

R.B. TODD



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P L A T E S

ILLUSTRATIVE OF

OBSERVATIONS

ON CERTAIN PARTS OF

THE ANIMAL ŒCONOMY,

INCLUSIVE OF

SEVERAL PAPERS FROM THE PHILOSOPHICAL TRANSACTIONS, ETC.

BY

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WITH NOTES,

BY

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## EXPLANATION OF PLATES.

### <sup>a</sup> PLATE XXV.

*Fig. 1.* Represents the testes within the abdomen, in an abortive fœtus of about six months. All the intestines, except the rectum, are removed; and the peritonæum in most places is left upon the surfaces which it covers, so that the parts have not that sharpness and distinct appearance which might have been given to them by dissection.

*a.* The upper part of the object, covered with a cloth. *bb.* The thighs. *c.* The penis. *d.* The scrotum. *e.* The flap of the integuments, abdominal muscles, and peritonæum of the right side, turned back over the os ilium, to bring the testis into view. *f.* The flap of the skin, and cellular membrane of the left side, disposed in the same manner. *g.* The flap of the abdominal muscles, and of the peritonæum of the left side, turned back over the spine of the os ilium. The lower part of this flap is cut away, in order to show the ligament of the testis passing down through the ring into the scrotum. *hh.* The lower part of each kidney. *i.* The projection formed by the lower vertebræ lumborum, and by the bifurcation of the aorta and vena cava. *k.* The rectum filled with meconium, and tied at its upper part, where the colon was cut away. *l.* That branch of the inferior mesenteric artery which was going to the colon. *m.* The lower branch of the same artery, which went down into the pelvis, behind the rectum. *n.* The posterior surface of the cavity of the bladder; the anterior part, which is higher than the ossa pubis in so young a fœtus, being cut away. *oo.* The hypogastric, or umbilical, arteries cut through, where they were turning up by the sides of the bladder, in their way to the navel. *pp.* The ureter of each side passing down before the psoas muscle and iliac vessels, in its course to the lower part of the bladder. *qq.* The spermatic arteries running a little serpentine. *rr.* The testes situated before the psoæ muscles, a little higher than the inguina. In this figure the interior edge of the testis is turned a little outwards, to show the spermatic vessels coming forwards to the posterior edge of the testis, in the duplicature of the peritonæum, which duplicature connects the testis, incloses its vessels, and gives it an external smooth coat, much after the same manner as the duplicature of the mesentery connects the intestine, conveys its vessels, and gives it a polished covering.

The beginning of the epididymis is seen at the upper end of the testis, from which it runs down on the outside (and therefore in this view behind the body) of the testis.

*ss.* The vas deferens of each side, passing across, in a serpentine course, from the extremity of the epididymis, at the outside of the lower end of the testis, and then before the lower part of the ureter, in its way to the vesicula seminalis. *tt.* What I have called the gubernacula or ligaments of the testis in a fœtus. On the left side this ligament is entire, and exposed in its whole length, the rings, skin of the groin and scrotum being removed, so that it is seen going down from

<sup>a</sup> It may be necessary to inform the reader that the series of Plates illustrative of the Animal Œconomy commences with Plate XXV., agreeably to the order of succession in which they occur in "The Works of John Hunter," in 4 vols. 8vo., edited by J. F. Palmer, Esq.

the lower end of the testis into the scrotum; but on the right side its upper and fore part is cut away, that the continuity of the epididymis and vas deferens may be seen; and no more of the ligament is exhibited than what is situated within the cavity of the abdomen.

N. B. The lower part of the ligament, as it is seen in the right side of this figure, lies so loose in the passage through the muscles, and is there so loosely covered by the peritonæum, that when the testis is pulled up, more of the ligament is seen within the cavity of the abdomen, and then the peritonæum is made tight and smooth at that place; but on the contrary, when the scrotum is pulled downwards, the lower part of the ligament is dragged some way down through the passage in the muscles, and the loose peritonæum is carried along with it; so that then there is a small elongation of that membrane, with an orifice from the cavity of the belly like the mouth of a small hernial sac, on the fore part of the ligament.

*Fig. 2.* represents the testes, &c., in the same subject as Plate XXVI.; all the parts above the ossa ilium being removed, and the abdominal muscles of the left side turned down to show the opening of the sac into, or from the abdomen; the bladder being likewise turned downwards to show the vasa deferentia winding round behind it.

*a a.* The thighs unfinished. *b.* The penis. *c.* The middle part of the scrotum; its lateral parts being removed, to show the testes. *dd.* The skin and cellular membrane of the abdomen turned down over the thighs. *ee.* Part of the abdominal muscles and peritonæum turned down at each groin. *ff.* The peritonæum covering the iliacus internus muscle of each side. *g.* The intestine rectum filled with meconium. *h.* The bladder with the umbilical artery on each side of it, turned a little forwards over the symphysis of the pubis. *ii.* The ureters passing over the iliac vessels to the pelvis. *k.* The right testis exposed, as in *Fig. 2. v. w. x x. y.* *l.* The left testis in the inclosed process of the peritonæum. See *Fig. 2. u.* *m.* The spermatic vessels of the left side, seen through the peritonæum which covers them, in their descent through the abdominal muscles at the groin. *n.* The left vas deferens seen through the peritonæum, in its passage from the mouth of the sac to the posterior part of the bladder. *o.* The mouth, or aperture of the process of the peritonæum, whereby its mouth or cavity communicates with the general cavity of the belly. This aperture closes up, and the membrane becomes smooth at this place, when the fœtus grows a little older; unless when the gut falls down after the testis, and keeps it open; in that case it makes the mouth of the hernial sac. *p.* The left epigastric artery branching upon the inside of the rectus muscle, which is here turned downwards and outwards. This artery is always situated, as in this figure, on the inside of the mouth of the hernial sac, or passage of the spermatic vessels.

N.B. It is evident that part of the peritonæum, which in this figure is carried down in the form of a hernial sac to a little below the testis, lies before the testis, epididymis, spermatic vessels, and vas deferens; and that it covers those parts in the same manner as it covers the abdominal viscera, viz., the posterior part of the sac (supposing the sac to be cut lengthways into two halves,) is united with them, and gives them a smooth surface; while the anterior half of the sac lies loose before them, and may be removed to some distance from them, as when the sac is distended with water.

## PLATE XXVI.

This figure represents nearly the same parts in a fœtus somewhat older than *Fig. 1. Plate XXV.*, in order to show the state of the testes when they have recently descended from the abdomen into the scrotum. The small intestines are removed, and the large intestines are left in their natural situation, not now obstructing the view of the testes. On the left side the integuments only are removed, which

shows the chord passing out through the ring, with the testicle in the vaginal coat. On the right the ring is cut through, and the whole vaginal coat is slit open, exposing the testicle and chord.

*a a.* The liver in outlines. *b b.* The thighs unfinished. *c.* The penis. *d.* The middle part of the scrotum; on each side of which the fore part of the scrotum is cut away, that the testes may be seen. *e e.* The two flaps of the skin, and of the cellular membrane, dissected off from the lower part of the abdomen, and turned down upon the thighs. *f.* The intestinum cæcum. *g g.* The appendicula cæci vermiformis. *h.* The arch of the colon. *i.* The turn of the colon under the spleen. *k.* The colon passing down on the outside of the left kidney. *l.* The last turn of the colon, commonly called its sigmoid flexure, which in adults is seated quite in the cavity of the pelvis. *m.* The beginning of the rectum. *n.* Part of the abdominal muscles of the right side, with the smooth investing peritonæum, turned out over the spine of the os ilium. *o o.* The lower part of the obliquus externus muscle of the left side. *p.* The lower part of the rectus muscle of the right side, turned outwards and towards the left side, so that the epigastric artery is seen going to the inside of that muscle. *q.* The fore part of the bladder. *r.* The urachus (as it is called). *s.* The crural vessels coming into the thigh from behind the ligamentum Fallopii. *t.* The external appearance of the spermatic rope of the left side. *u.* The external appearance of the testis, when its tunica vaginalis, or process of the peritonæum, is a little distended with air or water, poured into it from the cavity of the abdomen. *v.* The right testis, brought fully into view by laying open the process of the peritonæum in its whole length. *w.* The head of the epididymis, of the same side. *x x.* The spermatic vessels. *y.* The vas deferens. *z.* The ureter. *§.* The remains of the gubernaculum, or ligament, which bound and conducted the testis to the scrotum.

#### PLATE XXVI\*.

A side view of the pelvis of a young ram, to show the right testicle remaining in the cavity of the abdomen, after the left had come down, but which is removed with that half of the pelvis.

The testicle which lies in the loins is flatter than common, and is only attached by one edge, which is principally by the epididymis; there is also a ligament passing from the upper part of the common attachment which binds the testicle to the posterior part of the abdominal muscles; this is analogous to the ligament that attaches the ovarium to the same part in the female quadruped.

The epididymis passes along the outer or posterior edge; and at the lower part becomes larger and pendulous, making a little twist upon itself where it becomes vas deferens.

The vas deferens is a little contorted, and passes down obliquely over the psoas muscle to the bladder.

From the lower end of the testicle there is a ridge continued along the psoas muscle through the abdominal ring, going on to the scrotum, which is most probably the gubernaculum; but it was so much covered by a hard suety fat, that I could not exactly ascertain its structure: at the lower part of this ridge, about an inch and a half from the ring, I found the termination of the cremaster, which was a tolerably large muscle; part of its fibres seemed to arise in common with the internal oblique, while the rest appeared to come from the psoas and iliacus internus behind it; the outer portion passed inwards and downwards, and spread upon the forepart of the ridge, or gubernaculum, where the greatest part of its fibres were lost, and the rest of them were continued into the back part of it. The posterior portion got upon the inside of the ridge and was lost in the same manner as the former. A the inside of the thigh, only having the outline drawn. B B the inside of the abdominal muscles spread out. C the symphysis of the os pubis. D the muscles of the thigh cut through at their origin where they arise from a middle tendon. E the lower end of the right kidney. F G the iliac vessels



exposed to show their situation. H the remains of the umbilical artery. I the urinary bladder. K the body of the right testicle, with the ramifications of the veins upon the surface. L the epididymis. M the vas deferens. N the vesiculæ, commonly called seminales.

### PLATE XXVII.

Shows two testicles, with the spermatic chords dissected; in the one the vas deferens, in the other a portion of the epididymis, is wanting.

*Fig. 1.* The right testicle and spermatic chord.

A A The body of the testicle. B B The spermatic chord, in which there is no appearance of vas deferens. C The epididymis, where it takes its origin from the body of the testicle. D The abrupt termination of the epididymis, it not being continued to the lower end of the testicle.

*Fig. 2.* The left testicle.

A A The body of the testicle. B The blood-vessels of the testicle separated from the vas deferens. C The origin of the epididymis. D The termination of the epididymis; to show which, the tunica vaginalis is removed. E The origin of the vas deferens. F The vas deferens, as it passes up towards the ring of the abdominal muscles.

### PLATE XXVIII.

A side view of the pelvis, taken from the same subject as Plate XXVII., in which the vasa deferentia did not communicate with the vesiculæ, and the vesiculæ did not communicate with the urethra. A the body of the penis. B the symphysis of the pubis. C the bladder. D the left ureter. E E the rectum. F the anus. G the sphincter muscle of the anus, turned aside. H the levator muscle of the anus, turned down. I the prostate gland. K the Cowper's gland of the left side. L the peritonæum, which lined the left side of the pelvis. M the sacrum, where it is articulated with the os ilium. N the left vas deferens. O the vesiculæ.

### PLATE XXIX.

To show the gradual increase, in size, of the testes of the sparrow, from the middle of winter to the beginning of the breeding season, I examined those glands in January, February, March and April; and the appearances they put on at these different periods are faithfully represented in the Plate, with the date of their examination annexed to each.

If we compare their size in January, with what it is in April, it hardly appears possible that such a wonderful change could have taken place during so short a period.

### PLATE XXX.

This Plate is a representation of Mr. Wright's free martin, taken from a drawing of the living animal, by Mr. Gilpin. It shows the external form of that animal, which is neither like the bull nor cow; but resembling the ox or spayed heifer.

### PLATE XXXI.

This Plate represents the organs of generation of Mr. Wright's free martin, which are more the parts of a bull than those of a cow; and the animal, while alive, had a good deal the character and look of an ox. A the peak of the labia. B B the labia. C the glans clitoridis. D D D D the inner

surface of the common vagina. E E the orifices of the ducts of two glands. (The glandular sinuses of Malpighi and Gaertner.) F meatus urinarius. G G the inner surface of the true vagina, terminating in a blind end at H. H the termination of the vagina in a blind end. I I I I what may be called uterus, but impervious. K K what may be called horns of the uterus. L L the testicles. M M the spermatic vessels. N N the cremaster muscles. O O the vesiculæ seminales. P P the ducts of the vesiculæ seminales seen through the vagina. Q points to the ducts of ditto, into which are introduced bristles<sup>a</sup>.

## PLATE XXXII.

This plate shows the organs of generation of Mr. Arbuthnot's free martin, which are almost a complete mixture of the male and female: with this structure of the parts, the external appearances and general character of the animal corresponded, it being neither that of the bull nor cow, but a mixed character. A the peak of the labia. B B the two labia. C the glans clitoridis. D D the inside of the common vagina. E E orifices of the ducts of two glands. (The glandular canals of Malpighi and Gaertner.) F the orifice of the meatus urinarius. G G the true vagina. H H either the contracted vagina, or what may be called uterus. I I the horns of ditto, only pervious a little way. K the right ovarium deprived of its capsula. L the left ovarium inclosed in its capsula. M a bristle introduced through the orifice into the capsula. N the right testicle. O O O O the right vas deferens. P P the vesiculæ seminales. Q Q the ducts of vesiculæ seminales seen through the vagina. R points to the openings of the vasa deferentia and vesiculæ seminales.

## PLATE XXXIII.

This plate exhibits a front view of the organs of generation of Mr. Well's free martin, which are more the parts of a cow than of a bull; and the animal itself resembled a young heifer very much in its appearance. A the clitoris. B B the crura clitoridis. C the urethra. D the bladder. E the body of the uterus beyond the bladder, which is impervious. F F the horns of ditto, which are also impervious. G the left ovarium deprived of its capsula. H the capsula inclosing its ovarium. I I I I interrupted parts of the vasa deferentia. K K the spermatic vessels. L the gubernaculum of the right side. M the beginning of the tunica vaginalis communis, into which is introduced a bristle to show that it is hollow. N N Vessels going behind the bladder. O O the two ureters. P P the vesiculæ seminales.

## PLATE XXXIV.

*Fig. 1.* A part of a uterus at the ninth month of utero-gestation, with a portion of the placenta, to show the mode in which the blood-vessels of the mother communicate with it.

A The substance of the uterus, separated from the placenta, and turned back. B The surface of the placenta by which it is attached to the uterus, covered by the decidua. C The angle of reflection, at which the uterus is turned back upon itself. D The edge of the placenta. E The decidua covering the chorion.

Upon the surface of the uterus are to be seen the veins or sinuses, running in an oblique direction, filled with wax, and broken off where they pass through the decidua.

<sup>a</sup> This description, it will be seen in the 2nd edition of the *Animal Economy*, is made to apply to Plate XXXII., and *vice versa*, in consequence of an alteration in the relative position of the plates in that edition which was unaccompanied with a corresponding change in the letter-press. The error resulting from this oversight is corrected in the present edition.

*u u u*. The arteries injected and broken off as they pass from the uterus to the placenta. *b b b b*. The continuation of these arteries, which make several spiral turns as they dip into the decidua, and afterwards terminate on the surface of the placenta. *c c c c*. The veins injected and broken off where they pass into the substance of the uterus. *d d d d*. The corresponding portions of the same veins, where they pass from the placenta through the decidua. *e e e e*. The blood-vessels, ramifying upon the decidua, broken off from the uterus.

*Fig. 2.* Is a section of the placenta of the monkey figured in Plates XXXV. and XXXVI.

*a*. The cut surface, showing the fissure passing into the substance of the placenta from the uterine surface. *b*. The surface which adhered to the uterus, on which is the open end of a vein broken off, which was passing from the placenta to the uterus. *c c*. The cut ends of the vessels of the umbilical chord as they were ramifying on the inner surface of the placenta.

#### PLATE XXXV.

The bilobed placenta of a monkey, showing the foetal surface with the membranes attached and extended beyond its circumference. The foetal vessels ramify over the surface as in the human subject, and the chord is attached near to the edge of the placenta, as it often is in the human subject, but it is more regularly twisted. The amnios, which covers as usual the foetal surface of the placenta, is thrown into wrinkles near the chord and where it passes over the interlobular fissures.

#### PLATE XXXVI.

The same placenta, showing the uterine surface, with part of the decidua and other membranes attached to it.

*a*. The decidua reflected from the chorion and placenta. *b*. The chorion, which is attached to the outer surface of the placenta. *c*. The amnios. *d d d d*. The broken ends of the veins, which return the blood from the cells of the maternal placenta to the uterine sinuses. (See fig. 2. pl. XXXIV. which is a section of the same placenta.)

#### PLATE XXXVII.

A portion of intestine of a hog, the peritonæal coat of which is covered in several places with small pellucid cysts containing air.

It was sent to me by my friend Mr. Jenner, surgeon, at Berkley, who informed me, that this appearance is found very frequently upon the intestines of hogs that are killed in the summer months. A The portion of the mesentery. B The portion of intestine on which the air-cells are situated.

#### PLATE XXXVIII.

The crop, taken from a pigeon when it had no young ones. The crop in the pigeon is probably more in the middle of the neck than in any other bird, being two equal bags, as it were, passing out, laterally, from the œsophagus; while in most other birds it is a little on one side. The œsophagus of those birds who have crops, may be divided into two, a superior and inferior. The superior is that which leads from the mouth to the crop; the inferior, from the crop to the gizzard.

The crop was inverted and distended with spirits. It shows the appearance of its internal surface. A The inner surface of the superior œsophagus. B B The inside of the two projecting bags of the

crop. C The inferior œsophagus, leading from the crop to the gizzard. D D D D Glands situated on the lower part of the crop, and continued into the inferior œsophagus. E A glandular structure upon the inner surface of this œsophagus, just before it terminates in the gizzard, for the purpose of secreting a substance analogous to the gastric liquor.

### PLATE XXXIX.

The crop from a male pigeon, while the female was breeding, to show the change which takes place at that time, on its internal surface, for the purpose of secreting a substance which is to nourish the young.

The crop is prepared in the same way as in Plate XXXVIII.; and the only difference in the appearance is the glandular structure on the inner surface of the two lateral projecting bags, which is not seen at any other time.

### PLATE XL.

A thermometer which has the scale so constructed as to admit of its being introduced into any cavity that can receive the ball. The scale is moveable; but the freezing point is marked on the stem or glass.

*Fig. 1.* A front view, exposing the glass stem of the thermometer, through which the divisions marked upon the concave surface of the sliding ivory scale which embraces it, are very distinctly seen.

*a.* The freezing point, which is marked upon the stem by a scratch on the glass.

*Fig. 2.* A side view, showing the degrees marked near the edge of the convex side of the ivory scale.

The thermometer is to be adjusted for measuring high or low degrees of heat, by bringing any number marked upon the scale opposite the freezing point, and counting either upwards or downwards.

### PLATE XLI.

The olfactory, or first pair of nerves, as they are seen upon the membrane of the septum narium.

The bony septum is removed to expose the nerves of the right nostril, as they pass at first between the membrane and bone. A the os frontis. B the frontal sinus. C the cartilaginous part of the septum narium. \*\*\*\* the cut edge, from which the septum has been separated all round. D the surface of the common skin, where it is lost in the membrane of the nose. E. the upper lip. F part of the alveolar process of the maxillary bone next the symphysis. G the roof of the mouth. H the bony palate. I the uvula and palatum molle. K the upper part of the fauces. L the opening of the Eustachian tube. M the cuneiform process of the os occipitis. N the inside of the cuneiform process, near the foramen magnum occipitale. O The posterior clinoid process. P The sphenoid sinus, with its septum. Q The cella Turcica. R The crista galli. S S The membrane of the right nostril that lined the septum; the septum being removed. T A branch of the fifth pair of nerves, that comes through the foramen commune or spheno-palatium. U U U The first pair of nerves, having passed through the cribriform plate of the ethmoid bone, ramifying on the membrane of the septum.

### PLATE XLII.

The olfactory, or first pair of nerves, as they are seen upon the membrane of the nose, which covers the turbinated bones; the exterior parts of the face being removed.

A. *Os*,

B



This engraving was taken from the same head as plate XLI. A The os frontis. B The os nasi. C The cartilaginous and membranous part of the nose. D The ala nasi, with the skin left on. E The septum narium. F The upper lip. G The cut surface. H H H The alveolar process of the superior maxillary bone. I Part of the antrum. K The os occipitis. L The body of the sphenoid bone. M The groove made by the carotid artery. N The posterior clinoid process. O the sphenoid sinus. P The crista galli. Q The membrane of the nose. R The membrane, a little more convex, where the inferior turbinated bone is situated. S The same where the superior turbinated bone is situated. T The branch of the fifth pair of nerves that was supposed to be lost on the membrane of the nose. U U U The trunk of the first pair of nerves which is afterwards lost upon that part of Schneider's membrane that covers the turbinated bones.

#### PLATE XLIII.

*Fig. 1.* A transverse section of the crystalline humour of the eye of a cuttle-fish, to show its structure; the central part is transparent, but the others are opaque, having been coagulated by proof spirits; and for the appearance of distinct fibres surrounding the central part.

These fibres are not uniform circles or ovals, since the layers are of different thicknesses in particular parts. *a a.* The fibres where they are most numerous. *b b.* Where they are least so.

*Fig. 2.* A section of the crystalline humour, the central part being removed, to show the fibrous structure of the surrounding laminæ.

#### PLATE XLIV.

This fish is called a Grampus<sup>a</sup>; it was caught at the mouth of the river Thames, in the year 1759, and brought up to Westminster Bridge in a barge. It was twenty-four feet long.

#### PLATE XLV.

Another species of Grampus<sup>b</sup>, which was caught in the river Thames, fifteen years ago. It was eighteen feet long.

#### PLATE XLVI.

*Fig. 1.* A species of Bottle-nosed Whale; the *Delphinus Delphis* of Linnæus<sup>c</sup>. It was caught upon the sea-coast, near Berkeley, where it had been seen for several days, following its mother, and was taken along with the old one, and sent up to me whole, for examination, by Mr. Jenner, Surgeon, at Berkeley. The old one was eleven feet long.

*Fig. 2.* The head of the same Whale as fig. 1. to show the shape of the blow-hole, which is transverse, and almost semicircular.

<sup>a</sup> [*Phocæna Orca*, Cuv. *Delphinus Orca*, Linn. This is acknowledged to be the most accurate figure of the Grampus hitherto published; and is cited by M. Fred. Cuvier as the type of that species. See *Histoire des Cétacés*, 8vo. 1836, p. 177.]

<sup>b</sup> I have searched in vain among the existing documents, relating to Mr. Hunter's researches on the Cetacea, for any note or memorandum tending to authenticate the above description. The original drawing, coloured after nature, exists in the Hunterian Collection, and is marked 'Porpus'. It is unnecessary to observe to those who have examined the common Porpoise, (*Phocæna communis*, Cuv.) that the figure in Plate XLV. is an exact representation of that species.

<sup>c</sup> [This is the *Delphinus Tursio* of Fabricius, the 'Grand Dauphin' or *Souffleur* of Cuvier; and a larger species than the *Delph. Delphis*, Linn., but with fewer teeth, having from 21 to 23 obtuse conical teeth on each side of each jaw, while the *Delph. Delphis* has double that number.]

## PLATE XLVII.

The Bottle-nose<sup>b</sup> Whale described by Dale<sup>a</sup>. It is similar to that of Plate XLVI. in its general form, but has only two small pointed teeth in the fore part of the upper jaw, and is rather lighter coloured on the belly. It was caught above London Bridge in the year 1783, and became the property of the late Mr. Alderman Pugh, who very politely allowed me to examine its structure, and to take away the bones. It was twenty-one feet long.

## PLATE XLVIII.

*Fig. 1.* The *Balæna rostrata* of FABRICIUS, or Piked Whale<sup>b</sup>. It was caught upon the Dogger Bank. It had met with some accident between the lower jaws under the tongue, in which part a considerable collection of air had taken place, so as to raise up the tongue and its attachments into a round body in the mouth, projecting even beyond the jaws. This rendered the head specifically lighter than the water, so that it could not sink, and therefore was easily caught. It was seventeen feet long, and was brought to St. George's Fields, where I purchased it. The dorsal fin having been cut off close to the back, is therefore only marked by a dotted line.

*Fig. 2.* A view of the tail, to show its breadth.

## PLATE XLIX.

Includes the external parts of generation, with the relative situation of the anus and the nipples, of the *Balæna rostrata*.

*Fig. 1.* The labia pudendi spread open, exposing the meatus urinarius, vagina, and anus, which in a natural state are all concealed, there only appearing a long slit, the two edges of which are in contact.

A A The labia pudendi. B The clitoris. C The meatus urinarius. D The opening of the vagina. E The anus.

*Fig. 2.* The sulcus, in which the left nipple lies, spread open, and the nipple itself exposed to view.

*Fig. 3.* The sulcus of the right nipple, in a natural state, only appearing like a line.

*Fig. 4.* A sulcus near to the nipple, which is spread open to show the inside. This sulcus, I conceive, gives a freedom to the motion of the skin of these parts, so as to allow the nipple to be more freely exposed.

*Fig. 5.* The same sulcus on the opposite side, closed up.

## PLATE L.

A side view of one of the plates of whalebone of the *Balæna rostrata*. A The part of the plate which projects beyond the gum. B The portion which is sunk into the gum. C C A white substance, which surrounds the whalebone, forming there a projecting bead, and also passing be-

<sup>a</sup> [*Delphinus Dalei*, Cuv. *Delphinus bidens*, Schreber. *Hyperoodon Dalei*, Lacépède. *Heterodon Hunteri*, Lesson. See De Blainville, "Note sur un Cétacé échoué au Havre," in the Bulletin de la Société Philomathique, September 1835, which relates to the same species.]

<sup>b</sup> [The young of the great Northern Rorqual, (*Balæna Boops*, Linn.) according to Cuvier; but regarded as a smaller and distinct species by Lacépède and other naturalists, and called *Balenoptera rostrata*.]

tween the plates, to form their external lamellæ. DD. The part analogous to the gum. E A fleshy substance, covering the jaw bone, and on which the inner lamella of the plate is formed. F The termination of the plate of whalebone in a kind of hair.

### PLATE LI.

*Fig. 1.* A perpendicular section of several plates of whalebone in their natural situation in the gum; their inner edges, or shortest terminations, are removed, and the cut edges of the plates seen from the inside of the mouth. The upper part shows the rough surface formed by the hairy termination of each plate of whalebone. The middle part shows the distance the plates of whalebone are from each other. The lower part shows the white substance in which they grow, and also the basis on which they stand.

*Fig. 2.* An outline considerably magnified, to show the mode of growth of the plates, and of the white intermediate substance.

A The middle layer of the plate, which is formed upon a pulp or cone that passes up in the centre of the plate. The termination of this layer forms the hair. B One of the outer layers, which grows, or is formed, from the intermediate white substance. C C C C The intermediate white substance, laminae of which are continued along the middle layer, and form the substance of the plate of whalebone. D The outline of another plate of whalebone. E The basis on which the plates are formed, which adheres to the jaw bone.

### PLATE LII.

Two specimens of *Siren*, or Mud Iguana from South Carolina<sup>a</sup>.

“The lesser one B, which is preserved in spirits, measures about nine inches in length, and appears to be a very young state of the animal, as we may observe from the fin of the tail, and the opercula or coverings of the gills being not yet extended to their full size. These opercula, in their present state, consist each of three indented lobes hiding the gills from view, and are placed just above the two feet. These feet appear like little arms and hands, each furnished with four fingers, and each finger with a claw.

“In the specimen A, which is thirty-one inches long, the head is something like an eel, but more compressed; the eyes are small, and placed as those of the eel are; in this they are scarce visible. This smallness of the eye best suits an animal that lives so much in the mud. The nostrils are very plainly to be distinguished; these, with the gills, and the remarkable length of the lungs, show it to be a true amphibious animal. The mouth is small in proportion to the body; but its palate and inside of the lower jaw (see Fig. C), are well provided with many rows of pointed teeth; with this provision of nature, added to the sharp exterior bony edges of both the upper and under jaw, the animal seems capable of biting and grinding the hardest kind of food. The skin, which is black, is full of small scales resembling chagrin. These scales are of different sizes and shapes according to their situation, but all appear sunk into its gelatinous surface: those along the back and belly are of an oblong oval form, and close set together: in the other parts they are round, and more distinct. Both the sides are mottled with small white spots, and have two distinct lines composed of small white streaks, continued along from the feet to the tail. The fin of the tail has no rays, and is no more than an adipose membrane like that of the eel; this fin appears more distinctly in the dry animal than in those that have been preserved in spirits.

<sup>a</sup> [*Siren lacertina*, Linn., Cuv.]

“The opercula or coverings to the gills in dry specimens appear shrivelled up, but yet we may plainly see that they have been doubly pennated. Under these coverings are the openings to the gills, three on each side, agreeable to the number of the opercula. In the plate at Fig. F the fins are represented as they appear when just taken out of the water and put into spirits of wine.

“The form of these pennated coverings approach very nearly to what I have some time ago observed in the larva or aquatic state of our English Lacerta, known by the name of Eft or Newt (see Fig. D and E), which serve them for coverings to their gills, and for fins to swim with during this state; and which they lose, as well as the fin of their tails, when they change their state and become land animals; as I have observed by keeping them alive for some time myself.”—*From Mr. Ellis's paper in the Phil. Trans., Vol. LVI., p. 189.*

## PLATE LIII.

Male and Female TORPEDO <sup>a</sup>.

*Fig. 1.* A view of the under surface of the female.

*a.* An exposure, on flaying off the skin, of the right electric organ, which consists of white pliant columns, in a close and for the most part hexagonal arrangement, giving the general appearance of a honey-comb in miniature. These columns have been sometimes denominated cylinders; but, having no interstices, they are all angular, and chiefly six-cornered. *b.* The skin which covered the organ, showing on its inward side an hexagonal net work. *c.* The nostrils in the form of a crescent. *d.* The mouth in a crescent contrary to that of the nostrils, furnished with several rows of very small hooked teeth. *e.* The bronchial apertures, five on each side. *f.* The place of the heart. *ggg.* The place of the two anterior transverse cartilages, which, passing one above and the other below the spine, support the diaphragm, and uniting towards their extremities, form on either side a kind of clavicle and scapula. *hh.* The outward margin of the great lateral fin. *ii.* Its inner margin, confining with the electric organ. *h.* The articulation of the great lateral fin with the scapula. *l.* The abdomen. *mmm.* The place of the posterior transverse cartilage which is single, united with the spine, and supports on each side the smaller lateral fins. *nnnn.* The two smaller lateral fins. *o.* The anus. *p.* The fin of the tail.

*Fig. 2.* A view of the upper surface of the female.

*a a.* An exposure of the upper part of the right electric organ. *b.* The skin which covered the organ. *c.* The eyes, prominent and looking horizontally outwards, but capable of being occasionally withdrawn into their sockets. *d.* Two circular apertures communicating with the mouth, and furnished each with a membrane, which in air, as well as in water, plays regularly backwards and forwards across the aperture in the office of inspiration. *e.* The place of the right branchiæ. *f.* The two fins of the back. *gg.* The place of the anterior transverse cartilages.

*Fig. 3.* A view of the under surface of the male, whose size, as here represented, is, in general, smaller than that of the female.

*a a.* Two appendices, distinguishing the male species.

<sup>a</sup> *Torpedo Narke*, Cuv.

## PLATE LIV.

## Electric Organs of the TORPEDO.

*Fig. 1.* The upper surface of the electric organ.

A A The common skin of the animal. B The inspiratory opening. C The eye. D The part in which the gills are inclosed. E E E The skin dissected off from the electric organ, and turned outwards; the honey-comb appearance on its internal surface corresponding with the upper surface of the organ. F The part of the skin which covered the gills, with some ramifications of an excretory duct upon it. G G G The upper surface of the electric organ, formed by the upper extremities of the perpendicular columns.

*Fig. 2.* The right electric organ divided horizontally into nearly two equal parts at the place where the nerves enter; the upper half being turned outwards.

A A. B B. C C. D D. The corresponding parts of the trunks of the nerves, as they emerge from the gills, and ramify in the electric organ. A A The first or anterior trunk arising just before the gills. B B The second or middle trunk arising behind the first gill. C C The anterior branch of the third trunk arising behind the second gill. D D The posterior branch of the third trunk arising behind the third gill.

*Fig. 3.* A perpendicular section of the Torpedo a little below its inspiratory openings.

A A The upper surface of the fish. B B The muscles of the back as divided by the section. C The medulla spinalis. D The œsophagus. E The left gill split, to expose the course of a trunk of the nerve through it. F The breathing surface of the right gill. G G The fins. H H The perpendicular columns which compose the electric organ, with a representation of their horizontal partitions. I One of the trunks of the nerves, with its ramifications.

## PLATE LV.

## GYMNOTUS ELECTRICUS.

*Fig. 1.* Shows the whole animal of the full size. It lies on one side; which posture exposes the whole of the under fin. The head is twisted, to show its upper part, on which are seen the eyes, &c.

*Fig. 2.* Shows the animal lying in the same position; but the head is twisted in the contrary direction, so as to expose its under surface. Between the two fins, and before the beginning of the under fin, is the cavity of the belly of the fish; at the anterior part of which cavity is the anus.

## PLATE LVI.

## Electric Organs, GYMNOTUS.

*Fig. 3.* This figure exhibits the whole of the two organs on one side, the skin being removed as far as these organs extend.

A The lower surface of the head of the animal. B The cavity of the belly. C The anus. D The pectoral fin. E The back of the fish where the skin has not been removed. F F The fin which runs along the lower edge of the fish. G G G The skin turned back. H H H The lateral muscles of the above fin removed and carried back with the skin, to expose the small organ. I Part of the muscle left in its place. K K K The large organ. L L L The small organ. M M M The substance which divides the large organ from the small. N At this place the above substance is removed.

## PLATE LVII.

*Fig. 4.* A section of the whole thickness of the fish near the upper part, a little magnified. The skin is removed as far back as the posterior edge of the organ, and the other parts immediately belonging to it, such as the medulla spinalis. There are several pieces or sections taken out of the organ, which expose everything that has any relation to it. At the two ends of the figure, FF, the organ is entire, the skin only being removed. AA The body of the animal near the back, covered by the skin. BB The belly-fin, covered also by the skin. C Part of the skin removed from the organ and turned back. DD The muscles which move the fin laterally, and which immediately cover the small organ. E The middle muscles of the fin, which lie immediately between the two small organs. FF The outer surface of the large organ, as it appears when the skin is removed. G The small organ, as it appears when the lateral muscles are removed. HH The cut ends of the muscles of the back, which have been removed to expose the deeper seated parts. II The cut ends of the large organ, part of which has also been removed to expose the deeper seated parts. K The cut end of the small organ. L A part of the large organ, the rest having been removed. M The cut end of the above part. N A section of the small organ. OO The middle partition which divides the two large organs. P A fatty membrane, which divides the large organ from the small. Q The air-bladder. R The nerves going to the organ. S The medulla spinalis. T The singular nerve (*nervus lateralis*).

*Fig. 5.* A transverse section of the fish, exposing at one view all the parts of which it is composed.

A The external surface of the side of the fish. B The under fin. CCC The cut ends of the muscles of the back. D The cavity of the air-bladder. E The body of the spine. F The medulla spinalis. G The large artery and vein. HH The cut ends of the two large organs. II The cut ends of the two small organs. K The partition between the organs.

## PLATE LVIII.

ANIMAL FLOWER OF BARBADOES (*Serpula gigantea*, Pallas).

*Fig. 1.* A drawing of the animal after death, as it appeared in spirits, a little magnified.

A The under side of the body. BB The cartilages which attach the animal to the sides of the cavity in which it lies. C One of the cones covered by its membrane, in a collapsed state. D The lowest spiral turn of the membrane, and its tentacula spread out. EE The cut edges of the divided membrane, which are turned on each side to show the cone. F The cone as it appears in the intervals between the spiral turns of the membrane. G The moveable shell, with the smooth cartilaginous covering in an outside view. H The flattened end of the moveable shell, with hair upon it. II The two claws that arise from the surface of the flattened end of the moveable shell. K The anus, into which a hog's bristle is inserted.

*Fig. 2.* A drawing of the animal, with its tentacula expanded in search of food, as it appears in the sea; taken from a sketch made in Barbadoes, where no draughtsman could be procured while the animal was alive. This also is larger than the animal.

*a.* The sort of brainstone in which the animal was discovered. *b.* The external prominent shell. *cc.* The membrane which is protruded with the cones and immoveable shell, and makes a fold over the edges of the prominent shell. *dd.* The membranes and tentacula in a state of expansion. *e.* The inner side of the moveable shell, as it appears when protruded. *f.* The hole in the brainstone, as it appears when the prominent shell is broken off, and which may be seen in many specimens of brainstone.

## PLATE LIX.

*Fig. 1.* One of the incrustated skulls sent over by the Margrave of Anspach, which is much larger than that of the common white bear, longer for its breadth; and having a greater hollow between the anterior part of the skull and the bones of the face<sup>a</sup>.

*Fig. 2.* Another skull, which differs in many respects from *fig. 1*, and nearly in the same degree that the first does from the skull of the recent white bear<sup>b</sup>.

## PLATE LX.

*Fig. 1.* A portion of a skull; to what animal it belongs is not exactly ascertained, unless it be the growing state of the bones in one of the varieties of the white bear species, but it is materially different from the full-grown skulls expressed in Plate LIX. It is rather too large in proportion to the others<sup>c</sup>.

*Fig. 2.* Two of the incrustated ossa humeri, to show that these bones vary very much among themselves, these two being in many respects dissimilar<sup>d</sup>.

<sup>a</sup> This belongs to the extinct species called *Ursus spelæus* by Cuvier.

<sup>b</sup> This is the *Ursus arctoides* of Cuvier.

<sup>c</sup> This fragment appears to belong to the extinct bear called *Ursus priscus* by Goldfuss.

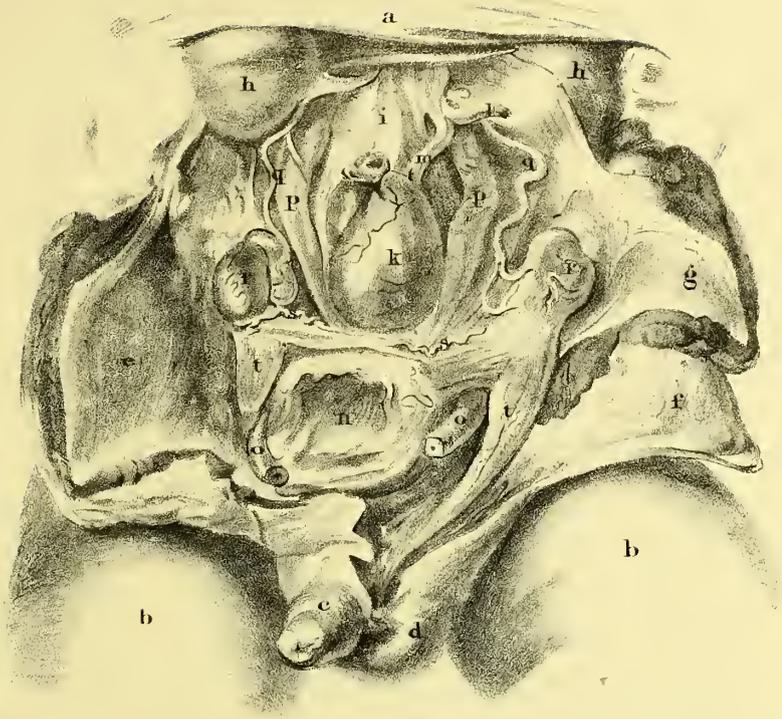
<sup>d</sup> One of the most marked differences is that the internal condyle is perforated in one of the humeri (though not represented in the plate), showing an analogy to the cat tribe, while in the other it is imperforate as in the existing bears.

THE END.

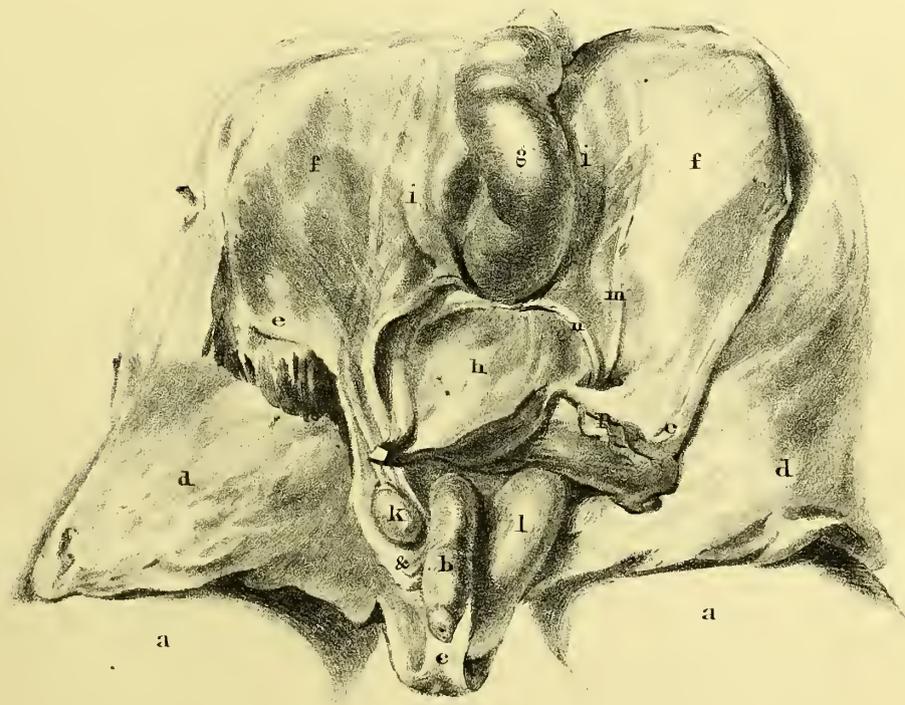
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*Fig. 1*



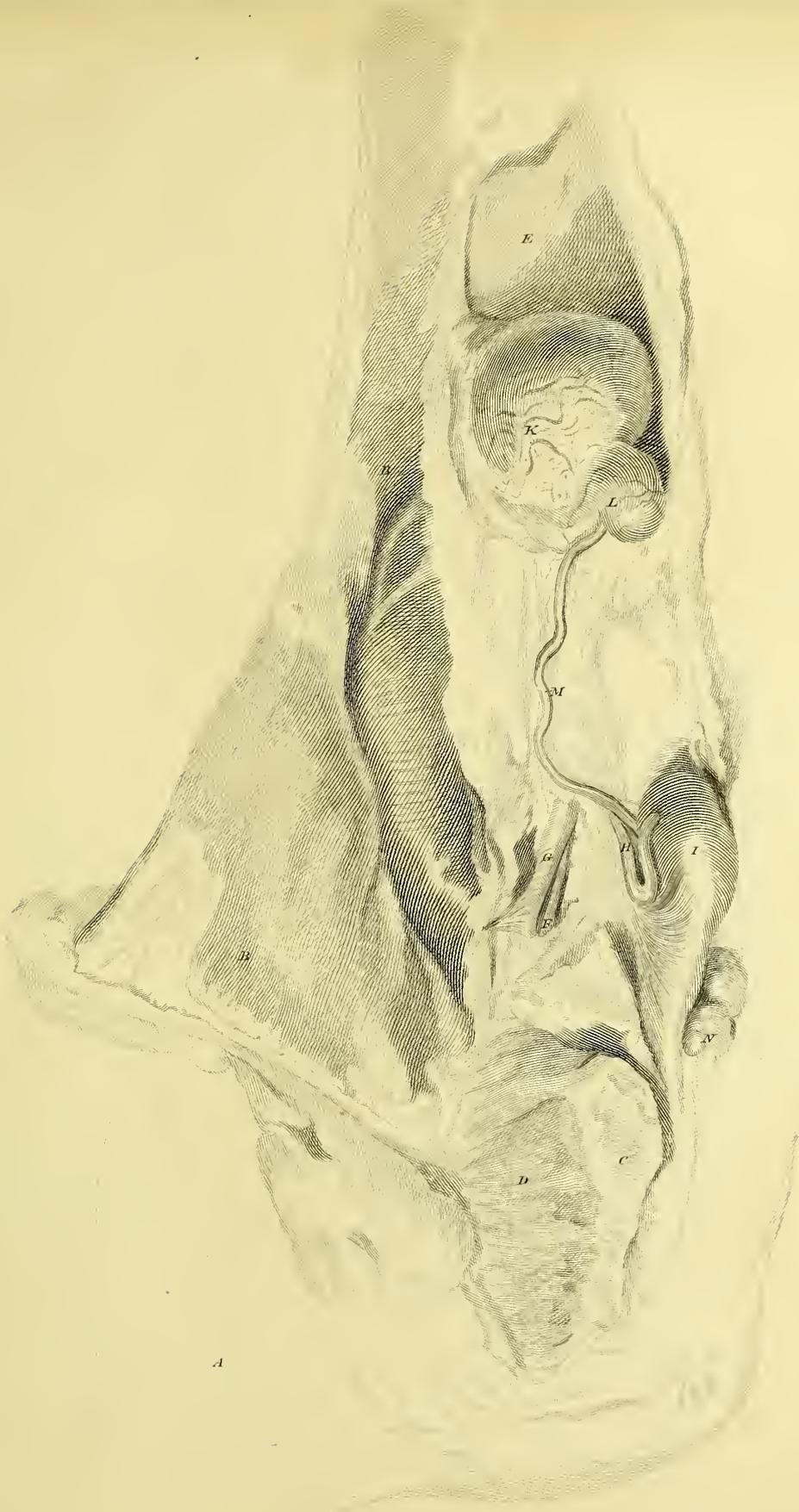
*Fig. 2*











A



Fig. I.

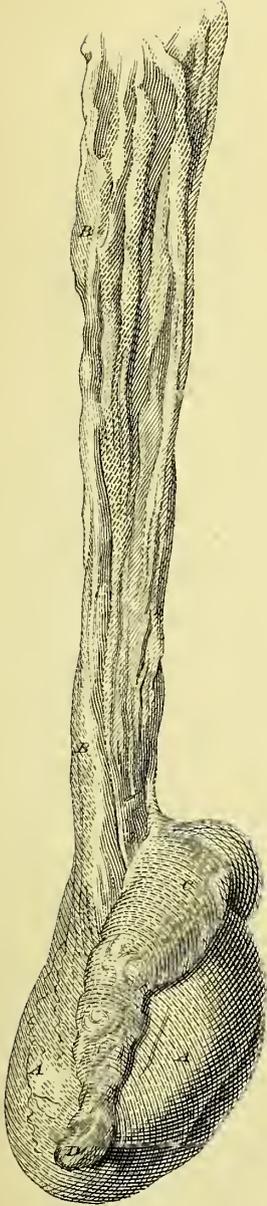
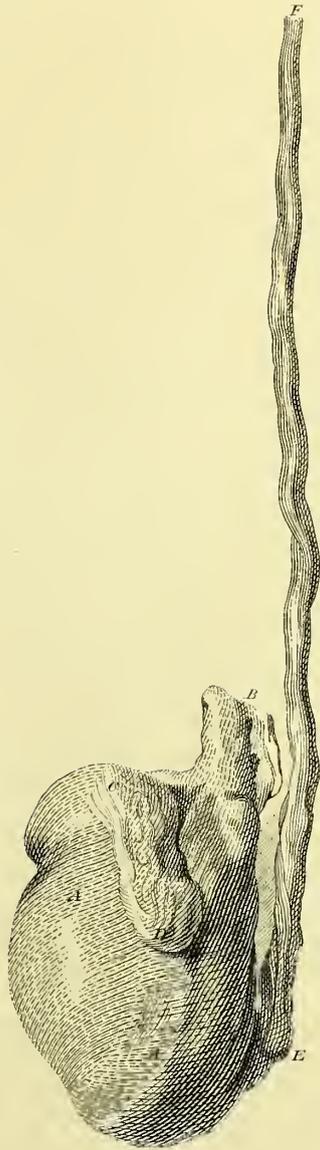
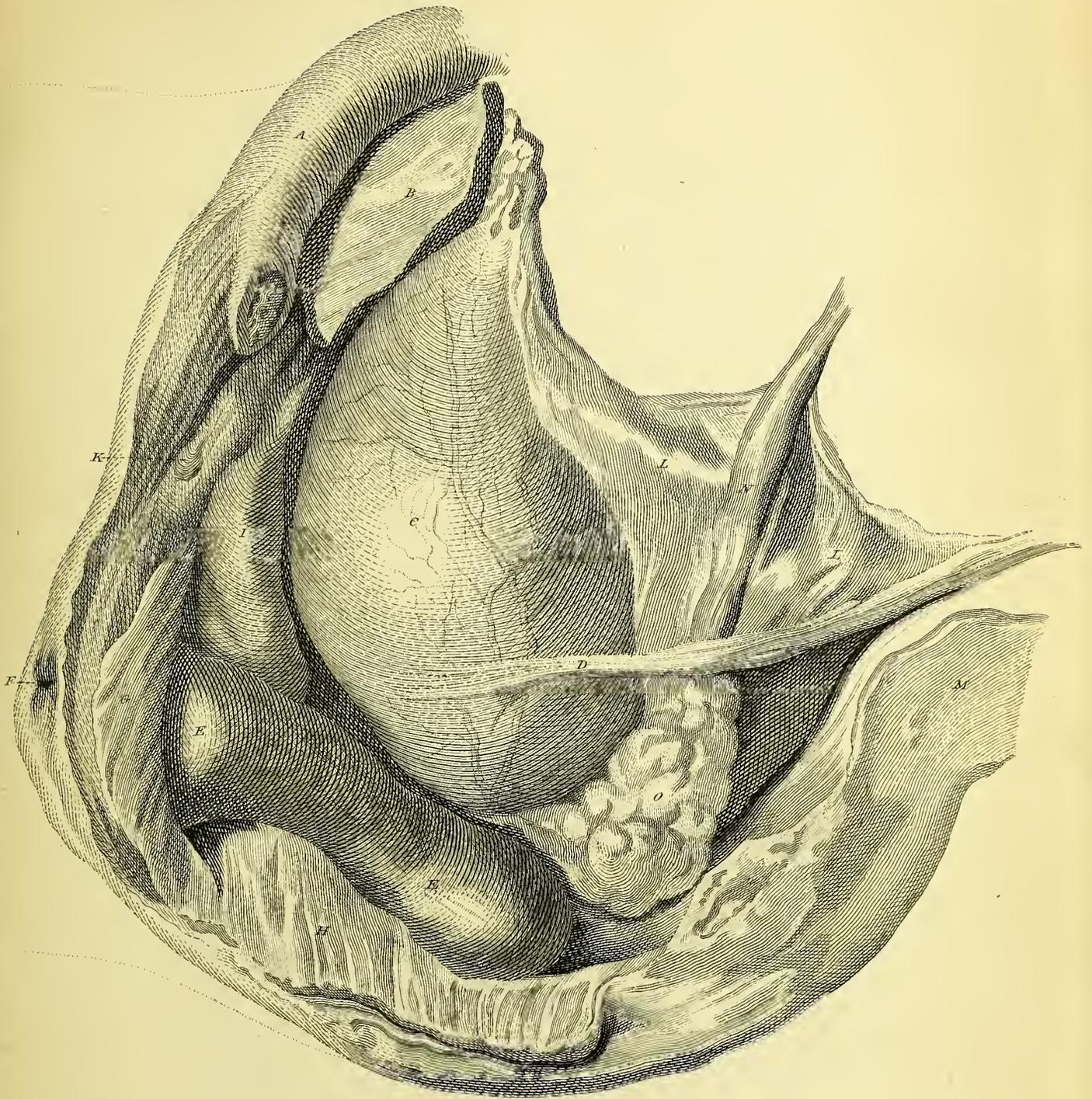


Fig. II.









 1 *January*

 2 *Middle of February*

 3 *Beginning of March*

 4 *Latter end of March*

 5 *Middle of April*





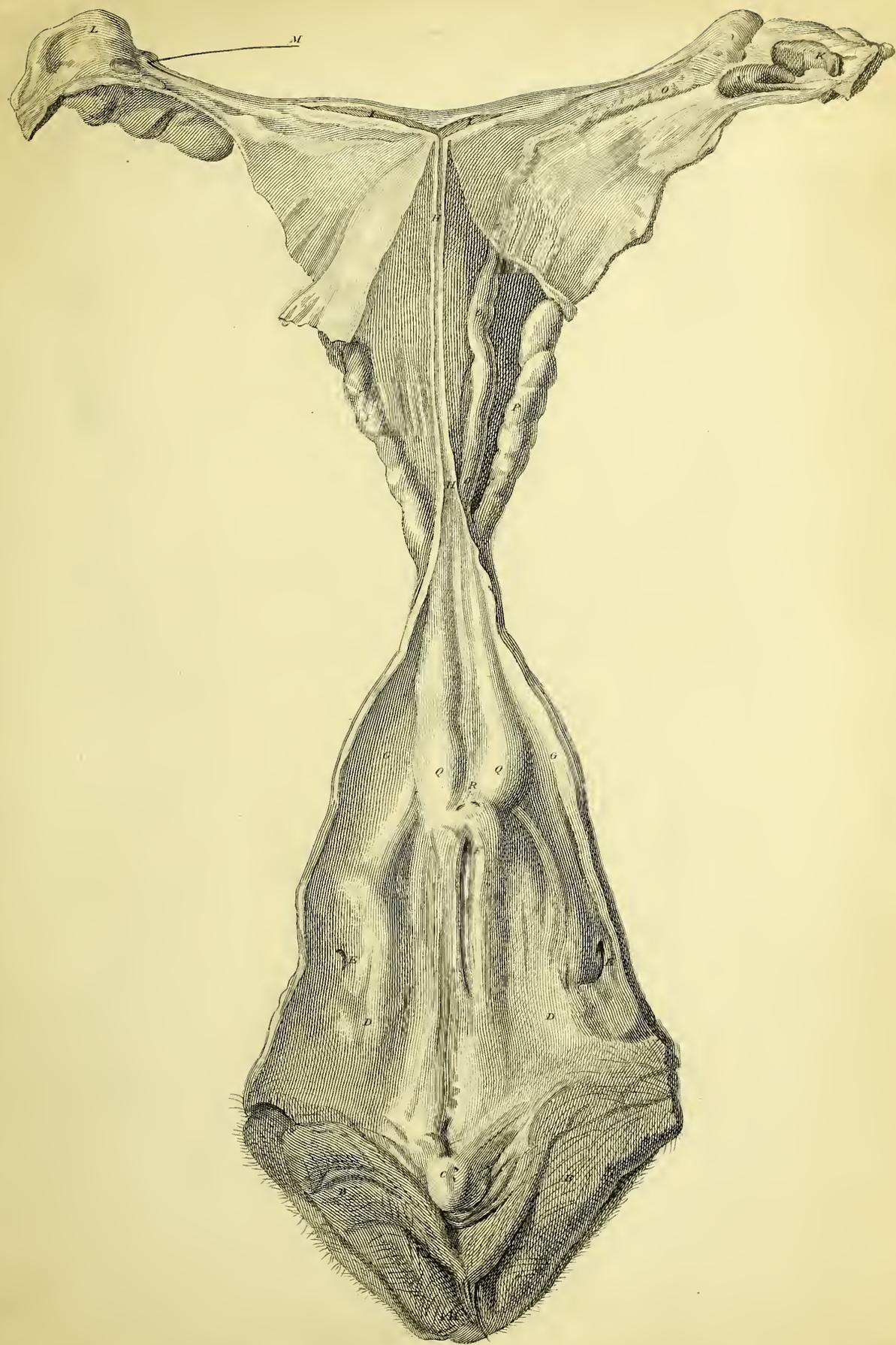
J. Gillman del.

W. Chapman sculp.











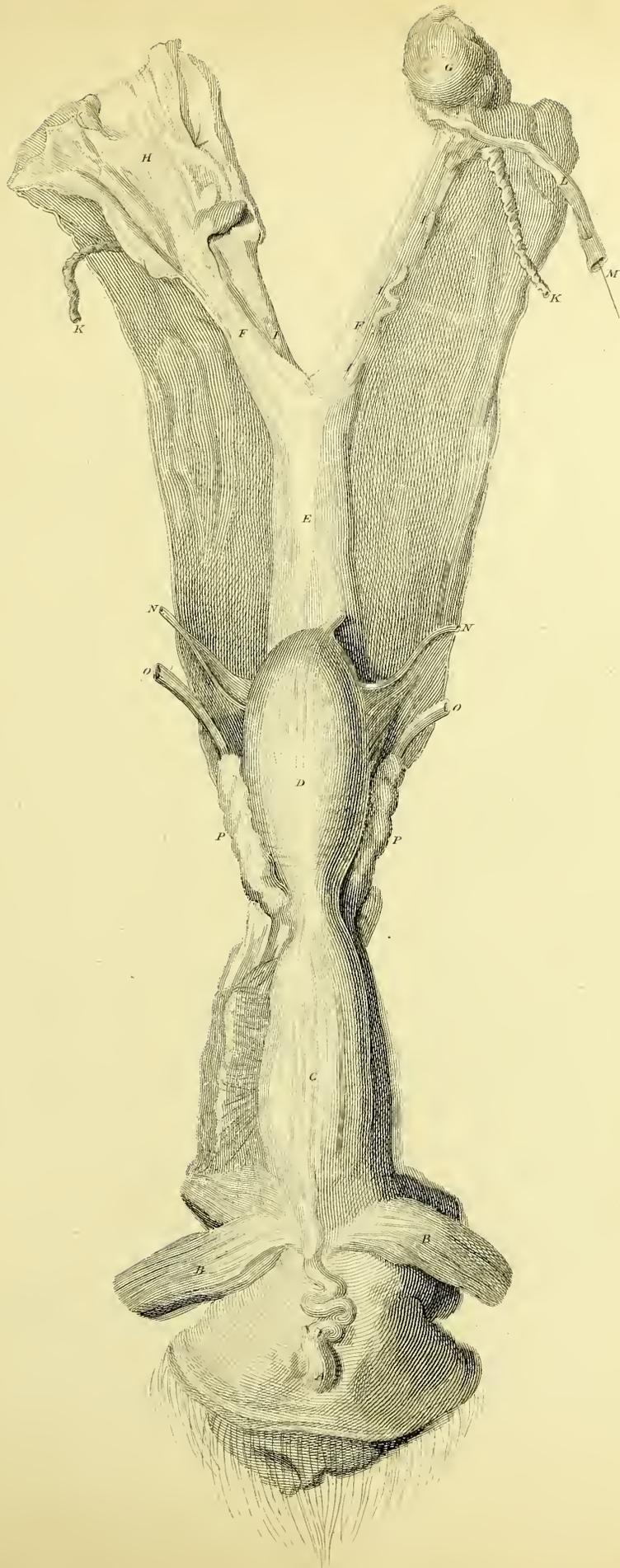
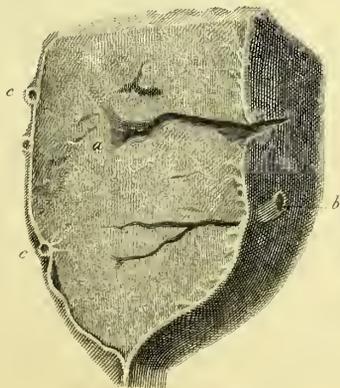


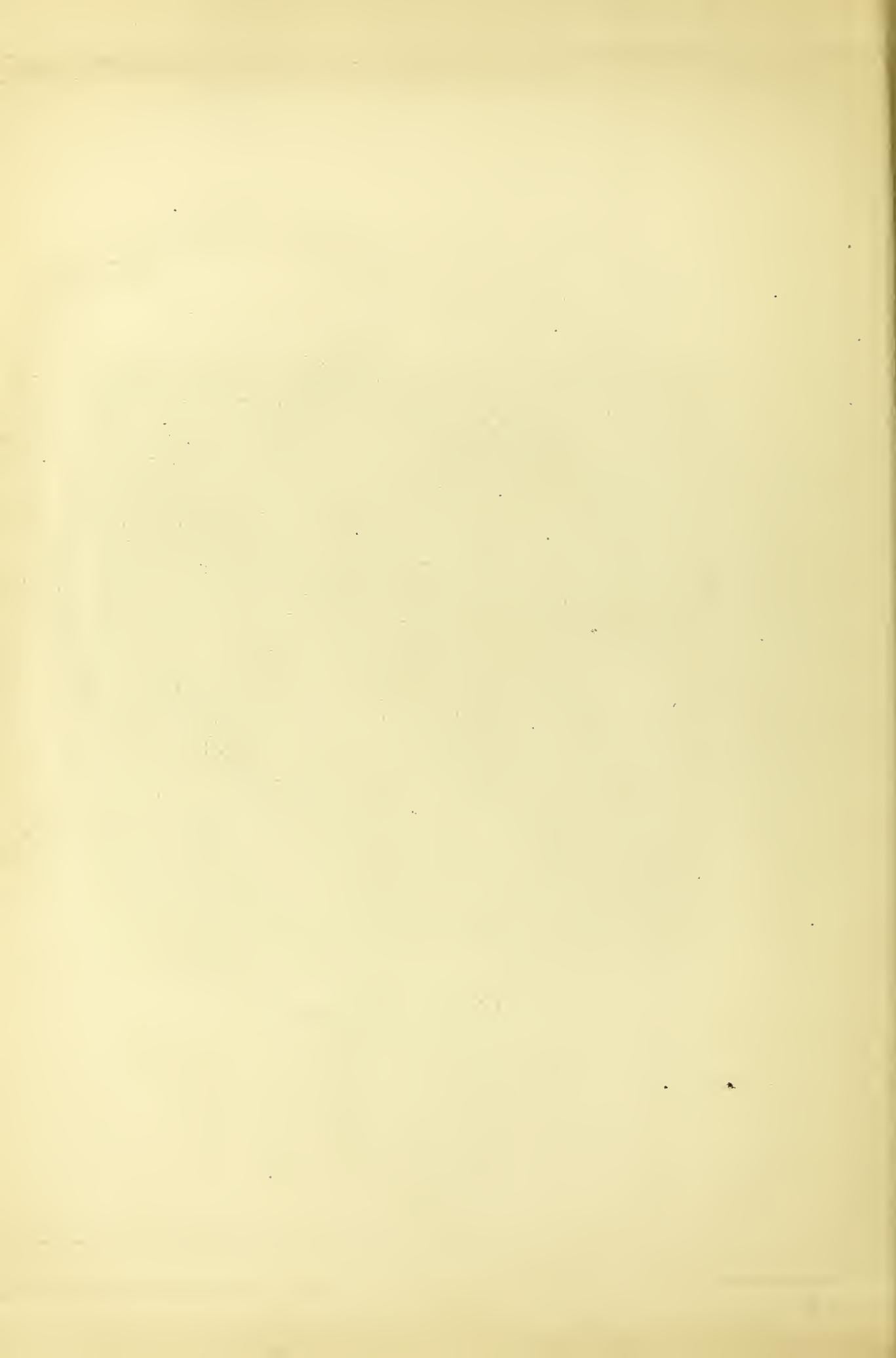


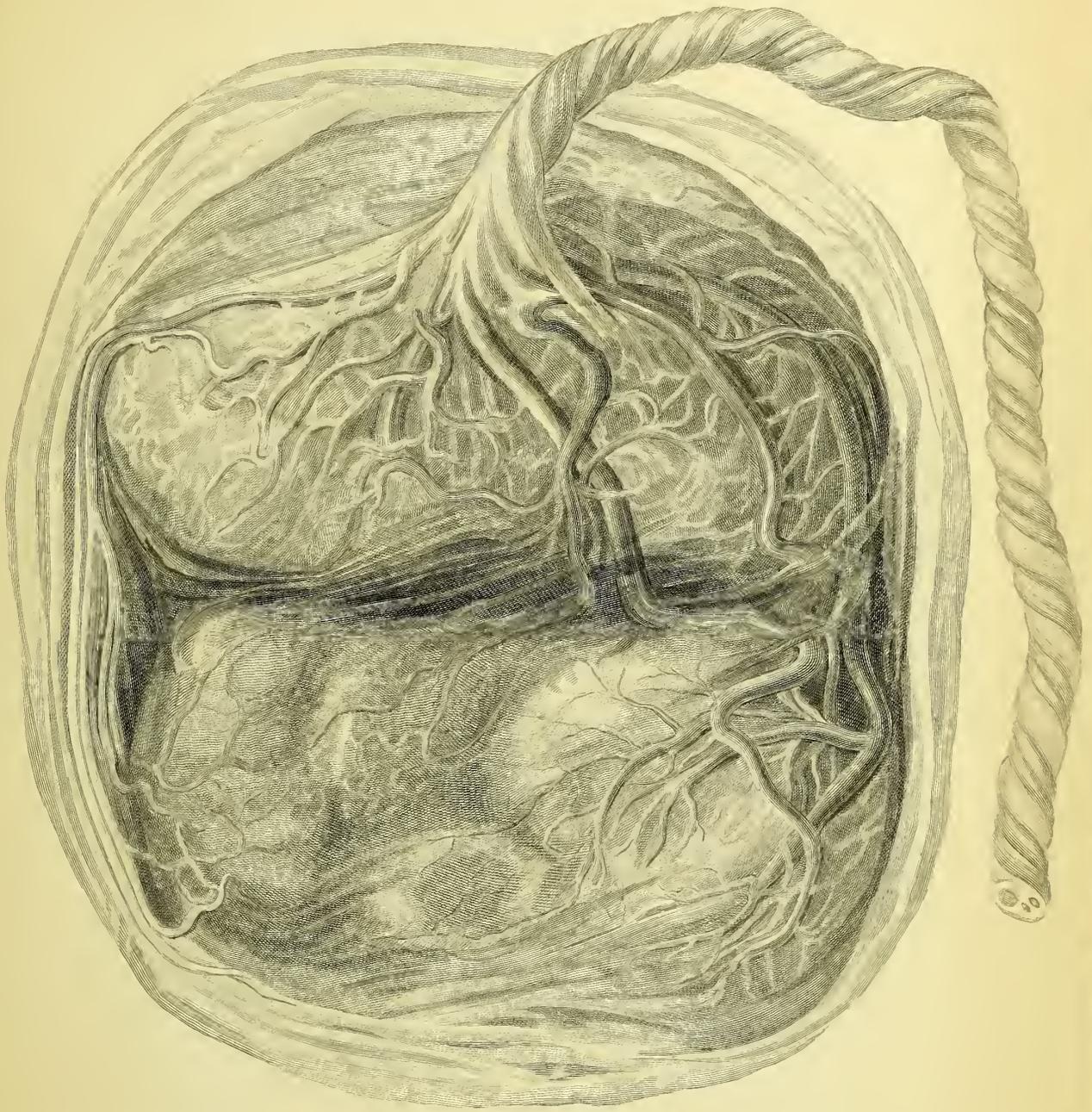
Fig. 1.



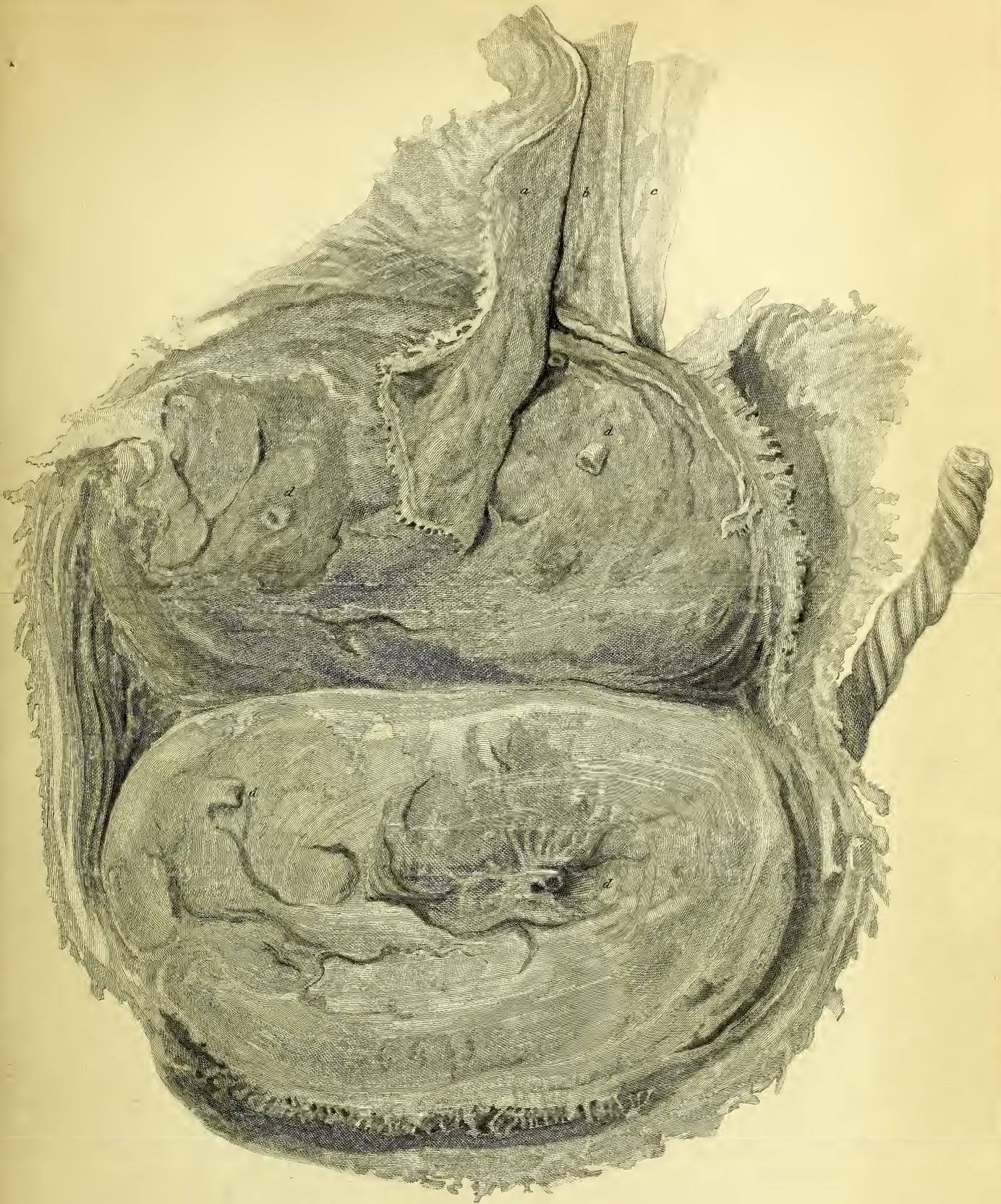
Fig. 2.



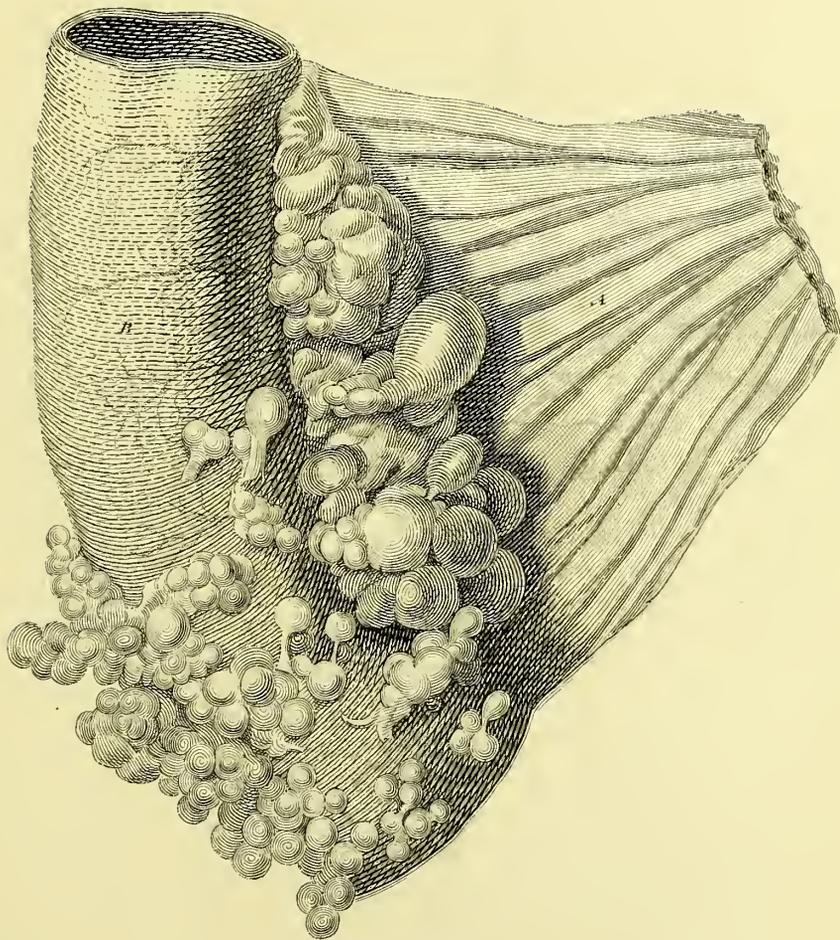




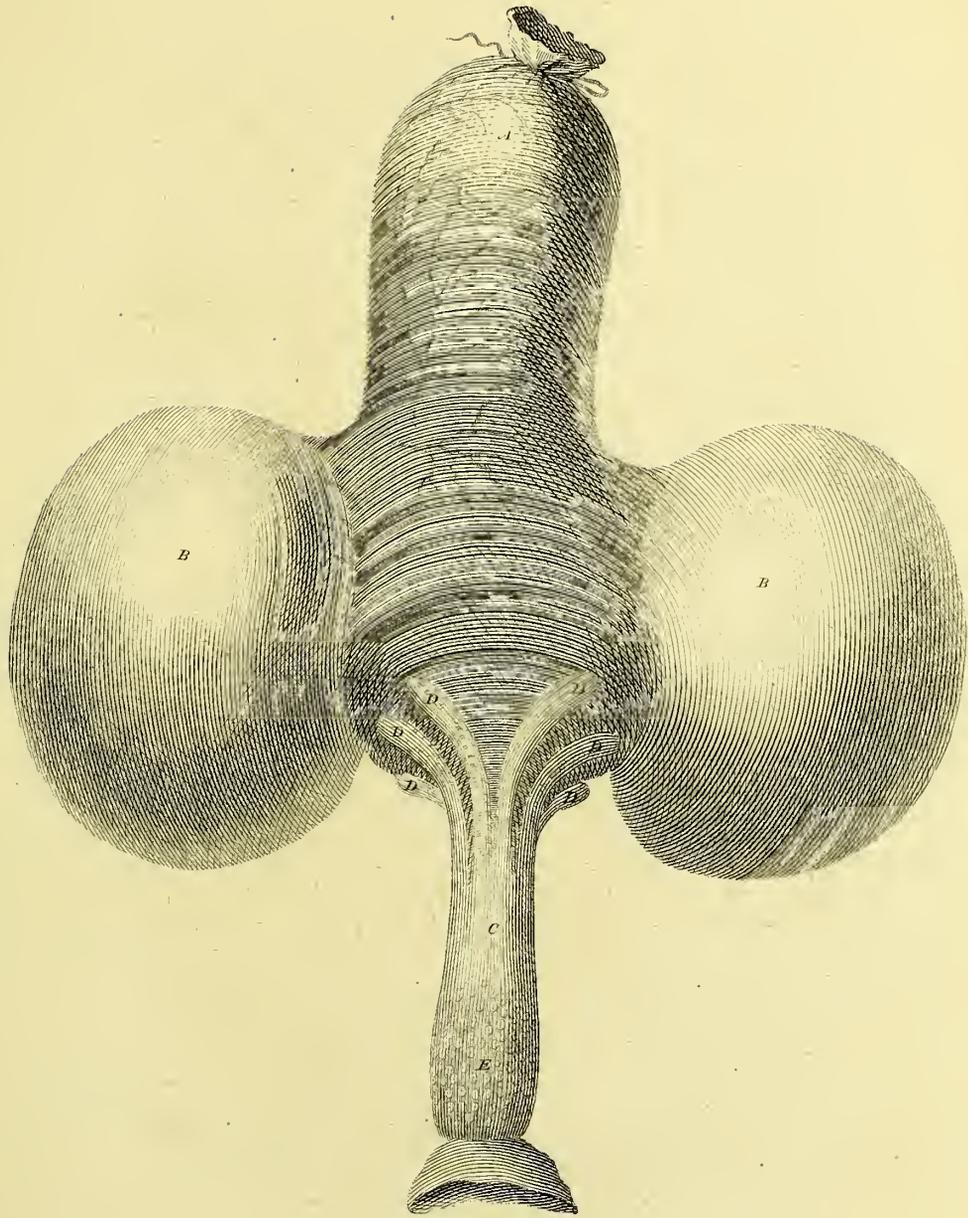














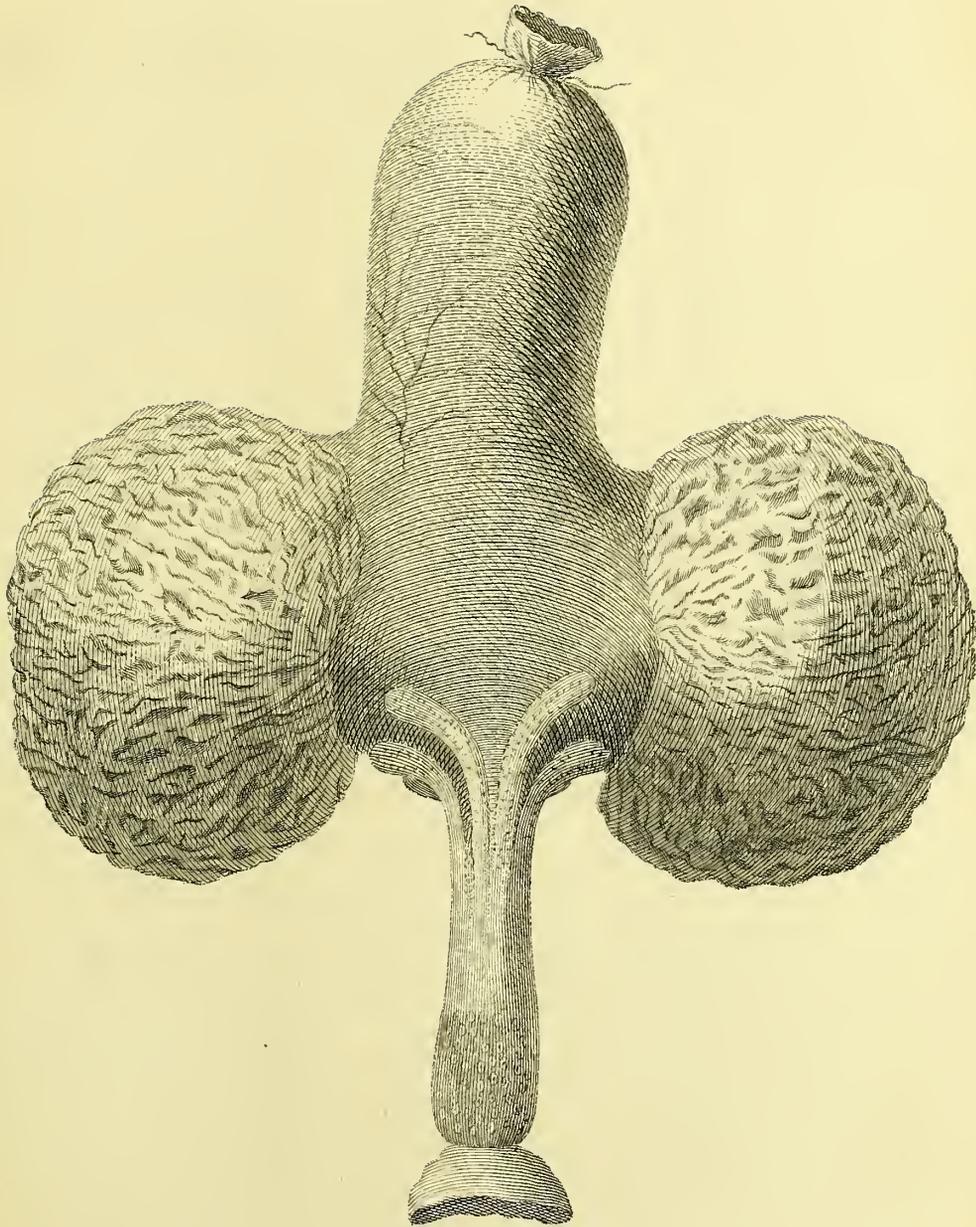




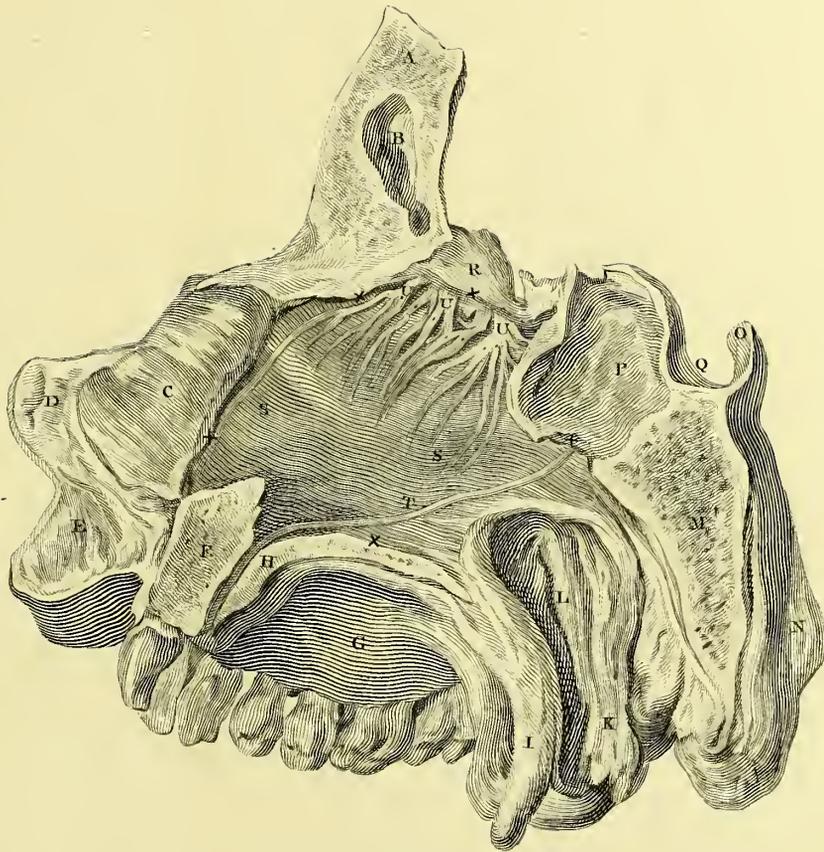
Fig. I.



Fig. II.





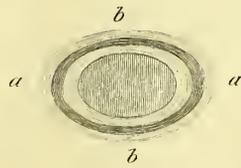






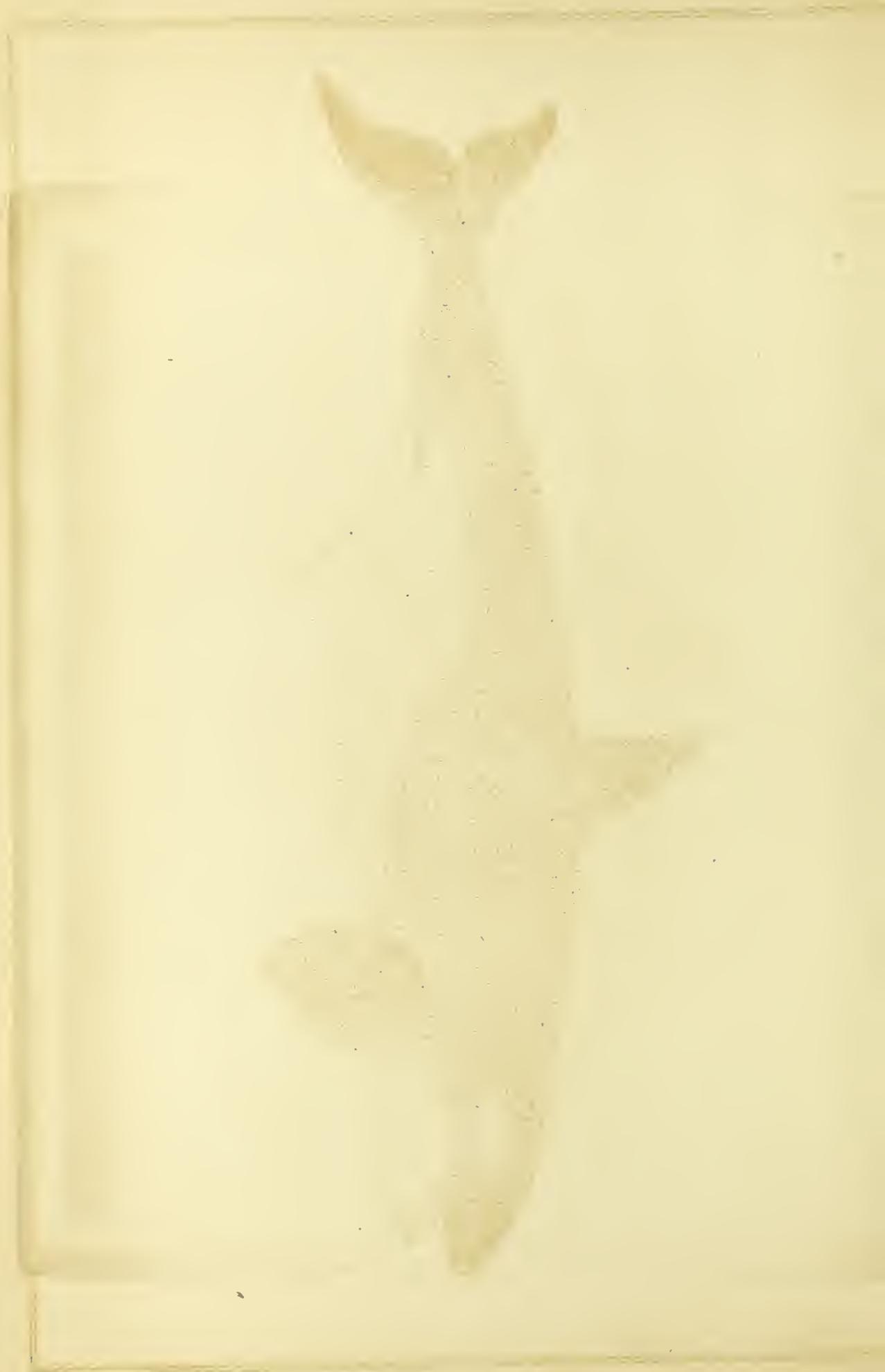


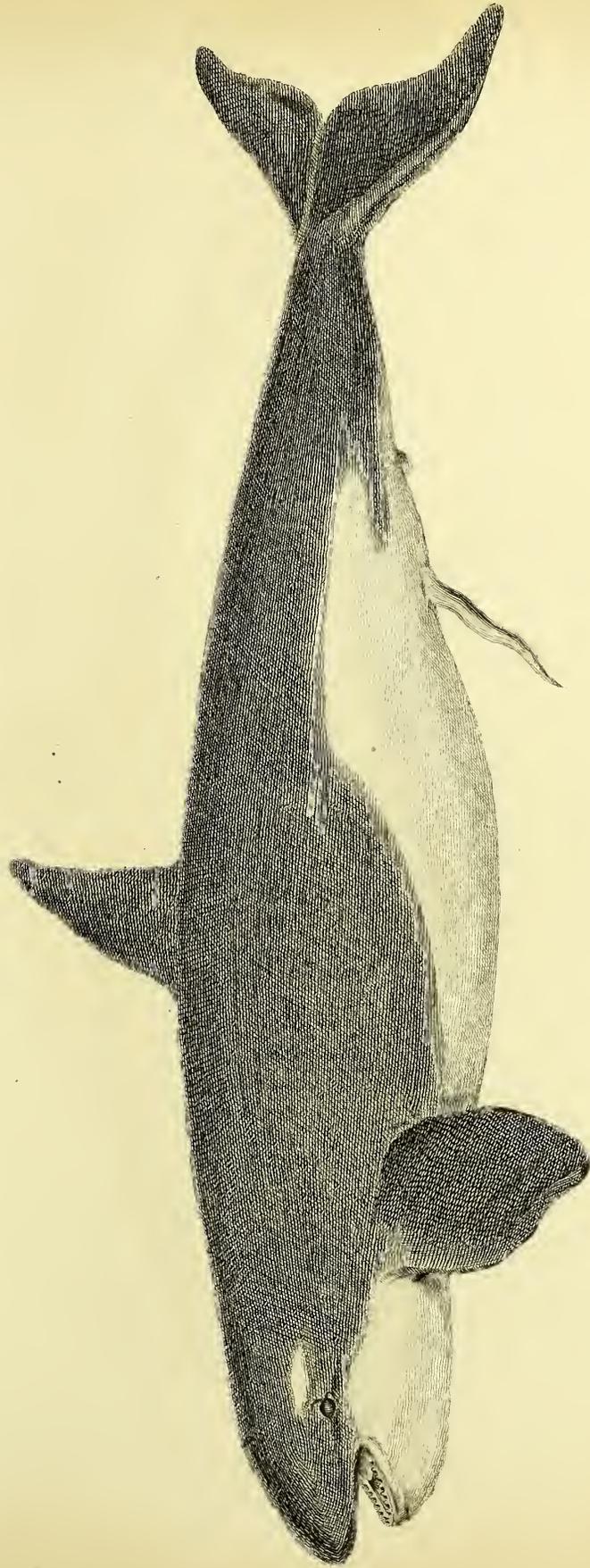
*Fig. 1.*



*Fig. 2.*





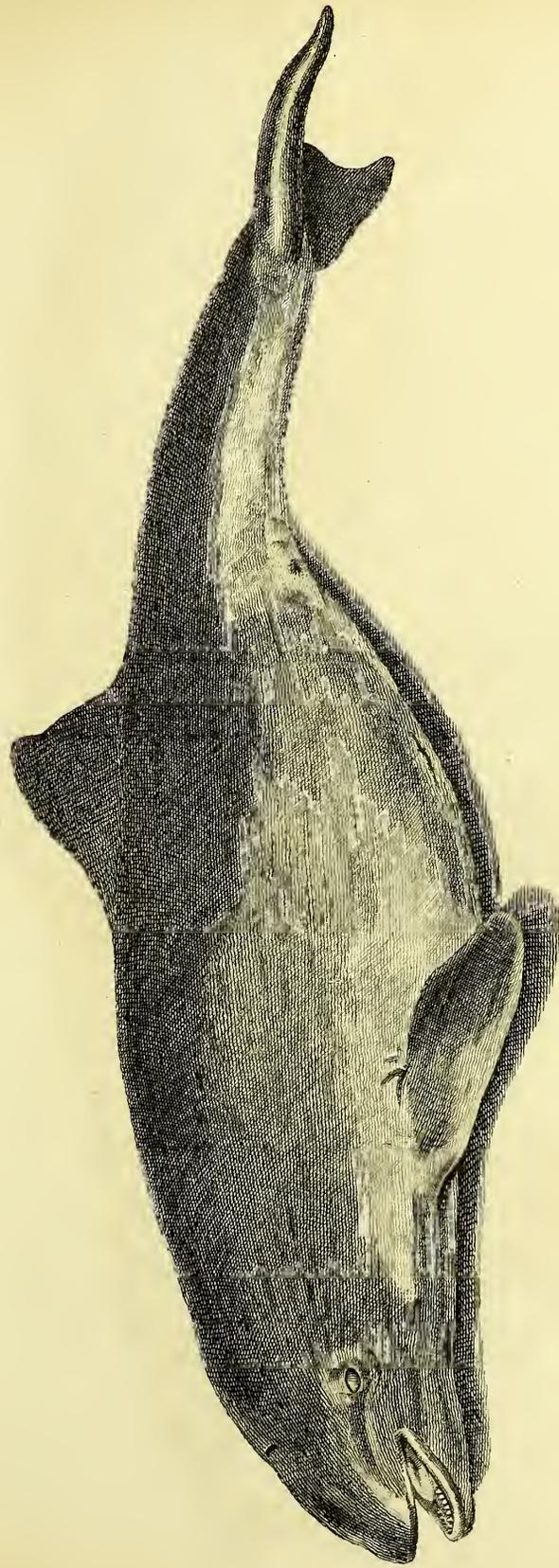


*Phocena Orca.*

309. 12. 2. 2.

W. D.



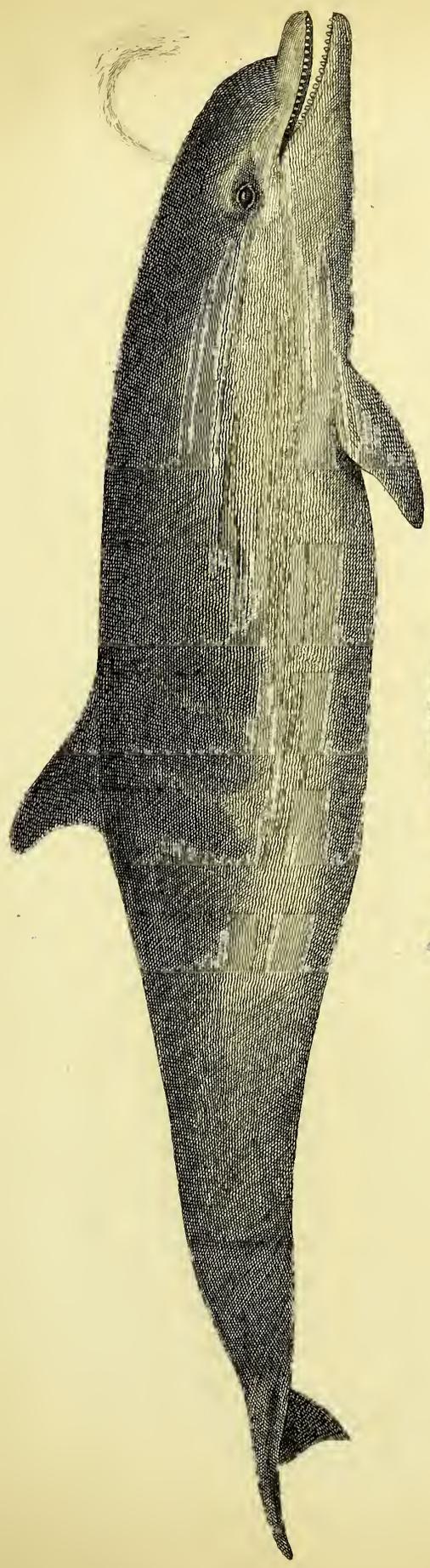


*Phocoena communis.*

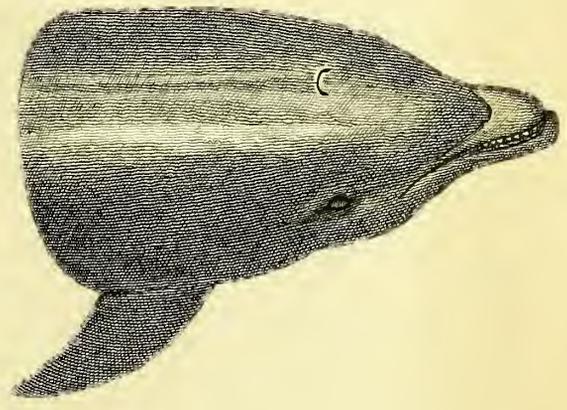
*W. G. Scudder del.*



*Fig. 1.*

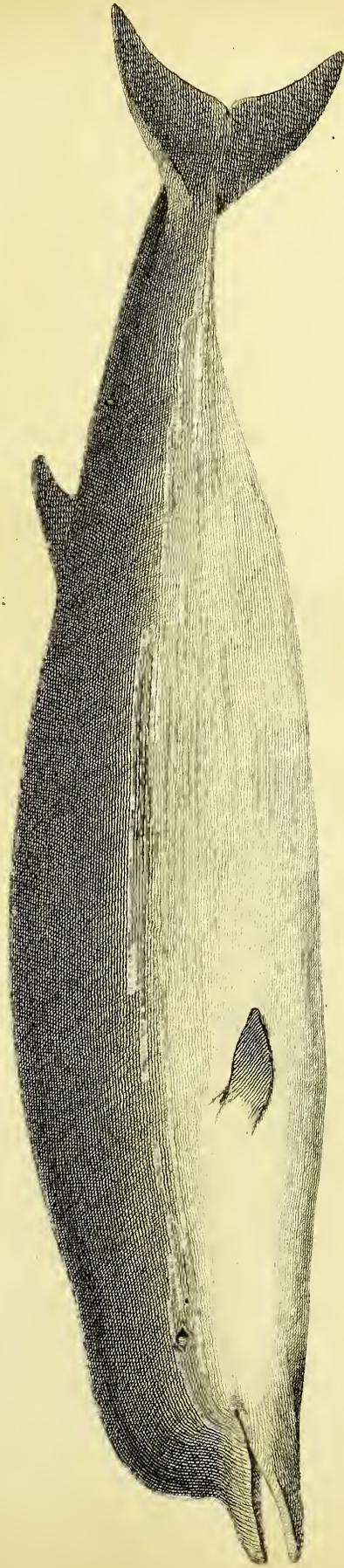


*Fig. 2.*



*Delphinus Ursia.*





*Hyperoodon bidens.*

100. 172



	F.	I.
Whole Length.....	17	0
Upper Jaw from Eye to Eye.....	1	8
Lower Jaw.....	2	6
Within the Whalebone .....	0	10½
Greatest length of Whalebone ..	0	5

Fig. 1.

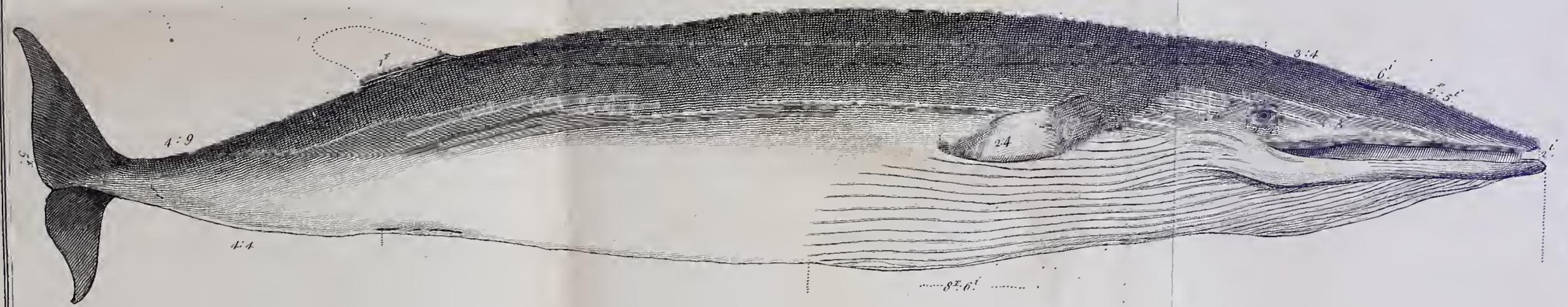
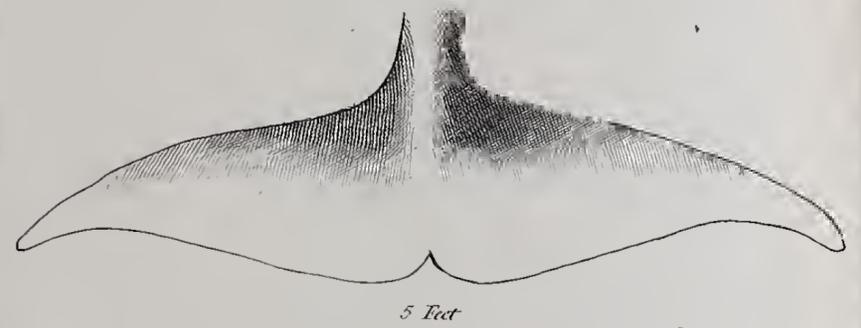


Fig. 2.



*Balaenoptera rostrata.*

Sayer Sc.



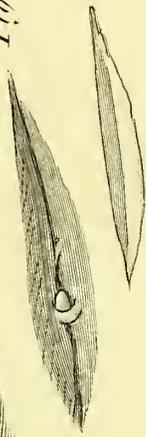
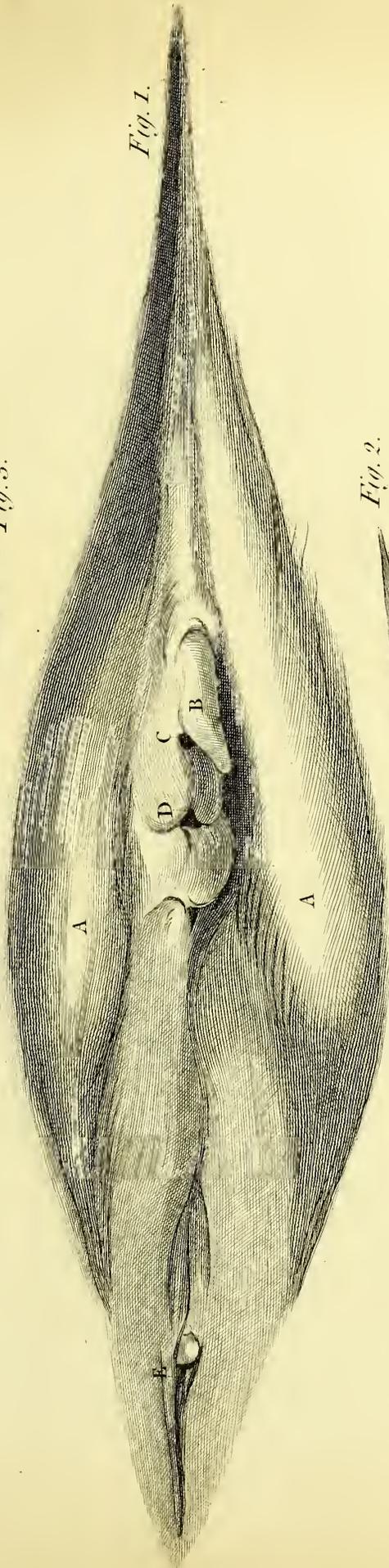
Fig. 5.

Fig. 3.

Fig. 1.

Fig. 2.

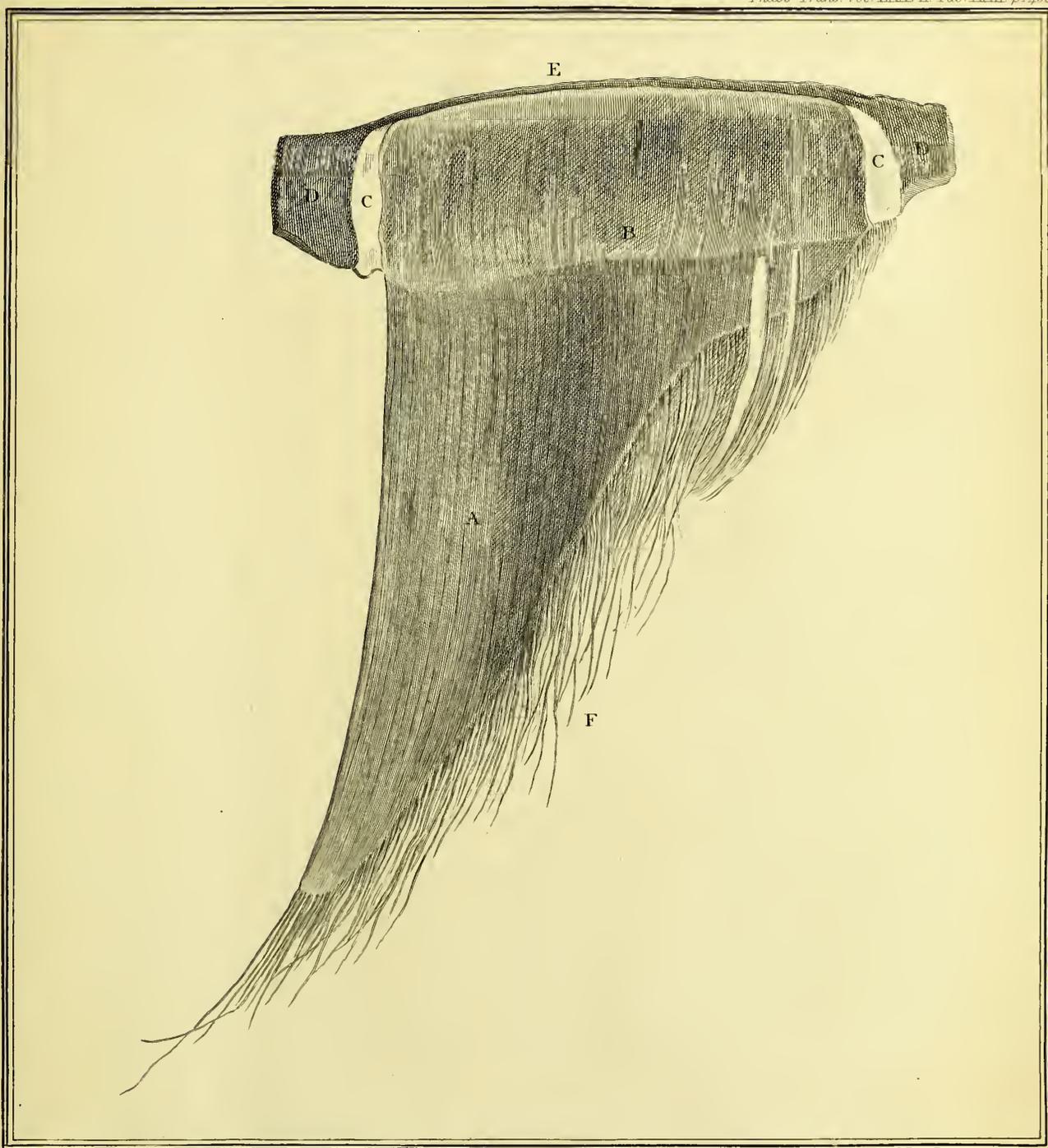
Fig. 4.



Feet inches

1 3





Bell del.

Barre sculp.

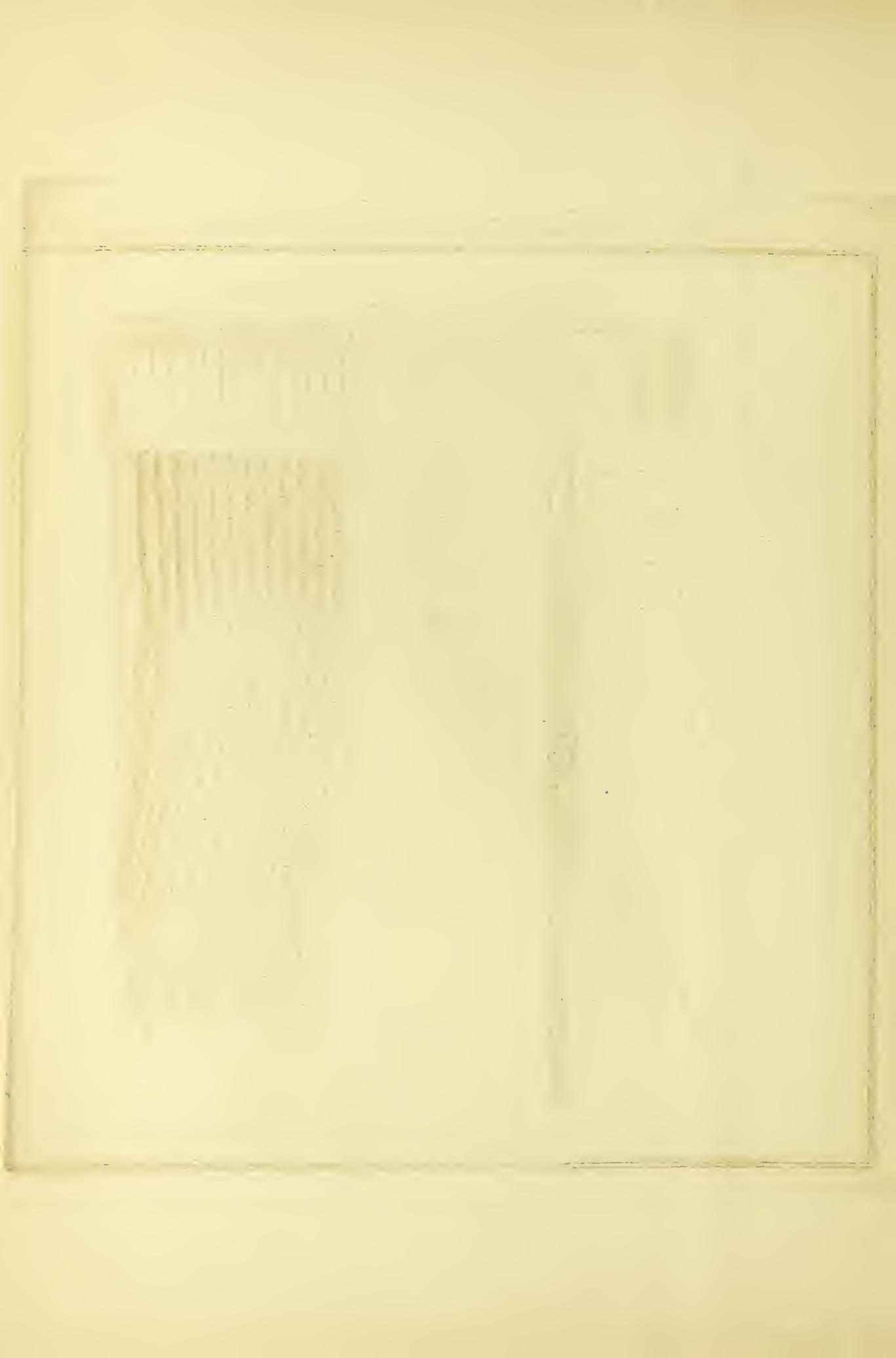


Fig. 2.

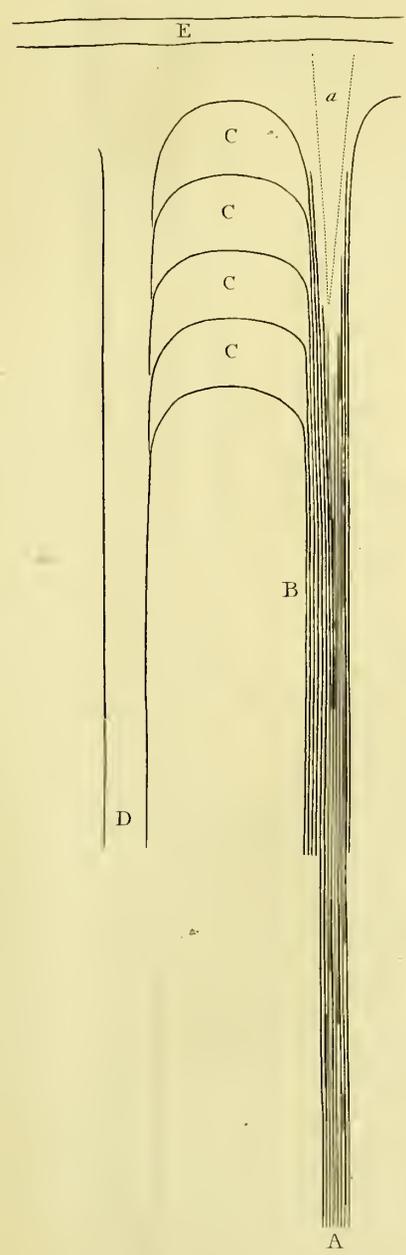
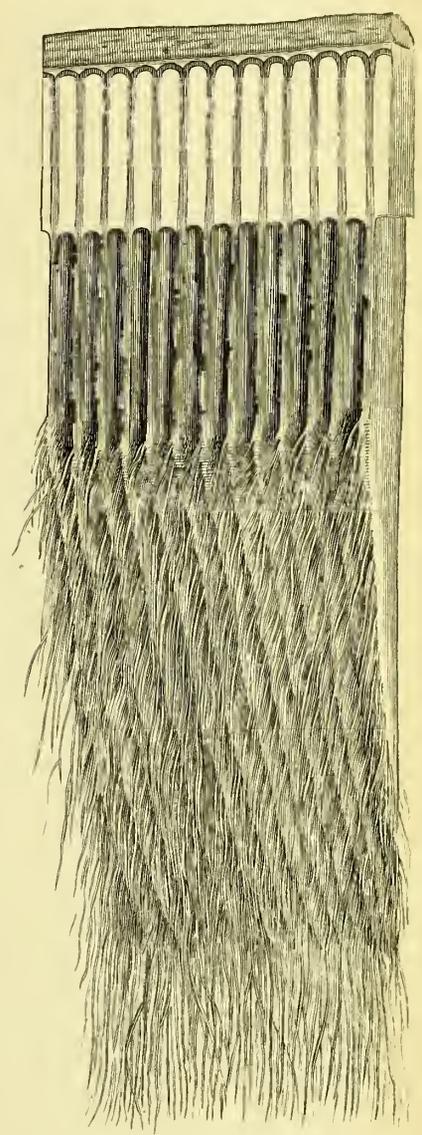


Fig. 1.





*SIREN of Linnæus or Mud Inguana from S. Carolina*





Fig. 1.



Fig. 3.

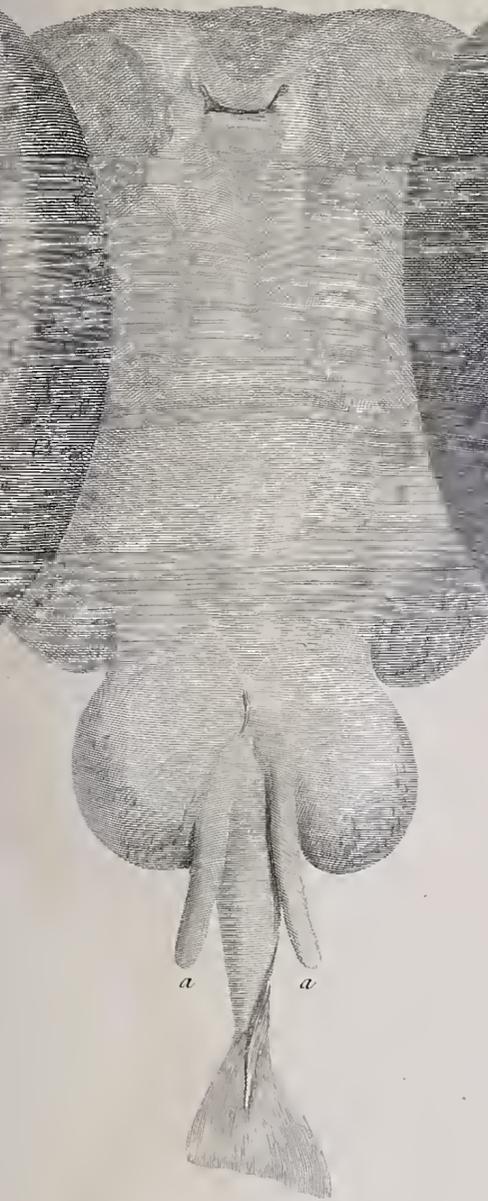


Fig. 2.





Fig 1.

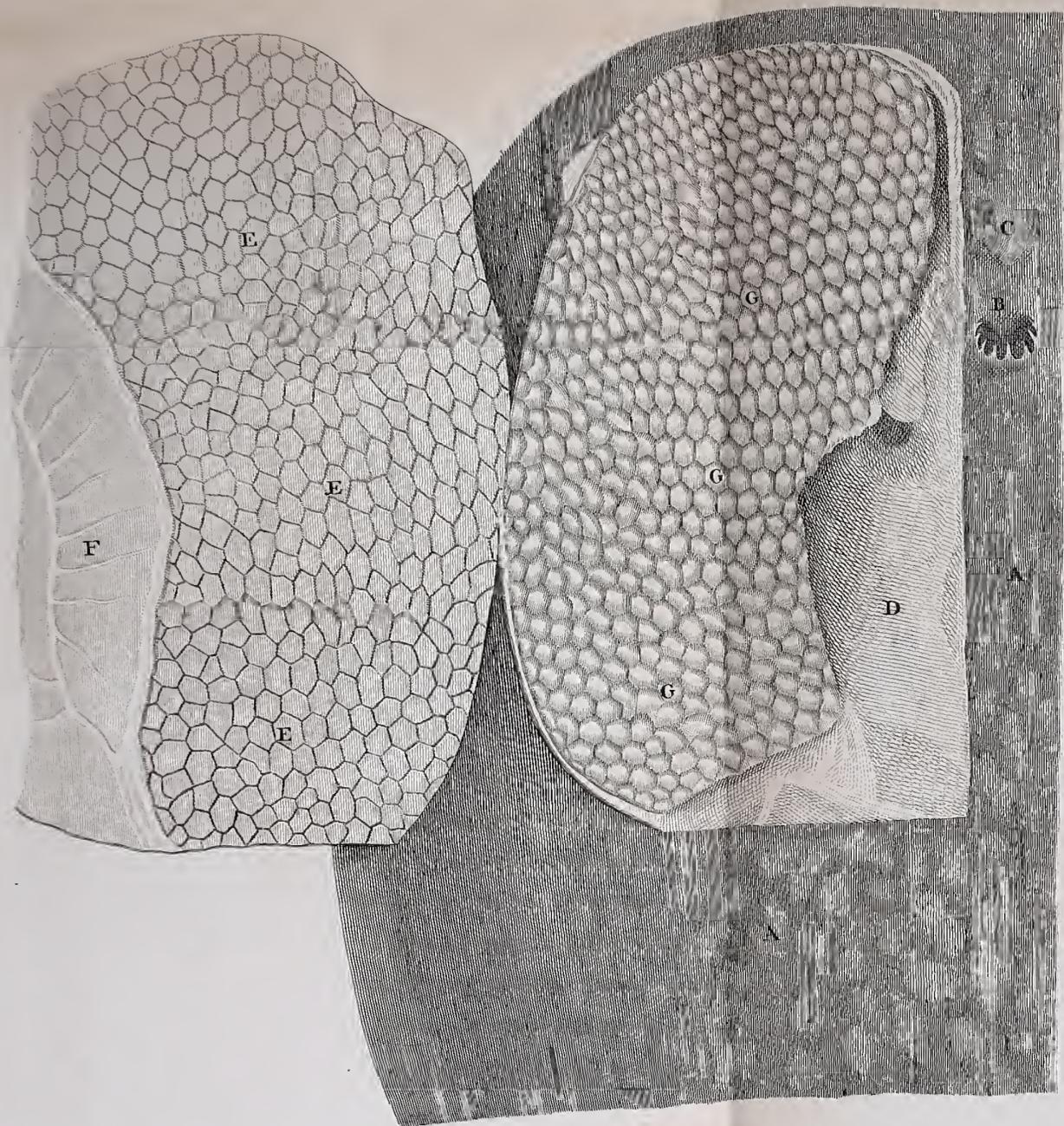


Fig 2.



Fig 3.

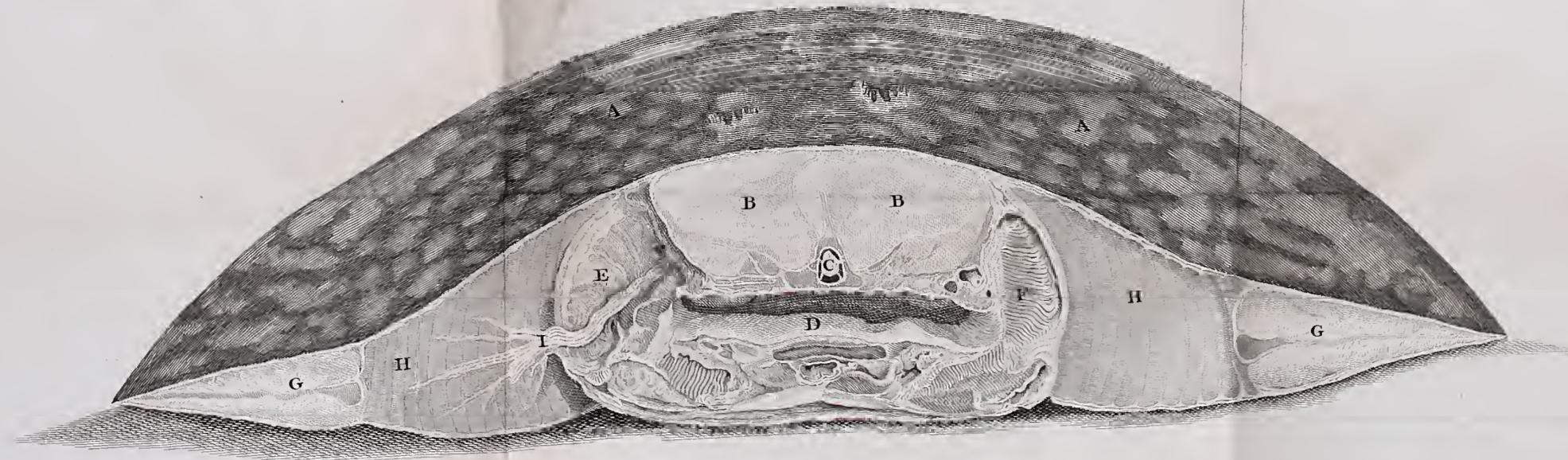




Fig 2

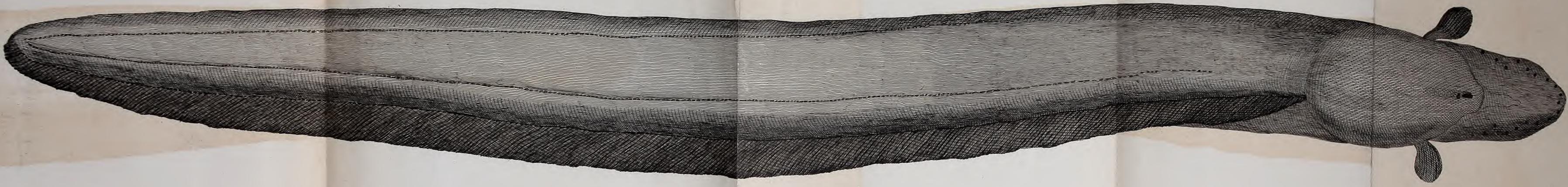
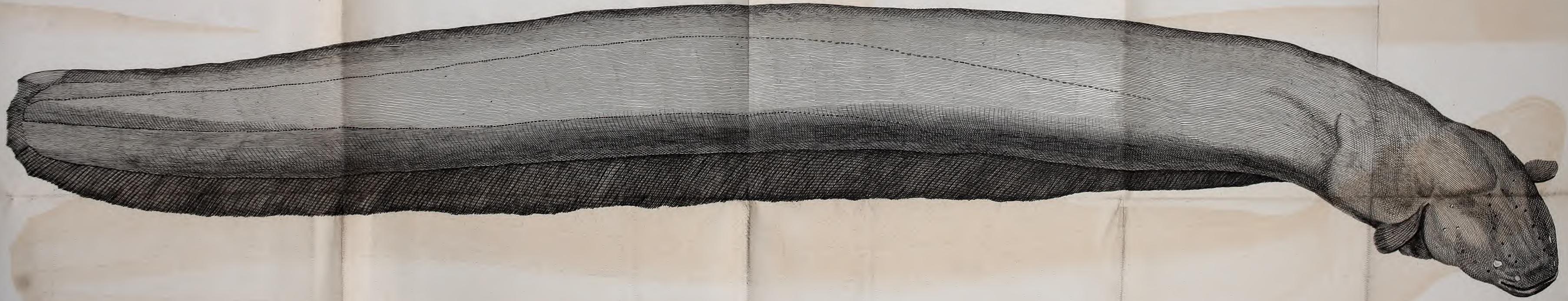
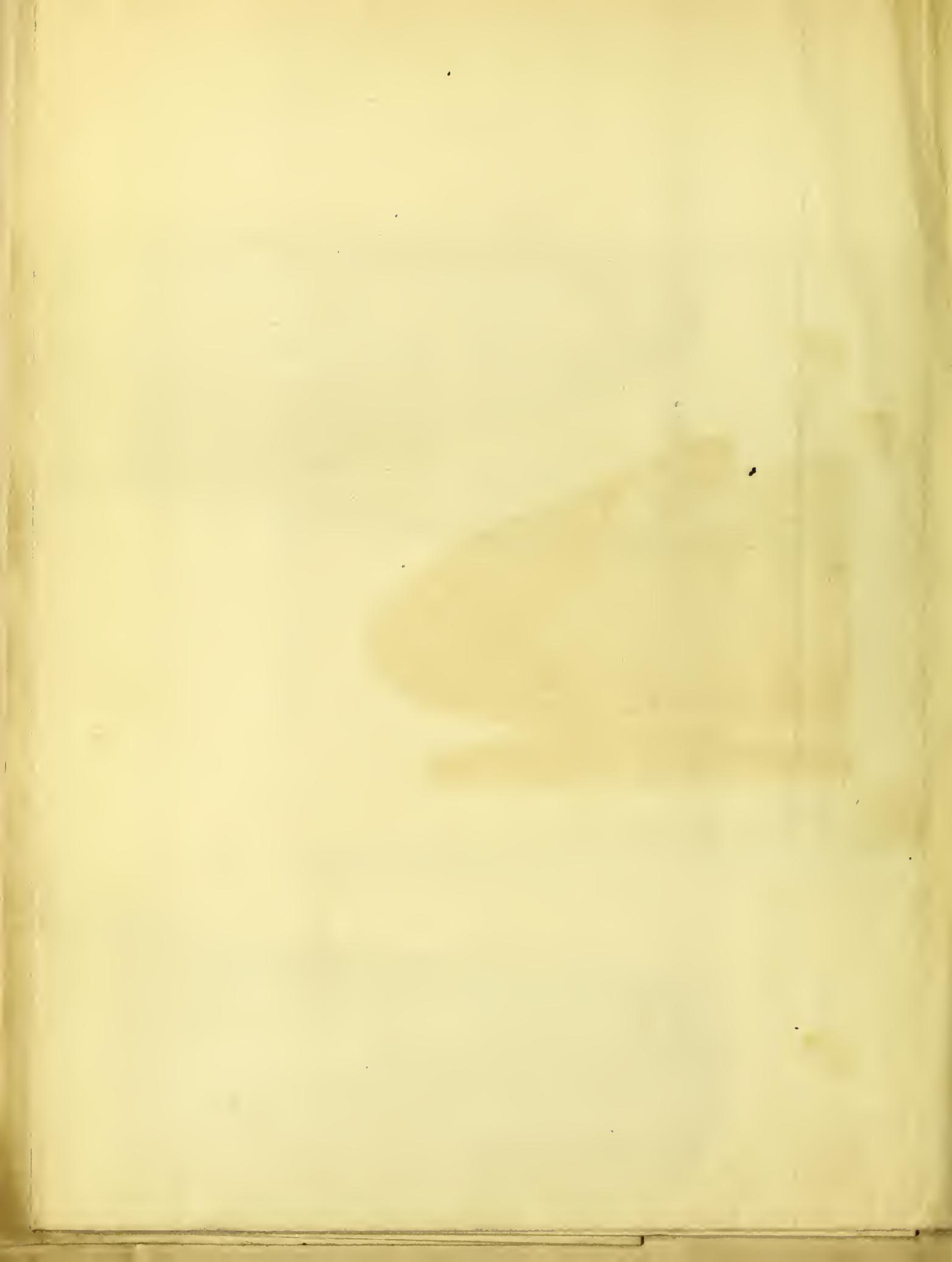
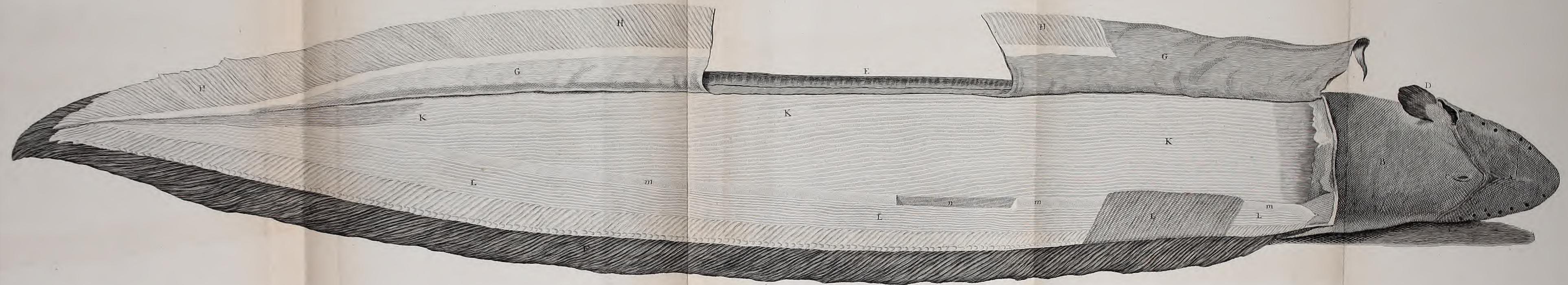


Fig 1







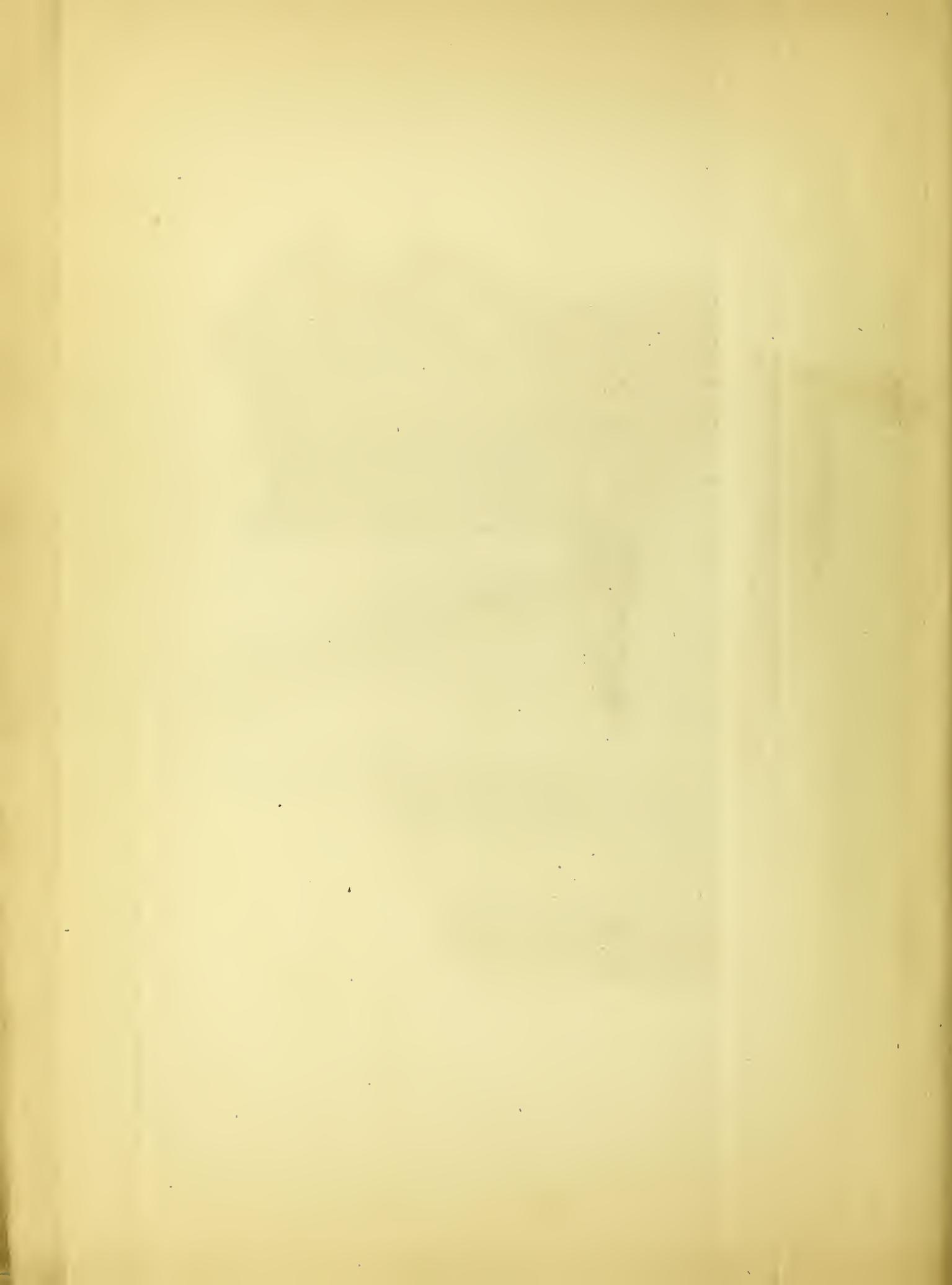


Fig 4

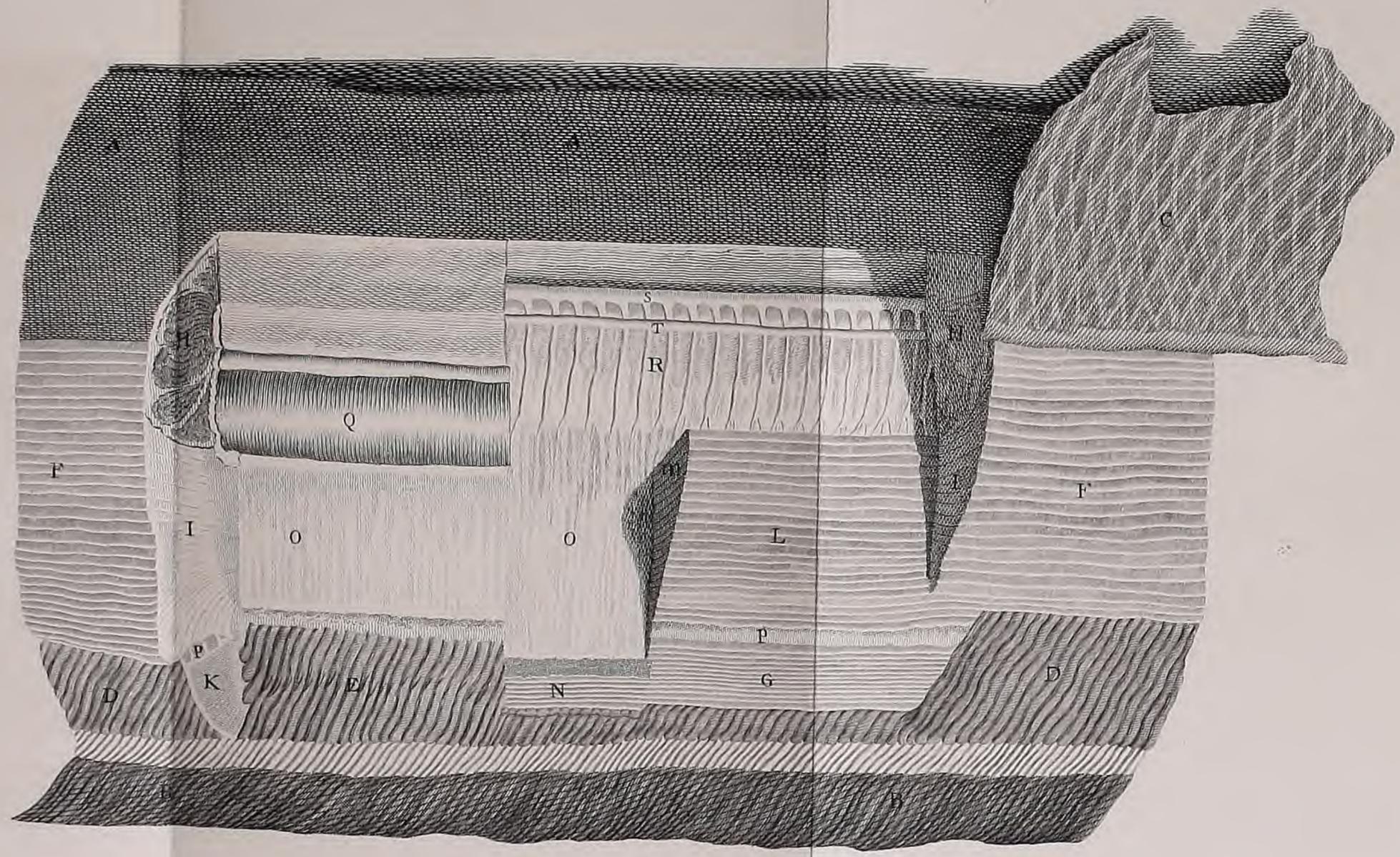


Fig 5

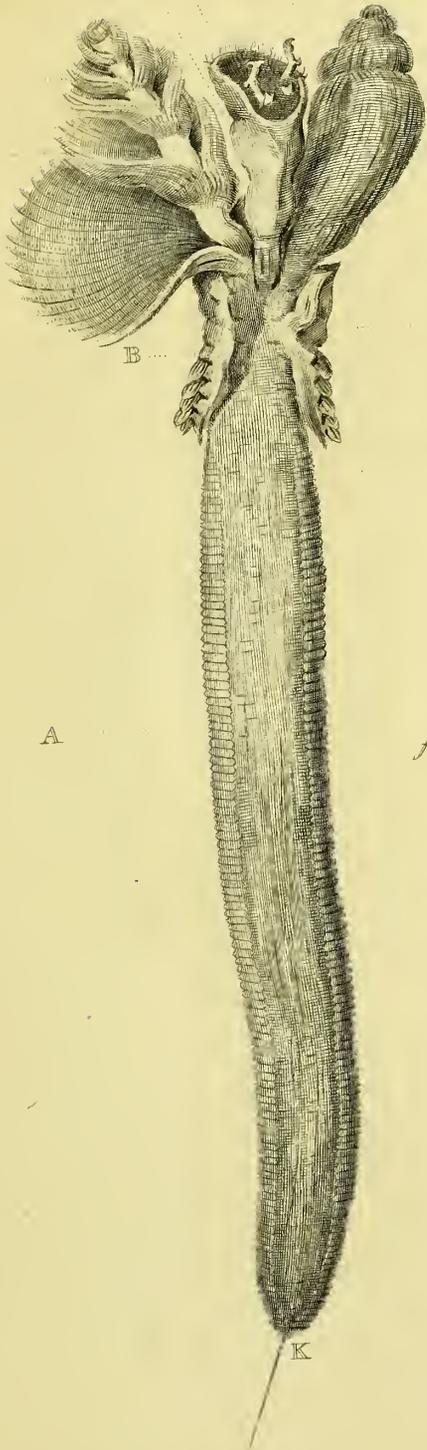




G H I I

*Fig. I.*

E  
E  
F  
D



C

B

A

*Fig. II.*

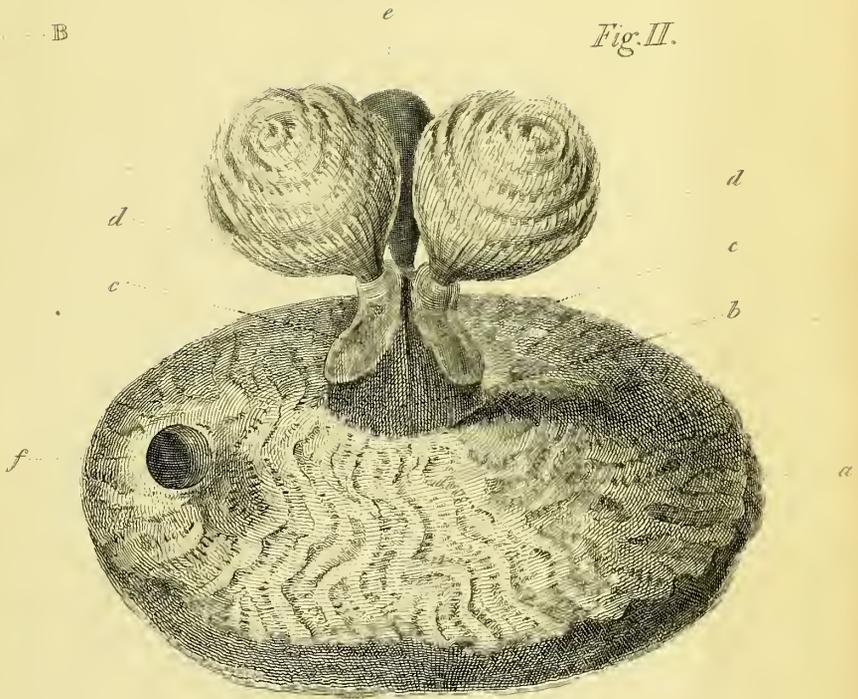




Fig. 1.

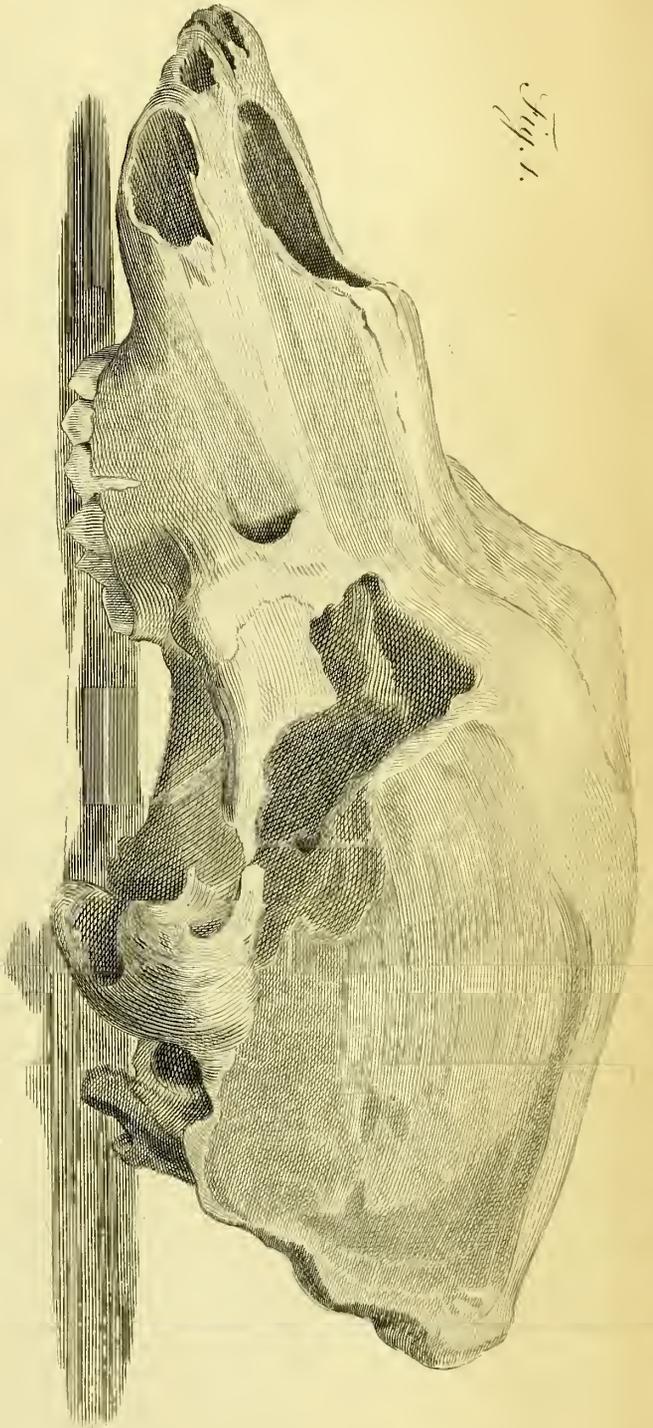
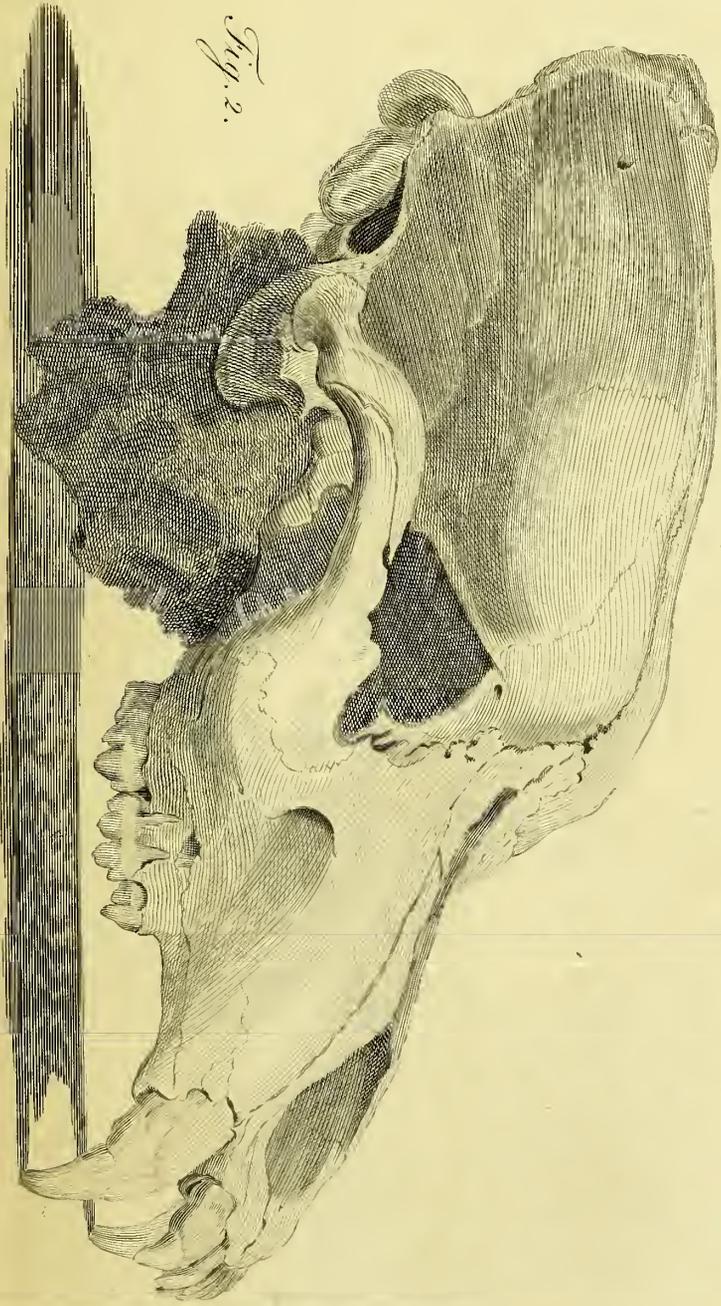
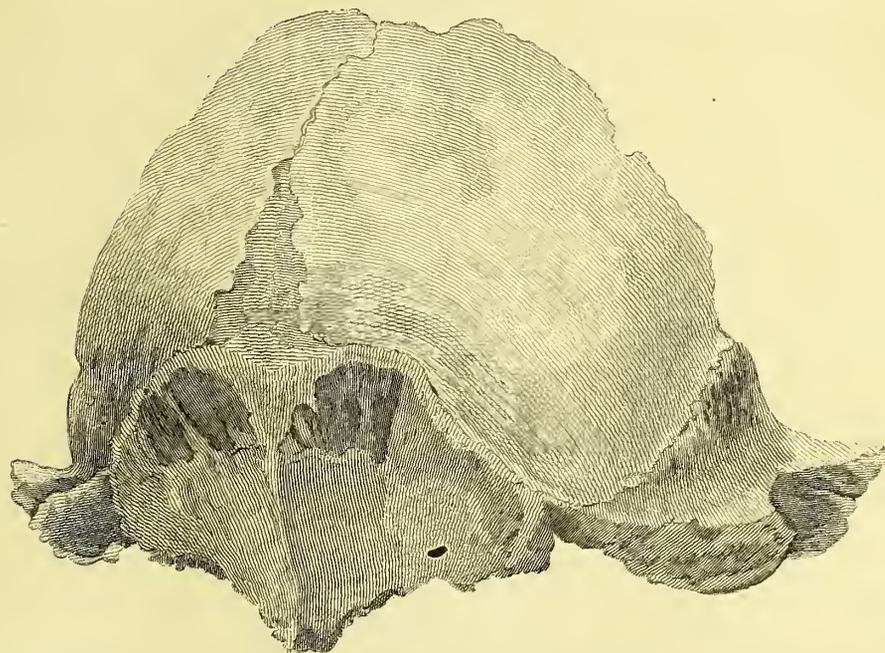


Fig. 2.

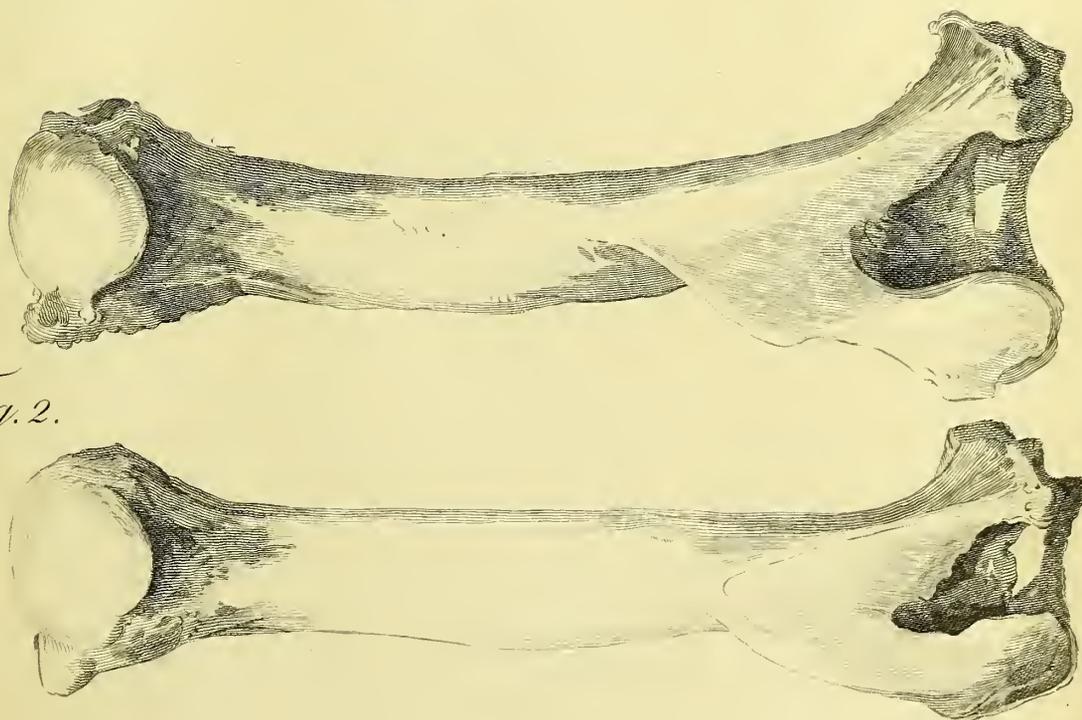




*Fig. 1.*



*Fig. 2.*













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