

a mushroom on a thick peduncle (fig. 3, *p*) projecting from an excavation (*Ib. e, e*) at the end of the glans with a thin wall or border, like a second prepuce; but this is of the same structure as the rest of the firm surface of the glans

On each side of the base of the glans, and rather towards its under part, there is a longitudinal thick oblong ridge or lobe (Pl. IX. figs. 5 & 6, and Pl. XVII. fig. 1, *r, r*), three inches and a half in length, and eight lines in basal thickness: the thick rounded free border of each lobe inclines downwards.

Mucous follicles similar to those on the under surface of the prepuce extend from the attachment of that fold along one half of the interspace of the lateral lobes. The depth of the preputial fold is least on the dorsal side of the glans. On each side of the base of the glans, near the dorsum, the follicles extend along a space of two inches from the root of the prepuce, but do not occur on the middle line. A narrow ridge commences in the median space of the 'dorsum glandis,' which increases in height as it advances forwards, and then subsides two inches from the border of the terminal or apical fossa. The projecting border of this fossa (Pl. XVII. figs. 2 & 3, *e, e*) describes a compressed oval, and is attached to the pedunculated appendage (*Ib. p, a*) by a process, like a frænum (*Ib. fig. 3, f, f*), continued upon the middle line of both the upper and under surfaces of the thick peduncle (*Ib. p*): the fossa between this peduncle and the free external border is not less than two inches in depth on each side; the upper or dorsal border of the fold is three times the breadth of the under one. The stem *p* of the terminal expanded discoid appendage *a* is subcompressed with an oval section, one inch in long diameter, where it supports the terminal disc two-thirds of an inch across. The disc *a* is ovate, one inch eight lines long by one inch across its broader inferior part, where it extends farthest from the supporting stem. The urethra (*Ib. u*) is perforated in the middle line of the terminal disc between its middle and upper third.

The lateral lobes (*Ib. fig. 1, r, r*) consist chiefly of erectile tissue; and all the parts of this singularly complex glans are much altered in size, and somewhat also in shape, during erection (see Pl. IX. figs. 4, 5 & 6).

Female Organs.—The ovaria are included within a large peritoneal sac (Pl. XVII. *o, p*) communicating with the general abdominal cavity by an opening which is three inches wide. They are compact, oblong, flattened bodies, with a smooth surface, as might be expected from the immature age of the animal. The left ovarium measured three inches and a half in length, by two inches and a half in breadth: the right was somewhat smaller. The external capsule of the ovarium is stout and unyielding, and the serous covering has the appearance of being strengthened by tendinous lines, one of which runs in a curved direction across the anterior part of the ovary, having other shorter lines diverging from it. The stroma ovarii is also dense. Three ovisacs or Graafian vesicles were dissected out of each ovarium: of these one was an inch in diameter, with very dense thick dark-coloured parietes; the rest had a diameter of two-thirds of an inch, with thinner coats. Their contents were examined with great

care under the microscope, but the granular layer was evidently broken up by decomposition, and the ovulum was invisible. The animal had been dead a fortnight.

The Fallopian tubes or oviducts commence by wide orifices having a richly fimbriated margin (Pl. XVII. *f, f*); their diameter at the expanded end equals two-thirds of an inch, but gradually diminishes in size as the tube passes in a slightly tortuous course along the parietes of the ovarian capsule towards the uterus; just before they enter the cornu uteri their diameter does not exceed one-third of a line; they terminate in the extremity of the cornu upon a valvular protuberance about the size of a pea, which is divided into four or five processes (*Ib. p*). The inner surface of the oviduct is augmented by short irregular longitudinal folds or processes of the lining membrane. Each oviduct is fourteen inches in length.

The cornua uteri (*Ib. u', u*) are each seventeen inches in length, and uniformly about an inch in diameter; their area is occupied by close-set longitudinal folds of the lining membrane, about a quarter of an inch in breadth, and having a wavy irregular free margin. There is no appearance of processes for the attachment of cotyledons. Where the cornua join the body of the uterus, the crenation or scalloping of the longitudinal folds becomes shorter and deeper. The length of the common uterus (*Ib. cu*) is about one and a half inch. The surface of its lining membrane is smooth, and presented, when first exposed, a leaden hue. The place of the 'os tinæ' is occupied by a complex and remarkable structure, which will be described as it was traced from the vagina towards the uterus.

A large transverse semilunar fold (*Ib. f, f*) projects from the upper and lateral parts of the vagina; the upper and broadest part of the fold is one inch; it gradually diminishes as it descends on each side, and the cresses are lost about four inches from the vaginal orifice, and about an inch and a half from the middle line of the lower surface. About an inch above this fold, or nearer the uterus, a second and smaller fold is formed, which also descends from the upper and lateral walls of the vagina, but passes across in an oblique direction. Then follow in quick succession a series of shorter, but equally broad semilunar folds (*Ib. f', f'*), which become alternate in their relative position as they approach the uterus, so as to cause the vagina to assume a spiral course not very unlike the disposition of the intestine in the Shark. As these valvular folds also assume a thicker, softer, and more vascular texture as they approach the uterus, it is by no means easy to determine where the vagina ends or the uterus begins. Measuring from the thickest fold which most resembles an os tinæ, the common uterine cavity does not exceed two inches in length: and in this short extent, compared with the cornua, the Rhinoceros resembles the Elephant.

The form, size, and relative positions of the vulval and preputial orifices have been already described. The length of the common or urogenital canal (*Ib. v, ug*) was four inches; its diameter about three inches. On each side, and about one inch and a half from the external outlet, were situated the apertures of the Malpighian or mucous

canals (*Ib. m, m*). The diameter of the orifice was about a line, but as the canals passed inwards in the parietes of the urogenital passage, they widened to the diameter of from two to three lines. At about three inches, distance from their outlet they branched off into two or three smaller divisions, from which a glairy mucus could be expressed, and these again subdivided and terminated in blind secerning cæca applied to the outside of the commencement of the vagina. The orifice by which the vagina (*v*) communicates with the uro-genital canal is small in proportion to the width of that canal, and its area is diminished by several short oblique longitudinal folds, whose free edges project into it: the whole of this contracted orifice may be regarded as a form of hymen, beyond which the vagina rapidly dilates in the wide canal represented at *v, v*, Pl. XVIII.

PART V.

Nervous System.

Of this part of the Anatomy of the Rhinoceros the opportunities for making observations were limited to the structure of the Brain and the Eye.

The brain of the full-grown male (Pl. XIX. XX. & XXI.) weighed, when deprived of its membranes, 1 lb. 14½ oz. avoirdupois, its proportion to that of the entire body being as 1 to 164.

An upper view of the natural size is given in Pl. XIX. fig. 1, a side view in fig. 2, and a base view in Pl. XX.

The cerebral hemispheres present a subdepressed semioval form, broader behind, and narrower in front than in the Horse, and presenting fewer and larger convolutions. Their disposition resembles that in the larger hoofed mammalia generally; converging from behind forwards as far as the anterior third of the cerebrum, and thence diverging as they extend forwards, but in a minor degree than in the Horse or Ox.

In the view of the base of the brain (Pl. XX.), the large external crura *p*, and internal crura *q*, of the rhinencephalon or olfactory ganglia, 1, 1, are shown, together with the protuberance *r*, which lies between the two crura. The chiasma of the optic nerves is shown at 2, 2; the infundibular base of the hypophysis cerebri at *k*; the single mass representing the corpora candicantia at *l*; the crura cerebri at *i*, and the third pair of nerves at 3, 3. The obtuse apices of the 'protuberantiæ natiformes,' *o*, are less broad than in the Ox, and more resemble the shape of the same parts in the Horse.

The cerebellum shows the small lobes, called 'flocci,' at *h*; and the inferior convolutions at *g*. The olivary tracts make a very slight prominence at *d*; the pyramidal bodies are better defined, but are crossed by some superficial transverse fibres near the pores *f*: and the 'corpora trapezoidea,' *e*, are defined. The inferior 'vermiform process' of the cerebellum is more regular and better defined than the superior one: it is shown at *v*, fig. 4, Pl. XXII.

The relative longitudinal extent of the great commissure or 'corpus callosum' is shown at *s, s*, in the view of the vertical section of the brain of the female Rhinoceros given in Pl. XXII. fig. 1. A septum lucidum, *q*, of moderate extent, connects the under surface of the anterior half of the corpus callosum with the fornix: in the same section the optic thalami are seen at *o*; the 'plexus choroides' at *p*; and the mass of the quadrigeminal bodies at *k*. The arrangement of the grey and white matter in the lobes and lobules of the cerebellum, forming the 'arbor vitæ,' *a*, is also shown: this is less complex than in the Horse.

The lateral ventricle is laid open by the removal of its outer wall to show the size and shape of the great hippocampus at *n*, fig. 2, Pl. XXII.; and in the same figure are shown the 'plexus choroides' *p*, passing through the 'foramen Monroianum' *m*, beneath the crura of the fornix and the outer lamina of the septum lucidum, *q*. The left lateral ventricle is laid open from above to show the proportions of the 'corpus striatum' *f*, with the hippocampus *i*, and the intervening part of the fornix, covering the optic thalamus *h*, together with the 'plexus choroides' *p*. In Pl. XXI. the corpus callosum *s, s*, has been bisected and the hemispheres divaricated to show the forms and proportions of the bigeminal bodies; of which the posterior pair *b* are broader but shorter than the anterior ones *a*. The pineal gland is shown at *n*; the optic thalamus at *h*; the 'plexus choroides' at *p*; and the 'corpus striatum' at *f*.

The commencing decomposition of the inner substance of the brain prevented the better definition of some of the other parts of this organ.

The common anastomotic trunk of the basilar or vertebral arteries, after traversing the median line of the pons, gives off a pair of arteries at right angles, which cross the crura cerebri between the pons and the third pair of nerves: a second pair of transverse branches is sent off just anterior to the former, and receive the anastomosing longitudinal branches from the ento-carotids which complete the circle of Willis. From the ento-carotid parts of the circle, a branch is given off to the interspace between the middle and anterior lobes of the cerebrum, where it divides into three or four branches.

The eyeballs are of small comparative size; each measured in antero-posterior diameter one inch five lines, and in transverse diameter one inch three lines. Some dark-brown pigment lies under the conjunctiva for the extent of about a line from the circumference of the cornea: the same kind of pigment is also deposited upon the outside of the nictitating eyelid, and over a great part of the inner surface of the same part, covered of course by a reflection of the conjunctiva. The trunks of the venæ vorticosæ perforate the sclerotica half-way between the entry of the optic nerve and the edge of the cornea. I injected one of these veins with mercury, which immediately returned by vessels perforating the sclerotica near the optic nerve. The disposition of the venæ vorticosæ, with the flocculent but somewhat firm connecting tissue of their radiating branches, presented that structure which most nearly resembled the figures given by Mr. Thomas of the parts he describes as "processes having a muscular

appearance, with the fibres running forwards in a radiated direction¹." There are no fibres accompanying the radiated branches of the veins, showing the striated character of voluntary muscle under the microscope. Mr. Thomas found that "the ciliary processes were affixed to the crystalline lens;" but on removing the anterior part of the sclerotica, whilst the eye was suspended in spirit, both the vitreous humour and the lens rolled out; and the capsule of the lens showed no particular mark of the insertion or fixation of the ciliary processes; their impressions, in remains of pigmental matter, were perceptible on the anterior part of the canal of Petit. The transverse diameter of the lens was six lines, the antero-posterior diameter four lines. Mr. Thomas also states that "the pigment was confined to the inside of the choroid²." But in both Rhinoceroses dissected by me, I found on the outside of the chorion much loose cellular tissue, with dark pigment: this coloured flocculent tissue concealed at first the *venæ vorticosæ*, even when injected. The sclerotica is one line thick at the back part of the eyeball; and is thinnest near the middle of the ball, becoming thicker towards the cornea, which is two lines thick. The choroid adheres pretty strongly to the back part of the sclerotic, around the entry of the optic nerve, both by the entering vessels and by the tenacity of its outer flocculent coat, especially where the vessels penetrate the sclerotica. There is no tapetum lucidum. The lower eyelid has a special depressor muscle.

DESCRIPTION OF THE PLATES.

All the parts are of the natural size except when otherwise expressed.

PLATE IX.

- Fig. 1. Metacarpal gland.
- Fig. 2. Metatarsal gland, laid open.
- Fig. 3. Excretory orifice of the gland.
- Fig. 4. External prepuce during the ordinary retracted state of penis (one-sixth natural size).
- Fig. 5. Penis as protruded when this retromingent quadruped stales (one-sixth natural size).
- Fig. 6. Glans penis, or the portion uncovered by the prepuce, when the organ is in a state of erection (one-sixth natural size).
- Fig. 7. External parts of generation in the female (two-thirds natural size).
- Fig. 8. The two teats.

PLATE X.

- Fig. 1. Right tonsil, epiglottis, and back part of larynx.

¹ Philosophical Transactions, 1801, p. 150. pl. 10. figs. 1, 2, 3.

² *Ib.* p. 150.

- Fig. 2. Inner surface of left side of the larynx laid open ; a part of the accessory fold of membrane *l*, and of the lower 'vocal chord' *v*, of the right side are preserved and turned forwards : *f*, accessory fibro-cartilage ; *u*, upper 'vocal chord' ; *th*, thyroid cartilage ; *cr*, cricoid cartilage ; *tr*, first tracheal ring ; *e*, epiglottis.

PLATE XI.

- Fig. 1. Outer surface of the stomach, with the serous tunic partially reflected to show the two decussating muscular layers (one-eighth natural size).
 Fig. 2. Inner surface of the stomach (one-eighth natural size).
 Fig. 3. Section of the coats of the stomach at the junction of the epithelial with the gastro-mucous linings.
 Fig. 4. A portion of the inner surface of the stomach, showing the follicular structure at the termination of the cardiac epithelium.

PLATE XII.

- Fig. 1. Portion of the inner surface of the beginning of the jejunum.
 Fig. 2. Portion of the inner surface at the end of the jejunum.
 Fig. 3. Portion of the inner surface near the end of the ileum.

PLATE XIII.

The cæcum, colon, and beginning of the rectum (one-tenth natural size).

PLATE XIV.

- Fig. 1. The inner surface of the duodenum, showing the terminal orifices of the biliary and pancreatic ducts.
 Fig. 2. The inner surface of the fundus vesicæ, showing the allantoic or urachal cicatrix.
 Fig. 3. Outside view of the right kidney (one-third natural size).
 Fig. 4. View of a portion of the pelvis of the kidney, with the beginning of the ureter.

PLATE XV.

- Fig. 1. Back view of the larynx, showing, *th*, thyroid cartilage ; *c*, cricoid cartilage ; *a a*, arytenoid cartilages ; *e*, epiglottis ; *d*, *crico-arytenoidei* muscles, the

left reflected; *o*, the right *arytenoideus*, reflected; *e*, *thyro-cricoideus*; *c*, articular tubercle, with a synovial surface for the joint with the base of the arytenoid cartilage.

Fig. 2. Back view of the larynx, showing in addition to the foregoing,—*k*, the commissural cartilage of the *arytenoidei* muscles *o o*; *g*, the right *thyro-arytenoideus*; *m*, the superior labia of the glottis; *n*, the upper 'chorda vocalis'; *v*, the lower 'chorda vocalis' bounding the entry of the laryngeal sac; *f*, the fibro-cartilage giving attachment to the epiglottideal fold of membrane *l*, which bounds the upper part of the suprachordal sacculus.

PLATE XVI.

The urinary bladder, vasa deferentia, vesicular, prostatic, and Cowperian glands (one-fifth natural size). The letters are explained in the text.

PLATE XVII.

Fig. 1. Muscles of the penis: *c*, crura penis; *pr*, reflected prepuce; *gl gl*, glans penis; *r*, lateral lobes of glans; *a*, terminal appendage of glans; *l l*, carneous mass of *levatores penis*; *l'* beginning, and *l''* insertion of the common tendon of the *levatores*, which runs along the 'dorsum penis'; *t t*, retractores penis.

Fig. 2. Front view of terminal fossa, and appendage of the glans penis: *u*, the orifice of the urethra.

Fig. 3. Oblique view of the same parts, showing, *e e*, the borders of the fossa; *p*, the peduncle of *a*, the discoid appendage; *f f*, its upper and lower fræna; *u*, urethral orifice.

Fig. 4. Part of the 'cervix vesicæ' showing the common orifices, into which bristles are inserted, of the vasa deferentia and vesicular glands, upon the crucial verumontanum; and the smaller excretory pores of the prostatic lobes.

PLATE XVIII.

The female organs of generation (one-fifth natural size): *op*, ovarian capsules; *f*, fimbriæ of oviduct; *p*, valvular papilla on which the oviduct terminates in the uterus; *u' u*, cornua uteri, the left laid open; a probe is passed through the coats of the right cornu to show the place of confluence of the cornua with the 'corpus uteri'; *f f'*, valvular folds of 'cervix uteri' and 'fundus

vaginæ'; (the complex glans penis has, probably, relation to this structure;) *v v*, vagina; *u*, the urethra, beyond the hymeneal constriction dividing the vagina from the uro-genital canal; *m m*, Malpighian canals, the left laid open—bristles are inserted into both; *vu*, vulva and clitoris.

PLATE XIX.

Brain of the male Rhinoceros.

PLATE XX

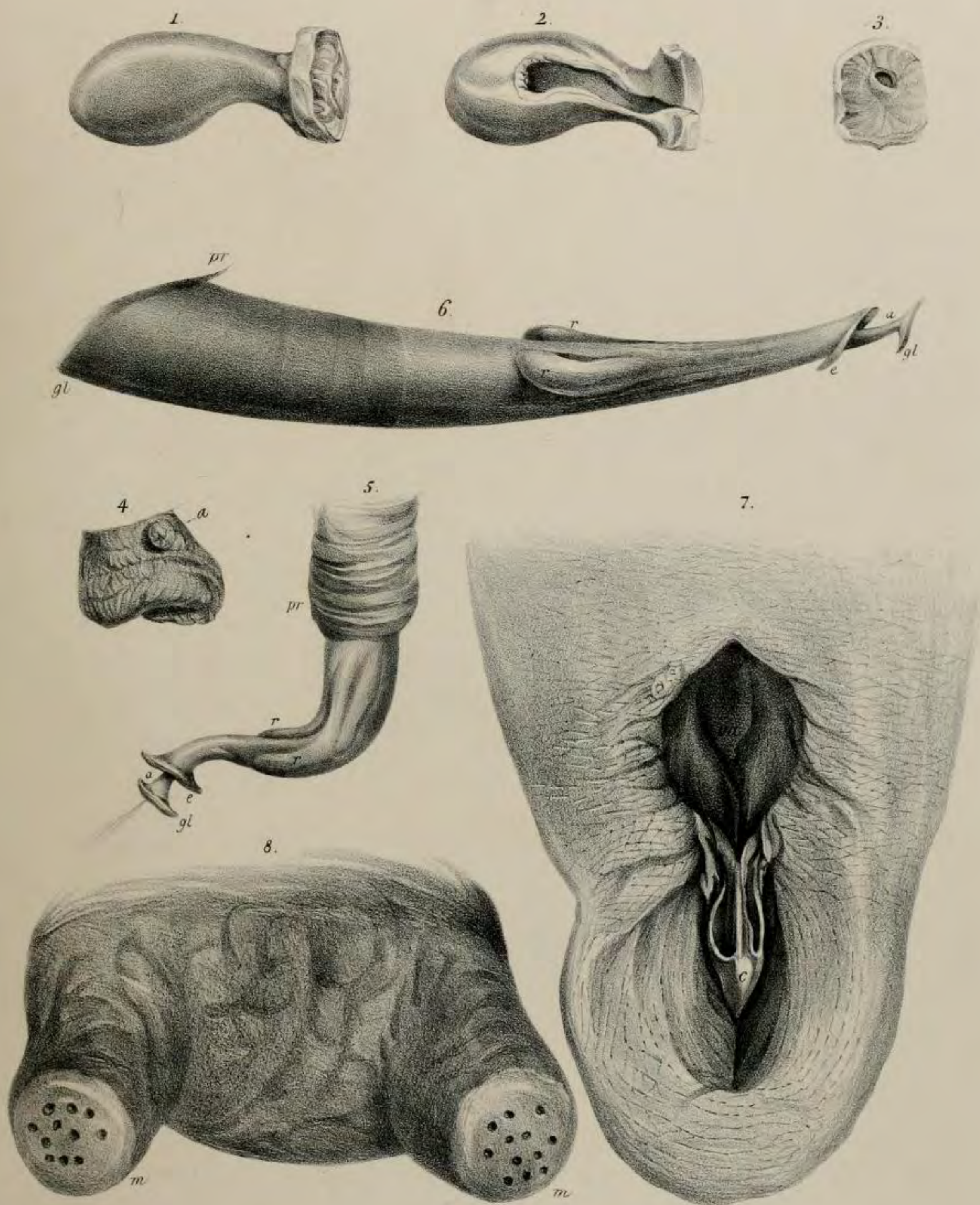
Base of the brain of the male Rhinoceros.

PLATE XXI.

Dissection of the brain of the male Rhinoceros.

PLATE XXII.

Dissections of the brain of the female Rhinoceros. The letters are explained in the text.



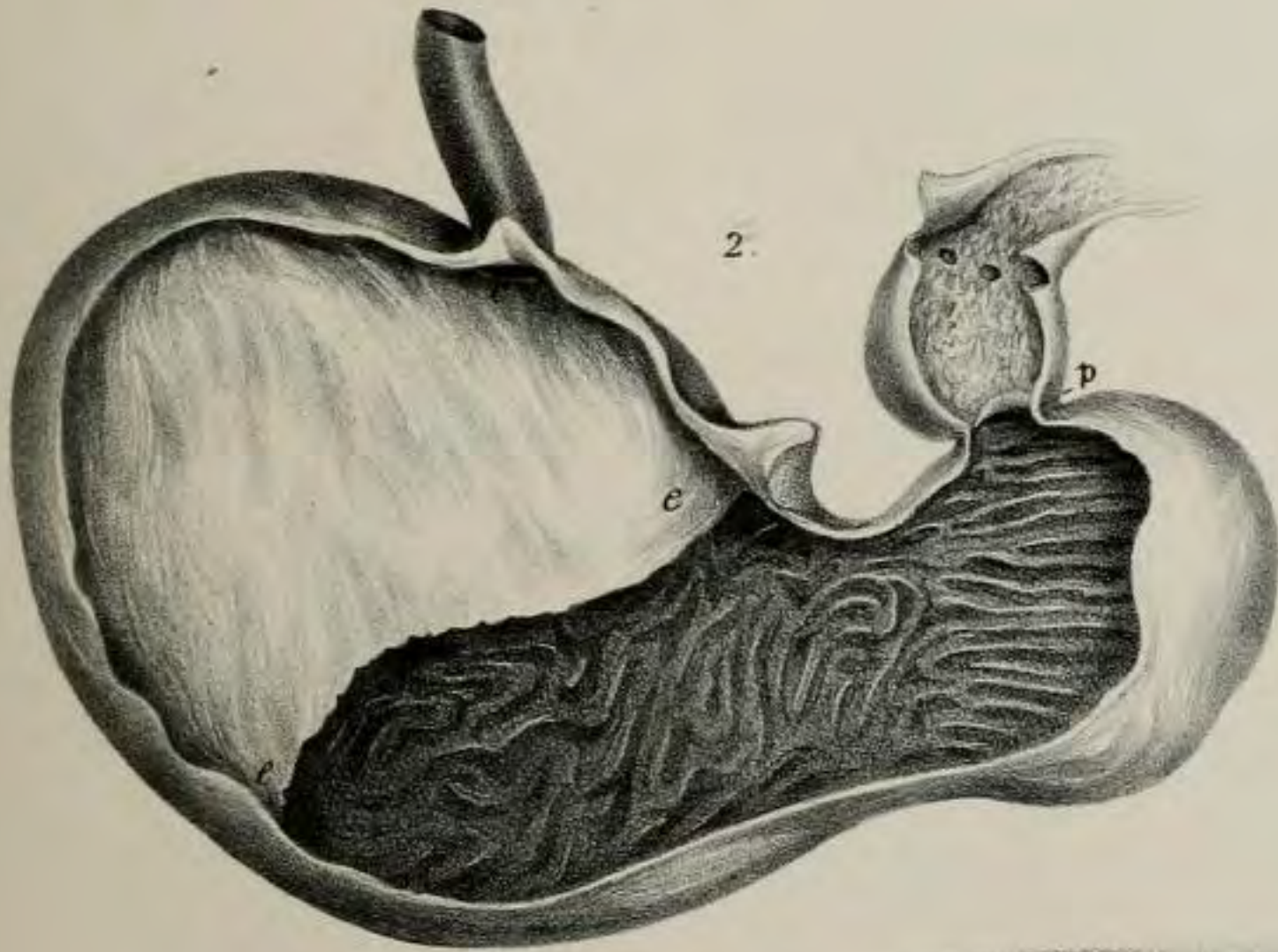
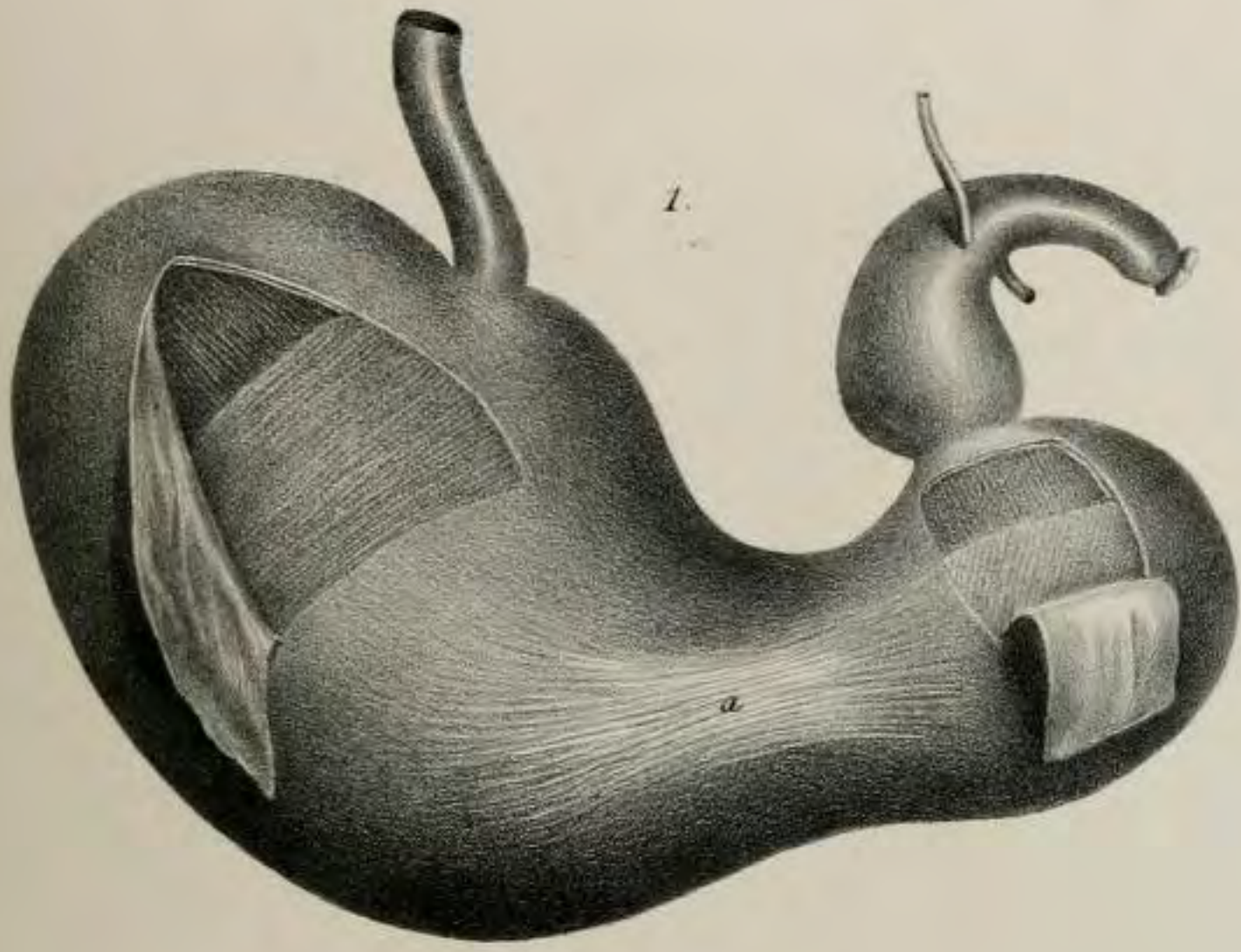
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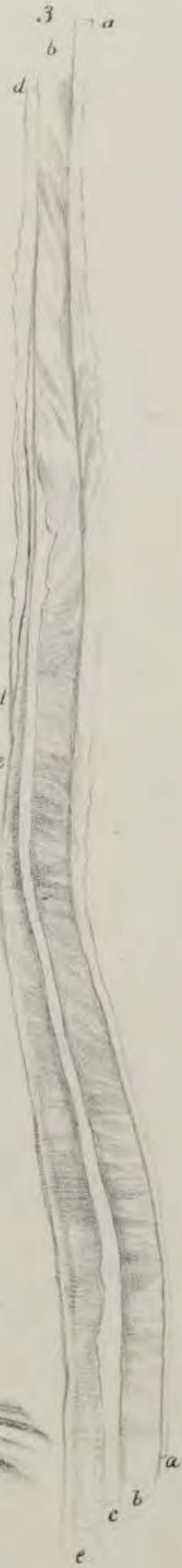
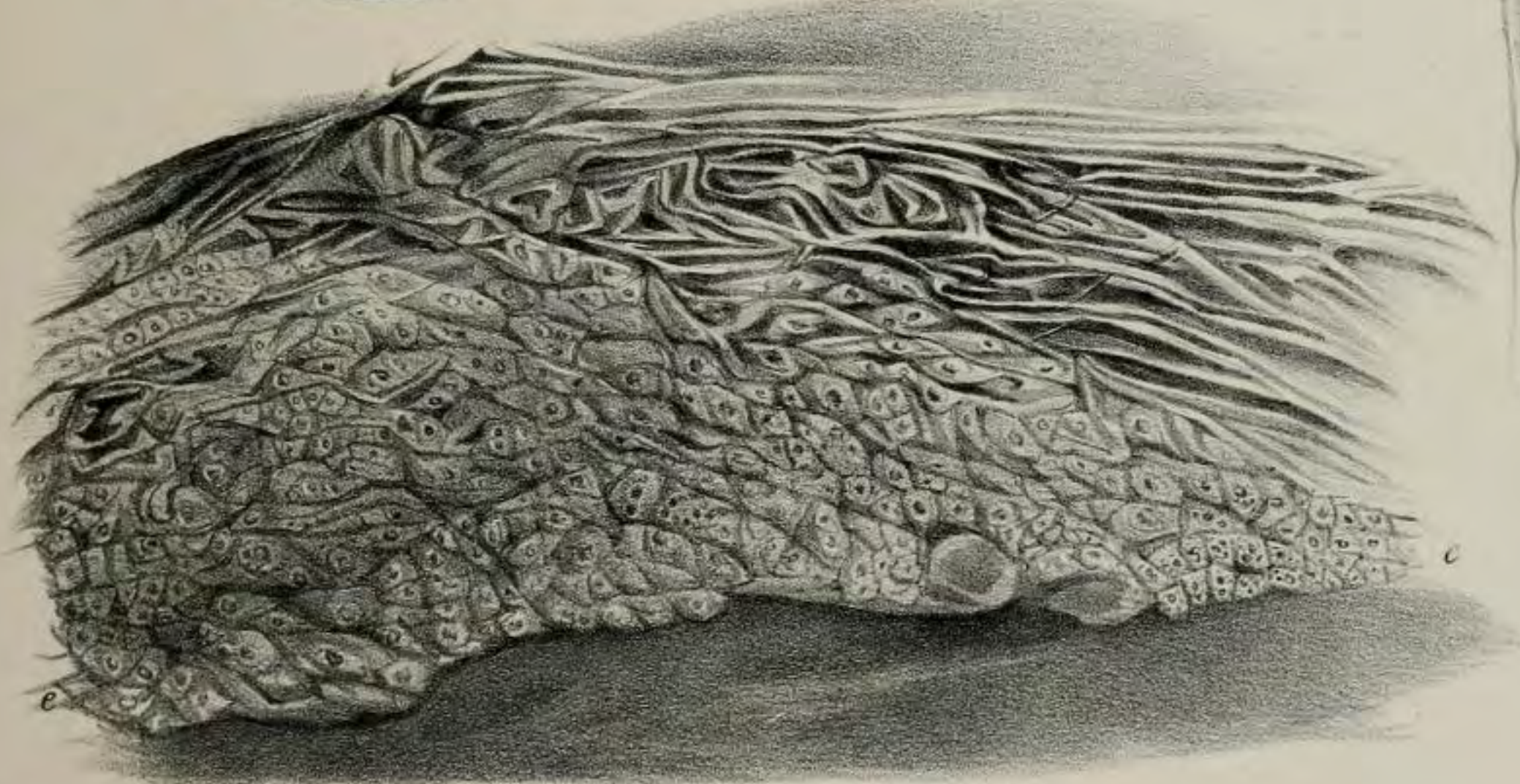
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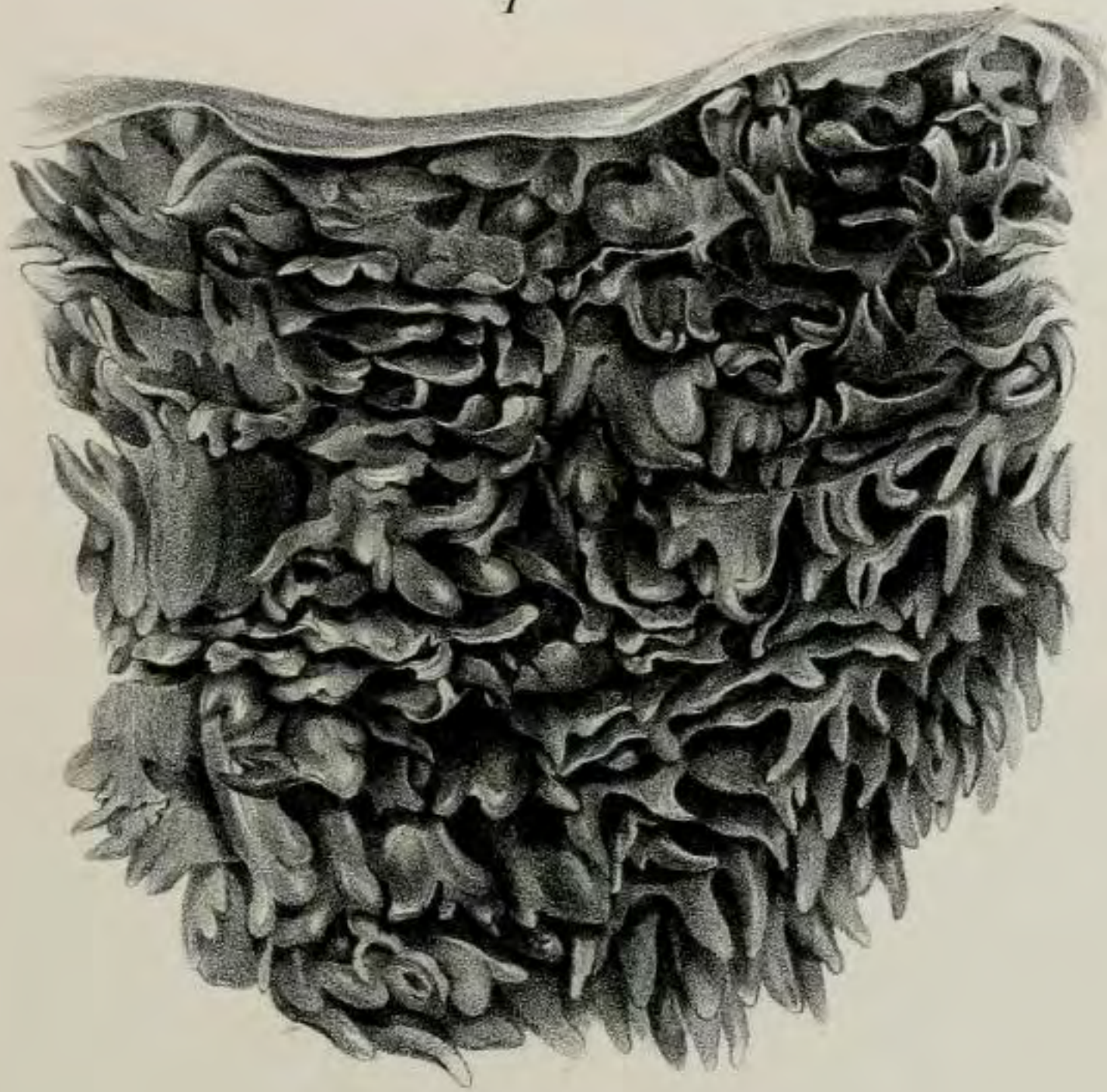
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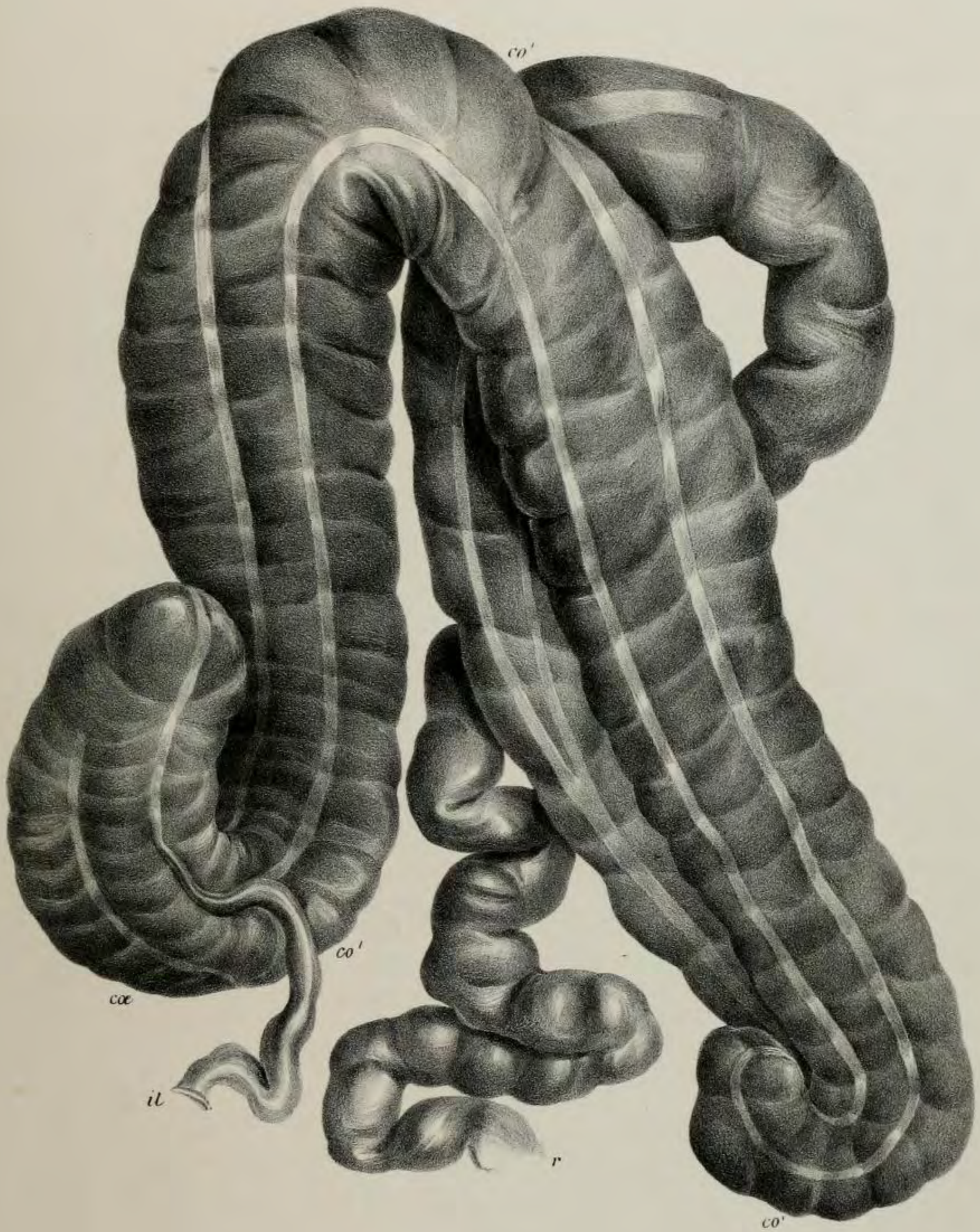
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Day & Son, Lith^{rs} to The Queen.

Rhinoceros Indicus.



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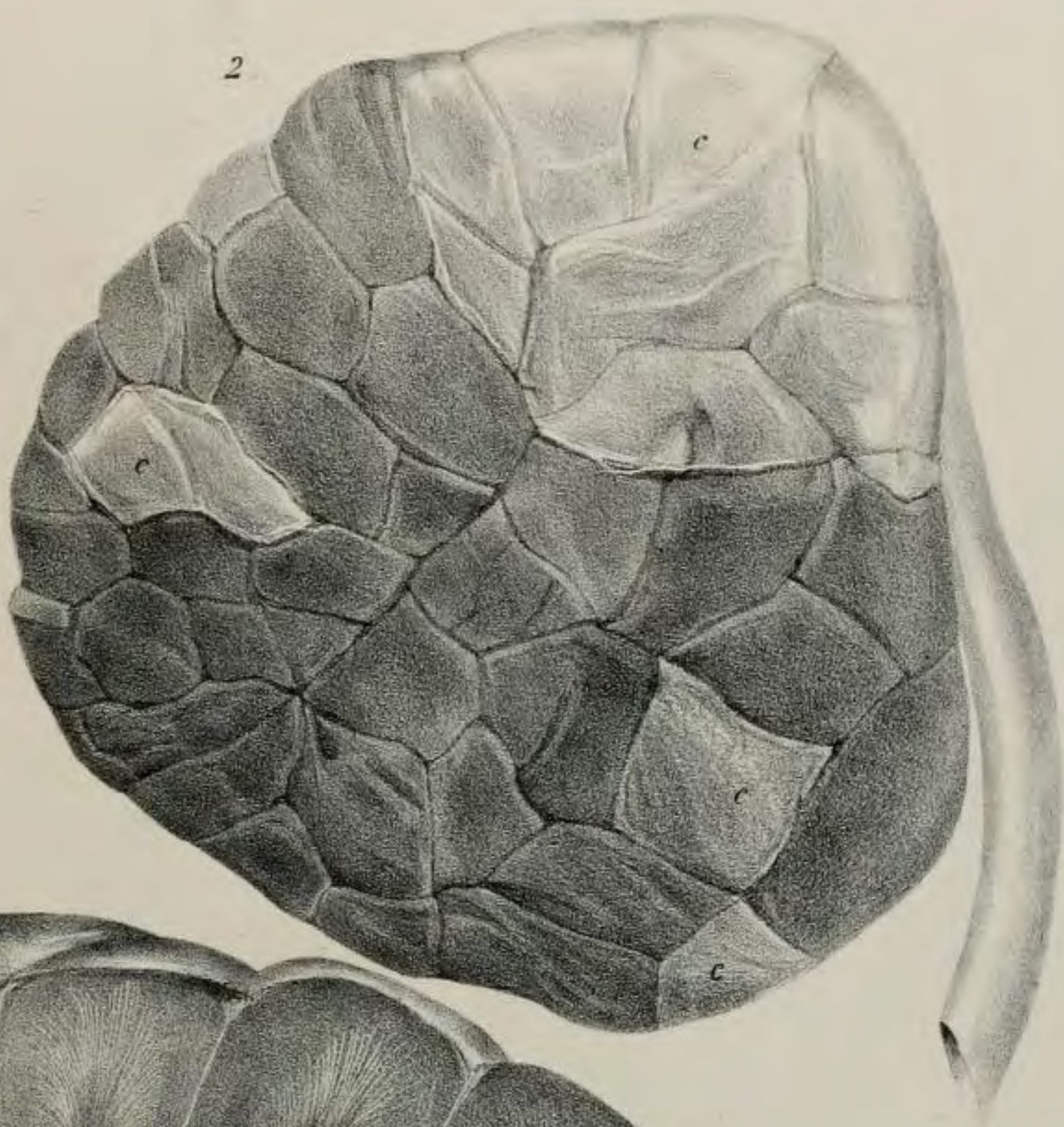
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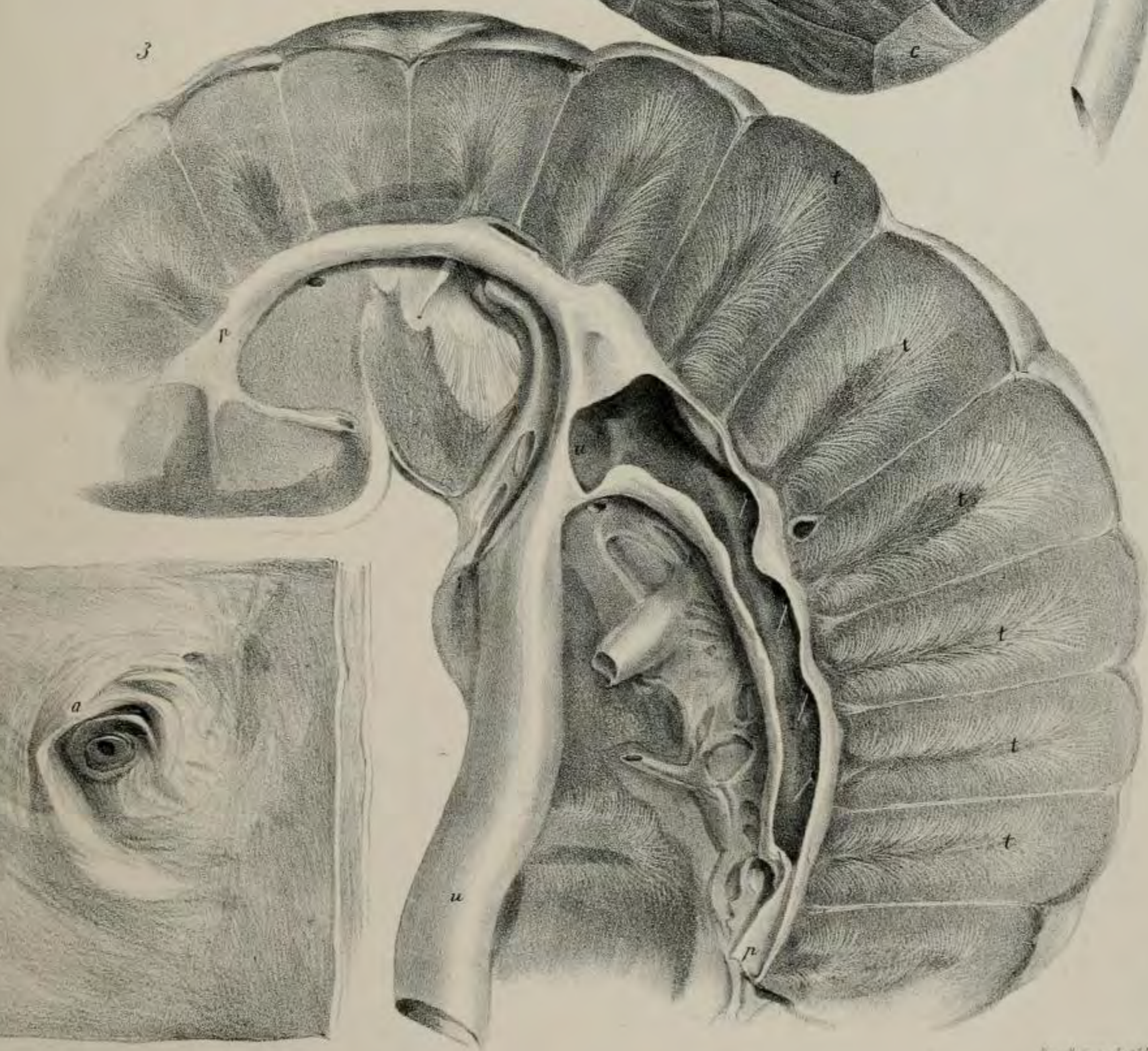
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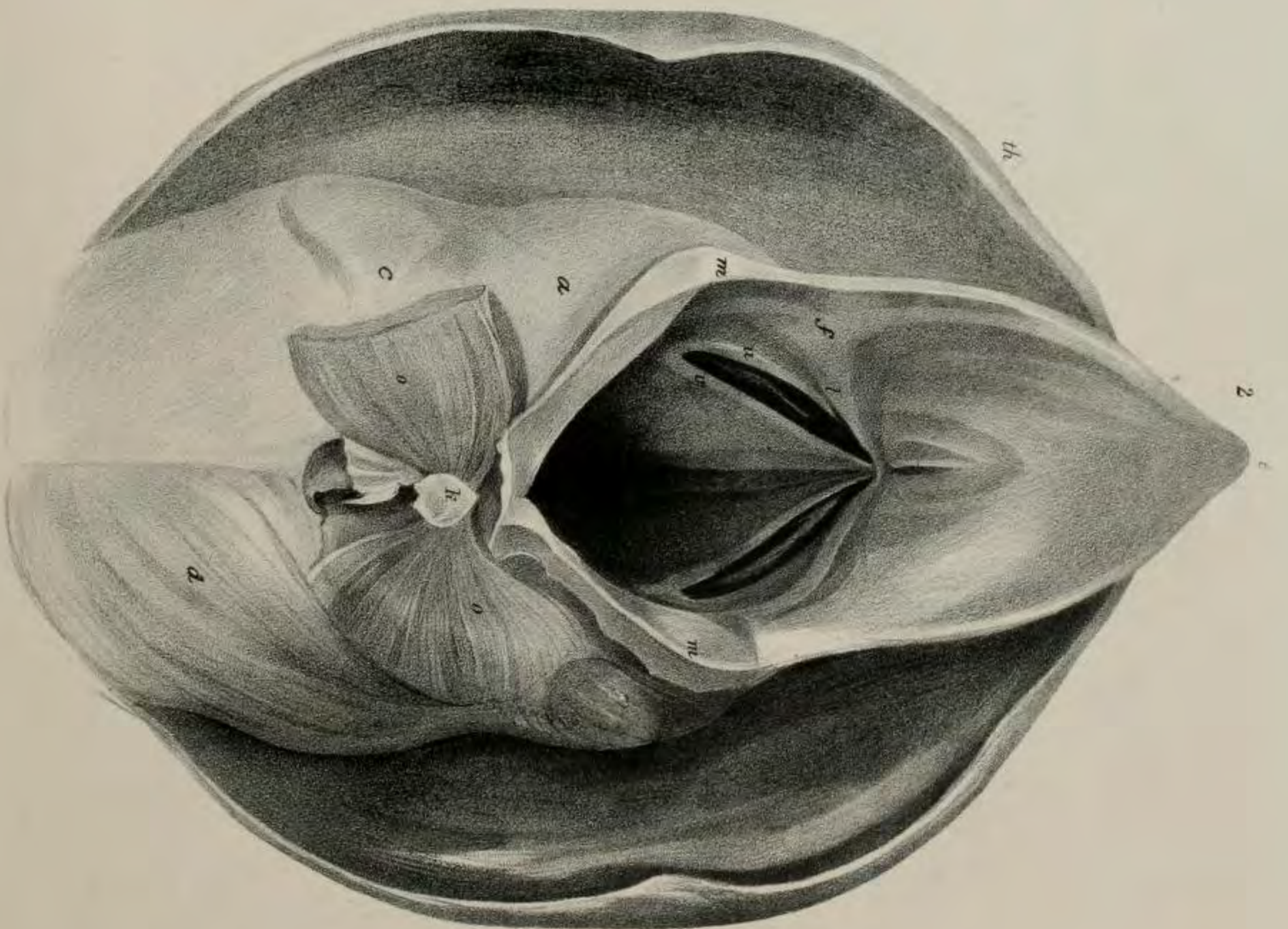
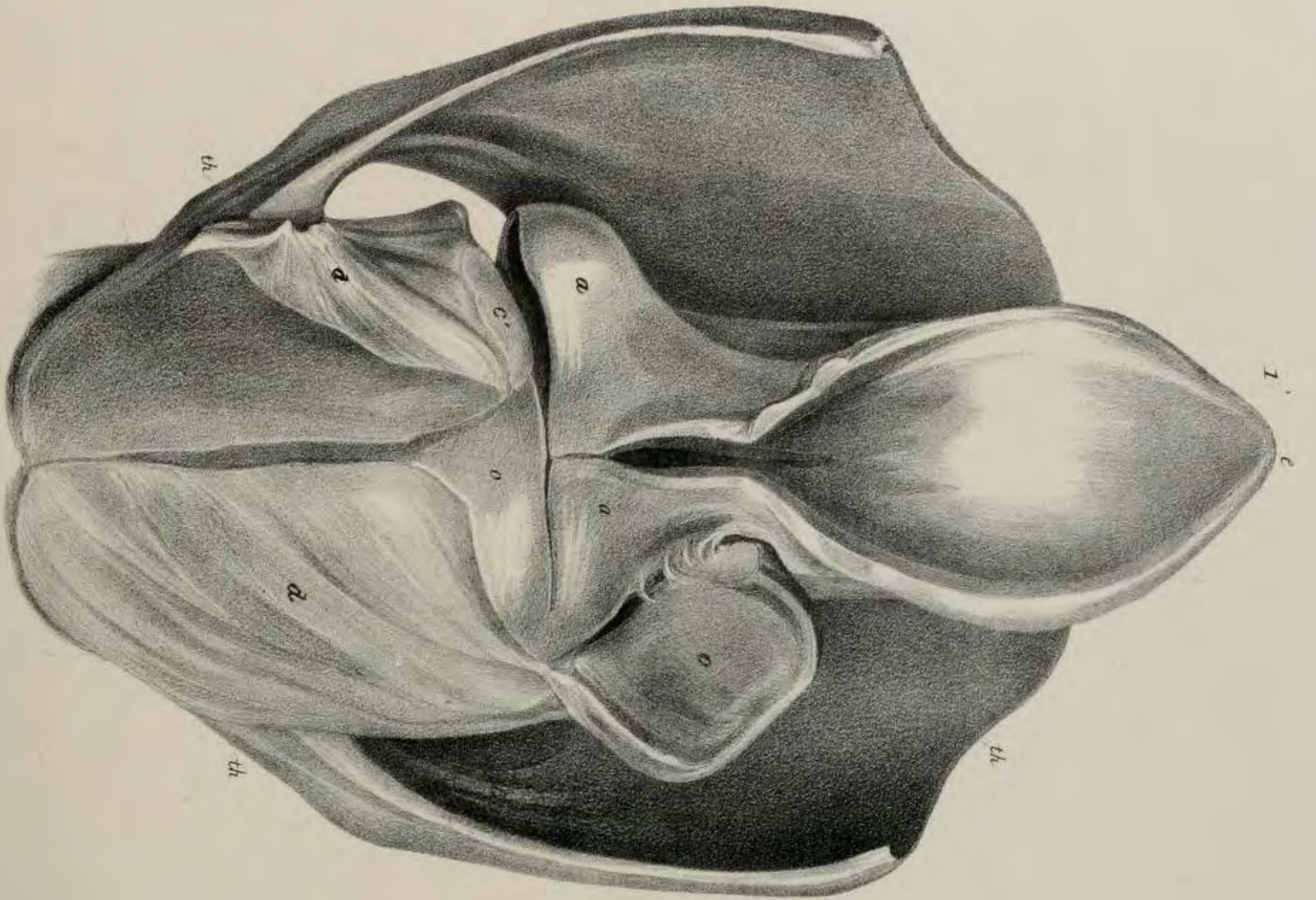
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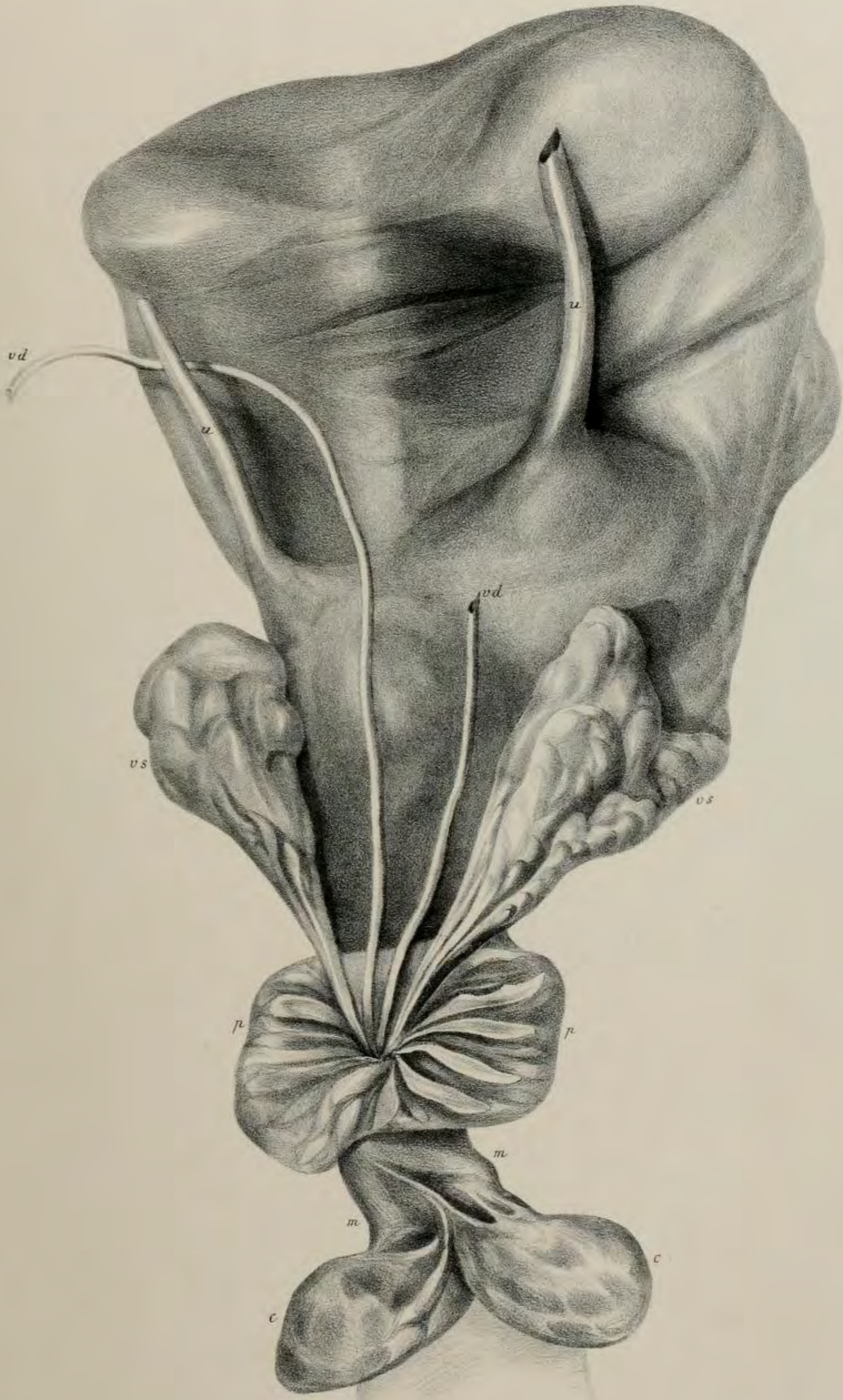
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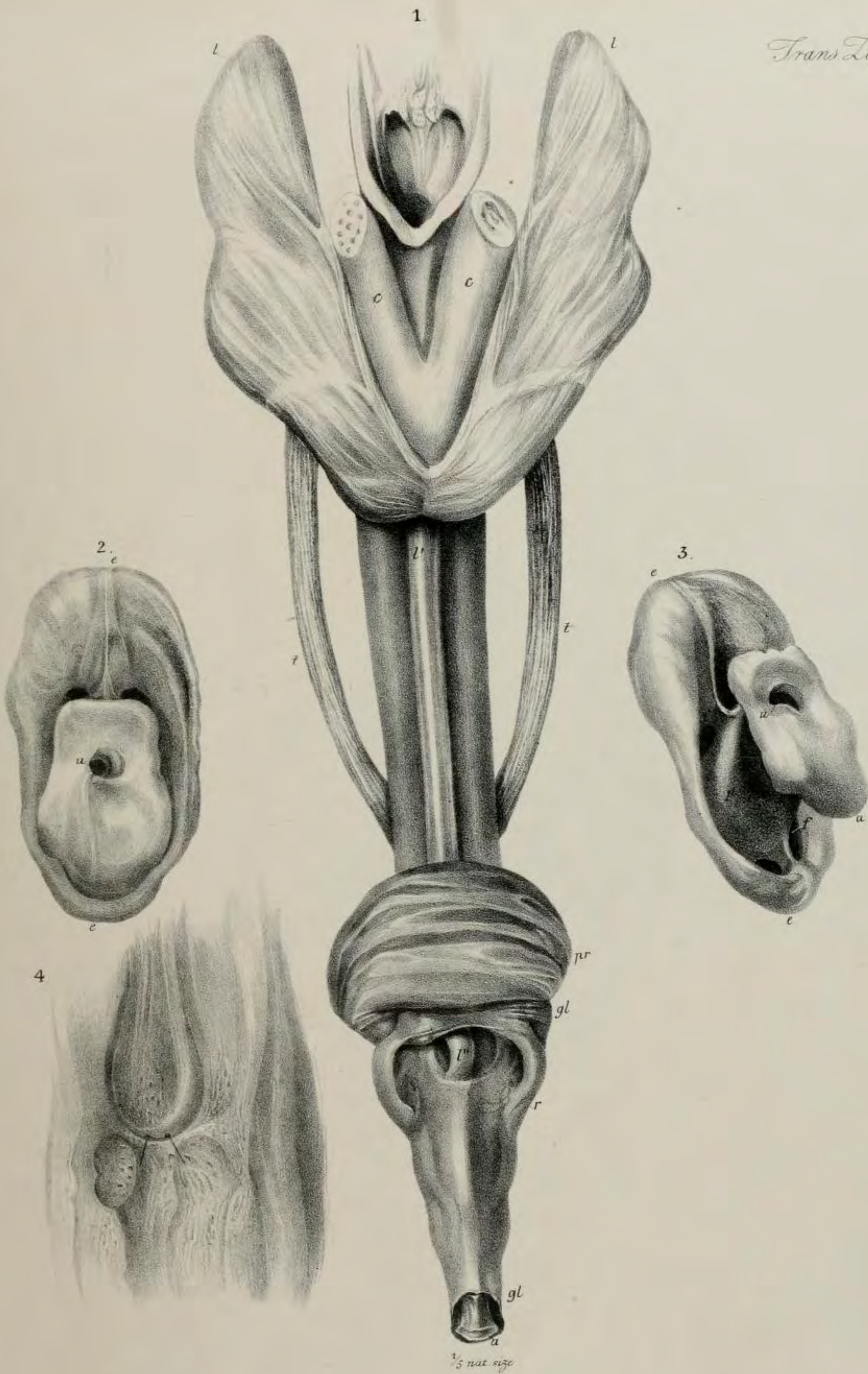
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Day & Son, Lith^{rs} to The Queen.

Rhinoceros Indicus

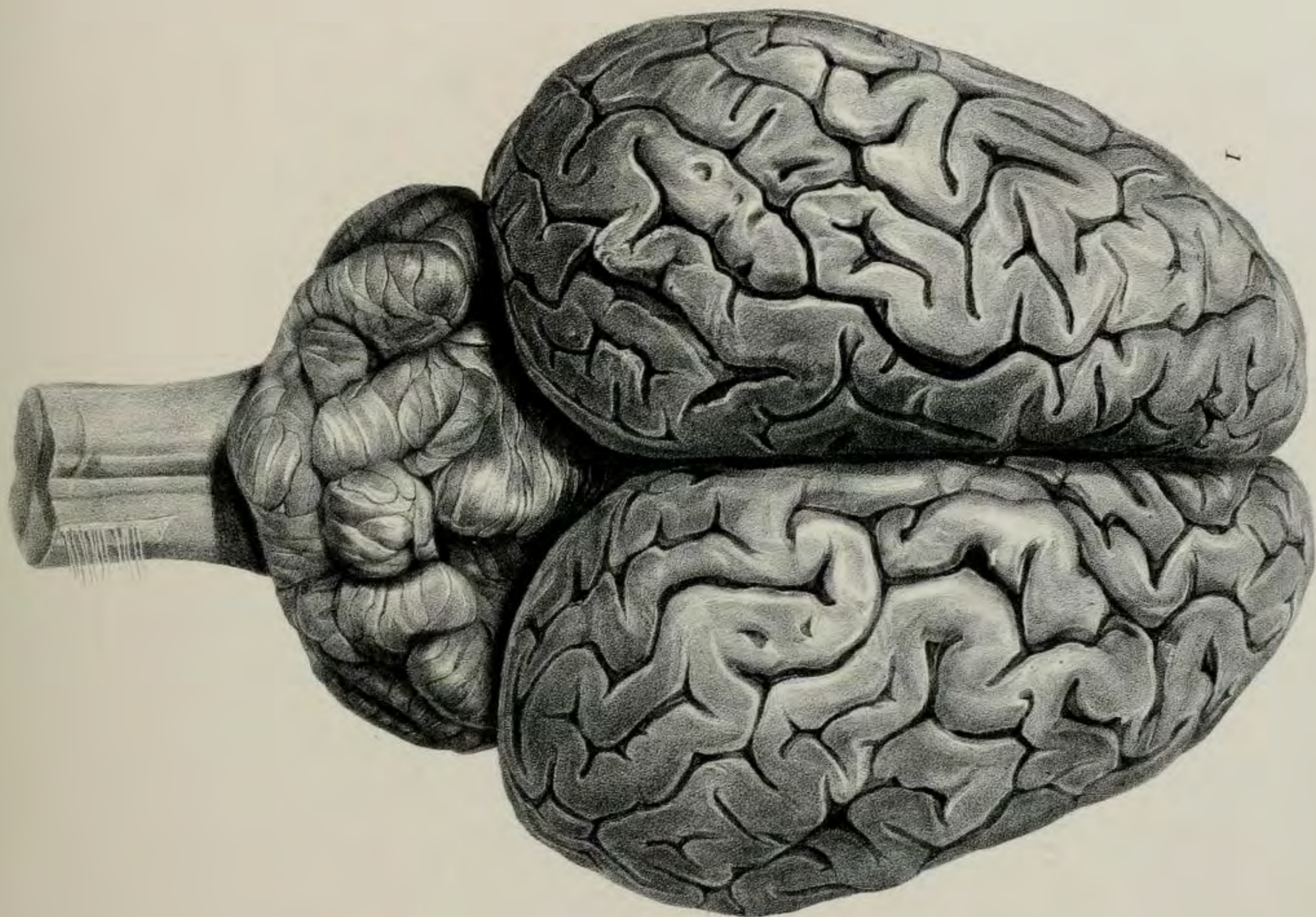




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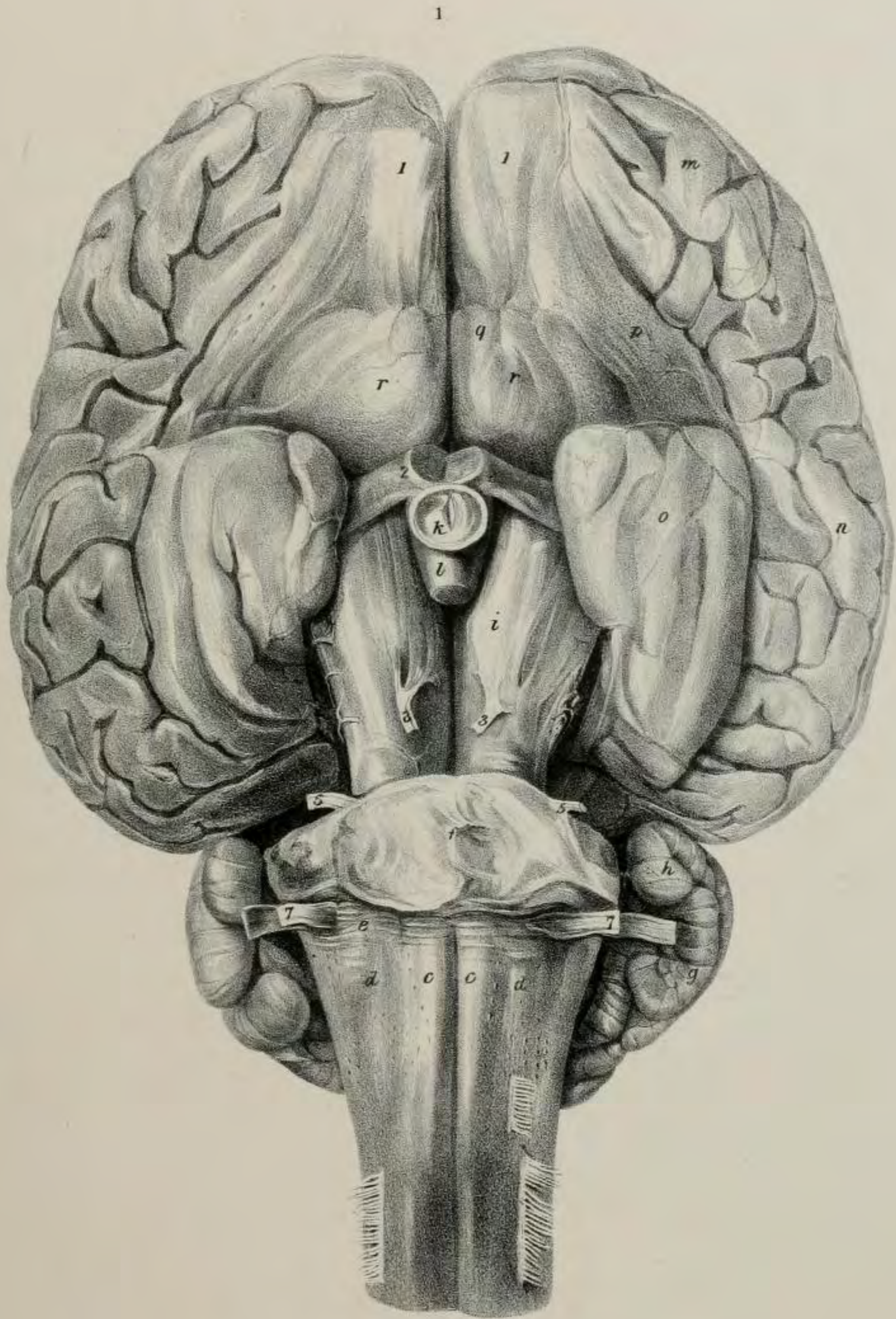
Rhinoceros Indicus.



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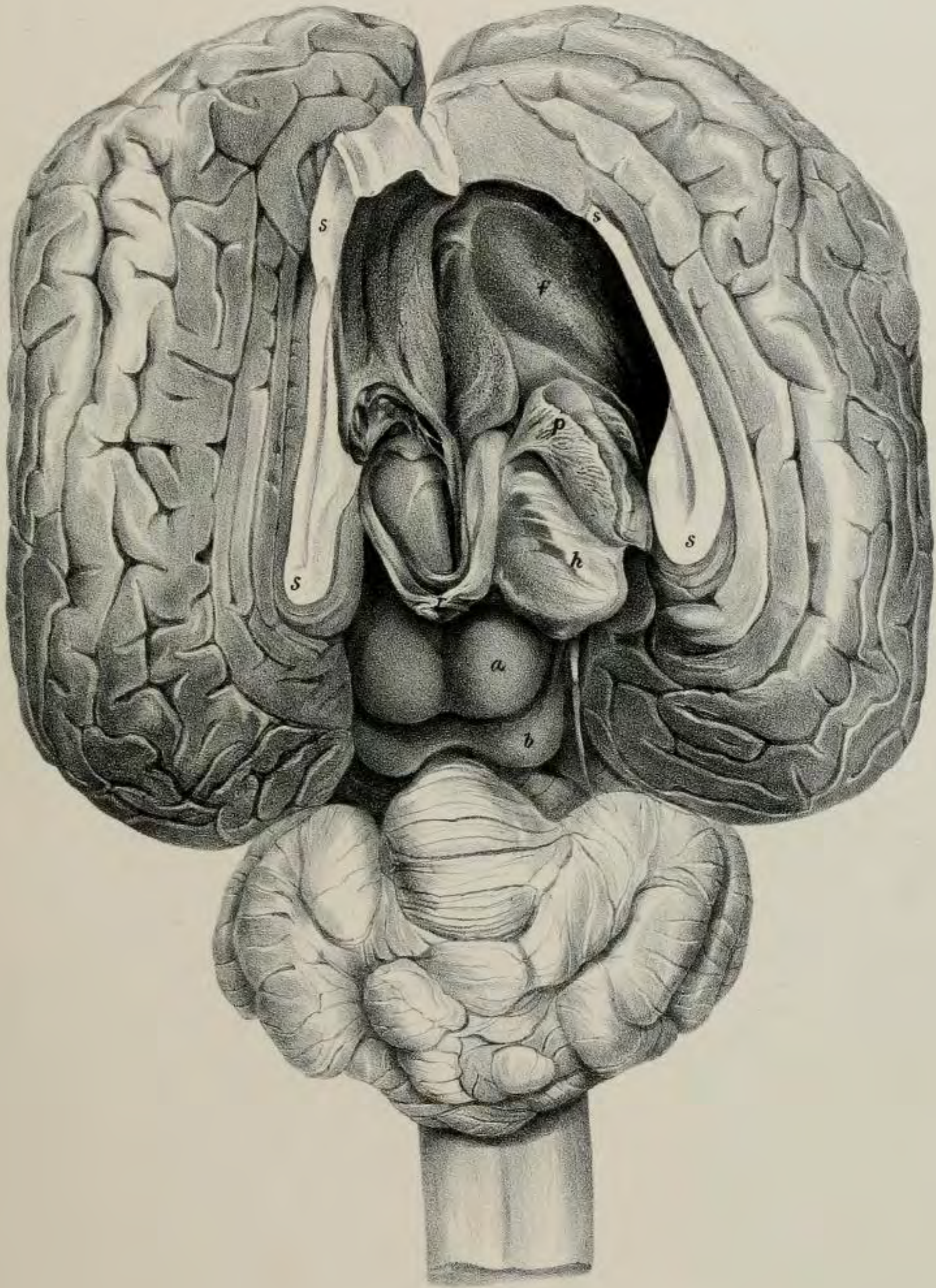


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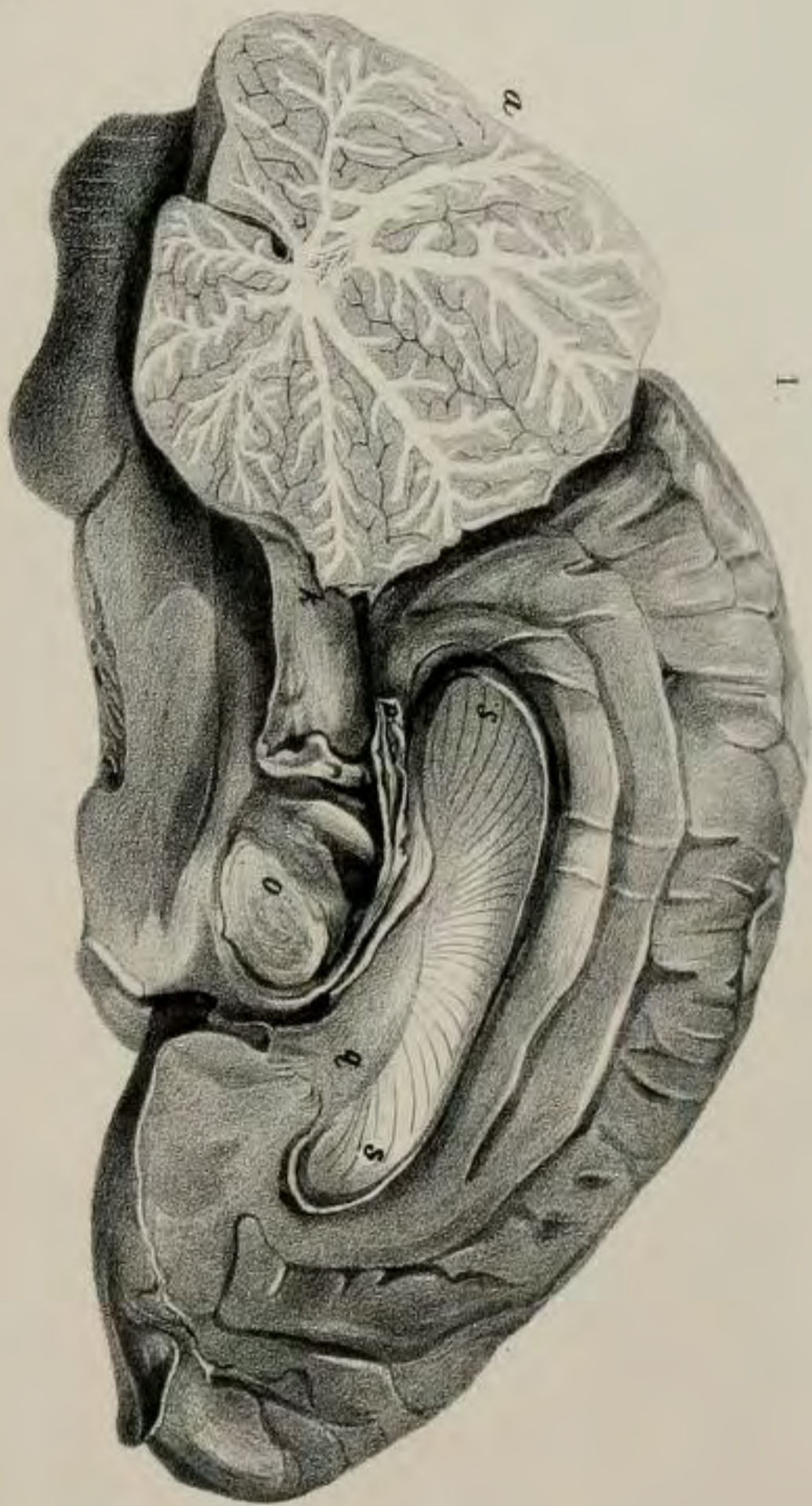
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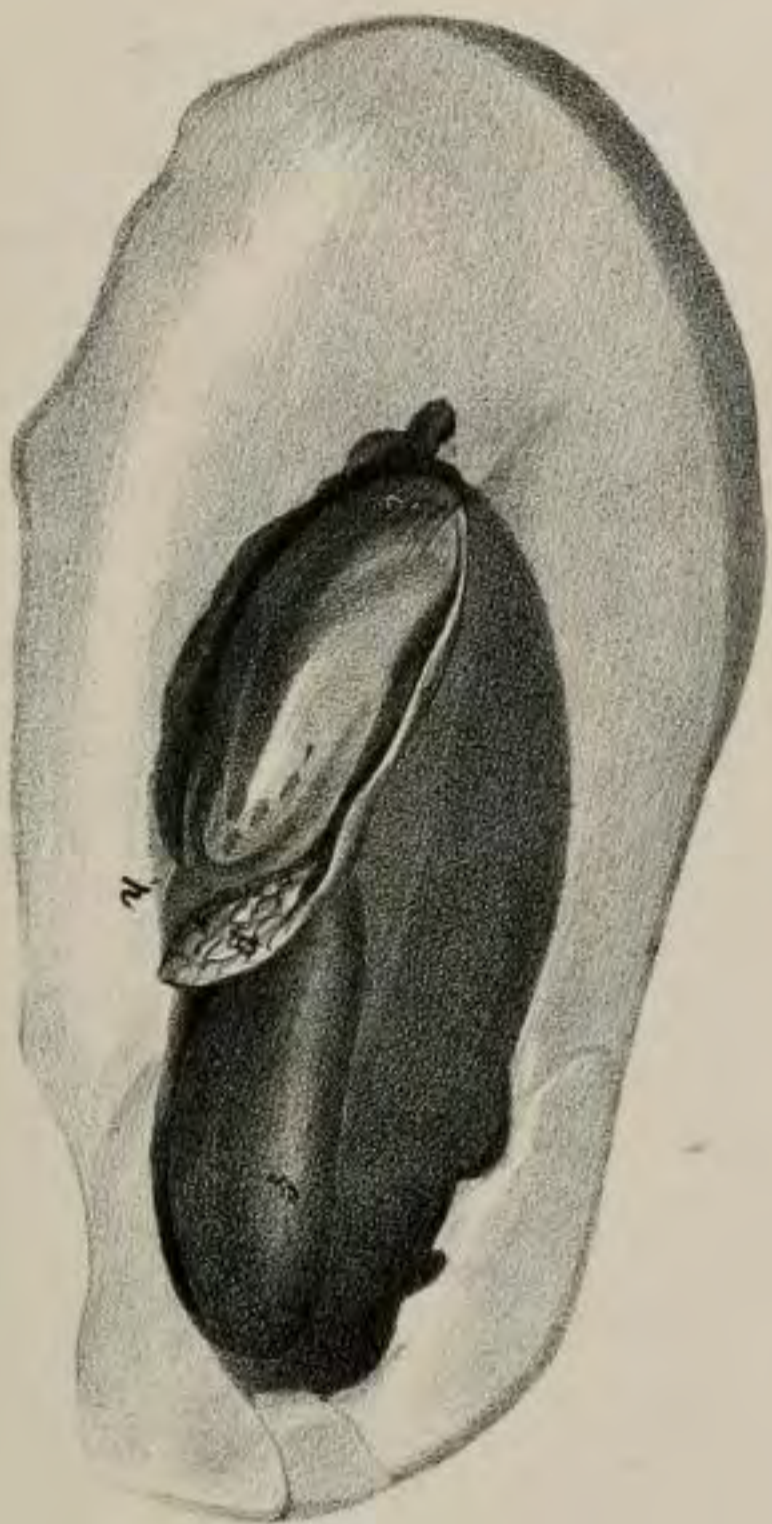
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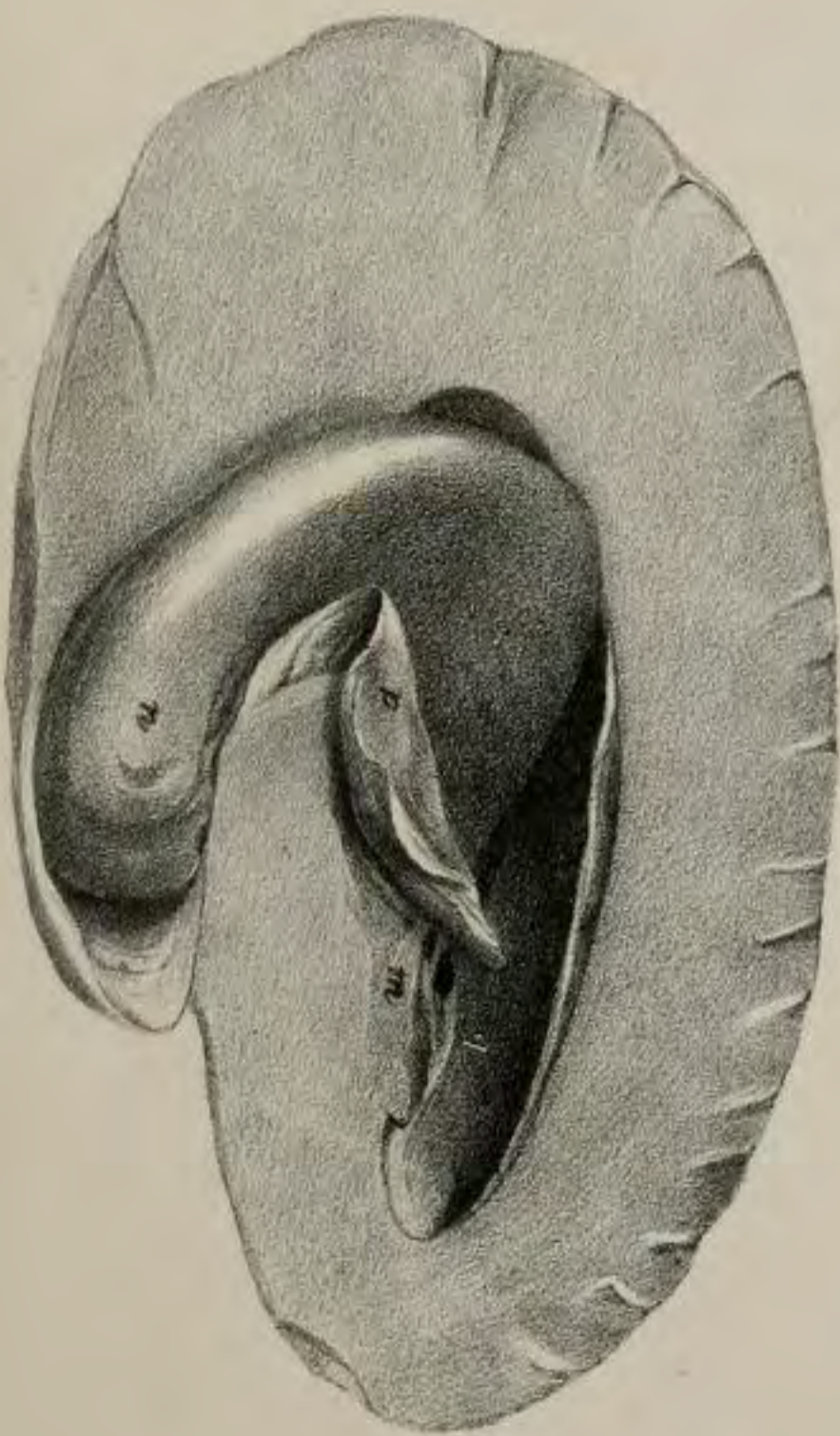
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