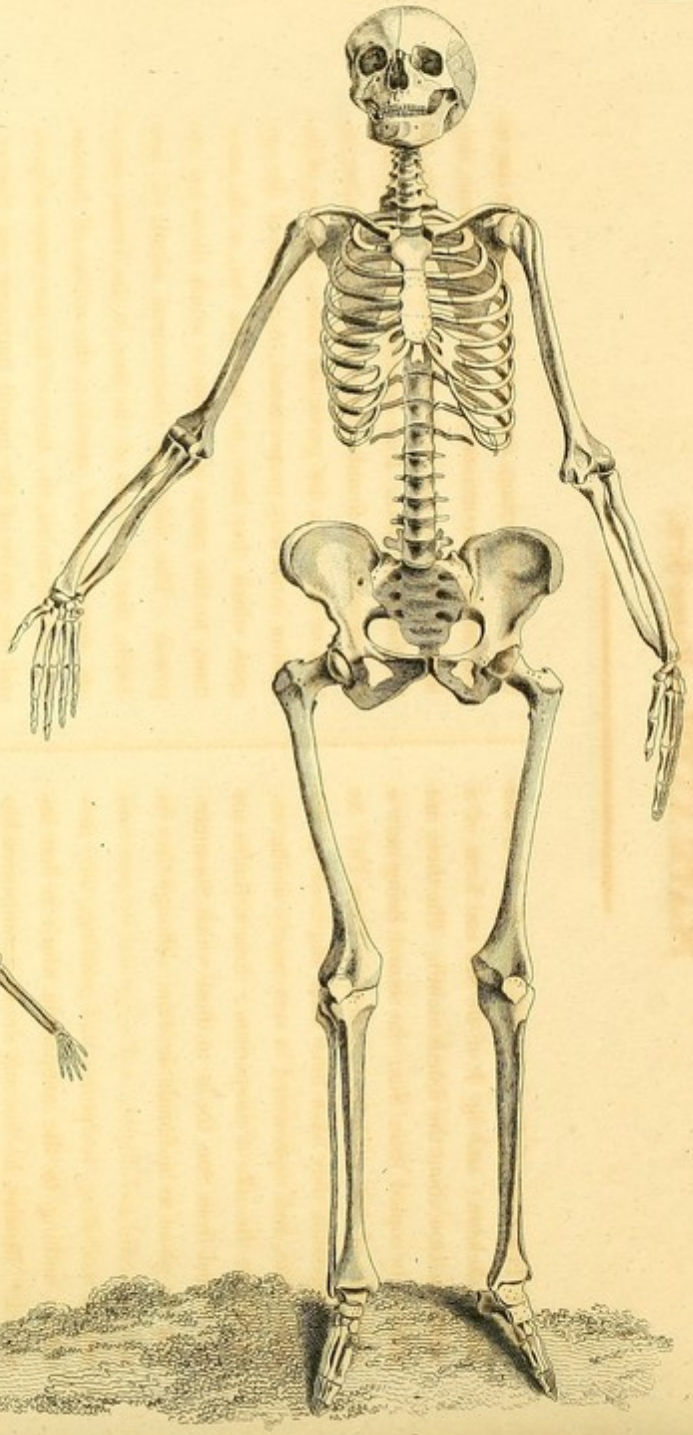


Fig. 3.

Fig. 2



E. Mitchell sculp.

PLATE XXXII.—From Sue.

Fig. 1. Is a view of the male skeleton; fig. 2. of the female skeleton; and fig. 3. of the size and form of a fœtal skeleton about the fourth month. The three are accurately copied from Sue, the second being only a repetition of that which has appeared in Plate IV. At my suggestion they have here been engraved on the same Plate, and represented in very nearly similar attitudes for the sake of comparison; these attitudes are also copied from Sue, for as to those which Soemmerring has given to his female skeleton, although they be more graceful and elegant, and suggested by men eminent in modelling, sculpture, and painting, they contribute nothing to the comparison which is here intended.* Besides, he has only drawn a comparison between the male and the female skeleton, while the third figure is here introduced to shew that many of those characters which he has described as peculiar to the female, are more obviously discernible in the fœtal skeleton. For instance, he observes, that the scull of the female is proportionally larger than that of the male, a character, surely, which is more discernible in the fœtal skeleton than in that of the female. He adds, that the frontal sinuses of the female are proportionally smaller, and that her glabella is less elevated; the observation, I believe, is correct, but it should be remembered, that the elevation of the glabella depends on the size of the frontal sinuses, and that it is less elevated in the fœtus, where there are no frontal sinuses, than in the adult or grown up female, where they are small.

Sue has represented the frontal bone of his fœtal skeleton as divided into two similar halves. This appearance occasionally occurs in adult males, though not so frequently, Monro has remarked, as in adult females; at any rate, it is a regular and uniform appearance in the fœtal skeleton. The foramina of the scull, continues Soemmerring, are, notwithstanding the size of the bones, proportionally smaller in the female skeleton than they are in the male, as, for instance, the two foramina optica. I am somewhat doubtful whether this remark be founded on widely extended observation, or only on a few particular cases; the size of foramina is not only proportioned to the size of the organs, which they have to transmit, but, at the same time, to the range of motion to which these are exposed. The following observations admit of less doubt, that the bones of the face, in the female skeleton, are smaller and smoother, the orifices of the nostrils less expanded, the forms of the jaws more elliptic, and the cavity of the mouth narrower and shorter. Yet if these be true with regard to the female, they are equally true with regard to the fœtus, where all the appearances to which they allude are more obviously striking. The size of the face depends much on the size of the jaws, now the jaws of the fœtus are formed only to hold twenty teeth, while those of a grown or adult female are elongated so as to hold thirty-two. The smoothness of the bones is affected chiefly by the actions of muscles, but impressions by muscles are less perceptible on the bones of the fœtus than in those of the female. The elliptic appearance, in the form of the jaws, arises from the circumstance of their being less elongated backwards, and that elongation is proportionally less in the fœtal skeleton than it is in the female. As for the nostrils being less expanded, and the cavity of the mouth narrower and shorter, these are consequences of the smaller bones of which they are composed, and which also are proportionally smaller in the fœtus than they are in the grown or adult female. The remark, that the intervertebral cartilages are of a greater proportional depth in the female skeleton than they are in the male, may be true

* Samuel Thomas Soemmerring. Tabula, Sceleti Feminini, juncta descriptione *Trajecti ad Mœnum apud Varrentrapp et Wenner*, 1787.

of the skeleton which he has depicted, which, he says, was that of a young female. The depth of these, to a certain extent, depends upon age, and upon the degree and continuance of the pressure to which they have been previously exposed. It is always greatest, cæteris paribus, in early life when the fluids are abundant, and in old age, when these become scanty, it is so much diminished that the spine is bent forward; it is also diminished in consequence of pressure, and therefore the body, which has been erect during the day, is shorter in the evening than it was in the morning, after lying for several hours in a posture where the pressure was removed. Be the depth, therefore, the effect of growth, or the want of pressure, these causes operate more powerfully in the fœtal skeleton than in the grown or adult female, and the facts will be found to support the conclusion.

That the thorax of the female skeleton, in general, is proportionally less than that of the male, cannot be questioned. The thorax is expanded by habitually frequent and vigorous inspirations, and these occasioned by habitually frequent and vigorous exertions, to which the female is not in general so much accustomed, and the fœtus still less in proportion, having no occasion for any respiration while it lies *in utero*, and but little occasion for vigorous respiration for several months even after birth. The thorax, therefore, of the fœtal skeleton is not only proportionally smaller than that of the female, but is sometimes scarcely the size of the head. Soemmerring adds, that the sternum of the female is proportionally shorter than that of the male; that her ribs lie in planes of inclination, which are somewhat different; that they form more acute angles with their sternal cartilages; that the shoulders slope more; and that there is a greater proportional distance between her last ribs and the crest of the Ilium. But all these appearances naturally result from the smallness of the thorax, and from the unfrequency of full inspirations; they are therefore more observable in the fœtal skeleton than in that of the female. As to his remark, that the cartilaginous parts of the ribs, compared with the ossified, are proportionally more extensive in the female than they are in the male; it may be observed, that, considering proportions, the same parts are still more extensive in the fœtal skeleton, where the ossification is only in its progress.

If the clavicles of the female be less curved, and her atlantal extremities proportionally smaller than those of the male, it should be recollected that the curves of the clavicles are somewhat increased by the more vigorous actions of the muscles, and, consequently, are proportionally less in the fœtus than they are in the female; that the smallness of her atlantal extremities keeps them more in proportion to the size of the thorax, and, besides that, their size must depend, in some measure, upon the nature of the employment to which they are habituated. It is well known that not only the strength, but the bulk of a hand, accustomed to frequent and hard labour, are considerably different from what they would have been, had the owner led an easy sedentary life.

That the feet of the female are proportionally smaller than those of the male, is an observation that, with few exceptions, is confirmed by experience. Yet this is not a character peculiar to the female, as not only the feet, but even the whole sacral extremities are proportionally smaller in the fœtal skeleton than they are in the female. During the time that the fœtus is *in utero*, the head, from its greater specific gravity, is the part most dependent in the liquor amnii; hence the impulse of the heart, which sends the blood to it, and

the two atlantal extremities is partly increased by the force of gravitation. On the contrary, after birth, when the body is erect, the same force operates against the impulse to the head, co-operating with that which sends the blood to the sacral extremities. The effects of such a gravitating force are frequently perceived in the œdematous swellings of the legs, counteracting the return of the venous blood and lymphatic fluids during the day, when the legs are perpendicular, or nearly perpendicular to the horizon, but permitting their return, during the night, on assuming the horizontal position, so that the swellings are generally found diminished towards morning, and increased towards evening. Nay, it is not improbable, that this gravitating force, by acting in favour of the sacral extremities, in consequence of the change which takes place at birth, may be partly the cause why these grow in length and in thickness proportionally faster than the two atlantal, and ultimately arrive at a larger size.

In his Appendix to his Treatise on the Bones, Monro has mentioned several characters of the female skeleton, which he supposes to result as much from a difference of habits, as a difference of sex; but, be the cause, or causes, what they may, that produce these changes, it certainly appears, that the female skeleton, in all the parts hitherto compared, does, in form and structure, deviate less than that of the male from those characters which were originally common to both. It is in the pelvis, and pelvis alone, that we perceive the strongly-marked and peculiar characters of the female skeleton. It is there that we cease to trace the analogies between its proportions and those of the fœtus; or, in other words, it is there that, in deviating from those characters which at one time were common to both, we regularly find it deviating farther than that of male—the pelvis of the fœtus being always proportionally the smallest of the three, and that of the female proportionally the largest. In attempting to account for these marked distinctions, the anatomist seldom pursues his inquiries into the nature of the primary cause, which plans the structure, and directs the processes of its organization. Confining his researches to objects of sense, he is generally satisfied with describing phenomena in the order of succession in which they appear, and supposes his explanation complete when he ascertains the visible means employed by the primary and invisible cause. In tracing these means, he observes the dependant posture of the head in the liquor amnii; sees the blood ascending in the arteries towards the pelvis, in opposition to the force of gravitation, and the same accelerated by the same force, as it descends in its return through the veins and lymphatics; he sees likewise the greatest portion of that blood which, after birth, flows towards the pelvis, diverted at this period into the two umbilical arteries, and the viscera of the abdomen pressing atlantad towards the diaphragm, instead of sacrad, toward the pelvis. From these appearances he is led irresistibly to the conclusion—that the cavity of the pelvis, in these circumstances, cannot have the same means of expansion that it has afterwards, when the umbilical arteries are closed, and when, in consequence of this change of structure, and the change of position, the blood is impelled to it with greater force and in greater quantity, and, at the same time, the abdominal viscera made to descend with a pressure from above, and a pressure outwards in every direction. At birth, therefore, the pelvis of the fœtus must always be proportionally small, though at this period, and for some time after, very little difference is to be observed between male and female in this part

of their osseous structure. This difference becomes only striking when they are approaching to the age of puberty. It is then that the female begins to exhibit a new phenomenon peculiar to her sex. It is then that in her, the blood begins to flow in a greater proportional quantity towards the pelvis than in the male; nay, in such a quantity as to exceed the demands of nourishment, and to require that the superabundance be regularly evacuated by a monthly discharge, a superabundance which, during her pregnancy, is reserved as necessary for the nourishment of her offspring. By this determination of her circulating fluids, the Os sacrum becomes broader and less bent forwards; her Ossa Ilia are expanded outwards; the angle under the symphysis pubis is enlarged; and the distance between the tuberosities of the Ischia considerably increased, while the Os coccyx and sacral extremities, from this diversion of blood to the pelvis, increase not so fast, nor arrive at the same proportional size as in the skeleton of the male adult.

After these remarks on the forms and structures of the human skeleton, which relate to the differences of age and sex, I have only to add, that certain forms of the face and head, different from any that are known to occur in the male, the female, or the fœtal skeleton, are, as Camper has shewn, regularly observed in those sculptured figures which the ancients formed to represent their imaginary deities. In the singular design of these uncommon artificial forms, it evidently appears, that the artists had something more in their view than the mere difference of what Camper has denominated the facial angle. The part called the Face has many resemblances to that of the fœtus, and therefore is found proportionally small compared with the part which is named the Cranium. The two jaws seem also to be formed like those of the fœtus, as if destined to hold only twenty teeth instead of thirty-two, but at the same time with such a depth and quantity of bone as are only to be found in the full vigour and meridian of life; the forehead, too, as well as the jaws, presents a combination equally uncommon; a fœtal form of the frontal bone, with two sinuses and a glabella proportionally elevated; a combination that leads to a feature which, to the eye of the anatomist, is strikingly peculiar; a nose raised from the small receding bones of the face to the same elevation as the glabella; a nose of such size, prominence, and strength, as irresistibly to suggest an idea very different from what we are apt to form in looking at the small, the slightly prominent, and the feeble nose continued from the flat glabella of the fœtus. By methods such as these, the effects certainly of much previous observation and reflection, the ancient sculptors, by artificial, yet harmonious combinations of those characters which indicate youth, with those which express the vigour of manhood, and the dignity of age, and by carefully excluding whatever implied debility in the one, or decay in the other, have produced forms which, though not natural, are admirably calculated to dazzle the eye, to captivate the fancy, and engage the feelings, before the judgment, which is tardy in its processes, has time to operate. Besides, these forms were not intended to be those merely of ordinary men; for, though meant to be human, they were also meant to be something more—the representations of heroes or of gods, of whom men were supposed to be resemblances; though resemblances as unlike as an ape is to a man.

PREFACE TO THE TABLE.

As Dr Monro, in describing the bones, has occasionally alluded to several of the muscles which are attached to them, with the view of rendering this part of his description still more complete, I have added, from my Work on the Muscular Motions of the Human Body, that Table, in which the Names of all the Bones of the Human Skeleton are enumerated, in nearly the order of demonstration; and under each, the names of the Muscles which are attached to it, either by what is called insertion or origin. If attached by insertion, their names are in Roman characters; if attached by origin, in Italic; if they have other attachments by insertion, the names of the parts into which they are inserted are in Roman characters, in a separate column towards the right; and if any other attachments by origin, the names of the parts from which they originate in Italic characters, in a similar column towards the left.

OS FRONTALE.

Occipitale. Temporalia.	*Epicranius.*	Cutis Orbiculares palpebrarum. Corrugatores superciliorum. Levatores labii sup. alarumque nasi.
	Orbicularis palpebrarum.	Cutis. Epicran. Corrug. supercil.
	Corrugatores superciliorum	Epicranius.
Sphenoidale. Temporalia. Jugalia.	*Temporales*	Maxilla basilaris.

OSSA PARIETALIA.

Frontale. Sphenoidale. Temporalia. Jugalia.	*Temporales*	Maxilla basilaris.

OSSA TEMPORALIA.

Sternum. Claviculæ.	Sternomastoidei.	
Processus transversi cervicis.	Trachelomastoidei.	
Processus spinales cervicis.	Splenii capitis.	
Occipitale. Frontale.	*Epicranius.*	Cutis. Orbic. palp. Corrug. supercil. Levator labii sup. alarumque nasi.
	Orbiculares palpebrarum.	Cutis Epicranius. Corrug. supercil. Levat. lab. sup. alarumque nasi.
Frontale. Sphenoidale. Parietalia. Jugalia.	*Temporales.*	Maxilla basilaris.
Jugalia.	*Masseteres.*	Maxilla basilaris.
	Digastrici.	Maxilla basilaris. Os hyoides.
	Stylohyoidei.	Os hyoides.
	Styloglossi.	Glossa seu lingua.
	Stylopharyngei.	Pharynx.
	Levatores palati mollis.	Velum pendulum palati.
	Laxatores tympanorum.	Mallei.
	Tensores tympanorum.	Mallei.
	Stapedii.	Stapedes.
	Anteriores auricularum.	Auriculæ.
	Retrahentes auricularum.	Auriculæ.

MALLEI.

Temporalia.	Laxatores tympanorum.
Tubæ Eustachii	Tensores tympanorum.
Sphenoidale.	Externi malleorum.

INCUDES.

Quibus musculi nulli.

ORBICULARIA.

Quibus musculi nulli.

STAPEDES.

Temporalia.	Stapedii.

OS OCCIPITALE.

Proc. spin. dorsi et cervicis.	Trapezii seu Cucullares.	Scapulæ. Claviculæ.
Proc. spin. cervicis.	Splenii capitis.	
Processus transversi cervicis et dorsi.	Complexi.	
Proc. spin. atlantis.	Recti capitis postici minores.	
Proc. spin. vertebræ dentatæ.	Recti capitis postici majores.	
Processus transversi cervicis.	Recti capitis interni majores.	
Atlas.	Recti capitis interni minores.	
Proc. trans. atlantis.	Recti capitis laterales.	
Proc. spin. atlantis.	Obliqui capitis superiores.	
Frontale. Temporalia.	*Epicranius.*	Cutis. Orbic. palp. Corrug. superciliorum.
	**Hyopharyngei.*	Os hyoides.
	**Syndesmo-pharyngei.*	Syndesmus ossis hyoidis.
	**Cephalo-pharyngei.*	Pharynx.

OS SPHENOIDALE.

Ossa temporalia, parietalia, jugalia, Frontale.	*Temporales.*	Maxilla basilaris.

* Vide constrictores pharyngis Albini.

OS SPHENOIDALE.

Maxilla coronalis.	*Pterygoidei externi.*	Maxilla basilaris.
Ossa palatina.	*Pterygoidei interni.*	Maxilla basilaris.
	Pterygo-pharyngei.	Pharynx.
	Circumflexi palati.	Velum pendulum palati. Uvula.
	Externi malleorum.	Mallei.
	Levatores palpebrarum superiorum.	Palpebræ superiores.
	Obliqui superiores oculorum.	Oculi.
	Recti attollentes oculorum.	Oculi.
	Recti abductores oculorum.	Oculi.
	Recti adductores oculorum.	Oculi.
	Recti depressores oculorum.	Oculi.

OS ESTHMOIDALE.

Cui musculi nulli.

OSSA LACHRYMALIA.

Quibus musculi nulli.

OSSA JUGALIA.

Frontale. Parietalia. Sphenoidale.	*Temporales.*	Maxilla basilaris.
Temporalia.	*Masseteres.*	Maxilla basilaris.
	Zygomatici majores.	Orbicularis oris.
	Zygomatici minores.	Orbicularis oris.

OSSA NASALIA.

Quibus musculi nulli.

MAXILLA CORONALIS.

	Compressores narium.	Cutis.
	Levatores labii superioris alarumque nasi.	Alæ nasi. Orbic. oris.
	Levatores anguloruni oris.	Orbicularis oris.
	Depressores labii sup. alarumque nasi.	Alæ nasi. Labrum superius.
Maxilla basilaris.	*Buccinatores.*	Orbic. oris.

MAXILLA CORONALIS.

	Mylopharyngei.	Pharynx
Sphenoidale.	*Pterygoidei externi.*	Maxilla basilaris.
	Obliqui inferiores oculorum.	Oculi.

OSSA PALATINA.

Sphenoidale.	*Pterygoidei interni.*	Maxilla basilaris.
	Azygus uvulæ.	Uvula seu staphy é

VOMER.

Cui musculi nulli.

OSS. SPONGIOS. BASILAR.

Quibus musculi nulli.

MAXILLA BASILARIS.

Parietalia. Temporalia. Jugalia. Frontale. Sphenoidale.	Temporales.	
Temporalia Jugalia.	Masseteres.	
Sphenoidale. Maxilla coronalis.	Pterygoidei externi.	
Sphenoidale. Palatina.	Pterygoidei interni.	
Tela cellulosa inter cutem et musculos deltoideos pectoralesque majores.	Latissimi colli.	Depressores angulorum oris, &c. Vid. Albin.
Temporalia.	Digastrici.	
	Mylohyoidei.	Hyoides.
	Geniohyoidei.	Hyoides.
Hyoides.	*Geniohyoglossi.*	Glossa seu lingua.
Maxilla coronalis.	*Buccinatores.*	Orbicularis oris
	Depressores angulorum oris.	Orbicularis oris.
	Depressores labii inferioris.	Orbicularis oris.
	Levatores menti.	Adeps et cutis labii inferioris.
	Mylopharyngei.	Pharynx.

DENTES.

Quibus musculi nulli.

OS HYOIDES.*

Ossa temporalia.	Digastrici.	Maxilla basilaris.*
*Maxilla basilaris.**	Mylohyoidei.	
Ossa temporalia.	Stylohyoidei.	
*Maxilla basilaris.**	Geniohyoidei.	
Cartilago thyroides.	Thyrohyoidei.	
Sternum.	Sternohyoidei.	
Scapulæ.	Omohyoidei.	
Occipitale.	Hyopharyngei.	
	Hyoglossi.	Glossa seu lingua.
Maxilla basilaris.	*Geniohyoglossi.*	Glossa seu lingua.

COLUMNA VERTEBRALIS.

Vertebræ Cervicis.

Vertebræ dors. Proces. trans. cervicis.	Longi colli.	
Atlas.	*Recti capitis interni minores.*	Os occipitale.

Processus Spinales.

Processus spinales cervicis.	Interspinales colli.	
Proc. trans. cervicis et dorsi.	Multifidi spinæ.	
Proces. trans. cervicis et dorsi.	Semispinales colli.	
Proces. trans. dorsi.	Semispinales dorsi.	Proc. spin. dorsi.
Proces. spinales dorsi.	*Trapezii.*	Os occipitale. Scapulæ. Claviculæ.
	Splenii capitis.	Ossa temporalia.
Proc. spin. vertebræ dentatæ.	*Recti capitis postici majores.*	Os occipitale.
Proc. spin. atlantis.	*Recti capitis postici minores.*	Os occipitale.
Proces. spinal. vertebræ dentatæ.	*Obliqui capitis inferiores.*	Processus transversi atlantis.
Processus spinales dorsi.	*Serrati postici superiores.*	Costæ.
	Rhomboidei minores.	Bases scapularum.

Processus Transversi.

Proces. trans. cervicis.	Intertransversarii colli priores.
Proces. trans. cervicis.	Intertransversarii colli posteriores.
Processus spinales dorsi.	Splenii colli.

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* Incertum sæpe quæ mobiliora.

Processus Transversi.

Proces. transversi dorsi.	Transversales cervicis.	
Costæ.	Cervicales descendentes.	
Proces. spinalis vertebræ dentatæ.	Obliqui capitis inferiores.	Proces. trans. atlantis.
Proces. trans. dorsi.	*Semispinales colli.*	Proc. spin. cervicis.
	Multifidi spinæ.	Proc. spin. cervicis.
Proces. trans. dorsi.	*Complexi.*	Os occipitale.
Proces. trans. dorsi.	*Trachelo-mastoidei.*	Ossa temporalia.
Proces. trans. atlantis.	*Obliqui capitis superiores.*	Os occipitale.
Proces. trans. cervicis.	*Recti capitis interni majores.*	Os occipitale.
Proc. trans. atlantis.	*Recti capitis laterales.*	Os occipitale.
	Scaleni.	Costæ.
Vertebræ dorsi.	*Longi colli.*	Vertebræ cervicis.
	Levatores scapularum.	Scapulæ.
	Levatores breviores duo costarum.	Costæ.

Vertebræ Dorsi.

Ilia.	Quadrati lumborum.	Proces. trans. lumborum. Vertebra ultima dorsi. Costæ ultimæ.
Proces. trans. ultimi. Vertebra ultima dorsi. Vertebræ et proces. trans. lumborum.	*Psoæ Magni.*	Femora.

Processus Spinales.

Proces. spinales lumborum.	Spinales dorsi.	
Proces. trans. dorsi.	Semispinales dorsi.	Proc. spin. cervicis.
Proces. trans. dorsi et lumborum.	Multifidi spinæ.	
Proc. spin. cervicis.	*Trapezii.*	Scapulæ. Claviculæ. Os occipitale.
Proces. spinales sacri lumborum. Cristæ iliorum. Costæ.	*Latissimi dorsi.*	Humeri.
Proces. spinales lumborum.	*Serrati postici inferiores.*	Costæ.
Proces. spinales cervicis.	*Serrati postici superiores.*	Costæ.
	Rhomboidei majores.	Bases scapularum.
	Splenii colli.	Proces. trans. colli.
Proces. trans. dorsi.	* *Biventres cervicis.*	Os occipitale.

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* Vide Albini Hist. Musculorum.

Processus Transversi.

Cristæ iliorum. Proces. spinales et transversi Sacri et lumborum.	Longissimi dorsi.	Costæ.
	Semispinales dorsi.	Proces. spinales dorsi et cervicis.
	Multifidi spinæ.	Proces. spinales dorsi et cervicis.
	Semispinales colli.	Proces. spinales cervicis.
Proces. trans. cervicis.	*Complexi.*	Os occipitale.
Proces. spinales dorsi et cervicis.	*Biventres cervicis.*	Os occipitale.
Proces. trans. cervicis.	*Trachelo-mastoidei.*	Ossa temporalia.
Proces. trans. dorsi.	*Transversales cervicis.*	Proces. trans. cervicis.

Vertebræ Lumborum.

Costæ.	*Diaphragma.*	Tendo cordiformis.
Vertebra ult. Proces. trans. ultim. dorsi.	*Psoæ magni.*	Femora.
	Psoæ Parvi.	Pubis.

Processus Spinales.

Sacrum. Proces. trans. lumborum.	Multifidi spinæ.	
Ilia. Proces. spinales sacri, lumborum, et dorsi. Costæ.	*Latissimi dorsi.*	Humeri.
Proces. spinales dorsi.	*Serrati postici inferiores.*	Costæ.
Ilia. Costæ. Proces. spinales sacri. Proces. spinales et transversi lumborum.	*Sacrolumbales cum Accessoriis.*	Costæ.
Ilia. Proces. spin. Sacri. Proces. spin. et trans. lumborum.	*Longissimi dorsi.*	Costæ et proces. trans. dorsi.
Proces. spin. Sacri. Trans. lumborum. Ilia. Ligamentum Pouparti.	*Obliqui externi abdominis.*	Costæ. Linea alba.

Processus Transversi.

Ilia.	Quadrati lumborum.	Costæ ultimæ. Vertebra ultima dorsi.
Ilia. Proces. spin. sacri et lumborum.	*Longissimi dorsi.*	Costæ et proc. trans. dorsi.
Ilia. Costæ. Proces. spin. sacri et lumborum.	*Sacrolumbales cum Accessoriis.*	Costæ.
Sacrum.	*Multifidi spinæ.*	Proces. spin. lumborum et dorsi.

Processus Transversi.

Ilia. Sacrum. Proces. spin. lumborum. Ligamentum Pouparti.	*Obliqui interni abdominis.*	Linea alba. Costæ.
Ilia. Ligamenta Pouparti.	*Transversi abdominis.*	Linea alba. Costæ.

Vertebræ Sacri.

Quibus musculi nulli.

Processus Spinales.

Ilia. Costæ. Proces. spin. lumborum et dorsi.	*Latissimi dorsi.*	Humeri.
Ilia. Proces. spin. et trans. lumborum. Ligamenta Pouparti.	*Obliqui interni abdominis.*	Costæ. Linea alba.
Ilia. Proces. spin. et trans. lumborum.	*Longissimi dorsi.*	Proces. trans. dorsi et costæ.
Ilia. Costæ. Proces. spin. et trans. lumborum.	*Sacrolumbales cum Accessoriis.*	Costæ.
Ilia. Coccyx. Proces. trans. Sacri.	*Glutei magni.*	Femora. Vaginæ femorum.
Ilia. Proces. trans. Sacri.	*Multifidi spinæ.*	Proces. spin. lumborum.

Processus Transversi.

Ilia. Proces. spin. Sacri. Coccyx. Ligamenta sacro-sciatica.	*Glutei magni.*	Femora. Vaginæ femorum.
Ilia. Proces. spin. Sacri.	*Multifidi spinæ.*	Proces. spin. lumborum.
	Coccygei.	Coccyx.
	Curvatores coccygis.	Coccyx.
Ilia.	*Pyriformes.*	Femora.

COCCYX.

Ischia.	Coccygei.	Coccyx.
Sacrum.	Curvatores coccygis.	Coccyx.
Pubes. Ischia.	*Levator ani.*	Sphincter ani. Acceleratores urinæ. Transversales perinei.
Ilia. Sacrum. Ligamenta sacro-sciatica.	*Glutei magni.*	Femora. Vaginæ femorum.

COSTÆ.

Costæ.	Intercostales.	
Proces. trans. dorsi.	Levatores longiores costarum.	
Proces. trans. dorsi et colli.	Levatores breviores costarum.	
Sternum. Cartilago ensiformis.	Triangulares sterni.	
Proces. spin. dorsi et cervicis.	Serrati postici superiores.	
Proces. spin. dorsi et lumborum.	Serrati postici inferiores.	
Ilia. Sacrum. Proces. spin. et trans. lumborum.	Sacrolumbales.	
Ilia. Sacrum. Proces. spin. et trans. lumborum.	Longissimi dorsi.	Proces. trans. dorsi.
Ilia.	Quadrati lumborum.	Proces. trans. lumborum. Costæ ultimæ. Vertebra ultima.
Ilia. Pubes.	Obliqui externi abdominis.	Linea alba.
Ilia. Sacrum. Obliqui externi. Proces. spin. et trans. lumborum.	Obliqui interni abdominis.	Linea alba.
Proces. trans. cervicis.	Scaleni.	
Ilia. Obliqui externi. Proces. trans. lumborum.	*Transversi abdominis.*	Linea alba.
	Subclavii.	Claviculæ
Claviculæ. Sternum.	*Pectorales majores.*	Humeri.
	Serrati antici.	Scapulæ.
	Serrati magni.	Scapulæ.
Ilia. Sacrum. Proces. spin. lumborum et dorsi.	*Latissimi dorsi.*	Humeri.
	Accessorii ad sacrolumbalem.	Sacrolumbales.
Vertebræ lumborum.	*Diaphragma.*	Tendo cordiformis.

CLAVICULÆ.

Costæ primæ.	Subclavii.	
Occipitale. Proces. spin. cervicis et dorsi.	Cucullares.	Scapulæ.
Sternum.	*Sternomastoidei.*	Ossa temporalia.
Sternum.	*Sternohyoidei.*	Os hyoides.
Costæ et sternum.	*Pectorales.*	Humeri.
Spinæ scapularum.	*Deltoidei.*	Humeri.

SCAPULÆ.

Occipitale. Proces. spin. cervicis et dorsi.	Cucullares.	Claviculæ.
Proces. spin. cervicis et dorsi.	Rhomboidei.	
Proces. trans. cervicis.	Levatores scapularum.	
Costæ.	Serrati antici.	
Costæ.	Serrati magni.	
	Coracohyoidei.	Hyoides.
	Supraspinati.	Humeri. Capsæ articulorum.
	Infraspinati.	Humeri. Capsæ articulorum.
	Teretes majores.	Humeri.
	Teretes minores.	Humeri. Capsæ articulorum.
	Subscapulares.	Humeri. Capsæ articulorum.
Claviculæ.	*Deltoidei.*	Humeri.
	Coraco-brachiales.	Humeri.
	Tricipitum brachiorum capita longa.	Ulnæ et humeri.
	Bicipites brachiorum.	Radii et aponeuroses cubitorum.

HUMERI.

Claviculæ. Scapulæ.	Deltoidei.	
Scapulæ.	Supraspinati.	Capsæ articulorum.
Scapulæ.	Infraspinati.	Capsæ articulorum.
Scapulæ.	Teretes majores.	
Scapulæ.	Teretes minores.	Capsæ articulorum.
Scapulæ.	Subscapulares.	Capsæ articulorum.
Scapulæ.	Coraco-brachiales.	
Claviculæ. Costæ. Sternum.	Pectorales.	
Scapulæ.	Tricipitum brachiorum capita longa.	Ulnæ.
Proces. spin. sacri, lumborum, dorsi. Ilia. Costæ.	Latissimi dorsi.	
	Tricipitum brachiorum capita brevia.	Ulnæ.
	Tricipitum brachiorum capita, nomine Brachiales externi.	Ulnæ.
	Anconei.	Ulnæ.
	Brachiales interni.	Ulnæ.
	Supinatores longi.	Radii.
	Radiales externi longiores.	Metacarp. indicum.

HUMERI.

Ulnæ. Capsæ articulorum.	*Supinatores breves.*	Radii.
Condylis radialibus humerorum, capsis articulorum, vaginis cubitorum, et ulnis, sepimentis aponeuroticis interpositis, connexi oriuntur.	*Radiales externi breviores.*	Metacarpi digitorum mediorum.
	Extensores communes digitorum.	Phalanges digitorum.
	Extensores proprii auricularium.	Phalanges digitorum auricularium.
	Ulnares externi.	Metacarpi digitorum auricularium.
Condylis ulnaribus humerorum, capsis articulorum, vaginis cubitorum, et ulnis, sepimentis aponeuroticis interpositis, connexi oriuntur.	*Palmares longi.*	Aponeuroses palmares. Ligamenta annularia.
	Radiales interni.	Metacarpi indicum. Trapezia.
	Ulnares interni	Ossa pisiformia. Lig. annularia.
	Pronatores teretes.	Radii.
Radii, et origines communes palmarium long. &c.	*Sublimes.*	Phalanges mediæ digitorum.

ULNÆ.

Scapulæ. Humeri.	Tricipites longi.	Capsæ articulorum.
Humeri.	——— breves.	
Humeri.	——— brachiales externi.	
Humeri.	Brachiales interni.	Capsæ articulorum.
Condylis radialibus humerorum, capsis articulorum, vaginis cubitorum, et ulnis, sepimentis aponeuroticis interpositis, connexi oriuntur.	*Extensores communes digitorum.*	Phalanges digitales.
	Extensores proprii auricularium.	Phalanges digitorum auricularium.
	Ulnares externi.	Metacarpi digitorum auricularium.
	Radiales externi breviores.	Metacarpi digitorum mediorum.
Ulnæ.	*Indicatores.*	Phalanges indicum.
Condylis ulnaribus humerorum, capsis articulorum, vaginis cubitorum, et ulnis, sepimentis aponeuroticis interpositis, connexi oriuntur.	*Palmares longi.*	Aponeuroses palmares. Ligamenta annularia.
	Radiales interni.	Metacarpi indicum. Ossa trapezia.
	Ulnares interni.	Ossa pisiformia. Lig. annularia.
	Pronatores teretes.	Radii.
Radii, et origines communes pulmarium long. &c.	*Sublimes.*	Phalanges digitales mediæ.
Ligamenta interossea.	*Profundi.*	Phalanges digitales distales.
Radii. Ligamenta interossea.	*Abductores longi pollicum, seu Extensores primi internodii.*	Metacarpi pollicum, interdum ossa trapezia, et abductores breves.
Radii. Ligamenta interossea.	*Extensores minores, seu secundi internodii.*	Phalanges proximales pollicum.
Ligamenta interossea.	*Extensores majores, seu tertii internodii.*	Phalanges distales pollicum.

RADII.

Scapulæ.	Bicipites.	Aponeuroses cubitorum.
Humeri.	Supinatores longi.	
Humeri. Ulnæ. Capsæ articulorum.	Supinatores breves.	
Una cum radialibus internis, &c. Vide Humeri et Ulnæ.	Pronatores teretes. Pronatores quadrati.	
Una cum extensoribus commun. digitorum. Vide Humeri et Ulnæ.	*Ulnares externi.*	Metacarpi digitorum minimorum.
Vide Humeri et Ulnæ.	*Extensores communes digitorum.*	Phalanges digitorum.
Ulnæ interdum.	*Flexores longi pollicum.*	Phalanges distales pollicum.
Una etiam cum radialibus internis, &c. Vide Humeri et Ulnæ.	*Sublimes.*	Phalanges mediæ digitorum.

CARPI.

Scaphoidea.

Quibus musculi nulli.

Lunaria.

Quibus musculi nulli.

Cuneiformia.

Quibus musculi nulli.

Pisiformia.

	Ulnares interni.	Metacarpi digitorum annularium. Ligamenta annularia.
Ligamenta annularia.	*Abductores digitorum auricularium.*	Phalanges proximales.

Trapezia.

Ulnæ. Radii. Ligamenta interossea.	*Abductores longi pollicum nonnunquam.*	Metacarpi pollicum.
Ossa magna et unciformia.	*Opponentes pollicum, seu Flexores metacarporum.*	Metacarpi pollicum.
Ligamenta carpi.	*Abductores breves pollicum.*	Phalanges proximales pollicum.

Trapezia.

Metacarpi pollicum. Metacarpi indicum interdum.	*Abductores indicum.*	Phalanges proximales. Tendines Extensorum.

Trapezoidea.

Ossa magna, unciformia. Metacarpi digitorum indicum, mediorum, annularium.	*Flexores breves pollicum.*	Phalanges proximales, interventu ossium sesamoidûm.

Unciformia.

Condyli ulnares humerorum, &c. Vide Humeri et Ulnæ.	Ulnares interni.	Pisiformia. Metacarpi digit. auricularium.
Ossa magna. Trapezoidea. Metacarpi digitorum indicum, mediorum, annularium.	*Flexores breves pollicum.*	Phalanges proximal. interventu ossium sesamoidûm.
Ligamenta carpi.	*Adductores metacarpi digitorum auricularium.*	Metacarpi digitorum auricularium.
Ligamenta carpi.	*Flexores parvi digitorum auricularium.*	Phalanges proximales digitorum auricularium.

METACARPI.

Primi, seu Pollicum.

Ligament. annularia. Trapezia. Ossa magna et unciformia.	Opponentes pollicum.	
Ulnæ. Radii. Ligamenta interossea.	Abductores longi pollicum, seu Extensores primorum internodiorum.	
Trapezia. Nonnunquam metacarpi indicum.	*Abductores indicum.*	Phalanges proximales indicum.

Secundi, seu Indicum.

Humeri.	Radiales externi longiores.	
Humeri. Sed vide Humeri et Ulnæ.	Radiales interni.	

Secundi, seu Indicum.

Interossei.
Vola radiales indicum.
Vola-ulnares indicum.
Anconi-radiales digitorum mediorum.
} Phalanges proximales et tendines Extensorum communium.

Trapezia. Trapezoidea. Ossa magna, unciformia. Metacarpi digitorum indicum, mediorum, et annularium.

Flexores breves pollicum.

Tertii, seu Digit. Mediorum.

Radiales externi breviores.

Interossei.

Metacarpi secundi, seu indicum.

Anconi-radiales digitorum mediorum.

Metacarpi quarti, seu digitorum annularium.

Anconi-ulnares digitorum mediorum.

} Phalanges proximales et tendines Extensorum communium.

Adductores pollicum. — Phalanges proximales pollicum, interventu ossium sesamoidûm.

Quarti, seu Digit. Annullar.

Interossei.
Vola-radiales digitorum annularium.
Anconi-ulnares digitorum annularium.
} Phalanges proximales et tendines Extensorum communium.

Metacarpi quinti, seu digitorum auricularium.

Quinti, seu Digit. Auricular.

Vide Humeri et Ulnæ.

Ossa unciformia Ligamenta annularia.

Ulnares externi.

Adductores metacarp. digitorum auricularium.

Interossei.

Vola-radiales.* — Phalanges proximales et tendines Extensorum communium.

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* Anconi-ulnares desunt eorum vices supplent abductores digit. auricular.

PHALANGES DIGITALES.

POLLICUM.

Phalanges Proximales.

Ulnæ. Ligamenta interossea.	Extensores minores pollicum, seu internodiorum secundorum.	
Ossa unciformia, trapezoidea, magna. Metacarpi digitorum indicum, mediorum, annularium.	Flexores breves pollicum.	Interventu ossium sesamoidûm.
Trapezia. Ligamenta annularia.	Abductores breves pollicum.	
Metacarpi digitorum mediorum.	Adductores pollicum.	

Phalanges Distales.

Ulnæ. Ligamenta interossea.	Extensores majores pollicum.
Radii. Ligamenta interossea. Nonnunquam Ulnæ et Humeri.	Flexores longi pollicum.

PHALANGES DIGITORUM.

Indicum.

Mediorum.

Annularium.

Auricularium.

Phalanges Omnes.

Condyli radiales humerorum, &c. Vide Humeri et Ulnæ.	Extensores communes.	

Phalanges Proximales.

Tendines Profundorum.	Lumbricales.	Tendines Extensorum communium.
Metacarpi.	Interossei.	

Phalanges Mediæ.

Condyli ulnares humerorum, &c. Vide Humeri et Ulnæ.	Sublimes.	

Phalanges Distales.

Ulnæ. Ligamenta interossea.	Profundi.	

MUSCULI PROPRII.

Digitorum Auricularium.

Una cum Extensoribus communibus.	Extensores proprii digitorum auricularium.	
Unciformia. Ligamenta annularia.	Flexores parvi digitorum auricularium.	Phalanges proximales.
Pisiformia. Lig. annular.	Abductores dig. auricular.*	Phalanges proximales.

Digitorum Indicum.

Ulnæ.	Indicatores.	Tendines Extensorum communium.
Trapezia. Metacarpi pollicum.	Abductores indicum.	Phalanges proximales.

ILIA.

Proces. spinal. sacri, lumborum, et dorsi. Costæ.	*Latissimi dorsi.*	Humeri.
Sacrum. Proces. spinales et transversi lumborum.	*Longissimi dorsi.*	Costæ. Proces. transversi dorsi.
Sacrum. Proces. spinales et transversi lumborum.	*Sacrolumbales.*	Costæ.
Pubes.	*Obliqui externi abdominis.*	Costæ. Linea alba.
Obliqui externi. Sacrum. Proces. spin. et trans. lumborum.	*Obliqui interni abdominis.*	Costæ. Linea alba.
Obliqui externi. Proces. transversi lumborum.	*Transversi abdominis.*	Costæ. Linea alba.
Ligamenta ilio-lumbaria.	*Quadrati lumborum.*	Proces. transversi lumborum. Costæ duodecimæ. Vertebra duodecima dorsi.

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* Anconi-ulnarium vices supplent. Vide Interossei supra.

ILIA.

Aliquando sacrum.	*Iliaci interni.*	Femora.
Sacrum.	*Pyriformes, seu Iliaci externi.*	Femora.
Sacrum. Coccyx. Ligamenta sacro-sciatica.	*Glutei magni.*	Femora et vaginæ femorum.
	Glutei medii.	Femora.
	Glutei parvi.	Femora.
	Tensores vaginarum.	Femora. Rotulæ. Tibiæ.
	Sartorii.	Tibiæ.
	Recti crurum.	Tibiæ, interventu rotularum.

PUBES.

	Psoæ parvi.	Vertebra ultima dorsi. Prima lumborum.
	Recti abdominis.	Costæ.
	Pyramidales.	Recti. Linea alba.
	Pectinei.	Femora.
	Graciles.	Tibiæ.
	Adductores longi.	Femora.
	Adductores breves.	Femora.
Ischia.	*Adductores magni.*	Femora.
Ischia.	*Obturatores externi.*	Femora.
Ischia.	*Obturatores interni.*	Femora.

ISCHIA.

	Gemini.	Femora.
	Semitendinosi.	Tibiæ.
	Semimembranosi.	Tibiæ.
Femora.	*Bicipites crurum.*	Fibulæ.
Pubes.	*Adductores magni.*	Femora.
	Quadrati femorum.	Femora.
Pubes.	*Obturatores externi.*	Femora.
Pubes.	*Obturatores interni.*	Femora.

FEMORA.

Ilia. Sacrum. Coccyx.	Glutei magni.	Vaginæ femorum. Rotulæ et tibiæ, interventu vaginarum.

FEMORA.

Ilia.	Glutei medii.	
Ilia.	Glutei parvi.	
Ilia. Sacrum.	Pyriformes, seu Iliaci externi.	
Ischia.	Gemini.	
Ischia. Pubes.	Obturatores externi.	
Ischia. Pubes.	Obturatores interni.	
Ischia.	Quadrati femorum.	
Ilia.	Tensores vaginarum.	Rotulæ. Tibiæ.
Pubes.	Pectinei.	
Pubes.	Adductores longi.	
Pubes.	Adductores breves.	
Pubes. Ischia.	Adductores magni.	
Vertebræ et proces. transversi lumborum. Vertebræ et proces. transversi ultimi dorsi.	Psoæ magni.	
Ilium. Aliquando sacrum.	Iliaci interni.	
	Vasti externi.	Tendines Rectorum, Tibiæ, interventu rotularum.
	Vasti interni.	Tendines Rectorum, Tibiæ, interventu rotularum.
	Crurei.	Tibiæ, interventu rotularum.
	Gemelli.	Calcanea.
Capsæ genuum.	*Plantares.*	Calcanea.
	Capita brevia bicipitum crurum.	Fibulæ.
Capsæ genuum. Cartilagines semilunares.	*Poplitei.*	Tibiæ.

TIBIÆ.

Ilia.	Sartorii.	
Pubes.	Graciles.	
Ischia.	Semitendinosi.	
Ischia.	Semimembranosi.	
Ilia.	Recti crurum.	Interventu Rotularum.
Femora.	Crurei.	
Femora.	Vasti interni.	
Femora.	Vasti externi.	
Ilia.	Tensores vaginarum femorum.	Femora. Rotulæ.

TIBIÆ.

Ligamenta interossea.	*Tibiales antici.*	Os cuneiforme internum. Metatarsi digitorum magnorum, primorum, seu pollicum.
Fibulæ.	*Extensores longi digitorum pedum.*	Phalanges digitorum minorum.
Fibulæ.	*Solei.*	Calcanea.
Fibulæ. Ligamenta interossea.	*Flexores longi digitorum pedum, seu profundi.*	Phalanges distales digitorum minorum.
Fibulæ. Ligamenta interossea.	*Tibiales postici.*	Ossa navicularia, unceiformia, interna, media externa, cuboidea, calcanea. Metatarsi digitorum tertiorum.

FIBULÆ.

Ischia. Femora.	Bicipites Flexores crurum.	
Tibiæ. Vaginæ femorum. Tendines bicipitum.	*Peronei longi.*	Metatarsi digitorum primorum, seu pollicum. Ossa cuneiformia prima.
	Peronei breves.	Metatarsi digitorum quintorum.
	Peronei tertii, seu Noni Vesalii.	Metatarsi digitorum quintorum.
Tibiæ.	*Extensores longi digitorum pedum.*	Phalanges digitorum minorum.
	Extensores proprii pollicum pedum.	Phalanges digitorum primorum.
Tibiæ.	*Flexores longi pollicum pedum.*	Phalanges distales digitorum primorum, seu pollicum. Calcanea.

TARSI.

Ossa Calcanea.

Femora.	Gemelli, seu Gastrocnemii.	
Tibiæ. Fibulæ.	Solei.	
Femora. Capsæ genuum. Cartilagines semilunares.	Plantares.	
	Extensores breves digitorum pedum.	Tendines Extensorum longorum, tendinibus digitorum quintorum exceptis.
	Flexores breves digitorum pedum, seu sublimes.	Phalanges mediæ digitorum minorum.

TARSI.

Ossa Calcanea.

	Massæ carneæ Jacobi Sylvii, seu Flexores digitorum accessorii.	Tendines Flexorum longorum digitorum pedum.
Ossa cuneiformia tertia. Nonnunquam adhesiones aliæ.	*Flexores breves pollicum pedum.*	Phalanges proximales, interventu ossium sesamoidûm.
Ligamenta astragalorum cervices sustinentia.	*Abductores pollicum pedum.*	Phalanges proximales, interventu ossium sesamoidûm.
Ossa cuboidea, cuneiformia tertia. Nonnunquam metatarsi quarti, tertii, secundi. Tendines Peroneorum longorum.	*Adductores pollicum.*	Phalanges proximales, interventu ossium sesamoidûm.
Metatarsi digitorum minim. Aponeuroses plantares.	*Abductores minimorum digitorum.*	Phalanges proximales digitorum quintorum, seu minimorum.

Astragali.

Quibus musculi nulli.

Navicularia.

Fibulæ. Ligamenta interossea.	Tibiales postici.	Ossa cuneiformia. Sæpe cuboidea. Calcanea. Metatarsi tertiorum digitorum.

Cuboidea.

Fibulæ. Ligamenta interossea.	Tibiales postici.	Navicularia. Cuneiformia. Sæpe Calcanea et metatarsi digitorum tertiorum.
Cuboidea. Cuneiformia tertia. Nonnunquam metatarsi quarti, tertii, secundi. Ligamenta trochlearia Peroneorum longorum.	*Adductores pollicum.*	Phalanges proximales, interventu ossium sesamoidûm.
Ligamenta trochlearia Peroneorum longorum. Metatarsi digitorum minimorum. Nonnunquam aponeuroses plantares.	*Flexores breves digitorum minimorum.*	Phalanges proximales digitorum quintorum, seu minimorum.

Cuneiformia Prima, seu Interna.

Tibiæ. Ligamenta interossea.	Tibiales antici.	Metatarsi digitorum primorum, seu magnorum, seu pollicum.
Tibiæ. Fibulæ. Vaginæ femorum. Tendines bicipitum.	Peronei longi.	Metatarsi digitorum primorum, seu magnorum, seu pollicum.
Tibiæ. Fibulæ. Ligamenta interossea.	Tibiales postici.	Ossa navicularia, cuneiformia secunda, tertia, Cuboidea. Calcanea. Metatarsi digitorum tertiorum.
Metatarsi primi et secundi.	*Abductores indicum, seu digitorum secundorum.*	Latera tibialia. Phalang. proximales.

Cuneiformia Secunda, seu Media.

Tibiæ. Fibulæ. Ligamenta interossea.	Tibiales postici.	Ossa navicularia, Cuneiformia prima, tertia, Cuboidea, Calcanea. Metatarsi tertii.

Cuneiformia Tertia, seu Externa.

Nonnunquam tendines Tibialium posticorum. Aponeuroses plantares. Cuboidea. Ligamenta inter cuboidea et cuneiformia tertia. Ligamenta inter cuboidea et calcanea.	*Flexores breves pollicum.*	Phalanges proximales, interventu ossium sesamoidûm.
Calcanea. Ligamenta Astragalorum cervices sustinentia.	*Abductores pollicum.*	Phalanges proximales, interventu ossium sesamoidûm.

METATARSI.

Primi, seu Pollicum.

	Transversales pedum.	Metatarsi quinti, &c. &c.*
Tibiæ. Fibulæ. Vaginæ femorum. Tendines bicipitum.	Peronei longi.	Ossa cuneiformia prima.
Metatarsi secundi. Ossa cuneiformia prima, seu interna.	†* *Abductores indicum, seu digitorum secundorum pedum.*	Latera tibialia. Phalang. proximales.

Secundi, seu Indicum.

		Phalang. prox. Tend. Extensorum.
Metatarsi primi. Ossa cuneiformia prima, seu interna.	† * *Abductores digitorum secundorum.*	Latera tibialia.
Metatarsi tertii.	† * *Adductores digitorum secundorum.*	Latera fibularia.

Tertii, seu Digitorum Mediorum.

		Phalang. prox. Tend. Extensorum.
	* *Abductores digitorum tertiorum.*	Latera tibialia.
Metatarsi quarti.	† * *Adductores digitorum tertiorum.*	Latera fibularia.

Quarti, seu Tertii, *Innes.*

		Phalang. prox. Tend. Extensorum.
	† *Abductores digitorum quartorum.*	Latera tibialia.
Metatarsi quinti.	† * *Adductores digitorum quartorum.*	Latera fibularia.

Quinti, seu Minimorum Digitorum.

Fibula.	Peronei tertii, seu Noni Vesalii.	
	Transversales pedum.	Metatarsi primi et quinti. Ossa sesamoidea fibularia. Digitorum primorum adductores. Interdum aliæ origines.
Ligamenta trochlearia Peroneorum longorum. Ossa cuboidea.	*Flexores breves digitorum minimorum.*	Phalanges proximales digit. quint.
Calcanea. Aponeuroses plantares.	* *Abductores digitorum minimorum.*	Phalang. prox. Tend. Extensorum. Latera fibularia.
	* *Adductores digitorum minimorum.*	Latera tibialia.

PHALANGES DIGITORUM.

Phalanges Proximales Pollicum.

Fibulæ.	Extensores proprii pollicum.	Phalanges distales.

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* Hi sunt musculi interossei pedum. † Notat antiplantares et bicipites. Cæteri sunt plantares, quorum singuli singulis capitibus oriuntur. Omnes quoad latera phalangum quibus inseruntur, aut tibiales, aut fibulares sunt.

PHALANGES DIGITORUM.

Phalanges Proximales Pollicum.

Calcanea. Cuboidea. Ossa cuneiformia tertia. Nonnunquam adhesiones aliæ.	Flexores breves pollicum.	Phalanges proximales, interventu ossium sesamoidûm.
Calcanea. Ligamenta astragalorum cervicis sustinentia.	Abductores pollicum.	
Calcanea. Cuboidea. Cuneiformia tertia. Nonnunquam metatarsi quarti, tertii, secundi. Ligamenta trochlearia Peroneorum longorum.	Adductores pollicum.	
Calcanea.	Extensores breves digitorum.	Tendines Extensorum propriorum pollicum. Tendines Extensorum longorum. Tendinibus minimorum digitorum exceptis.

Phalanges Distales Pollicum.

Fibulæ.	Extensores proprii pollicum.	Phalanges proximales.
Fibulæ.	Flexores longi pollicum.	

Phalanges Digitorum Minorum.

Phalanges Omnes.

Tibiæ. Fibulæ.	Extensores communes longi.	
Calcanea.	Extensores breves.	Tendines Extensorum propriorum pollicum. Tendines Extensorum longorum. Tendinibus minimorum digitorum exceptis.

Phalanges Proximales.

	Interossei.	Tendines Flexorum longorum.
Tendines Flexorum longorum.	Lumbricales.	Tendines Flexorum longorum.

Phalanges Mediæ.

Calcanea. Aponeuroses plantares.	Flexores breves perforati, seu Sublimes.

Phalanges Distales.

Tibiæ. Fibulæ.

Flexores perforantes, seu Profundi.

MUSCULI PROPRII.

Minim. Digit.

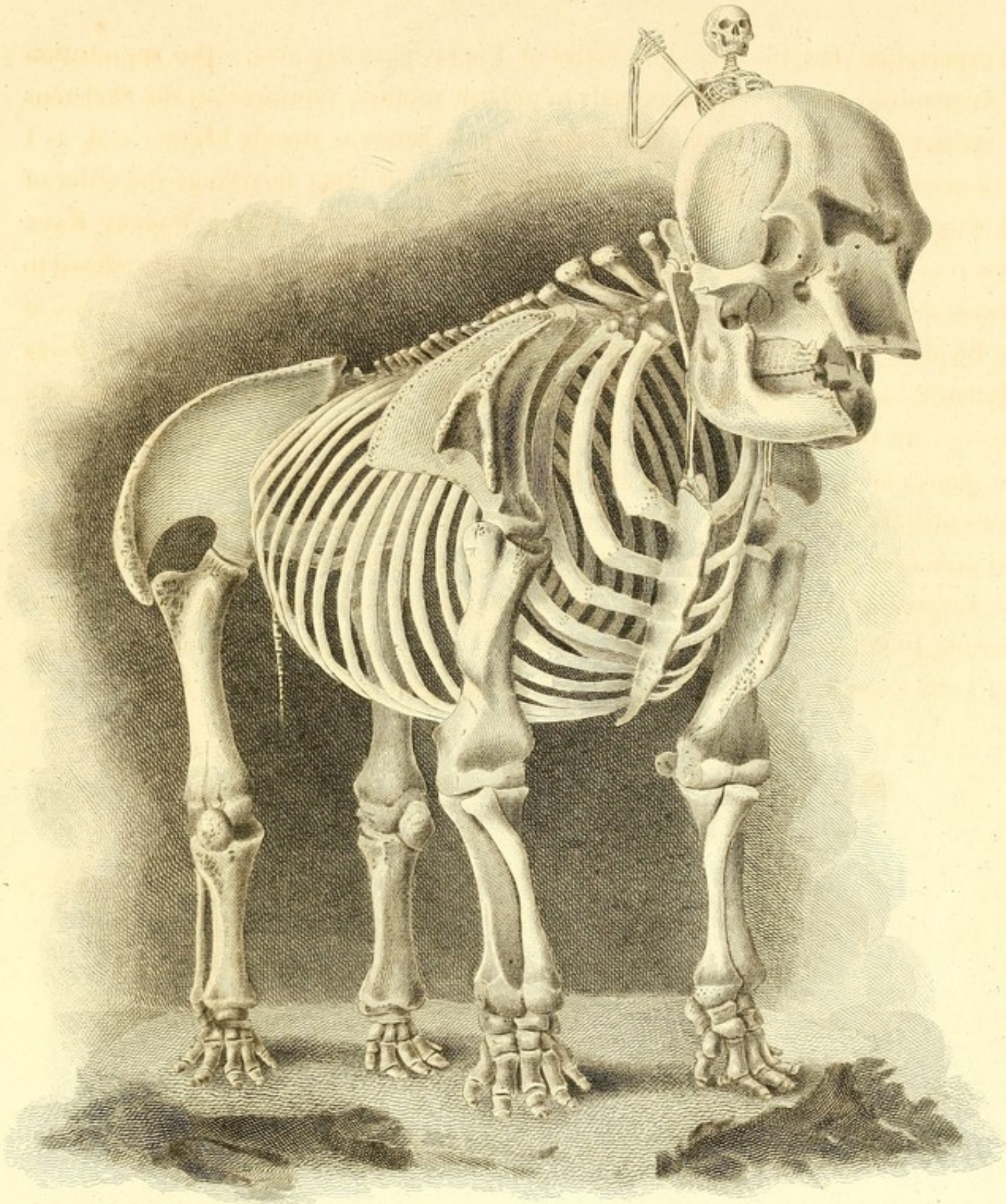
Ligamenta trochlearia Peronæorum longorum. Metatarsi digit. quint. Ossa cuboidea.

Flexores breves.

Phalanges proximales.

In expectation that the preceding Series of Engravings may obtain the approbation of Anatomists, Mr Mitchell intends to publish another, representing the Skeletons of various Quadrupeds, Birds, and Fishes. This Series is already begun; and, as I have agreed to supply the Originals; to select them for him; to arrange the order of his Engravings; and to add the Explanations—my ingenious friend, Robert Kaye Greville, Esq. of the County of Derby, has, without solicitation, generously offered to furnish the whole, or most of the Drawings. The following Figures of the Skeletons of the Elephant—of the Motacilla Rubecula—of the Scollopax Gallinago—and the Perca Fluviatilis, are given as Specimens of what may be expected from that Gentleman's Pencil. As these can so well speak for themselves, I say nothing of their merits; the figures of the two Birds, and the Fish, are from preparations by one of my late Assistants, Dr Willis; that of the Elephant, from a preparation dissected, articulated, and presented by my much-esteemed Friend, Dr George Ballingall, of Edinburgh, late Surgeon of the 33d Regiment of Foot; Surgeon-extraordinary to his Royal Highness the Duke of Kent; and Author of Practical Observations on Fever, Dysentery, and Liver Complaints, as they occur amongst the European Troops in India.

FROM Dr BARCLAY'S MUSEUM EDINr



P. E. Greville ad nat. del.

E. Mitchell, fculp.

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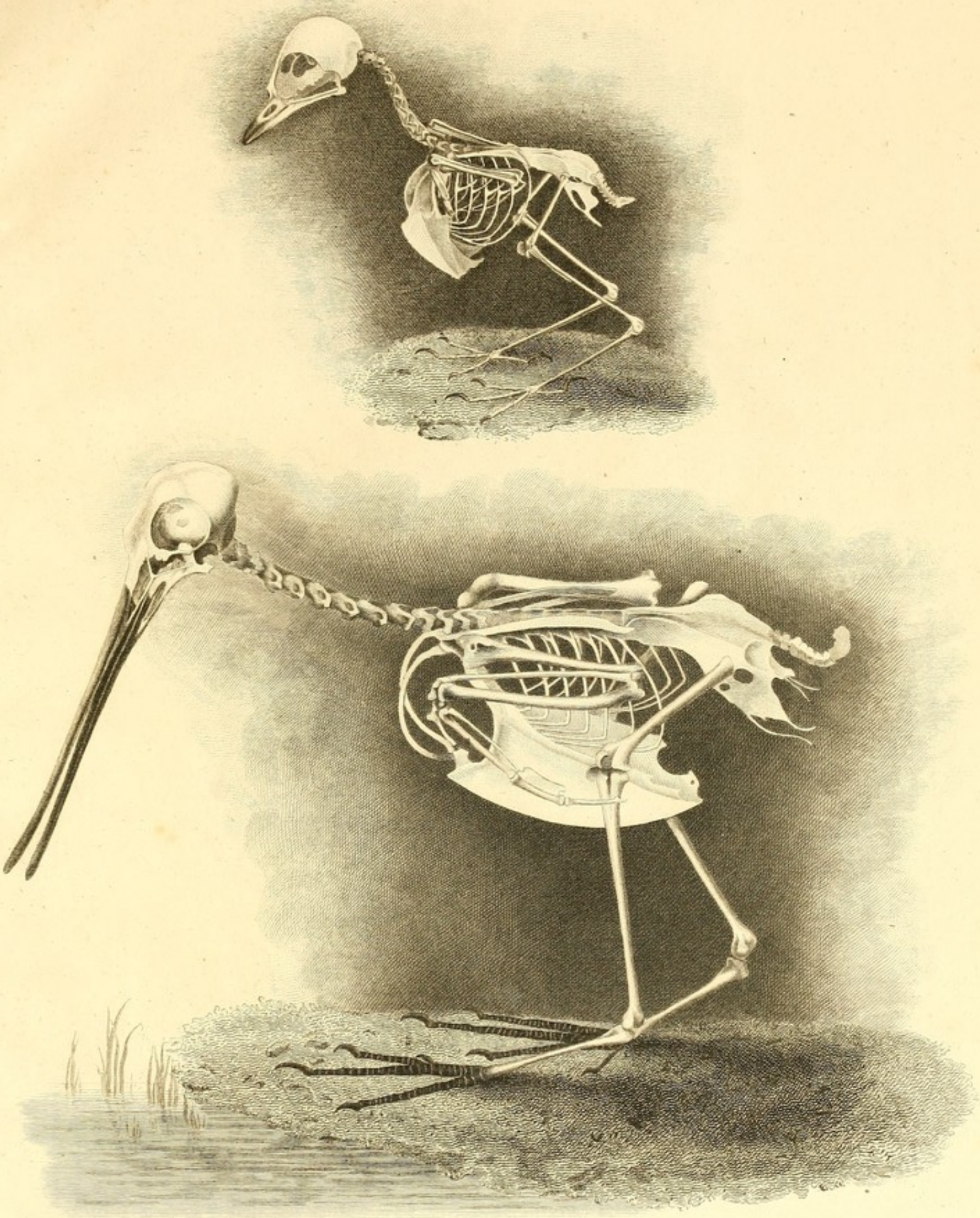
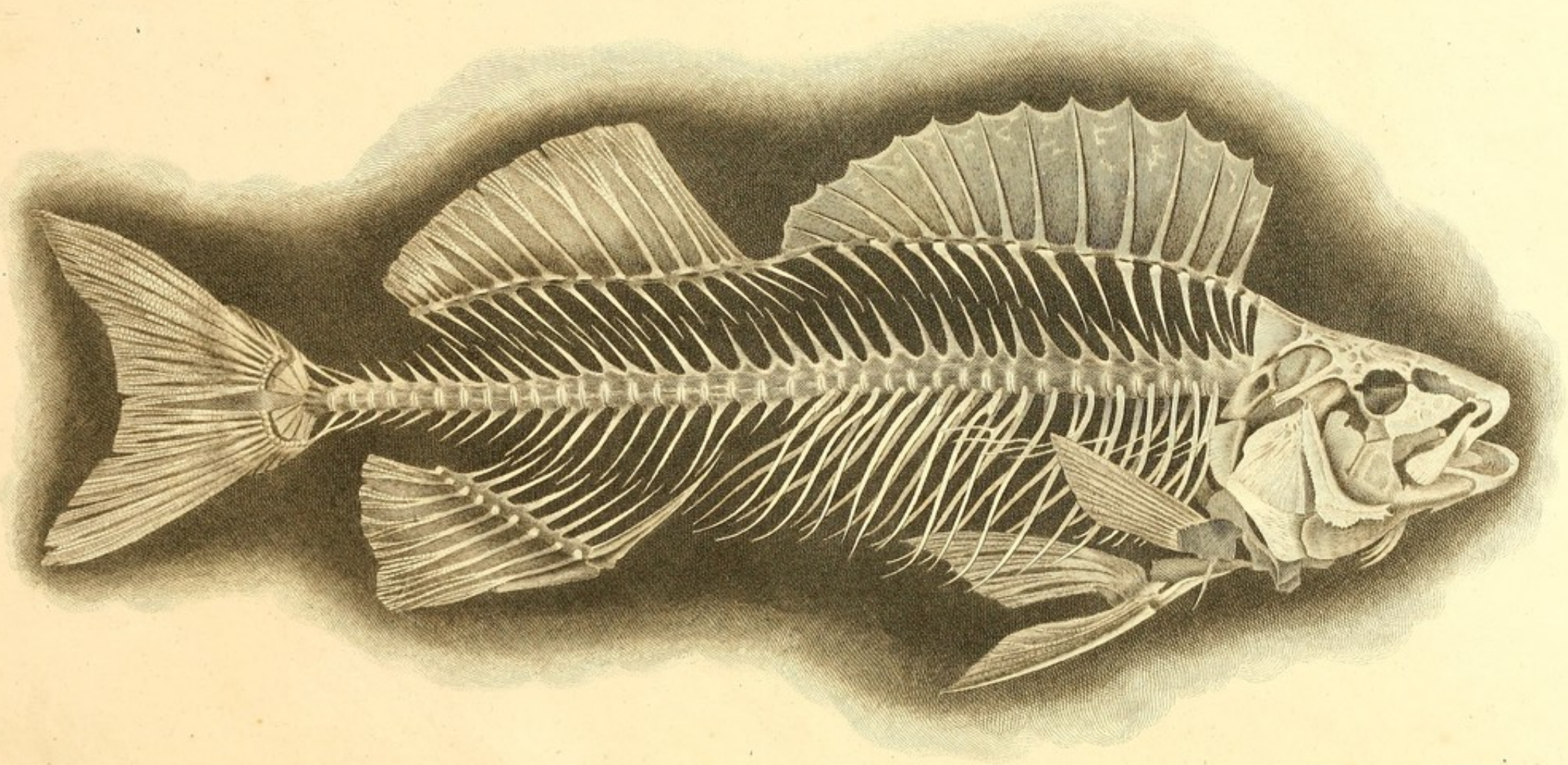


R. K. Greville ad. nat. del.

E. Mitchell sculpt.



FROM Dr BARCLAY'S MUSEUM EDINr

R.K.Greville ad viat del.

R.Mitchell sculpt