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ILLUSTRATIONS

OF

PALEY'S NATURAL THEOLOGY.

BOSTON—MDCCCXXVII.

ILLUSTRATIONS

OF

PALEY'S NATURAL THEOLOGY.

WITH

DESCRIPTIVE LETTER PRESS.

BY JAMES PAXTON,

MEMBER OF THE ROYAL COLLEGE OF SURGEONS, LONDON.

> "Of muscular actions, even of those well understood, some of the most curious are incapable of popular explanation, without the aid of Plates and Figures."
> PALEY'S THEOLOGY, Ch. ix.

BOSTON:
HILLIARD, GRAY, LITTLE, AND WILKINS.
1827.

CAMBRIDGE.
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TO THE

HONOURABLE AND RIGHT REVEREND

SHUTE BARRINGTON, LL. D.

LORD BISHOP OF DURHAM.

My Lord,

To your suggestion the world is indebted for the existence of Dr. Paley's valuable work on Natural Theology. The universal and permanent esteem in which it has been held in this country, and its favourable reception in France, even after the desolating influence of the Revolution, have abundantly approved your Lordship's selection both of the subject and of the person to whom you intrusted it.

In looking round, then, for a patron for these Illustrations, it was natural to have recourse to him who was the original suggestor of the work which it is their object to explain. Nor was I disappointed in my wish; your Lordship not only condescending to approve of the design, but to encourage me in its prosecution by your very liberal support. For this distinguished honour you will believe me deeply sensible; and if I may indulge the hope that my humble efforts will increase the utility of so eminent a writer, I shall consider it the highest gratification.

I am,

My Lord,

With great veneration,

Your Lordship's most obliged

And obedient servant,

JAMES PAXTON.

Oxford,
January 1, 1826.

PREFACE.

The works of Dr. Paley have acquired that popularity which renders it scarcely necessary to observe that his Natural Theology was written to establish the truth of the agency and wisdom of the Deity from the admirable contrivances and mechanism displayed in natural objects, inferring from thence that the knowledge and power requisite for the formation of created nature must be infinite.

The principal physical arguments made use of relate to organs destined to mechanical functions, as the bones of man—the muscles—the structure of animals, or comparative anatomy—prospective and compensatory contrivances—insects and plants: with most of these objects the anatomist only can be conversant; but all admit of graphic representation, and such has been attempted.

The designs of the following plates are original, obtained from the most authentic sources, and submitted to the critical examination of the most competent judges. It is hoped that the illustrations will be found the more interesting from their being simple and unincumbered by parts irrelevant to the subject of the author. These are accompanied by notes, which are intended to supply defective or correct erroneous statements, and to explain the plates.

The undertaking originated in the difficulty of understanding the various descriptions introduced by Paley, not however from his want of clearness, for the subjects in general are plainly and correctly described; but it is evident that visible representations strike the mind more forcibly than mere descriptions. It is therefore presumed that the subsequent illustrations will be an acquisition, by bringing vividly to the imagination, objects of which only an imperfect idea could otherwise be formed; and that they will consequently render the work more intelligible to the general reader.

CHAPTER I.

TAB. I.—THE WATCH.

Fig. 1. The *spring* and *barrel*, or first power, with the *chain* which connects it to—

Fig. 2. The *fusee* and *great* wheel. The fusee is tapered at the top to correct the irregular recoil of the spring. The great wheel turns—

Fig. 3. The *centre* wheel and pinion, which makes one revolution in an hour, carries the minute hand, and turns—

Fig. 4. The *third* wheel and pinion, which turns the contrate wheel.

Fig. 5. The *contrate* wheel, which makes one revolution in a minute, and turns the balance or escape wheel.

Fig. 6. The *balance* wheel, which acts upon the pallats of the verge, and escapes or drops from one pallat to another alternately, thereby keeping the balance in constant vibration.

Fig. 7. The *balance verge* and *balance* or *pendulum spring*, which regulates the whole machine.

Fig. 8. The *cannon pinion*, affixed to the centre wheel arbour, on which the minute hand is placed.

Fig. 9. The *minute* wheel.

Fig. 10. The *hour* wheel. These wheels are turned by the cannon pinion, and having a greater number of teeth, move much slower than the cannon pinion, and mark the hour by the hand on the dial.

The above is a description of the several wheels alluded to by Paley. Their relative situation, and combined movement, may be seen by the simple inspection of a watch.

TAB. I.

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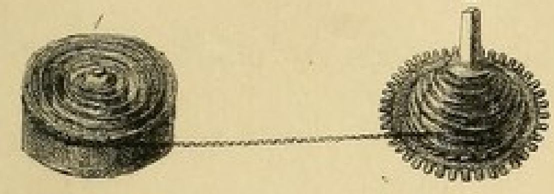

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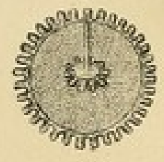

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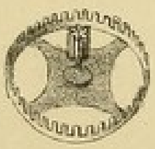

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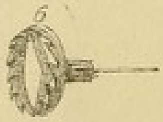

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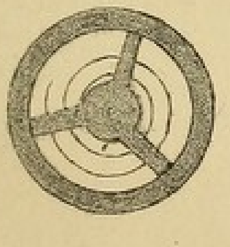

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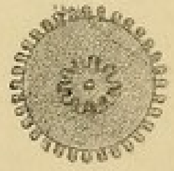

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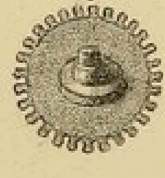

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CHAPTER III.

PART II.—THE EYE.

FIG. 1. The crystalline lens of a fish; it is proportionably larger than in other animals, and perfectly spherical.

FIG. 2. A section of the human eye. It is formed of various coats, or membranes, containing different humours of different degrees of density.

The external membrane, called sclerotica, is strong and firm for support of the internal parts of the eye; it is deficient in the centre, but that part is supplied by the cornea, which is transparent and projects like the segment of a small circle from one of larger size. The interior of the sclerotica is lined by the choroid, covered by a dark pigment [illegible] pigmentum nigrum, intended to absorb the superfluous rays of light. The choroid is represented in the plate by the black line. The third and inner membrane, which is marked by the white line, is the retina, the expanded optic nerve.

Within these coats of the eye are contained, a, the aqueous humour, a thin fluid like water; b, the crystalline lens, or a dense humour; c, the vitreous humour, in appearance like jelly. Together they make a compound lens, which refracts the rays of light coming from an object, d, and delineates an image, e, in the focus upon the retina, inverted.

FIG. 3. The lens of an insect.

FIG. 4. The crystalline [illegible].

FIG. 5, 6. A plan of the circular and radiating fibres which the iris is composed of; by the former [illegible], the latter dilates the pupil, or aperture formed by the inner margin of the iris.

FIG. 7. a, b, c, d, the four straight muscles, arising from the bottom of the orbit, where they surround, e, the optic nerve; and are inserted by broad thin tendons at the fore-part of the globe of the eye into the tunica sclerotica.

CHAPTER III.

TAB. II.—THE EYE.

Fig. 1. The crystalline lens of a fish; it is proportionably larger than in other animals, and perfectly spherical.

Fig. 2. A section of the human eye. It is formed of various *coats*, or membranes, containing pellucid humours of different degrees of density.

The external membrane, called *sclerotic*, is strong and firm, the support of the spherical figure of the eye; it is deficient in the centre, but that part is supplied by the *cornea*, which is transparent and projects like the segment of a small globe from one of larger size. The interior of the sclerotic is lined by the *choroid*, covered by a dark mucous secretion, termed *pigmentum nigrum*, intended to absorb the superfluous rays of light. The *choroid* is represented in the plate by the black line. The third and inner membrane, which is marked by the white line, is the *retina*, the expanded optic nerve.

Within these coats of the eye, are the *humours*. *a*, the *aqueous* humour, a thin fluid like water; *b*, the *crystalline lens* of a dense texture; *c*, the *vitreous* humour, in appearance like jelly. Together they make a compound lens, which refracts the rays of light issuing from an object, *d*, and delineates its figure, *e*, in the focus upon the retina, inverted.

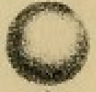
Fig. 3. The *lens of the telescope*.

Fig. 4. The crystalline *lens*.

Fig. 5, 6. A plan of the circular and radiated fibres which the *iris* is supposed to possess; the former contracts, the latter dilates the pupil, or aperture formed by the inner margin of the iris.

Fig. 7. *a*, *a*, *a*, *a*, the four *straight* muscles, arising from the bottom of the orbit, where they surround, *c*, the optic nerve; and are inserted by broad thin tendons at the fore part of the globe of the eye into the tunica sclerotica.

TAB. II.



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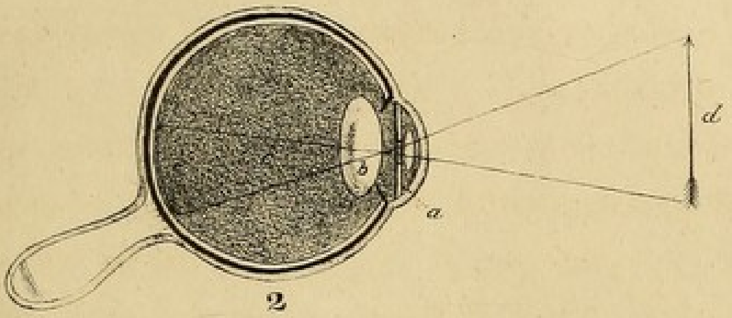

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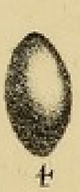

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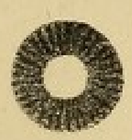

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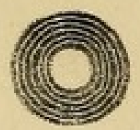

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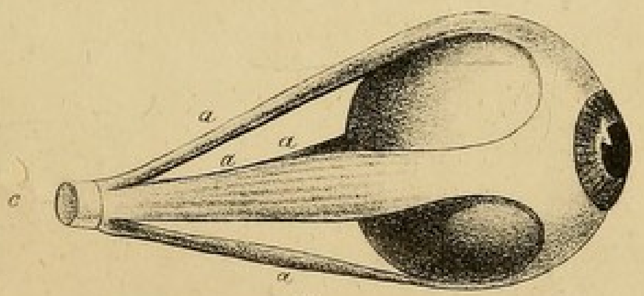

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Swett Del.

Lith. of Pendleton

CHAPTER III.

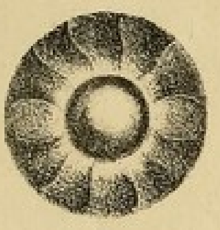
TAB. III.—THE EYE OF BIRDS AND OF THE EEL.

Fig. 1, 2. The *flexible rim, or hoop*, of the eye of birds, consisting of bony plates, which occupy the front of the sclerotic; lying close together and overlapping each other. These bony plates in general form a slightly convex ring, Fig. 1, but in the *accipitres* they form a concave ring, as in Fig. 2, the bony rim of a hawk.

Fig. 3, 4, 6. exhibit the *marsupium;* it arises from the back of the eye, proceeding apparently through a slit in the retina; it passes obliquely into the vitreous humour, and terminates in that part, as in the eagle, Fig. 3, a section of the eye of the falco chrysaëtos. In some species it reaches the lens, and is attached to it, Fig. 4, 6. In the plate the marsupium is marked with a *.

Fig. 5. The head of an *eel;* the skin is represented turned back; and as the *transparent horny covering* of the eye, *a*, *a*, is a cuticular covering, it is separated with it.

TAB. III.



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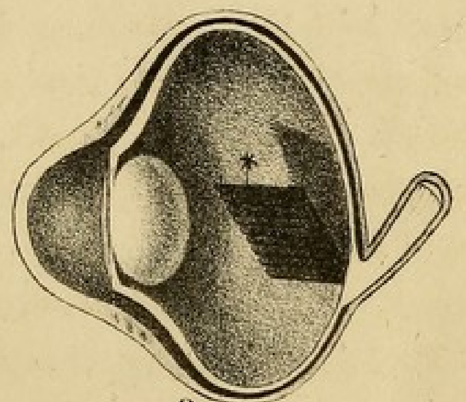

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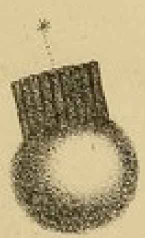

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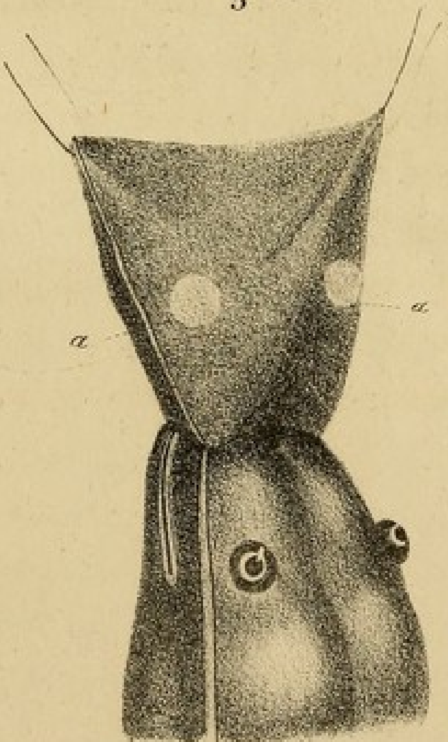

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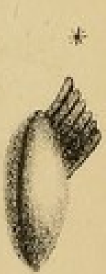

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CHAPTER III.

TAB. IV.—THE LACHRYMAL APPARATUS AND NICTITATING MEMBRANE.

FIG. 1. *a*, the lachrymal gland; *b*, orifices of the ducts, for several ducts, conducting the fluid to the eye; *c c*, the puncta lachrymalia, which convey the tears into *d*, the lachrymal sac, terminated by the nasal.

FIG. 2. The nictitating membrane, or third eyelid; it is a thin semi-transparent fold of the conjunctiva, which, in a state of rest, lies in the inner corner of the eye, with its loose edge nearly vertical, but can be drawn out so as to cover the whole front of the globe. In this figure it is represented in the act of being drawn over the eye.

FIG. 3. The muscles of the nictitating membrane are very singular in their form and action; they are situated on the back of the sclerotic; one of them, *a*, which from its shape is called quadratus, has its origin from the upper and back part of the sclerotic; its fibres descend towards the optic nerve, and terminate in a curved margin with a tendinous canal in it. The other muscle, *b*, which is called pyramidalis, arises from the lower and back part of the sclerotic. It has a long tendinous chord, *c*, which passes through the canal of the quadratus, as a pulley, and having arrived at the lower and outer part of the eye-ball, is inserted into the loose edge of the nictitating membrane. The corresponding letters refer to Fig. 4, a profile of the eye, and Fig. 5, the membrane and its muscles detached from the eye.

CHAPTER III.

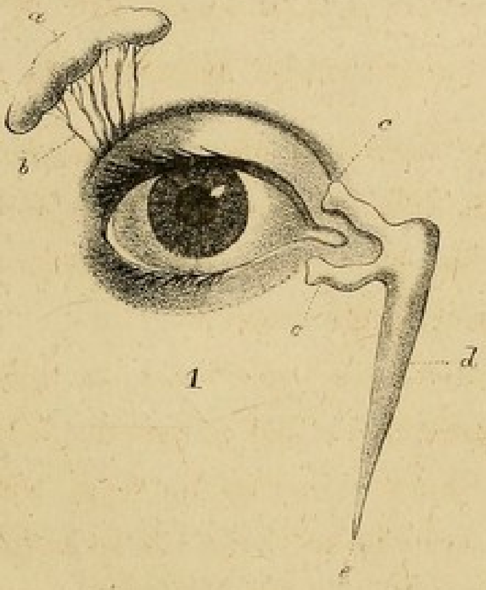
TAB. IV.—THE LACHRYMAL APPARATUS AND NICTITATING MEMBRANE.

Fig. 1. *a*, the *lachrymal gland*, the source of the tears; *b*, its several *ducts*, diffusing this fluid over the eye; *c*, *c*, the *puncta lachrymalia*, which convey the tears into, *d*, the *lachrymal sac*, terminating in the nostril.

Fig. 2. The *nictitating membrane*, or third eyelid; it is a thin semi-transparent fold of the conjunctive, which, in a state of rest, lies in the inner corner of the eye, with its loose edge nearly vertical, but can be drawn out so as to cover the whole front of the globe. In this figure it is represented in the act of being drawn over the eye.

Fig. 3. The muscles of the nictitating membrane are very singular in their form and action; they are attached to the back of the sclerotic; one of them, *a*, which from its shape is called *quadratus*, has its origin from the upper and back part of the sclerotic; its fibres descend towards the optic nerve, and terminate in a curved margin with a cylindrical canal in it. The other muscle, *b*, which is called *pyramidalis*, arises from the lower and back part of the sclerotic. It has a long tendinous chord, *c*, which passes through the canal of the quadratus, *a*, as a pulley, and having arrived at the lower and exterior part of the eye-ball, is inserted into the loose edge of the nictitating membrane. This description refers also to Fig. 4, a profile of the eye, and Fig. 5, the membrane and its muscles detached from the eye.

TAB. IV.



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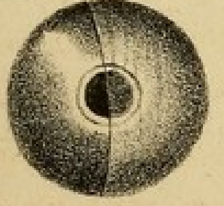

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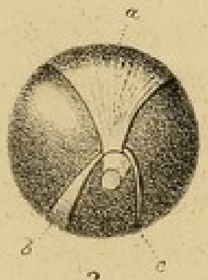

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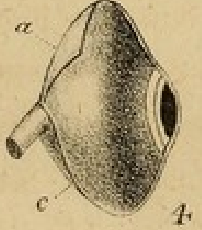

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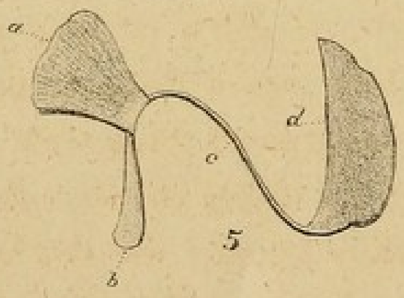

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Swett Del. Lith. of Pendleton.

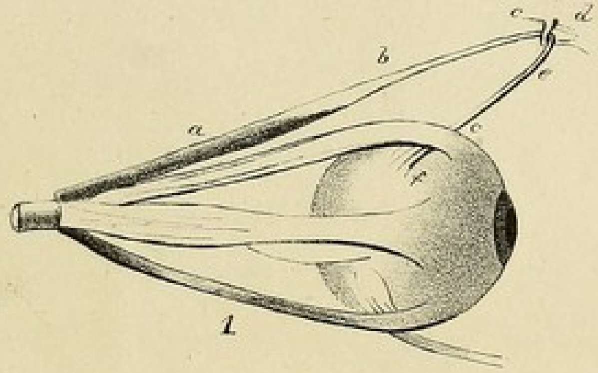
CHAPTER VII.

TAB. VI.—TROCHLEAR MUSCLE OF THE EYE, AND KIDNEY.

FIG. 1. The *trochlear or superior oblique* muscle, arises with the straight muscles from the bottom of the orbit. Its muscular portion, *a*, is extended over the upper part of the eye-ball, and gradually assumes the form of a smooth round tendon, *b*, which passes through the pulley, *c*, and is fixed to the inner edge of the orbit, *d*, then turning backwards and downwards, *e*, is inserted into, *f*, the sclerotic membrane.

FIG. 2. A section of the *human kidney ; a*, the *emulgent artery* which conveys the blood to, *b*, the *papillæ*, where the peculiar fluid is secreted ; from whence it passes by tubes into *c*, the *pelvis ; d*, the *emulgent vein* which returns the blood ; *e*, the *ureter*, or tube, which conducts the secretion to its receptacle.

TAB. VI.



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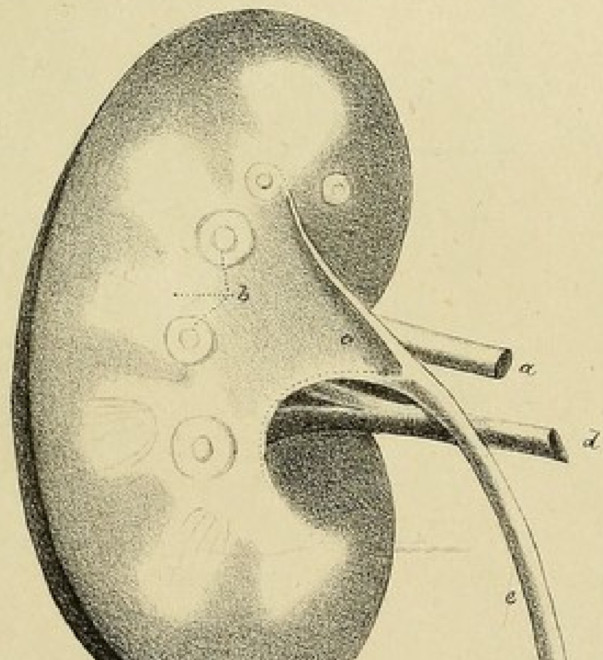

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CHAPTER VIII.

TAB. VII.—VERTEBRÆ OF THE HUMAN NECK.

FIG. 1. A representation of the head and the neck; the latter is composed of seven bones called vertebræ.

FIG. 2. exhibits the first and second vertebræ, with their mode of connexion. The uppermost vertebra, termed the atlas, from its supporting the globe of the head, has an oval concave surface on either side, a, a, for the reception of two corresponding convex surfaces placed on the lower part of the head, in such a manner as only to admit of the action of bending and raising the head.

FIG. 3. The atlas.

FIG. 4. The second vertebra, called dentata, has two plane surfaces, e, e, adapted to the planes, e, e, FIG. 3. of the atlas; and this manner of articulation provides for the turning of the head laterally in almost every direction. FIG. 2. and 4. 5, 6, show the tooth-like process which affords a firm pivot for the production of the lateral motion just described. This process is received into a corresponding indentation of the atlas, FIG. 3. 6, and a strong ligament passes behind it, serving as an effectual security against dislocation and consequent compression of the spinal marrow. FIG. 4. 4, marks the situation of the spinal marrow, which passes through the ring of each vertebra. The letter, c, indicates a perforation in the lateral process; and as there is a corresponding perforation in each lateral, or c, c, [illegible] transverse process of the seven cervical vertebræ, a continued passage is thus formed for the protection of two important bloodvessels destined to supply the brain.

CHAPTER VIII.

TAB. VII.—VERTEBRÆ OF THE HUMAN NECK.

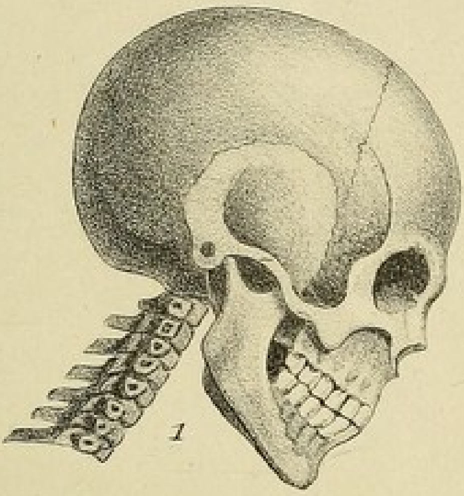
FIG. 1. A representation of the head and the neck; the latter is composed of seven bones called *vertebræ.*

FIG. 2. exhibits the first and second vertebræ, with their mode of connexion. The uppermost vertebra, termed the *atlas,* from its supporting the globe of the head, has an oval *concave* surface on either side, *a, a,* for the reception of two corresponding *convex* surfaces placed on the lower part of the head, in such a manner as only to admit of the action of bending and raising the head.

FIG. 3. The *atlas.*

FIG. 4. The second vertebra, called *dentata,* has two plane surfaces, *a, a,* adapted to the planes, *a, a,* Fig. 3. of the atlas: and this manner of articulation provides for the turning of the head laterally in almost every direction. Fig. 2. and 4. *b, b,* show the *tooth-like process* which affords a firm pivot for the production of the lateral motion just described. This process is received into a corresponding *indentation* of the atlas, Fig. 3. *b,* and a strong ligament passes behind it, serving as an effectual security against dislocation, and consequent compression of the spinal marrow. Fig. 4. *d,* marks the situation of the spinal marrow, which passes through the ring of each vertebra. The letter, *c,* indicates a perforation in the lateral process; and as there is a corresponding perforation in each lateral, or as it is termed *transverse* process of the seven *cervical* vertebræ, a continuous passage is thus formed for the protection of two important blood-vessels destined to supply the brain.

TAB. VII.



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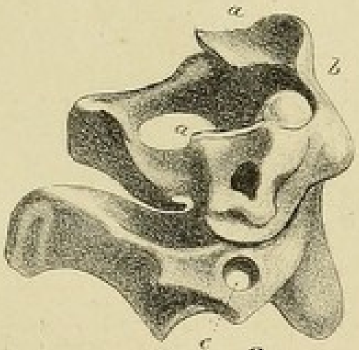

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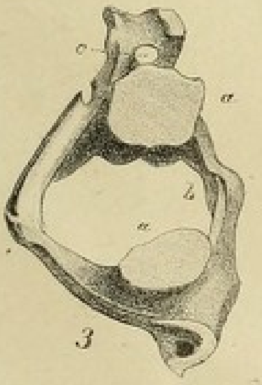

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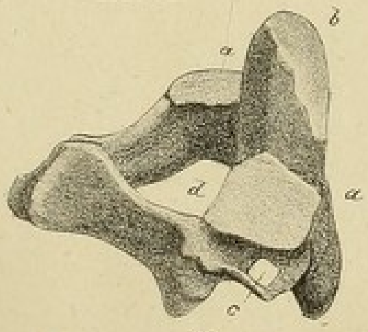

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Swett Del. *Lith. of Pendleton.*

CHAPTER VIII.

TAB. IX.—THE SPINE.

FIG. 1. The dorsal spine, so named from the series of sharp processes projecting from the posterior part of the vertebræ. The spine consists of seven vertebræ of the neck, distinguished by the perforations in their transverse processes; of twelve belonging to the back, and marked by articulations for the heads of the ribs; and, lastly, of five belonging to the loins, which are longer than the other vertebræ.

FIG. 2. A separated dorsal vertebra; *a*, the body of the vertebra; *b*, the ring through which the spinal marrow passes; *c c*, the articulating surfaces to which the ribs are attached.

FIG. 3. The vertebra of a very large serpent, drawn from a specimen belonging to the anatomy school of Christ Church, Oxford. This figure shows the socket of the vertebra.

FIG. 4. The hollow rounded body evidently calculated for extensive motion.

FIG. 5. A part of the spine of the same reptile, [illegible] [illegible] and more [illegible] to the [illegible] of [illegible] tion of [illegible].

CHAPTER VIII.

TAB. IX.—THE SPINE.

Fig. 1. The *human spine*, so named from the series of sharp processes projecting from the posterior part of the vertebræ. The spine consists of *seven* vertebræ of the neck, distinguished by the perforations in their transverse processes; of *twelve* belonging to the back, and marked by depressions for the heads of the ribs; and, lastly, of *five* belonging to the loins, which are larger than the other vertebræ.

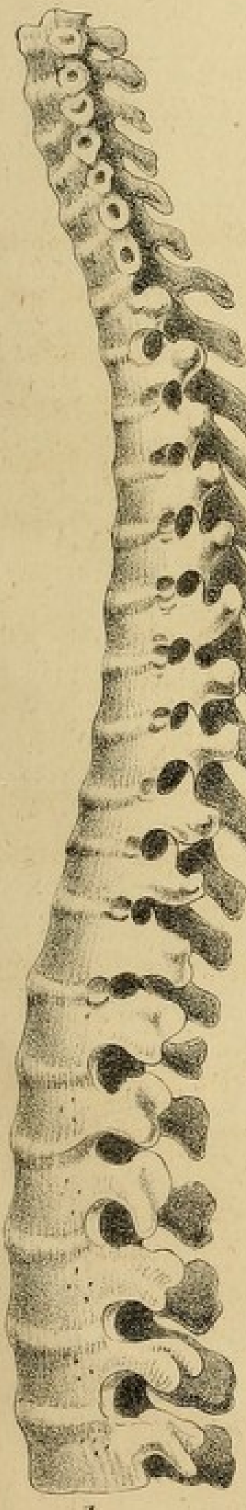
Fig. 2. A separated *dorsal vertebra: a*, the body of the vertebra; *b*, the ring through which the spinal marrow passes: *c*, *c*, the articulating surfaces to which the ribs are united.

Fig. 3. The vertebra of a very large serpent, drawn from a specimen belonging to the anatomy school of Christ Church, Oxford. This figure shows the socket of the vertebra.

Fig. 4. The ball or rounded joint, evidently calculated for extensive motion.

Fig. 5. A part of the spine of the same reptile; it is exceedingly strong, each bone being united to the other by fifteen surfaces of articulation.

TAB. IX.



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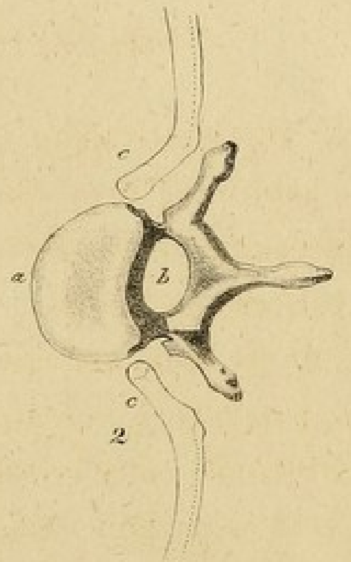

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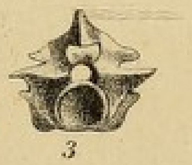

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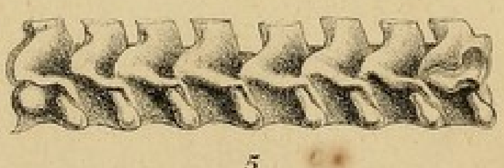

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Swett Del. Lith. of Pendleton.

CHAPTER VIII.

FIG. 1.—THE CHEST, PATELLA, AND SHOULDER-BLADE.

FIG. 1. The spine, ribs and [illegible] constitute the frame-work of the chest or thorax. Referring to [illegible] of the plate, or to nature, we observe that the ribs are not continued through-out from the spine to the sternum, but intervening cartilages complete the form of the chest, by connecting the end of the ribs to the breast bone. [illegible] a [illegible] provision relative to the mechanical function of the lungs, [illegible]. The muscles of respiration enlarge the capacity of the chest by elevating the ribs; and during the [illegible] interval of muscular action the cartilages, from their own elasticity restore the ribs to their former position.

FIG. 2. represents the front of the patella, the anterior surface convex. Fig. 3, the posterior surface, has two concave depressions adapted to the condyles of the thigh bone. The projection of the patella, acting as a pulley, removes the acting force from the center of motion, by which means the muscles have a greater advantage in extending the leg.

FIG. 4. The shoulder-blade (*scapula*) is joined to the collar bone, by ligaments, and to the thorax by powerful muscles which are capable of sustaining immense weights, and whose action gives the various directions to the arm, and enables it freely to revolve at the shoulder-joint.

CHAPTER VIII.

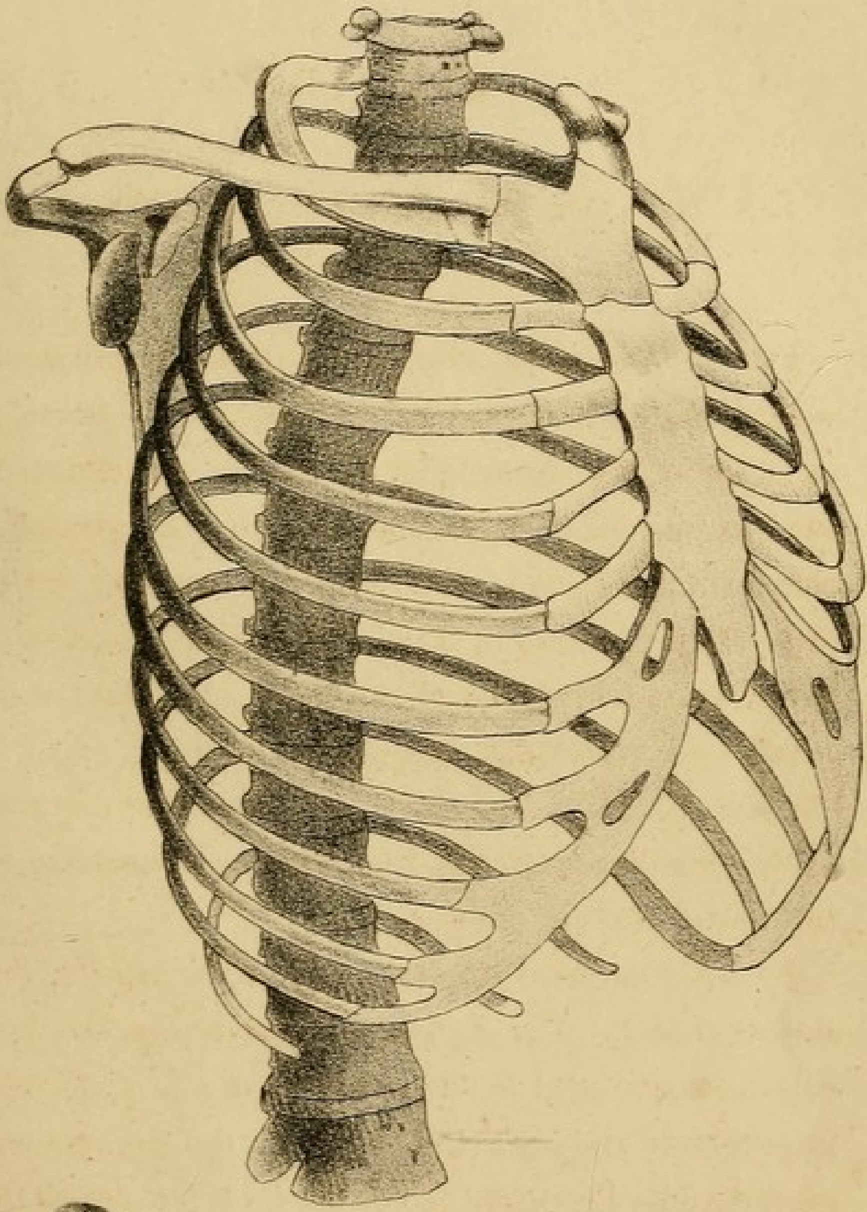
TAB. X.—THE CHEST, PATELLA, AND SHOULDER BLADE.

FIG. 1. The *spine*, *ribs*, and *sternum*, constitute the framework of the *chest* or *thorax*. Referring however to the plate, or to nature, we observe that the ribs are not continued throughout from the spine to the sternum, but intervening *cartilages* complete the form of the chest, by connecting the end of the rib to the breast bone. This is a further provision, relative to the mechanical function of the lungs, deserving notice. The muscles of respiration enlarge the capacity of the chest by elevating the ribs ; and during the momentary interval of muscular action the cartilages, from their great *elasticity*, restore the ribs to their former position.

FIG. 2. represents the true shape of the *patella*, the *anterior surface convex*. Fig. 3. the *posterior surface*, has two *concave* depressions adapted to the condyles of the thigh bone. The projection of the patella, as a lever, or pulley, removes the acting force from the centre of motion, by which means the muscles have a greater advantage in extending the leg.

FIG. 4. The shoulder-blade (*scapula*) is joined to the collar bone by ligaments, and to the thorax by powerful muscles which are capable of sustaining immense weights, and whose action gives the various directions to the arm, and enables it freely to revolve at the shoulder joint.

TAB. X.



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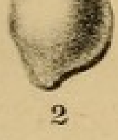

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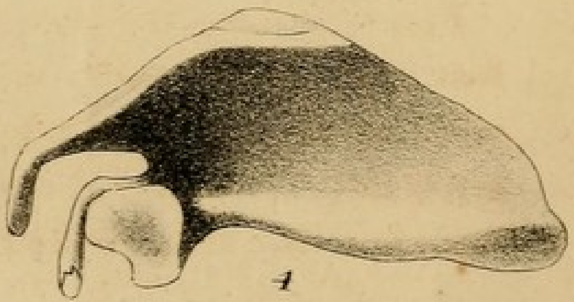

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Sweet Del. Lith. of Pendleton

CHAPTER VIII.

PLATE XI.—THE HIP, KNEE, AND ANKLE JOINTS.

Fig. 1. The capsular ligament is here opened in order to show the ligament of the hip, named the round ligament. It allows considerable latitude of motion, at the same time that it is the great safe-guard against dislocation.

Figs. 2 and 4. The crucial or internal ligaments of the knee-joint arise from each side of the depression between the condyles of the thigh bone; the anterior is fixed into the centre, the posterior into the back of the articulation of the tibia. They therefore materially limit the motions of the joint, and give the firmest resistance to violent exertions. Viewing the form of the bones, we should consider it one of the weakest and most superficial; but the strength of its ligaments renders it the most secure, and the least liable to dislocation of any joint in the whole body.

Fig. 3. One of the two semilunar cartilages of the knee, from their shape called semilunar; it is also represented in situ, Fig. 2. The outer edge of each cartilage is thick, the inner concave edge thin; they form sockets for the condyles of the thigh bone and thus render it deep, and the cartilages are so fixed as to allow a little play at the knee, by which the joint moves with great freedom.

Moveable cartilage is not common, but is peculiar to those joints whose motions are very frequent, or which may bear a great weight. It is a contrivance found at the inner head of the collar bone and the articulation of the wrist, as well as at the knee. The obvious use is to lessen friction and facilitate motion.

Fig. 5. exhibits the formation of the ankle joint; a, the fibula; b, the tibia.

CHAPTER VIII.

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FIG. 1. The capsular ligament is here opened in order to show the ligament of the hip, named the *round ligament*. It allows considerable latitude of motion, at the same time that it is the great safe-guard against dislocation.

FIG. 2. and 4. The *crucial* or *internal ligaments* of the knee-joint arise from each side of the depression between the condyles of the thigh bone ; the anterior is fixed into the centre, the posterior into the back of the articulation of the tibia. This structure properly limits the motions of the joint, and gives the firmness requisite for violent exertions. Viewing the form of the bones, we should consider it one of the weakest and most superficial, but the strength of its ligaments renders it the most secure, and the least liable to dislocation of any joint in the whole body.

FIG. 3. One the *interarticular* cartilages of the knee, from their shape called *semilunar ;* it is also represented *in situ*, Fig. 2. The outer edge of each cartilage is thick, the inner concave edge thin ; the sockets for the condyles of the thigh bone are thus rendered deep, and the cartilages are so fixed as to allow a little play on the tibia, by which the joint moves with great freedom.

A moving cartilage is not common, but is peculiar to those joints whose motions are very frequent, or which move under a great weight. It is a contrivance found at the inner head of the collar bone and the articulation of the wrist, as well as at the knee. The obvious use is to lessen friction and facilitate motion.

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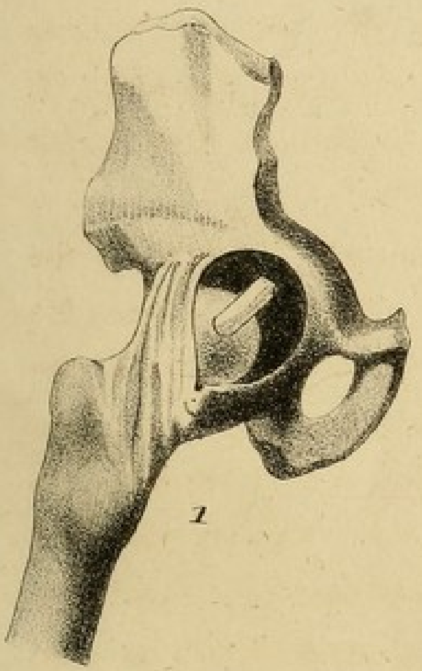
TAB. XI.



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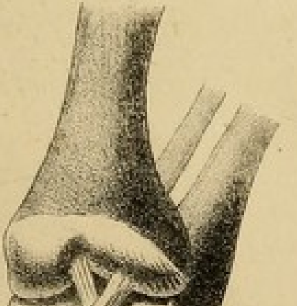

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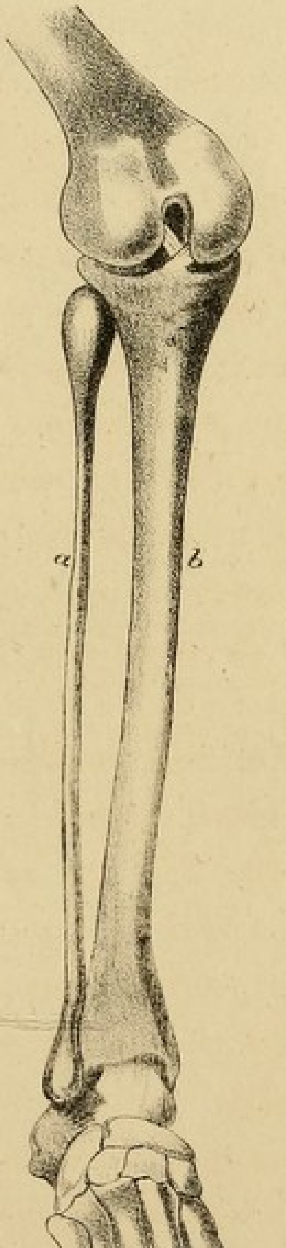

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TAB. XII.—THE SARTORIUS, AND OBLIQUE MUSCLES OF THE HEAD.

FIG. 1. a, a, the sartorius, is the longest muscle of the whole human body: it is extended obliquely across the thigh from the fore part of the ilii (the anterior superior spinous process of the os ilium,) to the inner side of the tibia. Its office is to bend the knee and bring the leg inwards.

FIG. 2. There are two pairs of oblique muscles; a, a, the obliquus capitis superior, arising from the transverse process of the atlas, and inserted into the occipital bone; b, b, the obliquus capitis inferior, arising from the spinous process of the dentata, and inserted into the transverse process of the atlas.

CHAPTER IX.

TAB. XII.—THE SARTORIUS, AND OBLIQUE MUSCLES OF THE HEAD.

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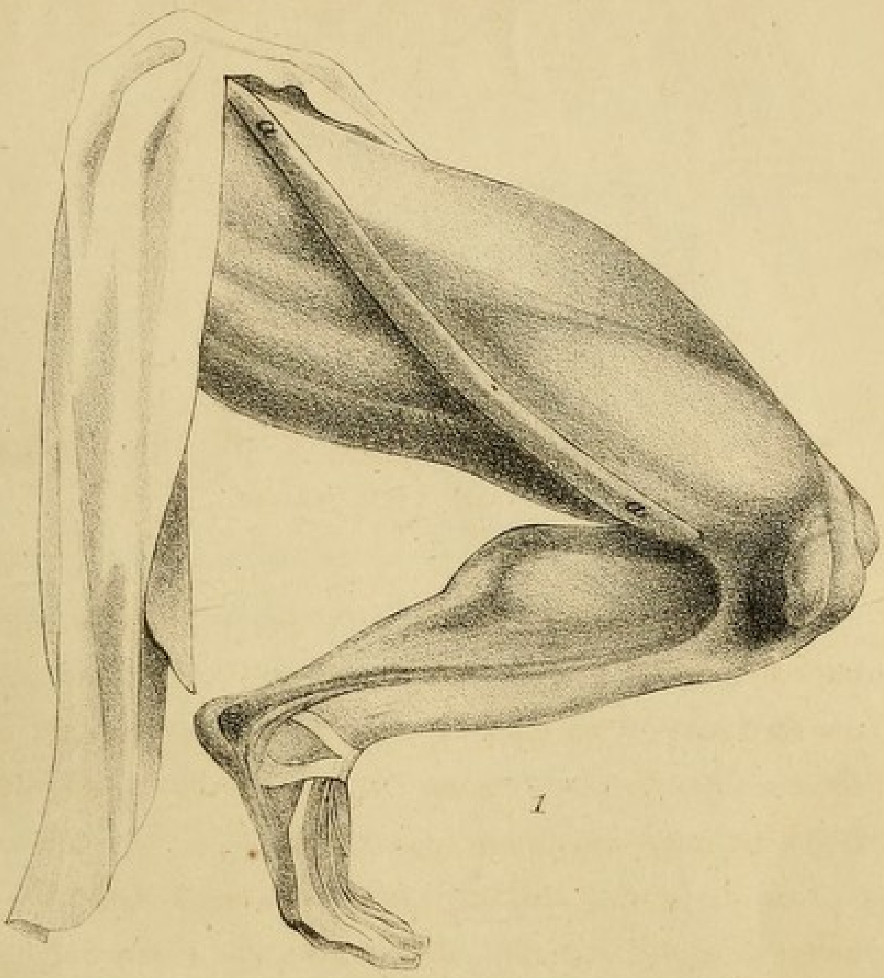
TAB. XII.



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Lith. of Pendleton.

CHAPTER XI.

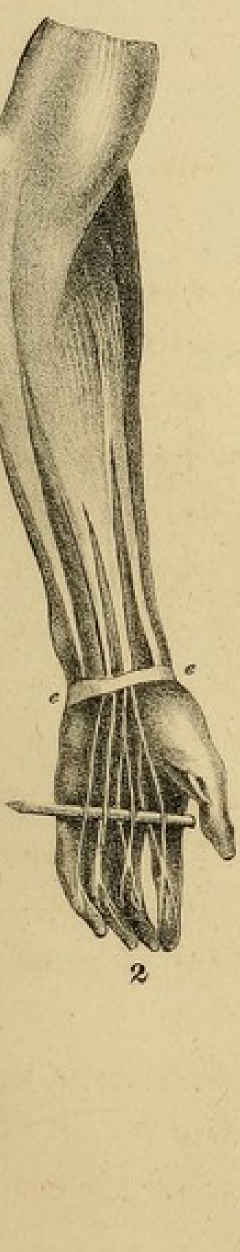
TAB. XIII.—THE MUSCLES OF THE ARM.

Fig. 1. *a*, the *biceps* (biceps flexor cubiti) arise by two portions from the scapula; they form a thick mass of flesh in the middle of the arm, which is finally inserted into the upper end of the radius; *b*, the *brachiæus internus*, arises from the middle of the *os humeri*, and is inserted into the ulna. Both these muscles bend the fore-arm. *c*, the *longus et brevis brachiæus externus;* these are better named as one muscle, *triceps extensor cubiti.* It is attached to the inferior edge of the scapula, and to the os humeri, by three distinct heads, which unite and invest the whole back part of the bone, becoming a strong tendon which is implanted into the elbow. It is a powerful extensor of the fore-arm. *d*, the *anconæus*, a small triangular muscle, situated at the outer side of the elbow: it assists the last muscle.

Fig. 1. and 2. *e*, *e*, the *annular ligament* of the wrist, under which pass the tendons of the muscles of the fingers.

Fig. 1. *f.* the *deltoid muscle;* the muscle at the shoulder by which the arm is raised.

TAB. XIII.



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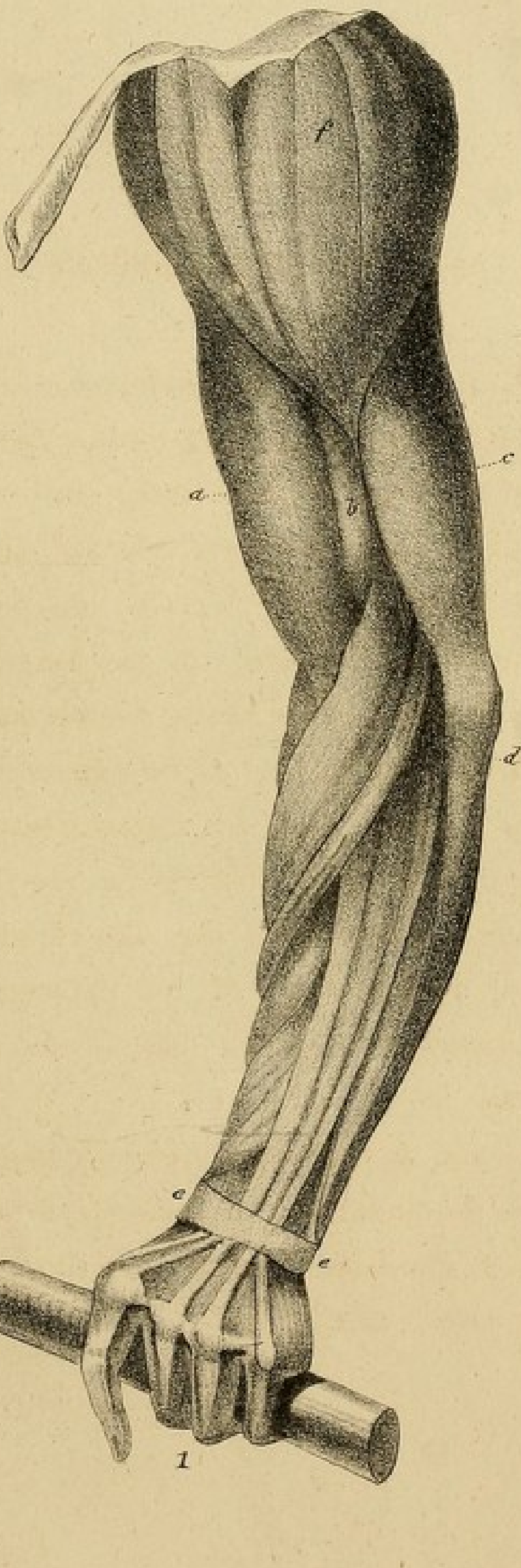

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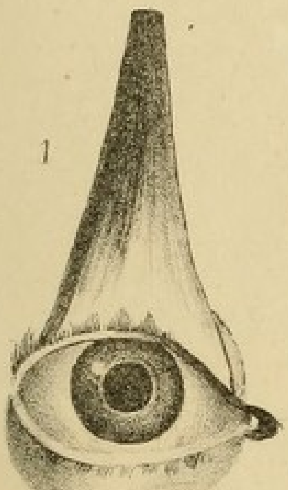
CHAPTER IX.

TAB. XIV.—THE MUSCLES THAT RAISE THE EYE-LIDS, AND SPHINCTER OR CIRCULAR MUSCLES.

FIG. 1. A front view of the muscle named *levator palpebræ superioris :* Fig. 2. a profile of the same in its natural position. This muscle arises within the orbit, and is inserted by a broad tendon into the upper eye-lid.

FIG. 3. exhibits examples of *sphincter* muscles: *a, a*, the *orbicularis palpebrarum*, encircling the eyelid; it closes the eye, and compresses it with spasmodic violence when injured by particles of dust, &c. *b*, the *orbicularis oris*, surrounding the mouth; it chief use is to contract the lips.

TAB. XIV.



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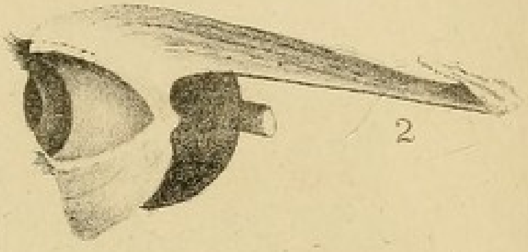

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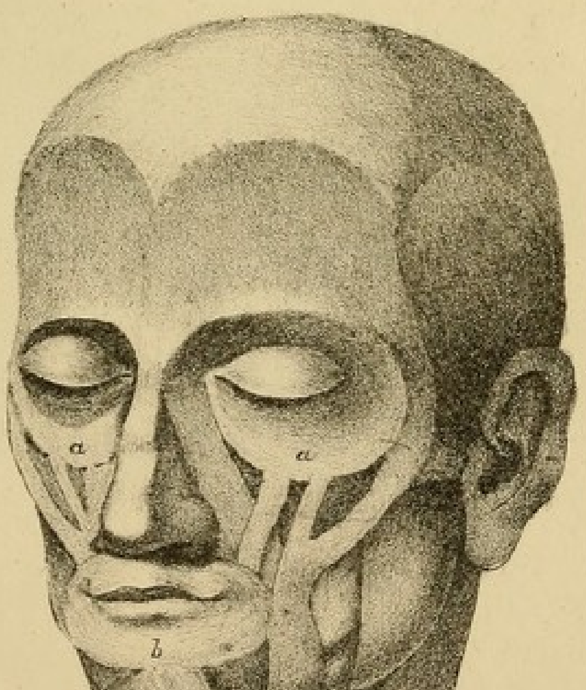

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Lith. of Pendleton.

CHAPTER IX.

TAB. XV. THE DIGASTRIC MUSCLE.

FIG. 1. and 2. The *digastric muscle* has its origin, *a*, at the lower part of the temporal bone; it runs downwards and forwards, and forms a strong round tendon, *b*, which passes through the stylo-hyoïdeus, *f;* it is then fixed by a strong ligament, *c*, to the os hyoïdes, *d;* it again becomes fleshy, runs upwards, and is inserted into the chin. This description differs from Dr. Paley's, and it will be found by reference to dissections or the plate, that the os hyoïdes furnishes a *stay* or *brace* instead of a pulley, and that the *loop* or *ring* is in the stylo-hyoïdeus muscle.

TAB. XV.

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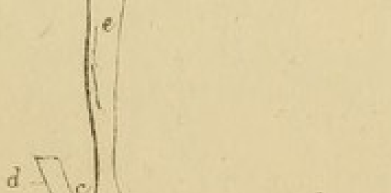

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Lith. of Pendleton, Boston.

CHAPTER IX.

TAB. XVI.—THE TENDONS OF THE TOES.

Fig. 1. *a*, the tendon of the *long flexor of the toes*, which divides about the middle of the foot into four portions, passing through the slits in, *b*, the *short flexor tendons*. Fig. 2. explains a similar contrivance belonging to each finger: *a*, a tendon of the *flexor sublimis*; *b*, a tendon of the *flexor profundus*, passing through it.

Fig. 3. *a*, *b*, tendons of the extensor muscles of the toes; *c*, a tendon of the flexor of the foot. These are bound down and confined *in situ* by, *e*, the *annular ligament* of the tarsus.

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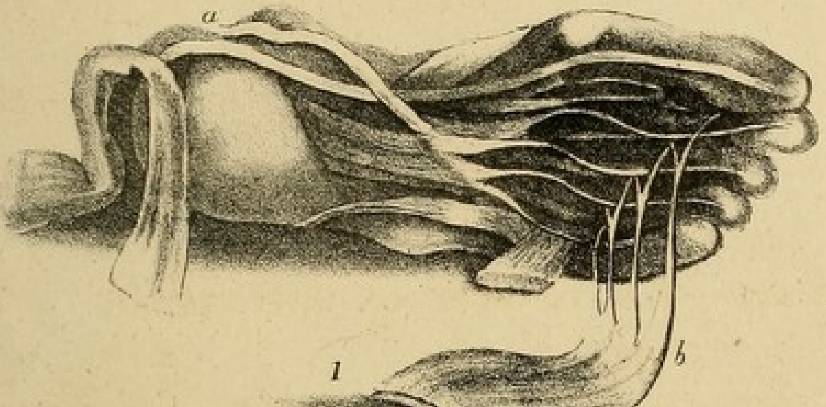
TAB.XVI.



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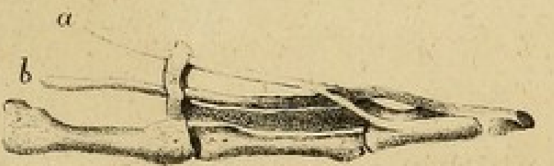

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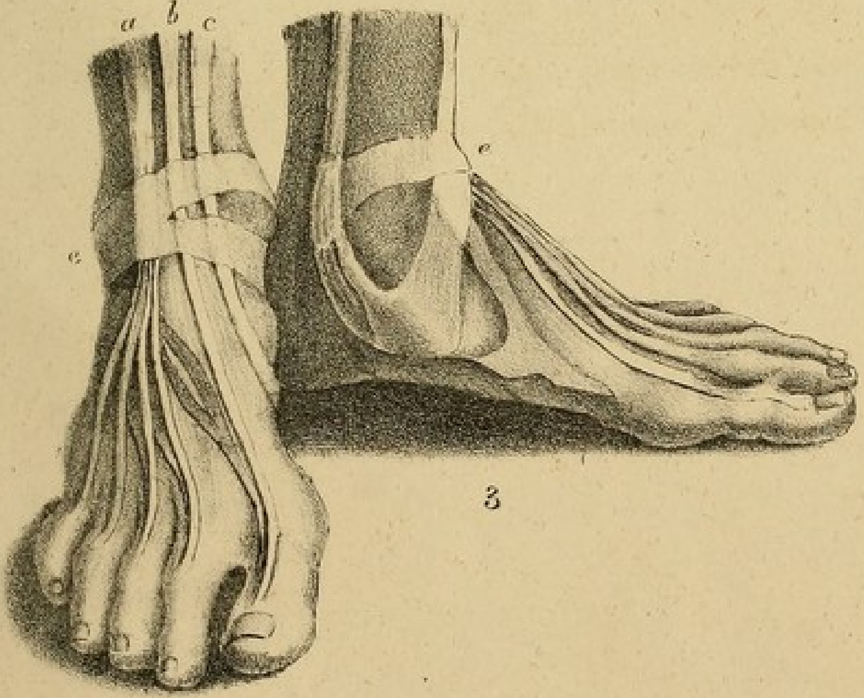

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Lith. of Pendleton. Boston.

CHAPTER X.

TAB. XVII.—THE HEART.

Fig. 1. A section of the human heart; *a, a*, the *superior* and *inferior vena cava*, the veins which convey the blood to, *b*, the *right auricle;* and thence into, *c*, the corresponding *ventricle;* from this ventricle the blood is impelled through, *e*, the *pulmonary artery* into the lungs; and returning by, *f, f*, the *pulmonary veins*, it is received into, *g*, the *left auricle:* it flows next into, *h*, the *left ventricle;* which by its contraction distributes the blood through the general arterial system:—*j*, the *aörta*, the great artery which transmits blood to the different parts of the body, from whence it is returned by veins to the *cavæ: k*, the *right subclavian; l*, the *right carotid* arteries, originating from one common trunk; *m*, the *left carotid; n*, the *left subclavian: d*, the *valves* of the right; *i*, the *valves* of the left ventricle.

Fig. 2. The valves of the right side (*tricuspid valves*) separated from the heart; *a, a, a*, the *carneæ columnæ*, or muscular fibres of the valves; *b, b, b*, the *chordæ tendineæ*, or tendinous filaments which are attached to, *c*, the valves.

Fig. 3. exhibits the *artery* cut open, with the form of the *semilunar valves*.

Fig. 4. A portion of the artery filled, showing how effectually the valves prevent the retrograde motion of the blood.

TAB. XVII.

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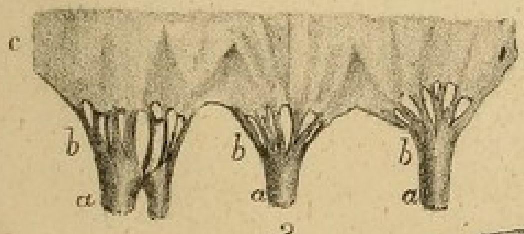

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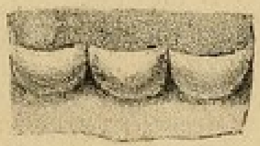

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Lith. of Pendleton, Boston.

CHAPTER X.

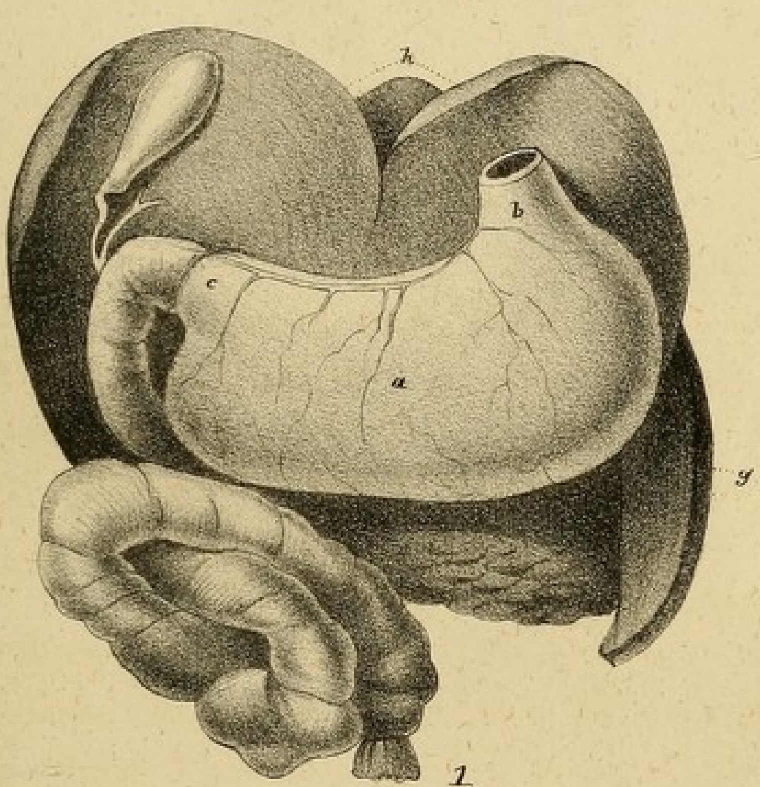
TAB. XVIII.—THE STOMACH, GALL BLADDER, &c.

FIG. 1. *a*, the *stomach*; *b*, the *cardia*; *c*, the *pylorus*. The *gastric juice* is a secretion derived from the inner membrane of the stomach, and digestion is principally performed by it. In the various orders of animated beings it differs, being adapted to the food on which they are accustomed to subsist. The food, when properly masticated, is dissolved by the gastric fluid, and converted into *chyme*; so that most kinds of the ingesta lose their specific qualities; and the chemical changes to which they would otherwise be liable, as putridity and rancidity, &c. are thus prevented.

In this plate, *h*, the *liver* is turned up, in order to show the *gall-bladder* which is attached to its concave surface; *d*, the *duodenum*; *e*, part of the small *intestines*; *f*, the *pancreas*; and *g*, the *spleen*.

FIG. 2. explains the several ducts and their communication with the *duodenum*; *a*, the *gall-bladder*; *b*, the *ductus cysticus*; which uniting with, *c*, the *ductus hepaticus*, forms, *d*, the *ductus communis*; which, after passing between the muscular and inner coats of the intestine, opens into it at *e*. *f*, the *pancreatic duct*. The bile is said to become more viscid, acrid, and bitter, from the thinner parts being absorbed during its retention in the gall-bladder.

TAB. XVIII.



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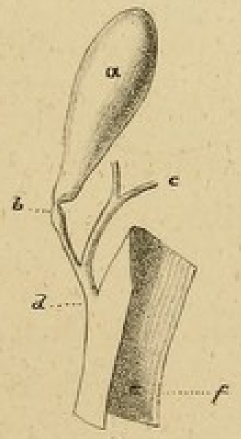

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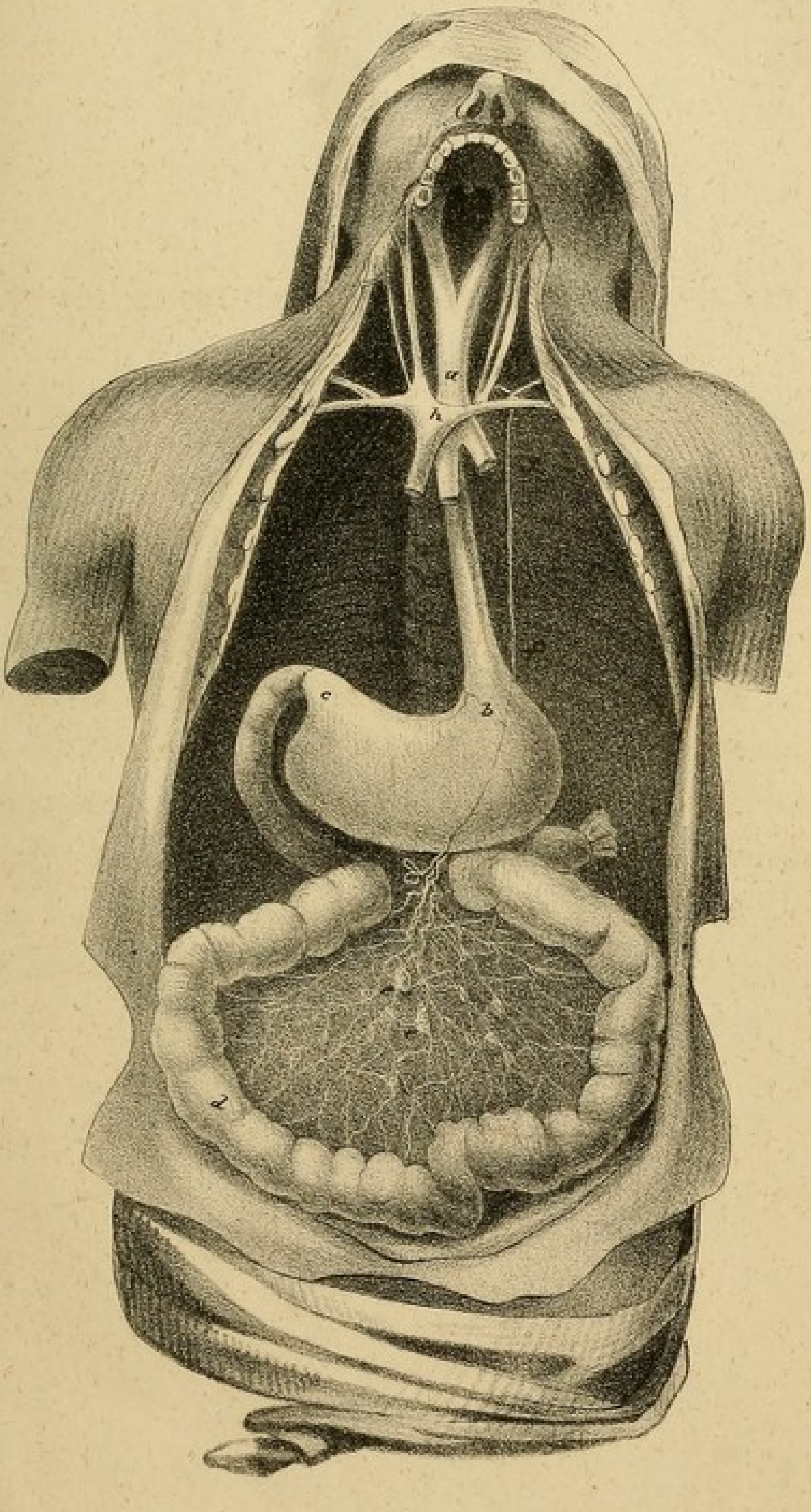
Swett Del. Lith of Pendleton

CHAPTER X.

TAB. XIX.—THE LACTEALS, AND THORACIC DUCT.

The figure in this plate represents the course of the food, from its entrance at the mouth to its assimilation with the blood; *a*, the *œsophagus*, extending from the *pharynx*, to, *b*, the *stomach;* where the alimentary matter having undergone the digestive process, escapes at, *c*, the *pylorus*, into, *d*, the *intestines*. In this plate a large portion of the latter is spread out to show a part of the absorbent system called *lacteals:* these collect and imbibe the *chyle* from the *ingesta,* and transmit it through, *e*, *e*, the *mesenteric glands*, into one general receptacle, *f*, (*receptaculum chyli*,) from which *g*, the *thoracic duct* ascends in a more or less tortuous direction to the lower vertebræ of the neck, and after forming an arch, it descends and enters, *h*, the left *subclavian vein*, at the point where that vein is united with the *internal jugular*. The absorbents of the right side frequently form a trunk, which enters the *right subclavian vein*.

TAB. XIX.



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CHAPTER X.

TAB. XX.—THE PAROTID GLAND.

Fig. 1. A dissection to exhibit the *parotid gland*.

Fig. 2. explains the former; *a*, *a*, the integuments turned back; *b*, the *parotid gland;* *c*, its *pipe* or *duct* passing over the *masseter*, then perforating, *d*, the *buccinator muscle*, and opening into the mouth opposite the second molar tooth.

TAB. XX.

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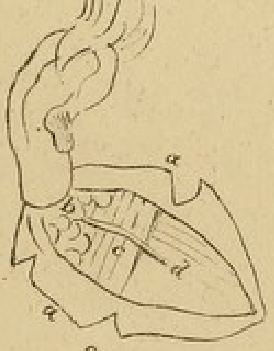

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J. R. S. Del. Lith. of Pendleton

CHAPTER X.

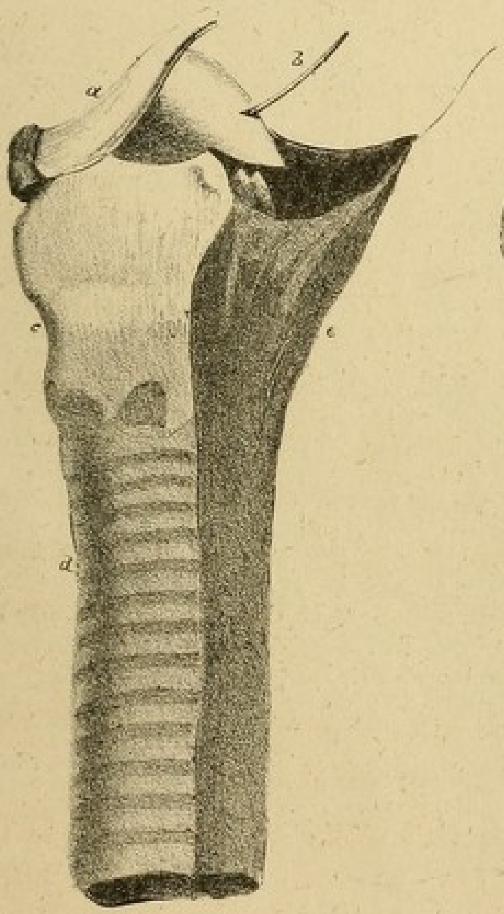
TAB. XXI.—THE LARYNX.

FIG. 1. The *larynx*, *pharynx*, &c. *a*, the *os hyoïdes*, *b*, the *epiglottis* pressed down, thus covering the *glottis*, or opening of the *larynx*; as it does in the act of deglutition.

FIG. 2. exhibits the *larynx*, and *trachea*; which is a continuation of the former; *b*, the *epiglottis*; *g*, the *arytenoïd cartilages*; *e*, the *thyroïd cartilage*, exceedingly strong, for the protection of the upper part of the air tube; *d*, the *cartilaginous ringlets* of the *trachea or wind-pipe*, each forming nearly two-thirds of a circle, and completed by a soft *membrane*, which, from its apposition to, *e*, Fig. 1. the *æsophagus*, accommodates itself to the substances passing into the stomach.

FIG. 3. The *larynx* or *upper* part of the wind-pipe of a bird.

TAB. XXI.



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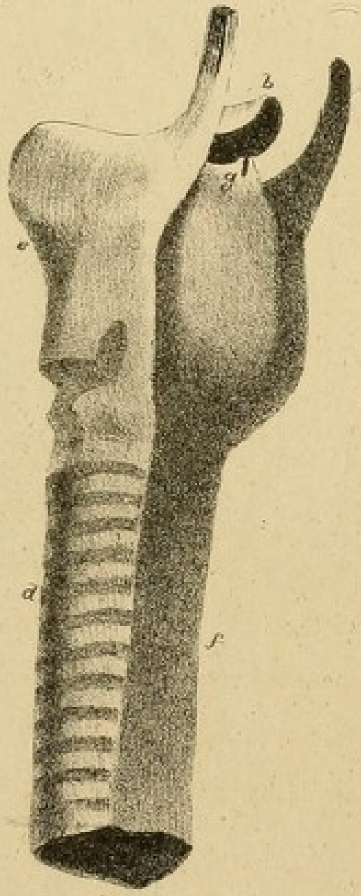

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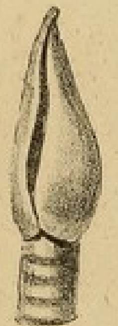

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Lith of Pendleton.

CHAPTER XI.

TAB. XXII.—PACKAGE OF THE VISCERA, AND MESENTERY.

Fig. 1. In this plate the parietes of the chest and abdomen, with the omentum, are removed to show the viscera *in situ; a*, the *heart; b*, the *aorta; c*, the *descending vena cava: d*, the *lungs* divided by the mediastinum into two portions; three lobes belong to the right, and two to the left portion of the lungs; *e*, the *diaphragm; f*, the *liver; g*, the *gall-bladder; h*, the *stomach; i*, the *spleen; k*, the *large intestines; l*, the *small intestines; m*, the *bladder*.

The viscera of the thorax and abdomen, *i. e.* the viscera of *organic life*, are *irregularly* disposed. The *agents of volition* are double, but the instruments of *involuntary motion*, namely the interior life, are single, and at least are irregular in their form.

The several viscera are correctly described in the Theology, and sufficient is said for the purposes for which they are introduced. To the supposed use of the *spleen* only an objection must be taken: various hypotheses have been entertained as to its office, but none are conclusive; the most probable is, that it is a source of supply of blood for furnishing the gastric secretion, or that the blood undergoes some important change in it.

Fig. 2. The *mesentery*. This membrane is formed by a reflection of the *peritonæum* from each side of the vertebræ; it connects the intestines loosely to the spine, to allow them a certain degree of motion, yet retains them in their places; and furnishes their exterior covering. Between the laminæ of, *a*, the *mesentery*, are received the *glands*, *vessels*, and *nerves;* and its extent admits of a proper distribution of each.

TAB. XXII.

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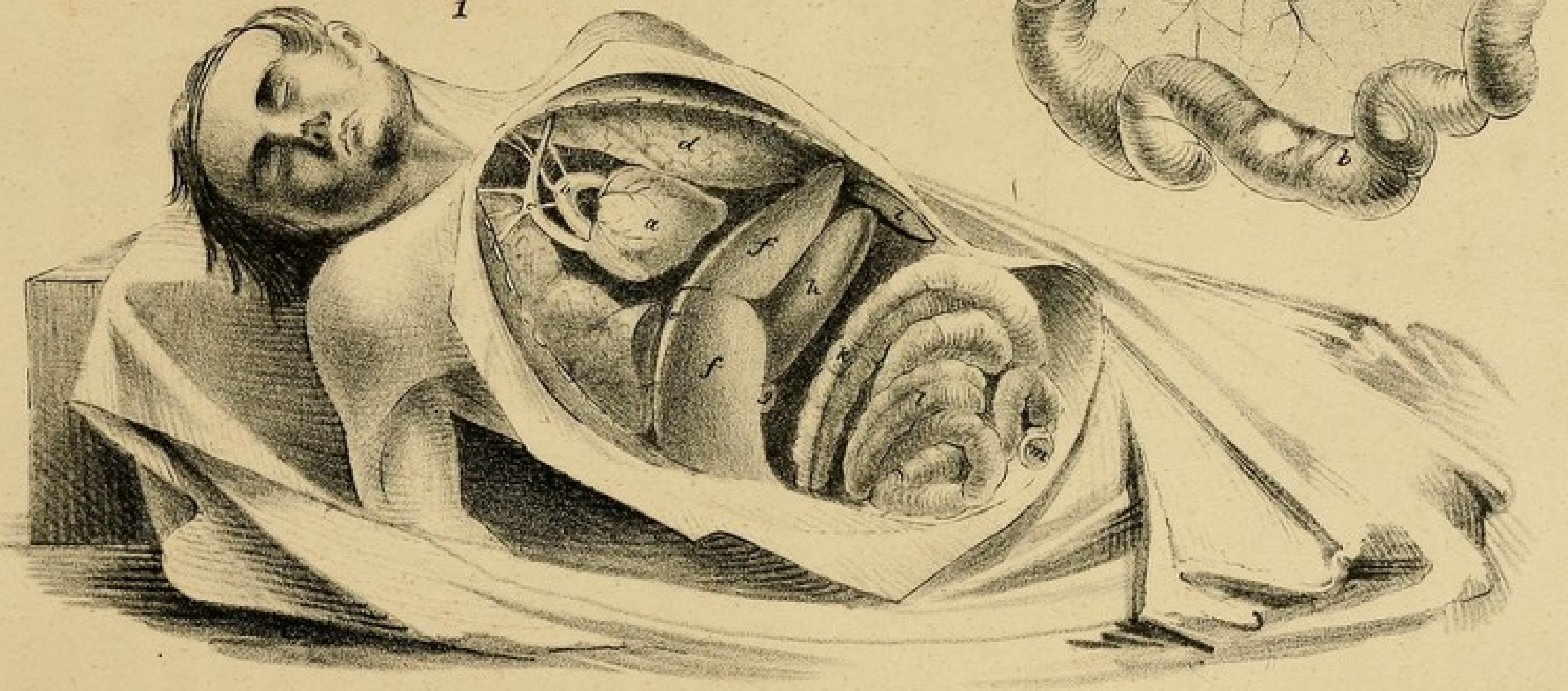

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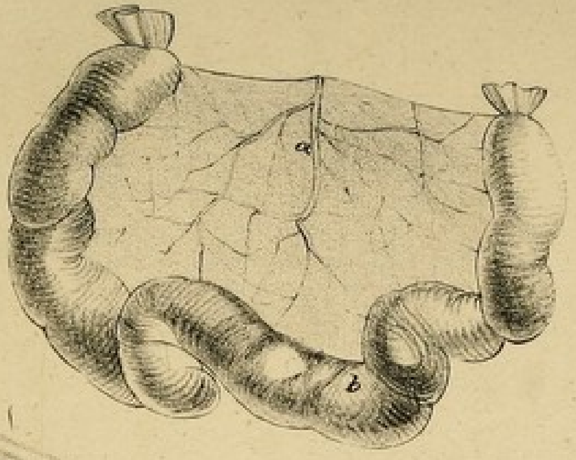


Swett Del.

Lith of Pendleton

CHAPTER XII.

TAB. XXIII.—NERVES OF THE BILL OF A DUCK, VALVULÆ CONNIVENTES. CHAP. XIII. AIR-BLADDER OF A FISH, AND FANG OF THE VIPER.

Fig. 1. The upper *mandible* of the duck, on which are distributed the first and second branches of the fifth pair of nerves; the former passing through the orbit to the extremity of the bill, and, together with the latter, supplying the whole palatine surface.

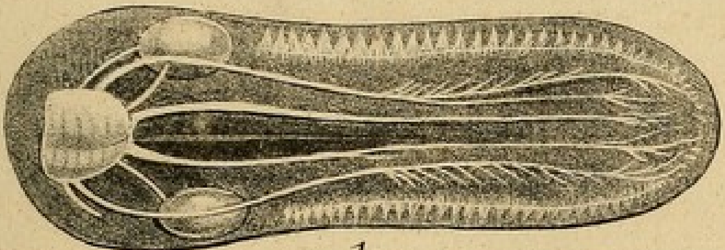
Fig. 2. A small portion of the human intestine cut open in order to show the *valvulæ conniventes*. It may be questioned, whether these extremely soft rugæ or folds of the villous coat of the intestine can in the least retard the passage of the food through its canal; nor does, as Paley supposes, the erect attitude of man require them; for, since there are as many of the convolutions of the intestines ascending as there are descending, the weight of the food can have no influence in the action of the intestine: it is certain, however, that this arrangement of the internal coat, affords *a more extensive surface of the lacteals and secreting vessels;* and this appears to be the real use of the *valvulæ conniventes*.

Fig. 3. The *air-bladder* in the roach. This vessel differs in size and shape, in different species of fish; generally communicating, by one or more ducts, either with the œsophagus or stomach; by which means the fish receives or expels the air, thus sinking or rising without effort: but as some are destitute of this organ, it is considered as an accessary instrument of motion.

Fig. 4. The head of a viper of the natural size.

Fig. 5. The *fang* magnified, at the root of which is the gland which secretes the venom: a hair is represented in the tube, through which the poison is ejected.

TAB. XXIII.



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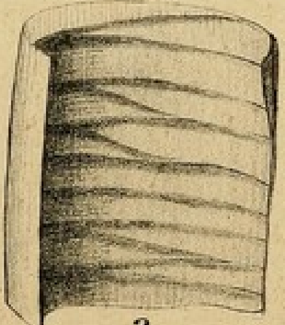

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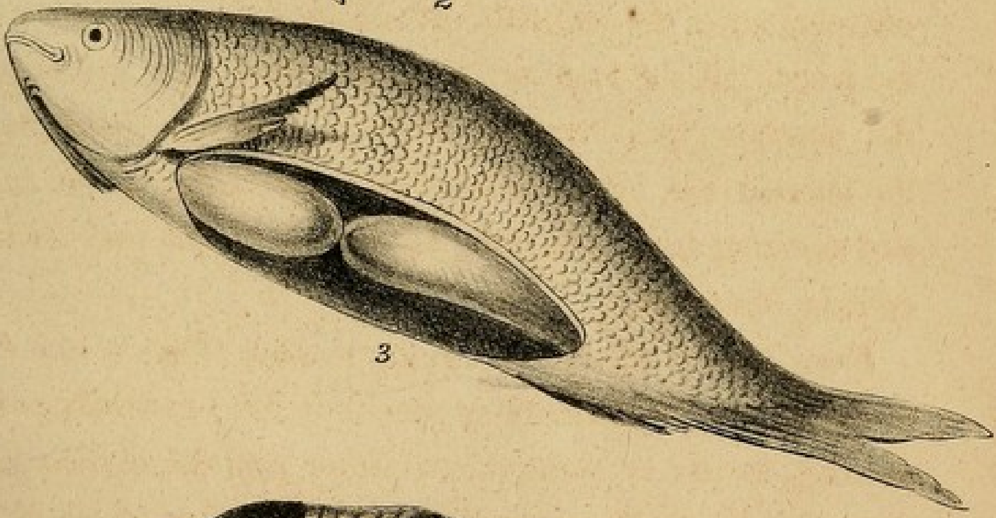

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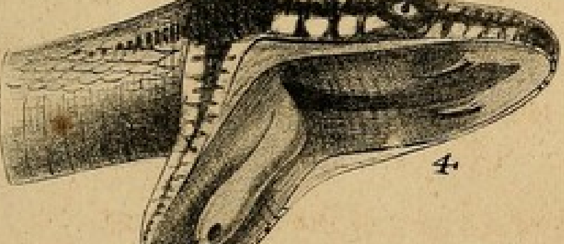

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CHAPTER XIII.

[illegible]—THE OPOSSUM.

FIG. 1. The American opossum (Didelphis marsupialis.)

FIG. 2. One of the young of the opossum.

FIG. 3. The pelvis of the opossum; c, c, the two bones (ossa marsupialia) placed on the anterior part called the ossa pubis. Drawn from a specimen in the Museum of the Royal College of Surgeons, London.

The kangaroo and several other animals of [illegible] have a similar structure.

CHAPTER XIII.

TAB. XXIV.—THE OPOSSUM.

FIG. 1. The American opossum; (*didelphis marsupialis.*)

FIG. 2. One of the young of the opossum.

FIG. 3. The pelvis of the opossum; *a*, *a*, the two bones (*ossa marsupialia*) placed on the anterior part called the *ossa pubis*. Drawn from a specimen in the Museum of the Royal College of Surgeons, London.

The kangaroo and several other animals of New Holland have a similar structure.

TAB.XXIV.

Lith. of Pendleton

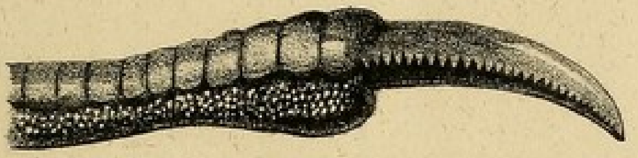
CHAPTER XIII.

TAB. XXV.—CLAW OF THE HERON, AND BILL OF THE SOLAND GOOSE.

Fig. 1. *The middle claw of the heron.*

Fig. 2. The head of the *Soland goose* (pelicanus bassanus), drawn from a specimen in the Ashmolean Museum, Oxford.

TAB. XXV.



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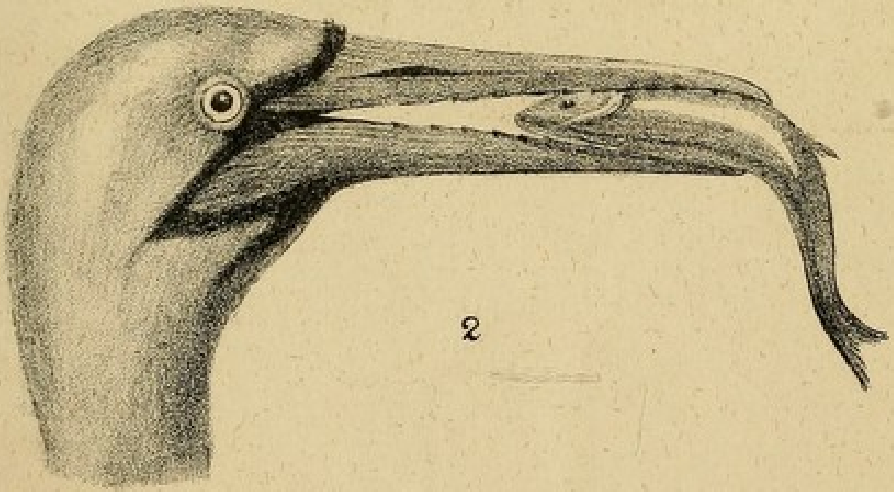

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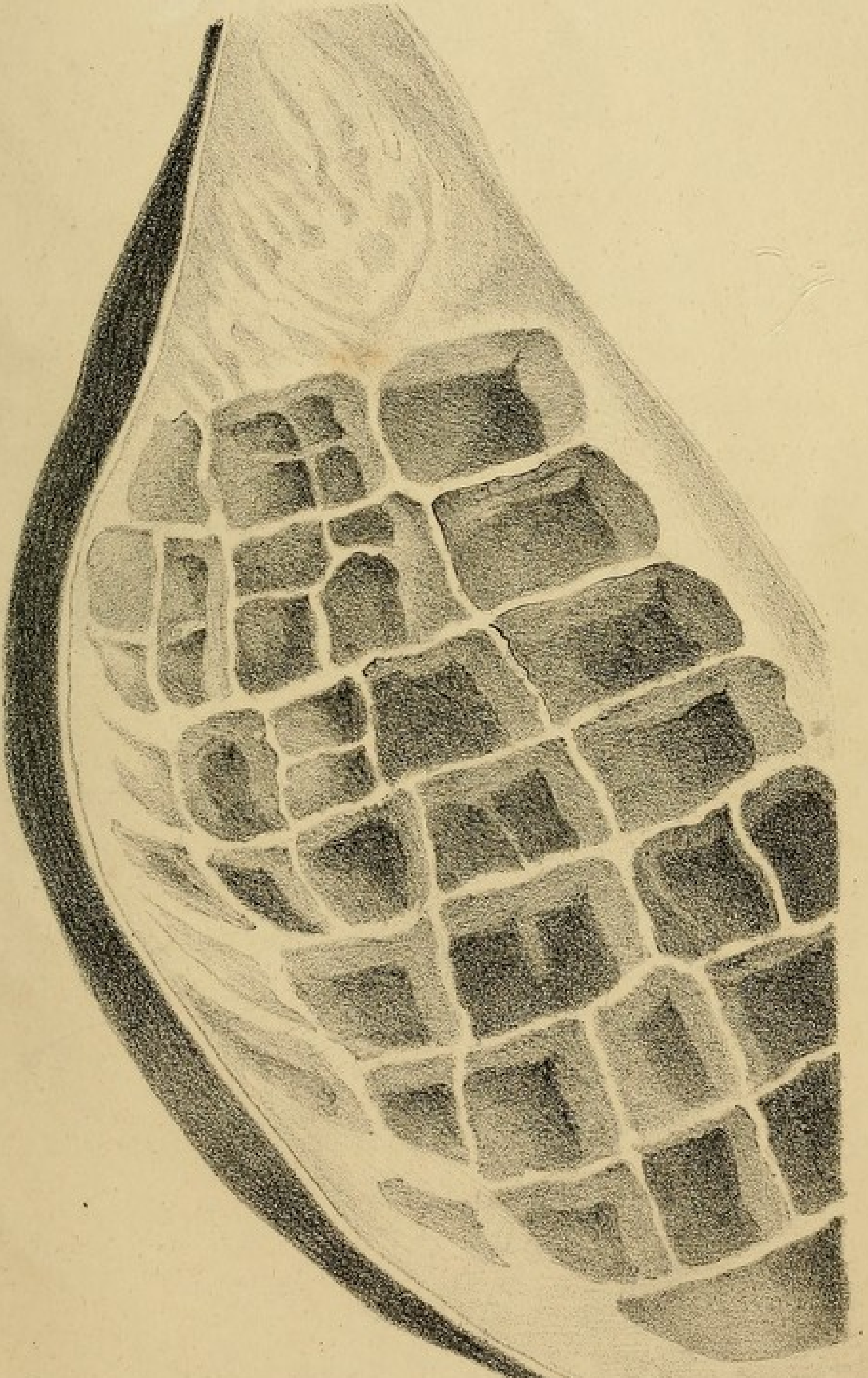
Lith. of Pendleton.

CHAPTER XIII.

TAB. XXVI.—STOMACH OF THE CAMEL.

The figure in this plate exhibits the *cells in the stomach of the camel*, from a preparation in the museum of the Royal College of Surgeons, London. In the camel, dromedary, and lama, there are four stomachs, as in horned ruminants; but the structure, in some respects, differs from those of the latter. The camel tribe have in the first and second stomach numerous cells, several inches deep, formed by bands of muscular fibres crossing each other at right angles; these are constructed so as to retain the water, and completely exclude the food. In a camel dissected by Sir E. Home, the cells of the stomach were found to contain two gallons of water; but in consequence of the muscular contraction, which had taken place immediately after death, he was led to conclude this was a quantity much less than these cavities were capable of receiving in the living animal. See Lectures on Comparative Anatomy, by Sir E. Home, vol. i. p. 168.

TAB. XXVI.



J. R. Smith del. *Lith. of Pendleton.*

CHAPTER XIII.

TAB XXVII.—TONGUE OF THE WOODPECKER, AND SKULL OF THE BABYROUESSA.

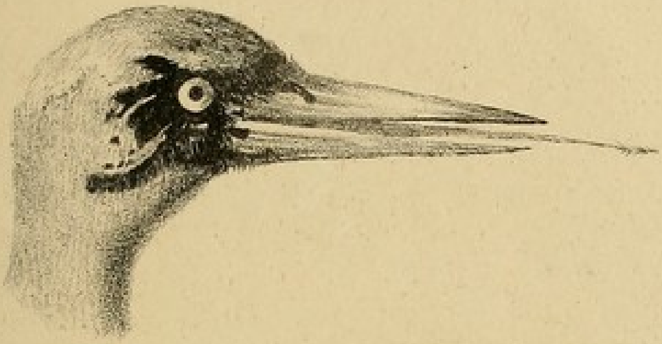
Fig. 1. The *head of the woodpecker*, (picus viridis.)

Fig. 2. The *tongue*, the natural size.

Fig. 3. The claw of the same bird, referred to in Chap. V.

Fig. 4. The *skull of the babyrouessa*, from a specimen in the Anatomy School, Christ Church, Oxford.

TAB. XXVII.



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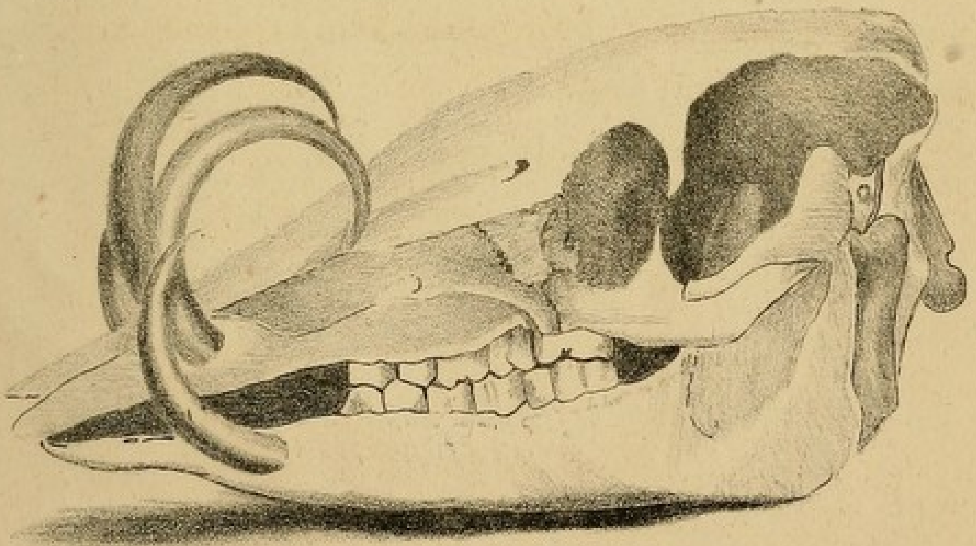

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J. R. Smith del.

Lith. of Pendleton.

PLATE XIV.

CHAPTER XIV.

FOR EXPLANATION—TEMPORARY AND PERMANENT TEETH.

FIG. 1. The gums and other parts of the head are removed, showing the teeth of the infant as they exist at the time of its birth; they are without roots, and contained in a capsule within the jaws.

FIG. 2. In this figure also, the outer alveolar plate of the jaws has been removed to show the succession of teeth. This is the state at six years of age. The temporary teeth are all shed between the ages of seven and fourteen, and are supplied by the permanent teeth, already nearly perfectly formed, and situated at the roots of the former.

CHAPTER XIV.

TAB. XXVIII.—TEMPORARY AND PERMANENT TEETH.

Fig. 1. The gums and outer plate of the bone are removed, showing the teeth of the infant, as they exist at the time of its birth; they are without roots, and contained in a capsule within the jaws.

Fig. 2. In this figure also, the outer alveolar plate of the jaws has been removed to show the succession of teeth. This is the state at six years of age. The *temporary* teeth are all shed between the ages of seven and fourteen, and are supplied by the *permanent teeth*, already nearly perfectly formed, and situated at the roots of the former.

TAB. XXVIII

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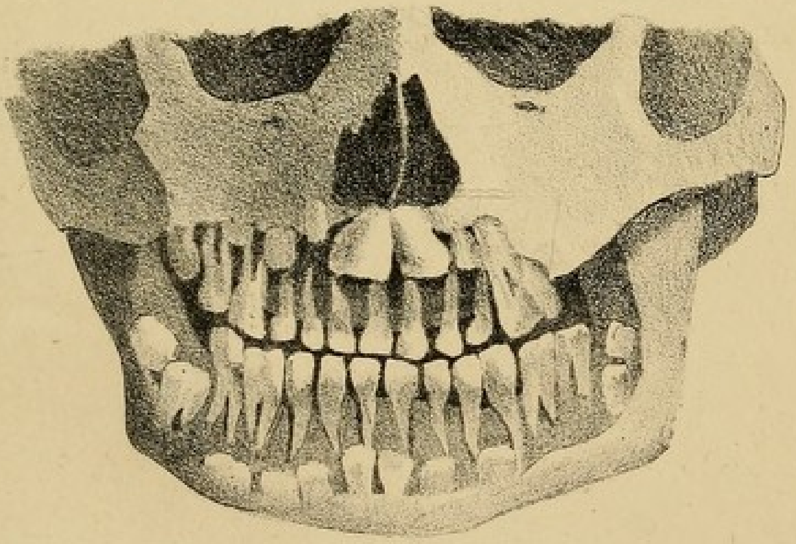

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[illegible]

CHAPTER XIV.

[illegible]

Fig. 1. A view of the fœtal heart; a, the ascending, b, the descending vena cava; c, the right auricle; d, e, f, mark the elevated ring of the *foramen ovale*, or the opening between the two auricles.

Fig. 2. The fœtal heart; a, its pulmonary artery; c, d, its branches; g, the *ductus arteriosus*, or canal for transmitting the blood into, h, the aorta. As the lungs are useless in the fœtus, unless as a "prospective contrivance," the heart has to carry on a single circulation only; thus that communication between the two auricles [illegible] and the ventricles also force the blood [illegible]

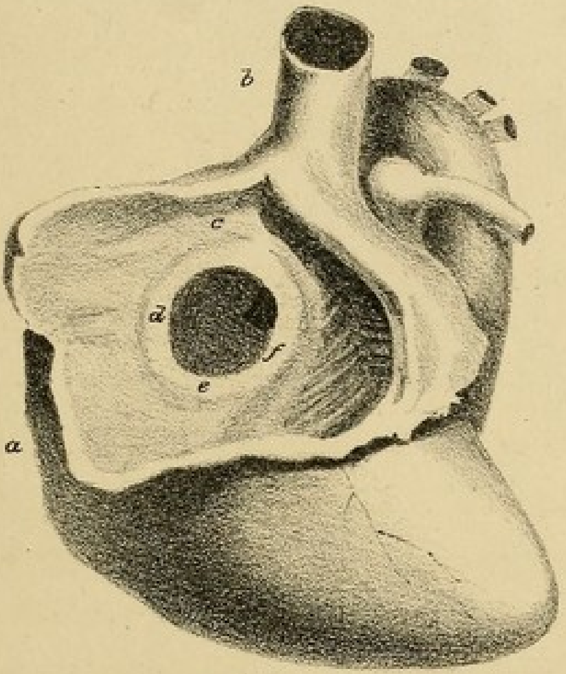
CHAPTER XIV.

TAB. XXIX.—FORAMEN OVALE, AND DUCTUS ARTERIOSUS.

Fig. 1. A view of the fœtal heart; *a*, the ascending, *b*, the descending vena cava; *c*, the right auricle; *d*, *e*, *f*, mark the elevated ring of the *foramen ovale*, or the opening between the two auricles.

Fig. 2. The fœtal heart; *a*, the pulmonary artery; *b*, *b*, its branches; *c*, the *ductus arteriosus*, or canal for transmitting the blood into, *d*, the aorta. As the lungs are useless in the fœtus, unless as a "prospective contrivance," the heart has to carry on a single circulation only: the free communication between the two auricles identifies them as one cavity; and the ventricles also force the blood into one vessel, the aorta.

TAB. XXIX



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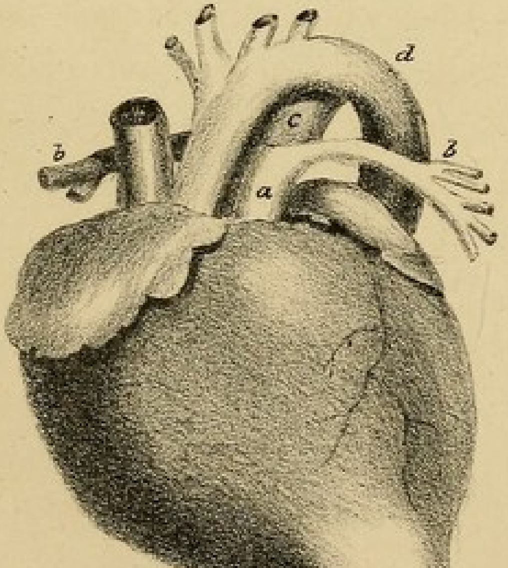

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J. R. Smith del. Lith. of Pendleton.

CHAPTER XVI.

THE [illegible] OUT OF THE [illegible]

FIG. 1. [illegible] served in the [illegible]. The eyes of the [illegible] are very [illegible] large and project more than half their [illegible]. They are covered [illegible] with a [illegible] opening [illegible] the pupil. The eyelid is continuous with the integument of the surface of the body [illegible] the eye [illegible] attached to the front of the eye, so it follows all its movements. The neck is [illegible] "inflexible," but [illegible], and the [illegible] of the [illegible] extraordinarily [illegible]; this, however, is admirably compensated by the [illegible] head [illegible] of the animal can see behind, before, or at either side, without moving the head.

FIG. 2. The [illegible] a preparation in the Museum of the Royal College of Surgeons, London. The [illegible] "[illegible];" but [illegible]. In this specimen the [illegible] is converted into a [illegible] valley [illegible] that the [illegible] round the [illegible] a very [illegible] of the [illegible] when [illegible] ulated.

FIG. 3. The [illegible] a dried preparation showing its [illegible].

CHAPTER XVI.

TAB. XXX.—THE CHAMELEON, AND GUT OF THE SEA FOX.

Fig. 1. The *chameleon*, drawn from one of the species preserved in the Anatomy School, Christ Church, Oxford. The eyes of this creature are very peculiar: they are remarkably large, and project more than half their diameter. They are covered with a single eye-lid, with a small opening in it opposite the pupil. The eye-lid is granulated like every part of the surface of the body, with this difference, over the eye the granulations are disposed in concentric circles which form folds in that part to which the eye is turned: and as the lid is attached to the front of the eye, so it follows all its movements. The neck is not "inflexible," but its shortness, and the structure of the cervical vertebræ exceedingly limit the motion; this however is admirably compensated by the not less singular local position than motion of the eye, as the animal can see behind, before, or on either side, without turning the head.

Fig. 2. The spiral intestine of the *sea-fox* cut open; taken from a preparation in the museum of the Royal College of Surgeons, London. The sea-fox is not, as Paley supposes, a "quadruped;" but a species of shark (squalus vulpes.) The convoluted intestinal tube is found in some genera of fish, only. In this specimen the internal membrane is converted into a spiral valve, having thirty-six coils, so that the alimentary substances, instead of passing speedily away, by proceeding round the turns of the valve, traverse a very considerable circuit: an extensive surface for the absorbents is thus provided.

Fig. 3. The valve removed from the intestine in a dried preparation showing its real form.

TAB. XXX.

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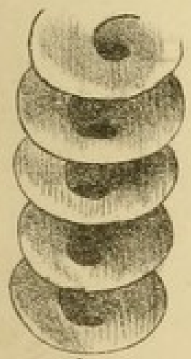

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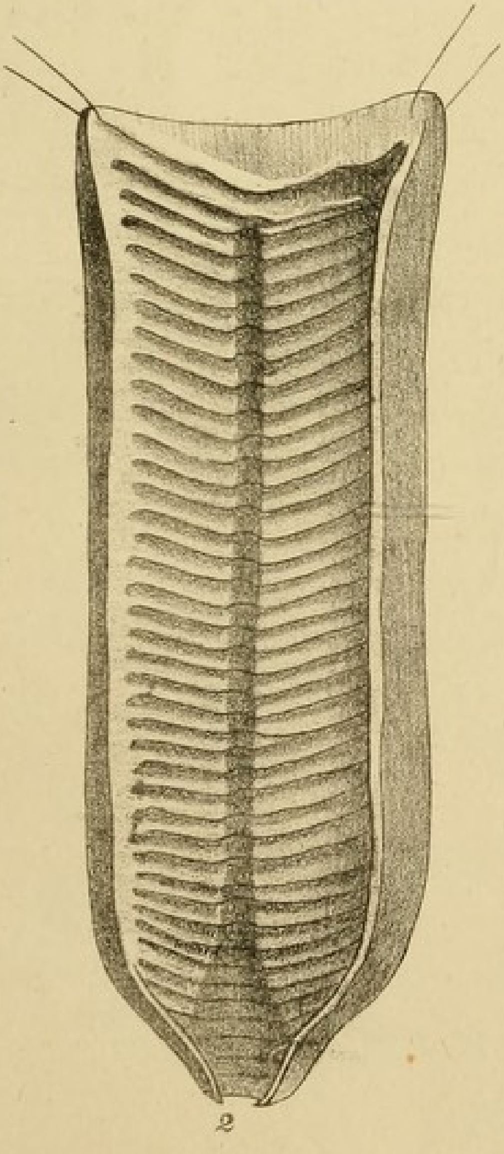

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CHAPTER XIX.

TAB. XXXI.—THE WINGS OF THE BEETLE, AWL, STING OF THE BEE, PROBOSCIS, &c.

FIG. 1. is an instance of the horny and gauze wings in one of the most beautiful of the beetle class of this country, the *scarabæus auratus*, or rose chafer; showing the expanded *elytra*, *a, a:* the true wings, *b, b.*

FIG. 2. A specimen of the elytra covering half the body in the *ear-wig*, (forficula auricularia:) one of the elytra is extended, and the membranous wing unfolded.

FIG. 3. The *awl* of the *œstrum bovis*, or *gad-fly*, highly magnified.

FIG. 4. One of the *hooks*.

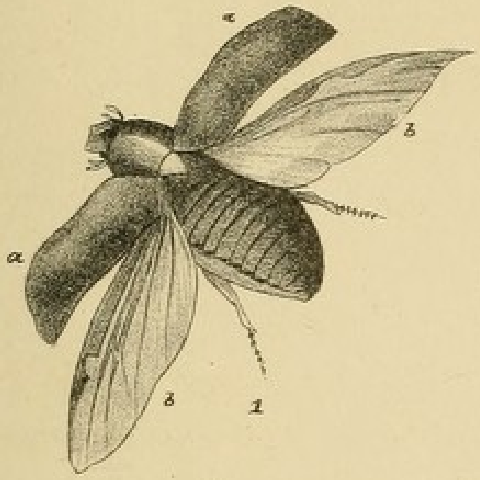
FIG. 5. The *sting of a bee*, drawn from nature as it appears by means of a magnifier of very high powers; *a, a, a, a*, the apparatus for projecting the sting; *b*, the exterior, *c*, the interior sheath of, *d*, the *true sting*, which is divided into two parts barbed at the sides; *e*, the bag which contains the *poison*.

FIG. 6. The *proboscis* of a bee extended; *a, a*, the case or sheath; *b*, the tube; *c*, the exterior, *d*, the interior fringes; *e*, the tongue; *f, f*, the exterior, *g, g*, the interior palpi.

FIG. 7. The appearance of the proboscis when contracted, and folded up.

FIG. 8. The head of a butterfly, showing the *coiled proboscis*.

TAB. XXXI.



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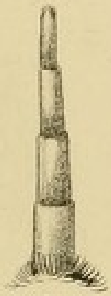

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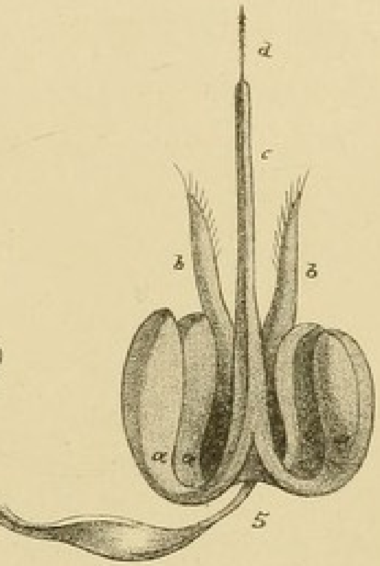

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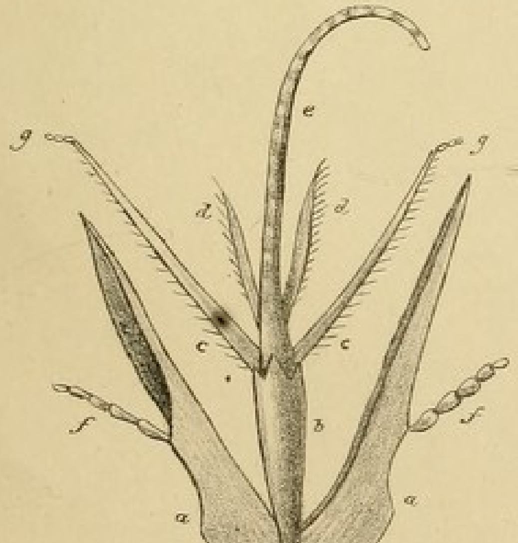

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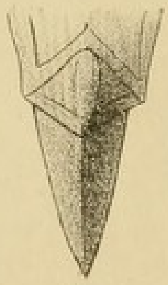

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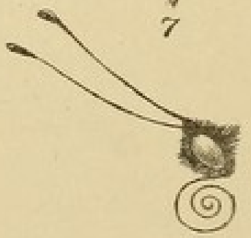

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CHAPTER XII.

PLATE XII.—THE CAPSULE, PISTIL, STAMINA, NIGELLA, FLOWER, AND GRAINS.

FIG. 1. The capsule or seed vessel of the poppy (papaver somniferum): it is divided to exhibit its internal structure.

FIG. 2. is an instance of an erect flower, the agave Americana; in which the pistil is shorter than the stamina.

FIG. 3. A flower of the crown-imperial. The relative length of the parts is now inverted.

FIG. 4. A nectary of the nigella.

FIG. 5. A grain of barley, showing the [illegible] and pollen granules.

CHAPTER XX.

TAB. XXXII.—THE CAPSULE, PISTIL, STAMINA, NIGELLA, PLUMULE, AND RADICLE.

FIG. 1. The *capsule* or seed vessel of the poppy (papaver somniferum): it is divided to exhibit its internal structure.

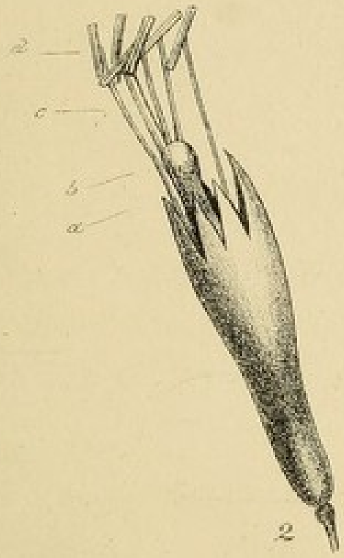
FIG. 2. is an instance of an erect flower, the agave Americana; in which the pistil is shorter than the stamina.

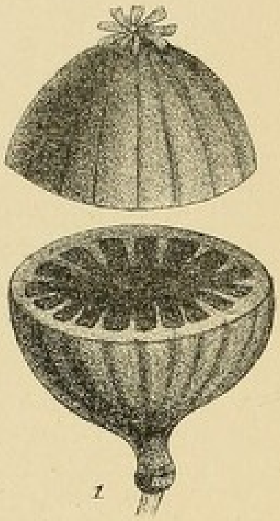
FIG. 3. A flower of the *crown-imperial*. The relative length of the parts is now inverted.

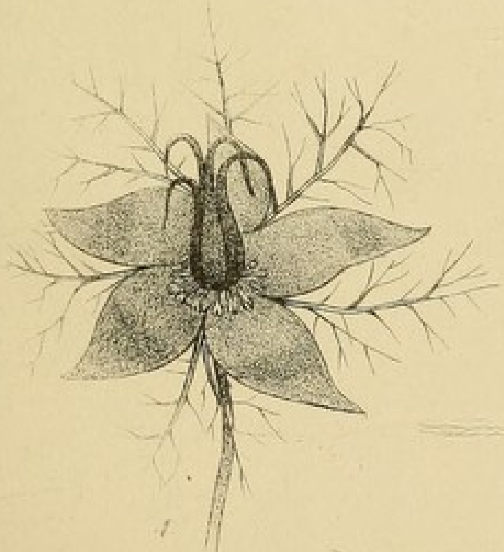
FIG. 4. A blossom of the *nigella*.

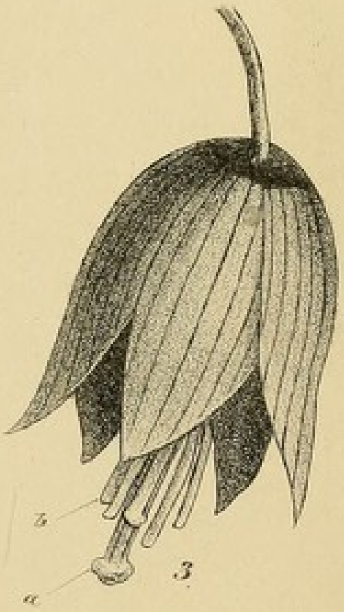
FIG. 5. A grain of barley, showing the *plumule* and *radicle growing from it*.

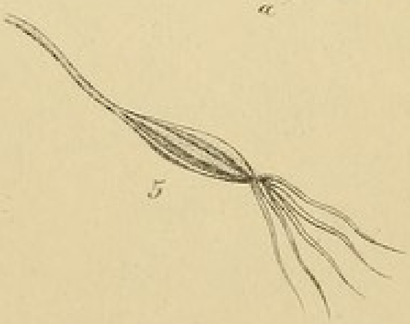
TAB. XXXII.











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[illegible]LANATION.

[illegible] THE [illegible]

[illegible] is a [illegible] ovary. The seeds alone, the flowers of [illegible] are [illegible]. This is drawn from a specimen in the possession of Dr. Hassall.

Fig. 2. The male plant, producing white flowers; these, when matured, rise like air bubbles, and suddenly expanding when they reach the surface of the water, float about in [illegible] [illegible] [illegible] them. "These [illegible] pollen is scattered over the stigmas of the first mentioned flowers, whose stalks soon afterwards regaining their spiral figure, and the fruit comes to maturity at the bottom of the water."

Fig. 3. Part of the [illegible] and [illegible] [illegible].

CHAPTER XX.

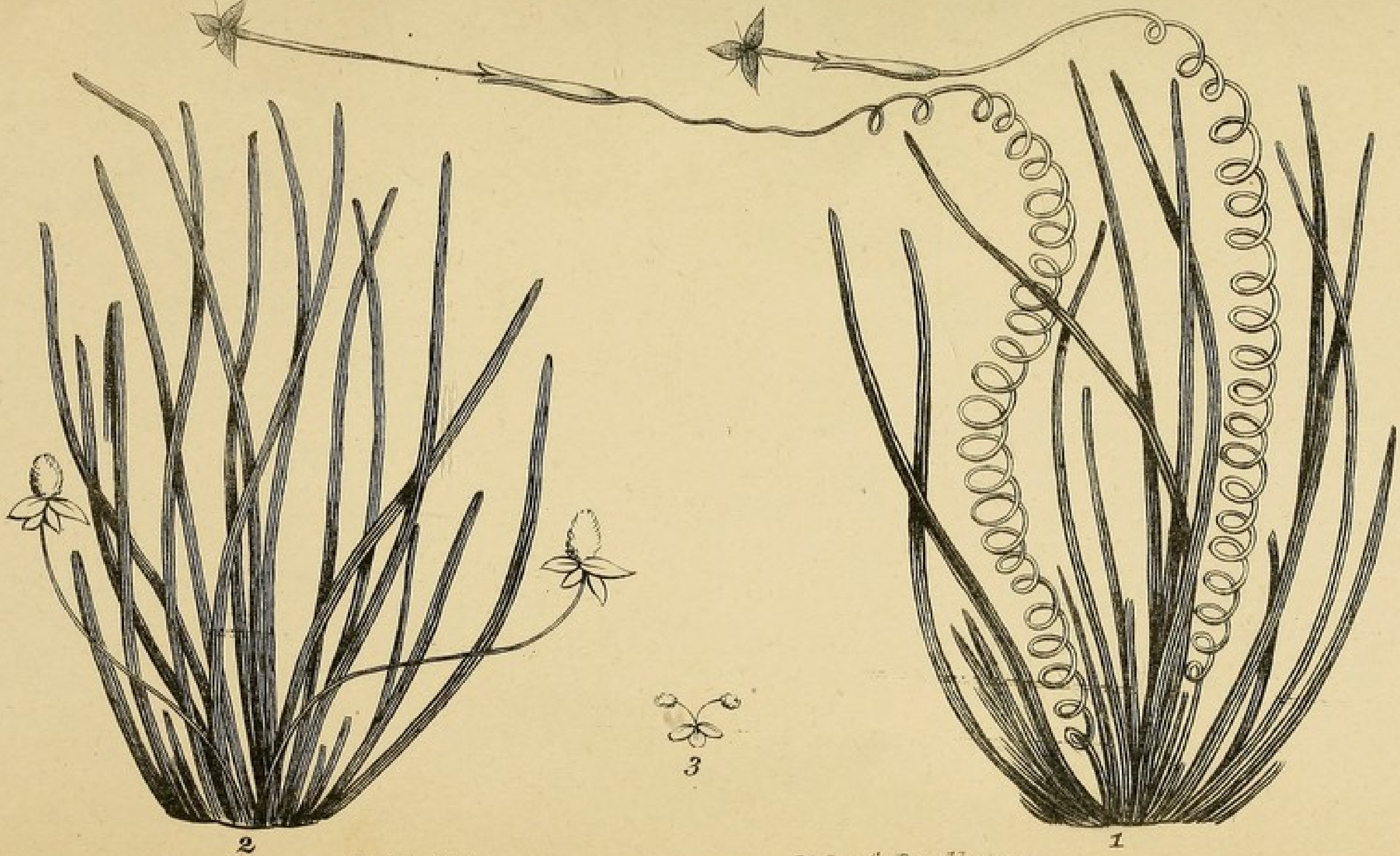
TAB. XXXIII.—VALLISNERIA.

Fig. 1. *Vallisneria spiralis.* The *female plant,* the flowers of which are purple. This is drawn from a specimen in the possession of Dr. Ogle.

Fig. 2. The *male plant,* producing white flowers; these when mature rise like air bubbles, and suddenly expanding when they reach the surface of the water, float about in such abundance as to cover it entirely. "Thus their pollen is scattered over the stigmas of the first mentioned blossoms, whose stalks soon afterwards resume their spiral figure, and the fruit comes to maturity at the bottom of the water."

Fig. 3. One of the separated *male* flowers magnified.

TAB. XXXIII.



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Lith. of Pendleton.

CHAPTER XX.

TAB. XXXIX.—CUSCUTA EUROPÆA.

This plant is a native of our own country, and is found in hedges, on clover, or on hops, where it proves exceedingly injurious to the crops. It flowers from July to August. The drawing was taken from a specimen which grew in the Physic Gardens, Oxford. It is represented twining about some nettles on which it generally supplies itself.

"Of all the parasitical plants, the dodder (cuscuta) tribe are the most singular, depending for their nourishment entirely on those vegetables about which they twine, and into which they send little [illegible] small suckers, [illegible] the original root of the dodder withers away, as soon as the young stem has fixed itself to any other plant, so that its connection with the earth is cut off." [illegible]

CHAPTER XX.

TAB. XXXIV.—CUSCUTA EUROPÆA.

This plant is a native of our own country, and is found in hedges, on clover, or on beans, where it proves exceedingly injurious to the crop. It flowers from June to August. The drawing was taken from a specimen which grew in the Physic Gardens, Oxford. It is represented twining about some nettles on which it annually attaches itself.

"Of all the parasitical plants, the dodder (cuscuta) tribe are the most singular, trusting for their nourishment entirely to those vegetables about which they twine, and into whose tender bark they insert small villous tubercles serving as roots, the original root of the dodder withering away entirely, as soon as the young stem has fixed itself to any other plant; so that its connexion with the earth is cut off." English Botany, p. 55.

TAB. XXXIV.

Swett, Del.   Lith. of Pendleton

CHAPTER XXV.

PLATE XXV.—THE AUTUMNAL CROCUS.

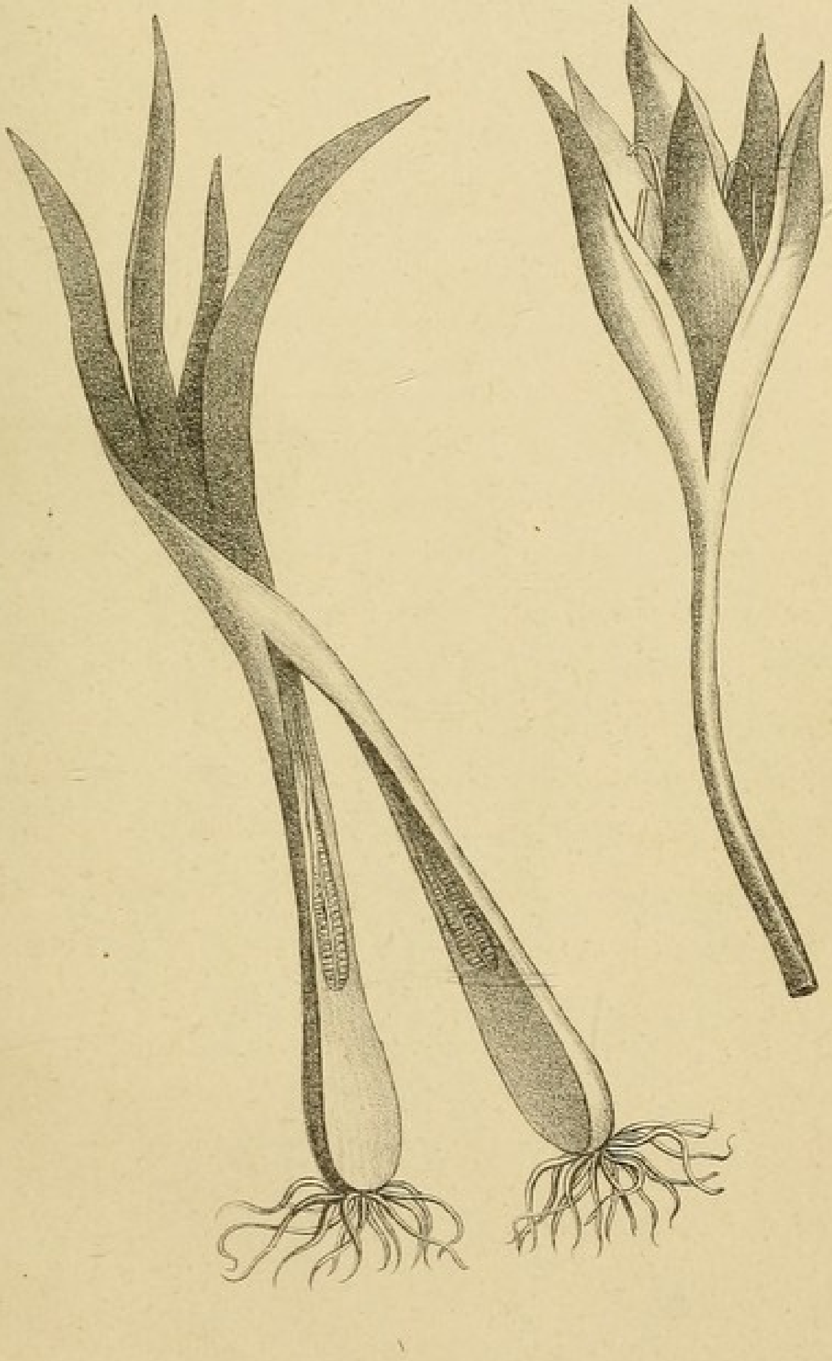
The colchicum autumnale. This plant [illegible] exhibits a mode of fructification scarcely paralleled among British vegetables. The flowers appearing very late in autumn, the impregnated germen remains latent under ground close to the bulb till the following spring, when the capsule rises above the surface accompanied by several long, upright leaves, and the seeds are ripened about June; after which the leaves decay. See British Botany, vol. i. p. 132. The plant is represented as it appears in spring; the root is divided to show the seed vessel near the bulb. The flower is remarkable for the length of its tube.

CHAPTER XX.

TAB. XXXV.—THE AUTUMNAL CROCUS.

The *colchicum autumnale.* This plant before us exhibits a mode of fructification scarcely paralleled among British vegetables. The flowers appearing very late in autumn, the impregnated germen remains latent under ground close to the bulb till the following spring, when the capsule rises above the surface accompanied by several long upright leaves, and the seeds are ripened about June, after which the leaves decay. See British Botany, vol. i. p. 133. The plant is represented as it appears in *spring;* the root is divided to show the *seed vessel* near the bulb. The flower is remarkable for the length of its tube.

TAB. XXXV.



Swett, Del. *Lith. of Pendleton.*

CHAPTER XX.

[illegible]

V[illegible] fly-trap[illegible] of [illegible] are so remarkable as to deserve a [illegible]. It is a native of North Carolina; the root [illegible] radical, supported on long, leafy, and [illegible] having a small portion of this next the leaf [illegible] and last [illegible] sides of two equal and [illegible] to each other [illegible] when [illegible] they [illegible] and, when [illegible] a long, [illegible] of a [illegible] on the [illegible] and [illegible] with a row of [illegible] at right angles with the surface of the [illegible] each other when they close. [illegible] middle of each [illegible] which are [illegible] to [illegible] [illegible]

CHAPTER XX.

TAB. XXXVI.—THE DIONÆA MUSCIPULA.

Venus's fly-trap. Some parts of this plant are so remarkable as to deserve a particular description. It is a native of North Carolina; the root perennial; leaves all radical, supported on long fleshy and strongly veined footstalks, leaving a small portion of this next the leaf naked: the leaf itself consists of two semi-oval lobes jointed at the back, so as to allow them to fold close together; they are fleshy, and, when viewed through a lens, glandular, sometimes of a reddish colour on the upper surface; the sides of both lobes are furnished with a row of cartilaginous ciliæ which stand nearly at right angles with the surface of the leaf, and lock into each other when they close. Near the middle of each lobe are three small spines, which are supposed to assist in destroying the entrapped insect. In warm weather the lobes are fully expanded and highly irritable, and if a fly or other insect at this time light upon them they suddenly close, and the poor animal is imprisoned till it dies. See Curtis's Botanical Magazine, No. 785.

TAB. XXXVI.

D. C. Johnston del.

Lith. of Pendleton

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