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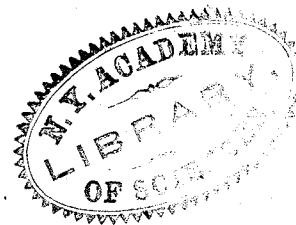
CATALOG RECORD FOR REQUESTED ITEM: TITLE/AUTHOR: Transactions of the Zoological Society of London.
IMPRINT: [London] : Published for the Zoological Society of London by Academic Press,
ISSN: 0084-5620
DATES OF PUBLICATION: Began with v. for 1833/35. Ceased with v. 37 in 1984.
NOTE: Description based on: Vol. 34, pt. 1 (Nov. 1977); title from cover. Vol. 32, pt. 6; v. 33, pt. 4; v. 34, pt. 3 separately cataloged in LC.

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OF LONDON.

VOLUME IV.



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1862.

IX. *On the Anatomy of the Great Anteater (Myrmecophaga jubata, Linn.).*

By Professor OWEN, F.R.S., F.Z.S. &c.

Read July 25, 1854.

THE energetic administration of the Zoological Society of London, besides adding to the means of instruction and instructive recreation for the millions who reside in or visit the metropolis, is not less operative in advancing the purely scientific aims of the Fellows of the Society.

Already the 'Transactions' and other publications of the Society contain the records of the organization of many rare animals, unknown, at least anatomically, before their exhibition in the Menagerie in the Regent's Park; and in addition to former Monographs, including those on the Giraffe, Phacochere, Walrus, and Rhinoceros, I have now the good fortune to be able to communicate the commencement of one on the Great Anteater of South America.

The subject of the present description was a full-grown female animal which was received at the Gardens in the Regent's Park, September 29, 1853, and there died, July 6, 1854. Contemporary notices of the peculiarities of its external form, modes of motion, particularly of its large, vertically fan-shaped, long-fringed tail, when the animal, coiled up for repose, covered itself with that portable blanket, preclude the necessity of premising much on these subjects; for information on which I may refer more particularly to the 'Literary Gazette,' No. 1916, for October 8, 1853, to Mr. Broderip's most interesting Paper in the No. of 'Fraser's Magazine' for February 1844, and to the excellent articles in the 'Household Words,' and the periodical entitled 'Excelsior.'

The weight of the entire animal at the time of its death was 62 lbs. avoirdupois. [Since communicating an account of the anatomy of this animal to the Scientific Meeting of the Zoological Society, July 25, 1854, a male Anteater of the same species (*Myrmecophaga jubata*), not quite fully grown, has also been examined by me, and the present memoir combines the results of both dissections.]

External Peculiarities and Dermal Muscles.

The following remarks on some external peculiarities, as observed in the recent animal, seemed to be worthy of recording.

The length of the naked sole of the fore foot, from the base of the middle claw to the back part of the carpal pad, is five inches. The distal half of the ungual phalanx of the first toe, or 'pollex,' projects from the common cutaneous sheath of the toes; it supports a slender curved claw one inch three lines long by three lines in greatest breadth. The end of the second phalanx, with the ungual phalanx of the second toe, 'index,' projects freely: the length of the exposed part of the claw is three inches, its basal diameter six

lines: this claw is curved, with its inner border and convex extremity trenchant; it can be bent so as to touch the carpal pad, but cannot be extended so as to bring the end of the claw in the line of the digit; its movements are limited to one plane. The ungual phalanx of the third digit, 'medius,' is free: the length of the claw following the convex curvature is four inches, its greatest basal breadth nine lines; its basal circumference two inches six lines; its under surface is flat, bounded by trenchant borders; its extremity is more pointed than that of the index; it can be bent so as to touch the carpal pad, but forms an obtuse angle downwards with the digit in a state of greatest extension. The second and ungual phalanges of the fourth digit are free; they are compressed, and terminate in a straight compressed pointed claw six lines in length; the joint of the last phalanx permits a slight extent of flexion and extension, and of free movement from side to side. A semilunar notch on the outside of the base of the liberated portion of the fourth digit indicates the extremity of the abortive fifth digit. This, with the metacarpal and proximal phalanx of the fourth, supports a convex callous pad at the outer and under part of the sole, two inches by one inch and a half in extent. The corium of this digital pad is developed into a number of large, low, obtuse papillæ, perforated or notched at the apex and covered by larger and more complex papillæ of the thickened cuticle. The carpal pad is smaller, of a kidney shape, one inch five lines in breadth. The part of the foot which receives the superincumbent weight in ordinary progression is the digital pad, and the outer side of the free portion of the compressed fourth digit.

The length of the sole of the hind-foot is five inches. The naked part begins about one inch in advance of the prominence of the calcaneum: the breadth of the sole at the base of the digits is two inches six lines, and there is a callosity at the inner margin one and a half inch behind the innermost digit, upon which the supplementary tarsal ossicle rests. Each of the five digits has the second as well as the ungual phalanges liberated, and each supports a curved, obtuse claw, about one inch in length, but somewhat longer on the middle digit and shorter on the outer digit. The three middle digits project the furthest, and their claws terminate at the same line: the outermost or fifth digit ends a little short of these, and the innermost digit is still shorter.

The integument of the Great Anteater has something of a pachydermal character; and although there is not any extensively diffused *panniculus carnosus*, there are some well-developed dermal muscles having attachments to parts of the endo-skeleton.

The corium between the rami of the lower jaw is one line in thickness, and increases as the skin approaches the sternum to a thickness of three lines, which is its average thickness over the back and sides of the trunk; it becomes rather thinner where it covers the abdomen, and upon the limbs.

The skin is connected to the subjacent muscles, by a thin layer of tough elastic cellular substance, along the under part of the neck; but, near the sternum, and over the fore part of the sternum, the lobules of an immense salivary gland, resembling fat-lobules at first sight, were found interposed. Pressure upon this glandular mass (Pl. XXXVII. fig. 1, a, a')—the size, shape, and disposition of which will afterward be

noticed,—was followed by the escape of thick tenacious mucoid saliva from the mouth, where it was poured out of two apertures, situated one a little behind the other, and both within six lines of the anterior border of the lower lip. After squeezing out much of the muco-salivary fluid, which presented a nearly clear opaline appearance when collected in a moderate quantity, an injection of size and vermilion was thrown into both orifices, whereupon the course of the long ducts became indicated by their tumefaction, especially at the base of the neck, where they dilated into reservoirs (*ib. c, c*), before communicating, as at *b*, immediately with the glands. The body of the hyoid, the epihyals, and the bases of the ceratohyals formed a bilobed prominence (*ib. l, l*) just anterior to the chief mass of the great salivary gland, and twenty-two inches behind the opening of the mouth.

The ordinary course of dissection was then proceeded with. Before carrying the incision along the abdominal integuments, the nipples were searched for: only one pair was found. Each nipple is subcompressed, subquadrate, about half an inch in length, with from ten to twelve lacteal orifices; it is situated four inches behind the axilla, nearly opposite the lower border of the pectoralis major. The mammæ may be said to be post-pectoral in position. The common cloacal aperture is situated beneath the root of the tail, on a prominence of soft integument, in shape like the letter T with the cross slightly bent, and the stem directed forwards, and forming the fissure where the urogenital canal opens. The tumid sides of this fissure, representing the labia majora, have their hinder ends overlapped by the crescentic fold, bounding the anus behind, the horns of which fold are bent forward and terminate outside the labia: the soft vascular lining of the vulva is continued by a short narrow median strip directly into that of the rectum.

On reflecting the skin from the under part of the head, the attention was first directed to a feeble development of a panniculus carnosus in the form of thin transverse fasciculi (*ib. e, e*) about half an inch in breadth, and occurring at intervals of from two to three inches, where they underlie the rami of the slender elongated under-jaw, and of the breadth of an inch and a half where they lie below the base of the cranium; these muscular strips (*dermogulares*) have their attachments exclusively in the integument, and aid in accommodating its movements to the alternating expansion and contraction of the great gular dilatation (Pl. XXXIX. fig. 3, *p, q*) near the base of the tongue. The transverse fasciculi are crossed by a longitudinal strip of cutaneous muscle (*dermolabialis posticus*, Pl. XXXVII. fig. 1, *f*) on each side of the under part of the head and neck; the strip emerges from beneath the fore part of the great subpectoral gland, *a*, is here very thin, and about six lines in breadth; it diminishes in breadth and increases in thickness as it extends forwards, assuming near the mouth the character of a muscle independent of the skin (Pl. XXXIX. fig. 1, *t*); where, passing beneath the tendon of the *retractor anguli oris*, *ib. f*, it is inserted into, or blends with, the fibres of an accessory portion of the *orbicularis oris* (*ib. r*). A shorter longitudinal muscular strip (*dermolabialis anticus*, Pl. XXXVII. fig. 1, *f'*) arises from the integument below the

fore part of the preceding muscle, becomes free as it advances (Pl. XXXIX. fig. 1, s), and is inserted into the proper *orbicularis oris* (*ib. q*).

Between the integument of the abdomen and the abdominal 'panniculus,' there is a layer of tough elastic cellular tissue like a fascia. On reflecting this, a broad layer of muscular fibres (*dermo-abdominalis*) is exposed, which covers the proper abdominal muscles. The flattened and slightly separated fasciculi of this dermal muscle arise from the fascia covering the anterior and inferior part of the sternum and contiguous sternal ribs; also from a median raphé of the subcutaneous fascia, attached to the linea alba, and extending two-thirds of the way towards the pubis. The anterior two-thirds of the above muscular sheet are joined by a broad layer of similar flattened fasciculi coming off from a fascia covering the side of the thorax, and the muscle so formed passes obliquely downwards and outwards, converging to form a thick fleshy band, about two inches broad, which is continued along the inner and upper part of the thigh, and becomes slightly twisted prior to its attachment to the aponeurosis covering the knee-joint. The posterior portion of the *dermo-abdominalis* consists of thinner and more scattered flattened fasciculi which pass outwards and downwards, and, as they diverge from the median line, are lost in the subcutaneous fascia covering the tendinous expansion of the *obliquus externus abdominis*. Between the *dermo-abdominalis* and the proper abdominal muscles there is a moderately thick layer of elastic cellular tissue.

Reserving the details of the muscular system in general for a subsequent communication, I proceed next to the visceral anatomy of the Great Anteater.

Thoracic and Abdominal Cavities, and general disposition of their Viscera.

On opening the abdomen, the liver is seen arching across the upper part of the abdominal cavity from the right to the left hypochondrium. The suspensory ligament enters a cleft to the left of the median plane, near the left end of the middle or cystic division, but not extending to within two inches of the anterior border of that division. To the right of the ligament is a wide subcircular notch, through which the fundus of the gall-bladder projects. Below the cystic lobe appears a prominent portion of the stomach, opposite the right side of the ensiform cartilage. The right lobe of the liver occupies the right hypochondrium, and between it and the stomach is seen a short convolution of the duodenum with the head of the pancreas. The spleen, a long and narrow organ, appears below the left half of the liver, between it and the stomach, and then bends downward and to the right, overlapping the middle constriction of the stomach. A short epiploon, without fat, extends from the spleen over the left division of the stomach which is seen projecting below the spleen. The epiploon is reflected back to a line a little behind the greater curvature of the stomach. The convolutions of the alimentary canal occupy the rest of the exposed part of the abdominal cavity. A thin layer of fat was interposed between the peritoneum and the soft walls of the abdomen.

One common duplicature of peritoneum, continued from the middle of the back part of the abdomen, and eighteen inches in extent where it is broadest, at the junction of the ileum with the colon, supports the whole intestinal canal, as in most reptiles,—mesentery, mesocolon and mesorectum being one and the same fold: the shorter diameter of this fold is from eight to ten inches. The mesenteric part is puckered to support the convolutions of the small intestines. A mesenteric gland of a dark colour is continued along the base-line of these plicæ for the extent of sixteen inches, beginning at the duodenal end of the pancreas and ending with the ileum. Parallel with this, on what may be regarded as the base-line of the mesocolon, are a number of detached glands of the same dark colour, and flattened, like the long mesenteric gland, but of a subcircular form, and from three lines to twelve lines in diameter. The mesenteric artery forms one series of arches, with their convexity at from six to twelve lines distance from the gut. The mesocolic vessels form also one series of arches, which are close to the gut.

The duodenum, arching round the head of the pancreas, is suspended on the beginning of the mesentery, where it is from two to three inches broad; and it is continued into the jejunum without being tied by a contraction of the mesentery to the back of the abdomen, as in most Mammalia. The right lobe of the liver is suspended to the dome of the diaphragm by a right coronary ligament, and a duplicature of peritoneum connects the extremity of that hepatic lobe to the upper part of the right kidney. There is also a left coronary ligament: a fold of peritoneum two inches broad connects the left lobe of the liver with the stomach at the fore part of the cardia; and a more posterior fold connects the left lobe of the liver to the left suprarenal body and left kidney. The peritoneum passes over the under surface (sternal aspect) of the kidneys, and over the same part of the right suprarenal body: it affords a more entire covering to the left suprarenal body. The peritoneal folds called 'broad ligaments' begin to be reflected from the front of the lower ends of the kidneys, converging to sustain the ovaria and enclose the ovarian ligaments, fallopian tubes, uterus, and ureters. The urinary bladder was empty and corrugated: the urachal fold, reflected from the middle of its fore part to near the fundus, expands as it extends to the lower part of the linea alba, terminating above at the obliterated umbilicus which is situated six inches above the symphysis pubis. A flat glandular body about the size of an almond was situated in the urachal fold: it might be the debris of part of an umbilical sac. Two narrow ureteral folds of peritoneum diverge from the back part of the urinary bladder to the broad ligaments.

The length of the female from the muzzle to the vent was four feet seven inches; the length of the head was fourteen inches; that of the tail thirty-three inches. The total length of the intestinal canal was thirty-four feet; the small intestines measuring thirty feet in length. The ileum dilates rapidly into the colon, which commences without any cæcal projection. The greatest circumference of the duodenum is two and a half inches:

the calibre of the intestinal canal gradually contracts to a circumference of one inch nine lines at the part which would be called jejunum in Man, and it recovers a circumference of three inches near the end of the ileum. The colon, within three inches of the ileum, has a circumference of nine and a half inches; and has decreased to a circumference of six inches, where it forms the rectum, about nine inches from the anus.

The inner surface of the duodenum and jejunum is smooth, offering no villi to the naked eye. A few irregular very narrow longitudinal folds of the lining membrane, not parallel to, but following one another, begin to appear in the ileum: these are succeeded by a longer longitudinal fold, or two, which are soon followed by one extending continuously through the ileum, along the side of the gut opposite the attachment of the mesentery: this fold is from two to three lines in breadth, is narrowest where the canal has been most distended, but is not obliterated by the utmost dilatation of the gut: it is a permanent single longitudinal production of the vascular lining membrane, and forms the chief characteristic of the lower half of the small intestines in the *Myrmecophaga jubata*. In this part of the canal there are patches of glandulæ agminatæ from one to two inches long, and with intervals of about one foot.

The transition of the ileum into the colon is effected by a rapid increase of diameter, viz. from one inch to two and a half inches; by a slight thickening of the muscular coat; by the appearance of a few transverse ridges or very low folds of the mucous membrane at the beginning of the colon, and not extending round the circumference of the gut: but the boundary of the ileum is not defined by any ileo-colic valve nor by any appreciable alteration in the vascularity or other structure of the mucous membrane in the two divisions of the intestinal canal.

The inner surface of the colon is smooth, finely reticulate, with a few very narrow transverse folds, from one inch to half an inch apart, subsiding for the most part before reaching the attached line of the gut; these folds are not obliterated when the canal is fully distended; they commence about eighteen inches from the ileum, gradually become shorter and narrower, and disappear about a foot from the rectum.

The longitudinal folds of the rectum extend to the margin of the anus, where a little dark pigment is developed under the epithelium. The soft epithelial-covered integument extends from the fore part of the anus to the vulva, which is distant about half an inch. The longitudinal muscular fasciculi of the rectum and rectal end of the cloaca are strongly marked, and are from one line to one line and a half in breadth.

In the thorax, a mediastinum, increasing in breadth from two to three inches as it passes backward from the aortic arch, completely divides that cavity into a right and left compartment; the heart and pericardium projecting equally into both. A peculiar subcompartment of the right pleural cavity is formed by a duplicature of pleura extending from the right division of the mediastinum and from the lower part of the pericardium around the inferior cava, into which compartment the lobulus azygos from the right lung projects.

The structure of the thoracic and abdominal viscera will form the subject of a succeeding part of the present memoir.

Salivary Glands.

The glandular mass representing the submaxillary salivary glands in Man (Pl. XXXVII. fig. 1, *a, a'*), is a bilobed body, sixteen inches in length, two inches in greatest thickness at the posterior part which forms the isthmus or junction of the two lobes or glands. From this confluent base they diverge, extending outwards and forwards, and form, each, a flattened triangular mass, from four to five inches in breadth and two inches thick posteriorly, and becoming thinner towards the outer and anterior border, where the apex is prolonged into a slender process. The isthmus, or base of the combined glands, overlies the anterior half of the thorax; the base of each lateral lobe is notched by the prominence of the shoulder-joint (*s, s*), round which its outer border extends; the contracting anterior prolongations of the gland pass forwards along the sides of the neck, external to the sterno-maxillares (*w, w*), and terminate a little in advance of the angle of the jaw, at *a'*.

The two packets of ducts (*ib. b, b*, figs. 1 & 2), which indicate the essential doubleness of the gland, emerge from the inner and posterior part of the lateral lobes, five or six inches in a straight line from the posterior border of the isthmus, and nine or ten inches from the anterior attenuated extremity of the gland. After a short course, the ducts dilate and form a small reservoir, *ib. e*, on each side; they are here so closely covered and connected by elastic cellular tissue as to seem a single reservoir; they maintain however their distinctness, and continue, contracted, from each dilatation, as three closely united attenuated ducts, which at length unite into one long and slender duct. The dilated portion is surrounded by a compressor muscle (*constrictor salivaris, ib. fig. 3, k*).

The gland is conglomerate, the primary lobes being for the most part oblong, sub-compressed, from about three to nine lines in diameter. The closely united ducts (*d, d*), after quitting the reservoir, are continued forwards covered by the extraordinarily extended *mylohyoideus* (*g, h, i, j*), and, after their union, the common duct terminates, as above described, at the symphysis of the lower jaw (Pl. XXXIX. fig. 3, *d*).

The parotid gland (*ib. fig. 1, x*) is small in proportion to the animal: it is situated in front and below the root of the ear, is of a triangular form, two inches four lines in length, one inch two lines in breadth, with the duct continued from the outer side of the anterior apex of the gland, which apex terminates at the posterior end of the origin of the masseter muscle. The duct (*ib. y*) extends forwards along the outside of the masseter near its origin, passes along the buccinator near its upper border and beneath the tendons of three of the retractors of the mouth, then dips under the orbicularis oris (*q, q*), and terminates near the opening of the mouth. The length of the duct is eleven inches, its diameter scarcely half a line. This is perhaps the longest duct, in proportion to the size of the gland, in the animal kingdom. The depressor auris (*w*),

which arises from the angle of the jaw, perforates the parotid gland. A chain of lymphatic glands is continued backward from beneath the parotid on the side of the neck.

The representative of the sublingual gland forms a thin layer, divided for the most part into narrow elongated lobes or groups of follicles (Pl. XXXIX. fig. 2, *fa*), attached to and spread over the inferior buccal membrane for an extent of twelve inches: the greatest breadth of this layer is two and a half inches, and is opposite the angle of the jaw.

There is a small elongated labial gland (*ib.* fig. 2, *z*), lying upon the fore part of the buccinator, near its lower border, and sending its secretion into the side of the fore part of the mouth; apparently to lubricate that contracted aperture during the frequent and rapid protrusive and retractile movements of the tongue. The buccal glands form a very extensive but extremely thin stratum of muco-glandular follicles, closely attached to the thin membrane of the mouth; they are chiefly developed at the lower and lateral parts, and along the middle of the upper surface of that part of the mouth which is prolonged backward, below the similarly prolonged nasal canal, beyond the bony palate. These glands terminate by innumerable very minute orifices upon the smooth inner surface of the buccal membrane, which they serve to lubricate. They are continuous with the better-marked series of follicles extending along the sides of the under surface of the mouth, beneath the lower jaw, which represent the 'sublinguales.' But the glands that pour out the abundant viscid secretion which lubricates the tongue and is mainly subservient to its peculiar prehensile function in the Great Anteater, are those conjoined or interblended pair that answer to the submaxillary salivary glands in other animals; which glands are most modified and developed, for a like function, in other species of *Myrmecophaga*, in the Armadillos (*Dasypus*), and in the Echidna.

In the little scansorial *Myrmecophaga didactyla*, the homologues of the submaxillary glands (Pl. XL. fig. 3, *c, c*) are subcervical and blended together, as in the larger species; and a slender process (*d*) is continued from them to the labial gland, *a*. The duct (*e*) commences by three tubes continued on each side from the main body of the gland; and these tubes dilate into a small reservoir, provided with a compressor muscle, before the long and slender single duct is continued, covered by the mylohyoideus, to the symphysis of the jaw. The parotid gland is of very small relative size; and this striking difference in the proportions of the two chief salivary glands indicates the difference in their functions and in the quality of their respective secretions. The labial glands (*a*) are relatively larger in the *Myrmecophaga didactyla* than in the *Myrmecophaga jubata*; and there is a superadded aggregate of mucous follicles (*b*) behind the eyeball, in the shallow orbit of the smaller species, the secretion of which enters near the angle of the mouth.

In the Armadillos (*Dasypus*), the submaxillary glands are subcervical in position, and, though large, are relatively less than in the true Anteaters (*Myrmecophaga*); they are also disunited, but come into contact at their lower extremities. Figure 1 of Pl. XL. represents these glands, *in situ*, of the natural size, in the specimen of the *Dasypus sexcinctus* described by me in the Proceedings of the Zoological Society for July 1832,

p. 130. The salivary bladder (*e*) is relatively larger than in the Great Anteater, and is a simple pyriform sacculus receiving the secretion of the great gland by three or four short ducts, entering obliquely at its fundus: the apex of the bladder is continued into the long and slender duct which terminates in the mouth just behind the symphysis mandibulæ. Figure 2 of Pl. XL. shows a further dissection of the right submaxillary salivary gland and bladder in another species of Armadillo (*Dasypus Peba*¹). The saliva which these reservoirs contain is very tenacious, the serous part being probably absorbed during its detention. Thus prepared and accumulated, it is expelled at the extremity of the mouth, in order to lubricate the tongue, which is thus, as in the Anteaters, made subservient to the catching of insects².

In the Spiny Anteater of Australia (*Echidna*), the homologues of the submaxillaries are as largely developed as in the hairy Anteaters of America, and are subpectoral and subcervical in position; but they are not blended together. The primary lobes are fewer and larger than in the *Myrmecophagæ*, and the secretion is carried from each gland by a single relatively very wide duct. When the duct has reached the interspace of the lower jaw, it dilates and then divides into eight or ten undulating branches, which subdivide and ultimately terminate by numerous orifices upon the membranous floor of the mouth. This unique modification of a salivary apparatus is figured and described in my Article *Monotremata* of the 'Cyclopædia of Anatomy and Physiology,' 8vo, vol. iii. 1847, p. 388, fig. 188.

Muscles of the Mandibular and Hyoid arches, and of the Tongue.

Mylohyoideus.—The muscle answering to the mylohyoideus is of unusual extent, and is divisible into different portions: the first of these is a thin layer of transverse fibres (Pl. XXXVII. fig. 1, *g*), extending from the symphysis menti about five inches backwards: the fibres pass from the under and outer side of one mandibular ramus to the opposite ramus, and are attached along the middle line of their central surface to the long and thin tendon of the geniohyoideus: the posterior transverse fibres overlap the anterior termination of the second division (*h*) of the mylohyoideus. The transverse fibres of this division arise externally, or laterally, from the inner side of each mandibular ramus, and are attached mesially and centrally to a continuation of the tendon of the geniohyoideus, which may be seen shining through the fibres of the mylo-

¹ Proceedings of the Zoological Society, 1832, p. 130.

² The preparations exemplifying the above interesting modifications of the salivary apparatus are preserved in the Physiological Series of the Museum of the Royal College of Surgeons, Nos. 772 L and M, and are described in the first volume of my Catalogue of that Series, p. 228, 4to, 1831. Prof. Rapp, in his excellent work, 'Über die Edentaten,' 4to, 1843, has given a figure of this structure, in the *Dasypus peba*, and refers to a description of it in an Inaugural Thesis by Winker, "Dissertatio sistens observationes anatomicas de Tatu novemcincto. Præs. Rapp. Tubingen, 1824." This Thesis I have never seen, nor, as yet, been able to obtain: I became aware of its existence only through the reference in the work above quoted.

hyoideus, and which looks like a raphé of the muscle. This portion, which represents the normal mylohyoideus (*h*), extends backward as far as the ascending ramus of the jaw. A third portion (*ib. i*, and Pl. XXXIX. fig. 1, *i*) arises fleshy from the inner side of the ascending ramus of the jaw, whence its fasciculi radiate towards the middle line, in a somewhat twisted course, the anterior ones passing beneath the second or normal part of the mylohyoideus. The fourth portion, *j*, at its anterior part arises from the angle of the jaw, then from the base of the cranium, and afterward from a strong fascia extended thence backwards, between the postcranial prolongations of the nose and mouth (Pl. XXXIX. fig. 2, *j*); the posterior and longest fasciculi come off more outwardly and radiate to spread over and blend with the gular fasciculi of the sternoglossi, passing outward and downward, and then bending inward to envelope that part of the hyoid apparatus. All the fibres of the fourth portion terminate in a median raphé, which is less marked than in the anterior portion. The fibres of the posterior division of the mylohyoideus, especially those which are attached superiorly to the under surface of the posteriorly prolonged nasal canal, form a kind of muscular sheath for the basal part of the muscles of the tongue (*ib. fig. 1, j*).

Constrictor salivaris.—This is a flat subquadrate muscle (Pl. XXXVII. fig. 3, *k*), which arises fleshy from the inner border of the base of the ceratohyal, *m*, passes downward and forward beneath the *ceratohyoideus*, *n*, expands on emerging, bends over the salivary reservoir (figs. 1 & 2, *c*), and is inserted into the tendon marked * in fig. 2: it also blends with the back part of the *mylohyoideus*. The *constrictor salivaris* is crossed by the ectocarotid (fig. 3, *o*), and by the large lingual nerve, *u*, which, winding round the ceratohyal, *m*, curves over the ectocarotid and the constrictor, passing forward beneath it and the ceratohyoideus muscle, to accompany the sternoglossi to the base of the tongue.

Ceratohyoideus.—This muscle (Pl. XXXVII. figs. 2 & 3, *n*) arises from the ceratohyal, *m*, about an inch from its upper end, whence its origin is continued for an extent of one inch and a half: its fibres converge and form a fasciculus six lines in breadth, which is inserted into the commissural tendon (*, fig. 2), and is connected with a strip, *x*, from the sternomaxillaris muscle. The ceratohyal (Pl. XXXIX. fig. 2, *m*), after giving attachment to the foregoing two muscles and to the anterior constrictor of the pharynx, extends freely forward in front of the scalenus, and mesiad of the sternomastoid muscle, its extremity being attached to the *stylohyoideus* muscle, *v*.

Stylohyoideus.—In most mammals, the hyoid arch, by the length of the ossified part of the stylohyal and the extent of the ossification of the ceratohyal, is almost restricted to hinge- or swing-movements forward and backward upon the proximal joints of the stylohyals as a fixed point; so that the basihyal with its immediate appendages—usually the tongue—cannot be very far protruded or retracted. In the *Myrmecophaga jubata* the usual place of the stylohyal bone is occupied by a long and slender muscle, the *stylohyoideus* (Pl. XXXIX. fig. 2, *v*), which arises from the petromastoid, and after a course of five inches is inserted into the ceratohyal, here the first bone of the hyoid

arch. Supposing the *stylohyoideus* to contract one-third of its length, it would protract the hyoid arch to the same extent: in which act it combines with the *geniohyoideus*. The retraction of the hyoid arch is provided for by the *sternothyroidei* (Pl. XXXVIII. fig. 1, *p*) and their apparent continuations the *thyrohyoidei*. There is no direct sternohyoid muscle: the homologue of this seems to be the sternal portion of the *sternoglossus* (*ib. g*).

Geniohyoideus.—This muscle arises by a single tendon from the symphysis of the jaw. It is one line in breadth, flat, runs back beneath the raphé of the anterior mylohyoideus; slightly expands beneath the raphé of the middle mylohyoideus, then again contracts and again expands, and at about ten inches from its origin becomes diffused into fleshy fibres, which gradually acquire a breadth of six lines, continue back in close connexion with the *mylohyoideus* to the commissural tendon (*, fig. 2) and there expand, the lateral borders being attached thereto. Here a mid-line of separation appears, and the muscle bifurcates into two flat fasciculi (Pl. XXXVII. figs. 1 & 2, *l, l*) each six lines broad, which are inserted into the angles of the basihyal.

The *Sternothyroidei* (Pl. XXXVIII. fig. 2, *p, p*) come off from the inner and lateral parts of the sixth, seventh and eighth sternal bones, and from the seventh and eighth sternal ribs near their articulations therewith. The interthoracic extent of these muscles is six inches. At about two inches from the origin is the point of a tendinous angular intersection (*), somewhat more marked than in the *sternoglossus*; the angle is turned forward on the opposite side of the muscle. These intersections vary somewhat in the two muscles, the left *sternothyroideus* presenting two within the chest, the right one three. Behind the manubrium the left muscle sends off a small fasciculus of fibres to the right one, and the right reciprocally to the left. Where the decussation takes place there is a tendinous intersection at the fore part, which does not extend to the back part of the muscle. In advance of the interchange of fasciculi the *sternothyroidei* diverge, increase in thickness, and decrease in breadth just before they emerge from the chest; beyond which cavity they are fleshy throughout their extent (*ib. fig. 1, p, p*), and are inserted into the lower and fore part of the thyroid cartilage (*ib. q*).

Cricothyroidei.—These muscles (Pl. XXXVIII. fig. 1, *r, r*) cover the whole of the cricoid cartilage, beneath and external to the *sternothyroidei*, and are inserted into the lower and lateral borders and productions of the thyroid cartilage.

The *Thyrohyoidei* (Pl. XXXVIII. fig. 2, *s, s*) arise from the lateral and anterior parts of the thyroid cartilage, above the preceding, and are inserted into the median two-thirds of the thyrohyal or posterior horn of the hyoid.

The *Intercornualis* (Pl. XXXIX. fig. 2, *q*) is a straightened mass of fibres passing obliquely from the thyrohyal forwards and inwards to the epihyal.

A ligament connects the mesial end of the ceratohyal with the anterior and outer end of the thyrohyal. A shorter and thicker ligament ties the posterior and outer end of the thyrohyal to the thyroid cartilage.

Sternoglossus.—This remarkable muscle arises fleshy from the lateral border of the dilated xiphoid and last sternal bone, and from its junction with the last two true ribs. The origin (Pl. XXXVIII. fig. 2, *e*) is at first triangular, but soon assumes a flattened shape, six lines broad by two lines thick, the muscle gradually diminishing in breadth, as it extends forwards, without losing thickness. Linear tendinous intersections (*ib. f, f*) mark the part of the muscle within the chest; the first occurs about two inches and a half from the origin, and is bent with the angle turned forward; the second, about two inches in advance, crosses the muscle obliquely; the third, at about the same interval, sends a slight angle forward; the fourth is an angular intersection, with the point turned backward on one side and forward on the other side of the muscle. From this point the sternoglossus passes forward, emerging from beneath the manubrium sterni as a simple fleshy muscle (Pl. XXXVIII. figs. 1 & 2, *g*), five lines broad and from two to three lines thick. Opposite the hyoid it is perforated by a lingual artery: between four and five inches in advance it is perforated by the lingual nerve (*ib. fig. 1, u, u*); and here it begins to give off, or its inferior stratum is resolved into, flattened fasciculi of fibres which decussate or combine with those of the opposite muscle, *h, h*. About six inches in advance of the basihyal these fasciculi spread over a dilated membranous portion of the buccal cavity, at the lower part of which the base of the tongue is situated: and here they converge and blend with corresponding flattened fasciculi, *o', o'*, sent off from the lower part of the *genioglossi*, as these pass backward to the base of the tongue. The main continuation of the sternoglossus, which is concealed by the subgular fasciculi, forms a rounded slender muscle (*i, i, fig. 2*), which raises the buccal membrane so as to form the back part of the frænum linguæ, and penetrates, or forms, the back part of the base of the tongue, and a great proportion of its substance.

Genioglossus.—This muscle (Pl. XXXVIII. *m, n, o*) has a complex origin, by a middle portion, from the short symphysis mandibulæ, *m*, and by a flattened penniform series of fibres, from the lower border of the mandibular rami for the extent of four inches behind the symphysis, *n, n*. The symphyisial origin is round and slender, and belongs more directly to the proper tongue-muscle: the ramal origins seem to be the more special fixed point of the subgular fasciculi. The fibres of the ramal origin, *n, n*, pass obliquely backward and inward, converging to a middle raphé, to which the symphyisial origin closely adheres. The two origins of the muscle are blended into one for about three inches beyond the point of attachment, in which extent the muscle forms a moderately thick depressed mass along the middle of the under part of the mouth. It then begins to expand, and to detach from its under surface those subgular fasciculi, *o', o'*, which diverge and unite with the corresponding dismemberments, *h, h*, of the *sternoglossi*. The main part of the *genioglossus* enters, as a single muscle (*ib. fig. 2, o*), the fore part of the base of the tongue, carrying into the floor of the mouth a fold of buccal membrane forming the fore part of the frænum linguæ. Between the

genio- and sterno-glossi, the fifth pair of nerves (Pl. XXXIX. fig. 2, *o*), which have arched almost transversely beneath the lower part of the gular pouch, converge to penetrate the tongue at the base of the frænum.

Epihyoglossi.—Beneath the insertions of the geniohyoidei (Pl. XXXVIII. fig. 1, *l, l*), a pair of more slender muscles (*ib. k, k*) come off from the median ends of the epihyals. These muscles, after a brief course, expand into a thin layer, resolve themselves into separate fasciculi, and combine an inch in advance of their origin to form a layer about eight lines in breadth below the middle line of the postlingual part of the mouth; which layer (*k*) slightly diminishes in size as it approaches the commissure of the sterno-glossi (*h*), and, with them, penetrates the back part of the frænum linguæ. The antero-posterior diameter of the base of the tongue, where it rises freely from the buccal membrane (Pl. XXXVIII. fig. 2, *o, p, i*), is three and a half inches. The convergence of the *sterno-* and *genio-glossi*, with the connecting frænal fold, forms a triangle, from the apex of which the tongue, *b*, assumes its vermiform shape, gradually diminishing from a breadth of eight lines to the obtuse apex which is one line in breadth, the length of this free part of the tongue being eighteen inches.

The tongue is covered by a smooth shining epithelium, which begins to present a softer, more vascular or mucous character fourteen inches from the apex; but the only papillæ anywhere present are two fossulate ones, 'papillæ vallatæ' (Pl. XXXIX. fig. 3, *f*), forming a pair, two lines apart, situated on the dorsum of the tongue about two inches in advance of the termination of the frænum. A linear groove, commencing two inches from the base of the tongue, extends along the dorsum to within four inches of the apex.

The muscular substance of the free part of the tongue is formed by the lingual portions of the *sternoglossi*, by the *genioglossus*, and by the proper 'linguales' muscles.

The buccal membrane (Pl. XXXIX. fig. 3, *p, q*) is smooth, perforated at its lateral and inferior parts, and also superiorly beyond the bony palate, by innumerable very minute orifices, from a quarter of a line to one line apart, by which the secretion of the thin glandular stratum before described enters the mouth.

Four inches in advance of the angle of the jaw, near the lower border of the ramus, a longitudinal ridge or low fold of the buccal membrane begins to rise, increasing in depth and assuming a callous hardness as it extends forwards and upwards: this ridge (Pl. XXXIX. fig. 3, *r*) is about two lines in breadth, and bends down so as to leave a groove between it and the lower membrane of the mouth. It is possible that the Termites may be crushed by the action of the tongue against these two callous ridges, which seem to occupy the place of teeth on each side the mouth.

The cavity of the mouth quickly expands as it passes backward and acquires its greatest breadth opposite the base of the skull and of the tongue (*ib. fig. 3, p, q*), having there a diameter of from four to five inches. The thin membrane, over which the diverging fasciculi of the sternoglossi and hyoglossi spread, is capable of considerable dilatation, and may serve, therefore, as a temporary receptacle for the Termites, where

they may be blended with the more alkaline and solvent salivary secretion of the parotids after being pounded by the tongue against the callous ridges, before they are finally swallowed: the singular backward extension of the fauces and nasal passages appears to relate in part to the presence and function of this receptacle.

The buccal cavity gradually contracts beyond the receptacle to the hyoid bone, immediately in advance of which, nineteen inches from the aperture of the mouth, are situated the tonsils (Pl. XXXVIII. fig. 2, *t, t*; Pl. XXXIX. fig. 3, *t*), each tonsil being an oval patch of a thin layer of muco-glandular substance with a finely reticulate surface, measuring one inch by nine lines. Behind the tonsils, and between them and the basihyals, a pouch of the gular membrane (*ib. s*) descends between the epihyals; it is one inch and a half in depth, by one inch in width.

One inch behind the prehyoid pouch, the extremity of the epiglottis, *v* (bisected in fig. 2, Pl. XXXVIII.), is seen projecting into the cavity of the mouth; it is broad and trilobed, the middle lobe subquadrate and curved downwards and backwards. A *hyo-epiglottideus* muscle extends from the back of the basihyal to the fore part of the base of the epiglottis: some fibres from this muscle appear to spread upon the prehyoid pouch.

The thyroid cartilage (Pl. XXXVIII. fig. 1, *q*) is ossified. The cricoid (*ib. fig. 2, y*) is cartilaginous. The arytenoids (*ib. fig. 2, w, w*) are low obtuse cartilages.

The *chordæ vocales* (Pl. XXXIX. fig. 3, *x, x*) extend from the middle of the lower and front part of the thyroid forwards to the arytenoid cartilages, *w*, the fold containing them expanding as they advance. There is a shallow fossa beneath this fold and a deeper one above it, or between it and the folds continuing from the epiglottis, *v*, to the arytenoids. There is a small fibrocartilage supporting an obtuse prominence from near the hinder end of the epiglottidean fold. The posterior interspace of the first tracheal cartilage is half an inch wide, but at the third ring the posterior extremities come into contact.

The posterior margin of the soft palate terminates by a low angular projection like the rudiment of a uvula (*ib. u*) opposite the base of the epiglottis. From the sides of this uvula the membrane arches backward, and gradually subsides upon the beginning of the œsophagus.

The whole length of the nasal passage (Pl. XXXIX. fig. 3, *c, e*) is twenty-two inches. The first inch is surrounded by the cartilaginous part of the nose: the next thirteen inches is enclosed by bone: the last eight inches of the canal has musculo-membranous walls, and is an enormously-developed homologue of the 'palatum molle' in Man.

Constrictores pharyngis.—The canal of the posterior nares is continued far back beyond the base of the skull (*ib. fig. 3, e, e*), and the homologues of the 'constrictor pharyngis' act upon this canal before they embrace the proper pharynx. They consist of several distinct muscles. The most anterior one (*ceratopharyngeus*, Pl. XXXIX. fig. 2, *f*) comes off from an extent of more than an inch of the middle part of the cerato-

hyal, *m.* It is a thin broad layer, the fasciculi of which diverge to spread upon the sides of the postcranial continuation of the nasal passage interlacing with the constrictor fibres which spread over the back part of that passage. The second muscle (*epipharyngeus*, *ib. g*) has a thicker origin, of ten lines in extent, from the back part of the inner end of the ceratohyal, and from the joint between this and the epihyal. The fasciculi diverge and spread over the sides of the posterior part of the soft nasal canal, partly overlapping the preceding muscle anteriorly, and being themselves slightly overlapped by the next portion behind. The third constrictor (*hyopharyngeus*, *ib. h*) has an origin three lines in extent from the thyrohyal and contiguous part of the basihyal: the fibres diverge upon the sides of the end of the nasal canal and the beginning of the pharynx; the anterior fibres overlapping and then blending with the posterior fibres of the preceding muscle. The fourth constrictor (*thyropharyngeus*, *ib. i*) comes off from the outer margin of the thyroid cartilage, having an origin of nine lines in extent. The fibres pass transversely round the pharynx, partially overlapping the preceding muscle, and slightly expanding at the back of the pharynx. The posterior continuation of this portion, which might be regarded as a fifth muscle (*cricopharyngeus*, *ib. v*) arises from the posterior and outer prolongation of the cricoid, behind the three upper rings of the trachea.

Retractor pharyngis (Pl. XXXIX. fig. 2, *k, k*).—A slender longitudinal muscle, arising from a fascia connected with the origin of the scalenus, runs along the outer side of a long slender gland, and then passes forwards to the outer side of the cricopharyngeus, where it bends backwards, slightly expands, and appears to blend with the contiguous fibres of the crico- and thyro-pharyngei. The breadth of the free part of this retractor pharyngis is from one to two lines.

In the dissection of the neck of the Great Anteater, three pairs of long and slender muscles are met with, which relate to the movements of the head.

Sternocervicalis.—This muscle arises from the upper and outer angle of the manubrium sterni, close to the inner (mesial) side of the *sternomaxillaris*, by a thin tendon four lines broad, which soon becomes fleshy, and the slender muscle (Pls. XXXVII. fig. 2, and XXXIX. *y*) gradually contracts to be inserted into the side of the middle cervical vertebra.

The *Sternomastoideus* (*ib. z*) arises from the outer angle of the manubrium sterni, by a tendon two lines broad, which gradually expands, is flattened, and at one inch nine lines from its origin becomes a fleshy flat muscle six lines broad; this gradually increases in thickness to a rounded form, then contracts, and forms a tendon at about eleven inches from its origin, which contracts to its insertion into the paroccipital representative of the mastoid protuberance.

Sternomaxillaris.—This muscle arises from the inner side, near the upper and outer angle, of the manubrium sterni, and manubrial fascia, centrad of the clavicular fascia, and of the origins of *sternomastoideus* and *sternocervicalis* (Pl. XXXVIII. fig. 1, *w, w*); its origin is by a flat, very short tendon, five lines broad: an aponeurosis passes from one

tendon to that of the fellow muscle. The fleshy part forms a long slender band six lines in breadth, which passes forward, and about four inches from its origin sends off a slender fleshy strip (Pl. XXXVII. fig. 2, *x*) to the ceratohyoideus, *n*, and the central tendon, *. It then advances as a slender round fleshy muscle, which degenerates into a subcompressed tendon about half an inch in length, opposite the *compressor salivaris*. Resuming its fleshy structure, it forms an anterior subcompressed belly, ten inches in length and from four to five lines in diameter (Pl. XXXIX. fig. 1, *w*). This gradually contracts and terminates in a slender tendon three inches long, which expands to be inserted into the outer and under part of the maxillary ramus, six inches in advance of the angle of the jaw.

To the action of the pair of muscles, so inserted, is mainly due that characteristic movement of the head of the Great Anteater when it composes itself to sleep, and draws its head downward and backward between the fore-limbs, in contact with the chest. The mouth is small, and susceptible of so slight an opening as not to require for that action so remarkable a modification of what appears to be a dismemberment of the homologue of the sternocleidomastoideus muscle.

The proper muscles of the jaws consist of the *temporalis*, the *masseter*, and the *pterygoidei*.

The *temporalis* (Pl. XXXIX. fig. 2, *a*) arises from a low ridge extending from the stunted zygomatic process of the squamosal upwards and slightly forwards,—the boundary rather of a large and ill-defined orbit than of a temporal fossa, which is in no wise marked off from the orbit: some fibres are derived from the temporal fascia; but the muscle is not above an inch in breadth, and its greatest length does not exceed an inch and a half; it is inserted into the external ridge, an inch in advance of the condyle, which feebly represents a coronoid process.

The *masseter* (Pl. XXXIX. figs. 1 & 2, *b*) has an extent of origin of three inches three lines from the malar process of the maxillary, from the short and free malar, and from a very strong fascia continued thence over the temporal muscle to the zygomatic process of the squamosal. The maxillary origin has the appearance of a distinct tendon, *b'*, expanding into an aponeurosis, which spreads over nearly the upper half of the outside of the muscle. The carneous fibres from the maxillary tendon pass vertically downward: the more posterior fibres proceed more obliquely downward and backward as they approach the angle of the jaw, into which the most posterior ones are inserted. The extent of the insertion from this point forward is four inches two lines. The action of this muscle is to close the mouth and protract the mandible.

The *pterygoideus internus* arises, chiefly fleshy, from a longitudinal channel on the under part of the pterygoid bone, which is bounded mesially by a low ridge, to which a short aponeurotic origin of the muscle is attached: the muscle gains in thickness and depth as it passes forward and outward to be inserted into the concavity on the inner side of the ascending articular part of the jaw.

The external *pterygoideus*—a narrower and smaller muscle—is not clearly distinct from the foregoing; it arises fleshy from the outer part of the tuberosity of the pterygoid bone, and the fibres pass more directly forward to their insertion, where they blend with those of the preceding muscle: this external part of the pterygoideus is more directly a retractor of the jaw: the other fibres would antagonize the masseteric ones in rotatory horizontal movements of the jaw.

Muscles of the Nose, Ear, and Lips.

The back part of the upper maxillary bone, which slopes downward and a little outward, to form the malar process, affords an aponeurotic origin to four muscles of the nose and lips. The *levator nasi* (Pl. XXXIX. fig. 1, *c*) is the superior of these; it becomes distinct an inch in advance of the common origin, its fleshy fibres converging to a small tendon two inches nine lines from that origin: the tendon, which is four inches in length, is inserted into the upper part of the nose, which it raises.

The *retractor anguli oris* (*ib. d*) is the second muscle: it comes off from the lower and outer part of the preceding, about an inch in advance of their common origin, and is aponeurotic on its upper border for two and a half inches. The aponeurosis, which forms the tendon of insertion, begins at the lower border of the muscle near where the first aponeurosis terminates. The whole length of the fleshy part of this muscle is four inches nine lines: its greatest breadth, where distinct, is three lines: the length of the slender tendon is two inches; it passes over the *orbicularis oris*, *q*, to be inserted into the angle of the mouth.

The *retractor alæ nasi* (*ib. e*) is the third muscle: it is sent off below and from the inner side of the preceding; has a fleshy belly three inches four lines in length, and a very slender tendon four inches three lines in length, which passes over the *orbicularis oris*, to be inserted into the skin of the back part of the nostril.

The *retractor labii inferioris* (*ib. f*) is the fourth muscle: it forms the lower and outer part of the common origin, covers that of the preceding muscle, has a fleshy portion five inches six lines in length, and a tendinous one two inches four lines in length. This tendon seems to penetrate the *orbicularis oris*, to the fibres of which it gives attachment both along its upper and lower borders. It is inserted into the lip below the angle of the small mouth.

The *retractor labii superioris* (*ib. m*) forms a fifth muscle, which has a more distinct origin from the malar process of the maxillary, than the preceding four, for the extent of one inch. Its fleshy part is three inches three lines in length; its very slender tendon is five inches in length, and is inserted into the upper lip, and to the lower part of the nostril, of both of which parts it is a retractor. Near its insertion it is connected with muscular fibres descending from the skin of the nose to the circular lip, where they are connected with the cutaneous muscles affecting that part.

The *orbicularis oris* (*ib. q*) arises from the outer side near the fore part of the long

maxillary: it is a thin muscular layer, eight lines in breadth, inserted into the tendon of the retractor anguli oris, and partly continuous with a thicker layer of the same sphincter which passes round, beneath the mouth, closely connected with the skin of the lip, to the same tendon of the opposite side. A small oblique tendon is developed near where the fibres of the longitudinal muscle (*dermolabialis anticus, s*) blend with and are lost in the *orbicularis oris*.

The *accessorius ad orbicularem oris* (*ib. r*) arises from the maxillary behind the muscle it assists, and contracts as it descends and blends its fibres with the true orbicularis: it receives the insertion of the *dermolabialis posticus*.

The *buccinator* (*ib. u*) is of unusual longitudinal extent, and consists of a thin layer of flattened fasciculi of vertical fibres arising from an aponeurosis attached to the toothless border of the upper jaw, and inserted at the outside of the similar border of the lower jaw.

A small mass of labial glands, two inches in longitudinal extent and from two to three lines in breadth, rests upon the under and fore part of the buccinator and dips under the *orbicularis oris*.

The *levator auriculæ* (*ib. v, v'*) has an extent of origin from the epicranial fascia of nearly four inches. The most anterior fasciculus, *v*, comes off behind the eye and is a protractor: the posterior fasciculus, *v'*, arises from the occiput and is a retractor: these with the intermediate fasciculi acting in succession would rotate the ear. Beneath the posterior fasciculus is a deeper-seated retractor of the ear inserted into the inferior and outer part of the auricular cartilage.

The *depressor auriculæ* (*ib. w*) is a roundish, slender muscle, which arises from the angle of the jaw, penetrates the parotid gland, and is inserted into the lower part of the cartilage of the ear.

Cuvier and Duvernoy long ago pointed out that the protraction and retraction of the tongue of the Anteaters and Echidna were not due to any peculiar conformation of the hyoid bone and muscles, but to another mechanism answering the same end. Those distinguished anatomists seem, however, not to have noticed to what an extent the base of the tongue is removed from the basihyal, nor to have recognized the share which the genioglossus takes in the formation of the tongue itself. "The hyoid in the *Myrmecophagæ* (the species is not noted) is placed very far back, and as a consequence, the base of the tongue is placed equally far back, although it is not, so to speak, attached to the hyoid bone. It seems to be composed exclusively of the sternoglossi and of an annular muscle¹."

The gular fasciculi of the genioglossus are recognized as 'geniobuccales,' and are described as "diverging upon the sides of the base of the tongue, beyond which they

¹ "L'os hyoïde étoit placé très en arrière; il en résulte que la base de la langue est également très en arrière, quoique celle-ci ne tienne pas, pour ainsi dire, à l'os hyoïde."—"Elle ne semble composée que des *sternoglosses* et d'un muscle *annulaire*."—Leçons d'Anatomie Comparée, tom. iii. 1799, p. 265.

form a tendinous sheath enveloping the sternoglossi, with which they are continued to the sternum¹:" in this description will be recognized what I have described as gular fasciculi, or dismemberments of the sternoglossi and genioglossi respectively. For the absence of any styloglossi, Duvernoy accounts by the remark, "that the base of the tongue is much further back than the stylohyal²." But this is not the case in the Great Anteater.

In the posthumous edition of Cuvier's 'Leçons d'Anatomie Comparée,' t. iv. 1836, p. 558, Prof. Duvernoy intimates, that the brief notice respecting the anatomy of the tongue in the Anteaters, inserted in the first edition, was an extract from a Memoir on that subject, which he read to the 'Société de la Faculté de Médecine de Paris' in 1804, and which was afterwards inserted entire in the 'Mémoires de la Société d'Histoire Naturelle de Strasbourg,' tom. i. 1830.

On referring to the latter volume, I find that the interesting remarks of the venerable anatomist were based upon dissections of the *Myrmecophaga tamandua*, Cuv., the *Myrmecophaga didactyla*, and the *Echidna Hystrix*: the Great Anteater (*Myrmecophaga jubata*) seems not to have come under the scalpel of either Cuvier or Duvernoy. Whatever discrepancy, therefore, may be found between the descriptions in the present Memoir and those in the 'Strasbourg Transactions,' may be set down, either to a different interpretation of the structures observed, or to the specific modifications of the *Myrmecophaga jubata*. I have not, at least, had the opportunity of testing by actual dissection the degree of concordance between the *Myrmecophaga tamandua* and the large species which would seem to have been now anatomized for the first time.

DESCRIPTION OF THE PLATES.

PLATE XXXVII.

Salivary and Lingual Structures.

- Fig. 1. Superficial view of the submaxillary salivary glands, and muscles of the tongue and jaw, beneath the head and neck: half the natural size.
 Fig. 2. Further dissection of the submaxillary gland and duct, and contiguous muscles: half the natural size.
 Fig. 3. Muscles of the salivary reservoir and contiguous muscles: natural size.

[The following letters indicate the same parts in each figure.]

- a, a.* Main body of the confluent submaxillary (here subcervical and subpectoral) salivary glands: *a'*, their slender anterior continuation.
b, b. Ducts, prior to their dilatation.
c. Dilated portion of the ducts, or salivary reservoir, surrounded by a muscle.

¹ *Ibid.* p. 264.

² "... que la base de la langue est plus en arrière que l'os styloïde."

- d.* Long and slender portion of the ducts leading to the mouth, covered by the mylohyoideus muscle.
- e, e.* Submandibular transverse fasciculi of panniculus carnosus (Dermogulares).
- f.* Dermolabialis posticus.
- f'*. Dermolabialis anticus.
- g.* Anterior
- h.* Middle
- i.* Twisted or radiated
- j.* Posterior
- } portions of the Mylohyoideus.
- k.* (fig. 3, *c.* fig. 1) Constrictor salivaris.
- l.* Geniohyoideus.
- m.* Ceratohyal.
- n.* Ceratohyoideus.
- o.* Carotid artery.
- p.* Sternothyroidei.
- q.* Thyroid cartilage.
- r.* Cricoid cartilage.
- s.* Prominence of shoulder-joint.
- t.* Trachea.
- u.* Lingual nerve.
- v.* Stylohyoideus.
- w.* Sternomaxillaris. *, (fig. 1) its middle tendon. *w'*, its tendon of insertion.
- x.* (fig. 2) Its strip to the tendon *.
- y.* Sternocervicalis.
- z.* Sternomastoideus.

PLATE XXXVIII.

Muscles of the Tongue.

Fig. 1. Inferior superficial view of muscles of the tongue: half the natural size.

- a.* Mouth.
- b.* Tongue.
- c.* Rami of lower jaw.
- d.* Ducts of submaxillary gland.
- e.* Origin (fig. 2)
- f.* Tendinous intersections (*ib.*)
- g.* Extrathoracic part
- h.* Gular fasciculi
- i.* Proper lingual part (fig. 2)
- k.* Epihyoglossi.
- } of the Sternoglossus.

- l.* Geniohyoidei (insertions of).
- m.* Symphysial origin
- n.* Ramal origin
- o.* Lingual or proper part
- o'.* Gular fasciculi
- p.* Sternothyroidei.
- q.* Thyroid cartilage.
- r.* Cricothyroidei.
- s.* Thyrohyoidei.
- t.* Thyrohyoidei antici, seu minores.
- u.* Lingual nerve.
- v.* Lingual artery.
- w.* Sternomaxillaris.
- y.* Sternocervicalis.
- z.* Sternomastoideus.

} of the Genioglossus.

Fig. 2. Proper muscles of the tongue: half the natural size.

- a.* Mouth.
- b.* Tongue.
- c.* Rami of the lower jaw.
- d.* Termination of the duct of submaxillary gland.
- e.* Origin
- f.* Tendinous intersections
- g.* Extrathoracic part
- h.* Gular fasciculi (fig. 1)
- i.* Proper lingual part, or continuation,
- k.* } fig. 1.
- l.* }
- m.* Symphysial origin
- n, n.* Ramal origin
- o.* Proper lingual part
- o'.* Gular fasciculi (fig. 1)
- p.* Frænal fold of the gular membrane at the base of the tongue.
- q.* Membrane of the mouth forming the gular dilatation.
- r.* Roof of the mouth.
- s.* Subgular or prehyoid pouch.
- t.* Tonsils.
- u.* Uvula.
- v.* Divided epiglottis.
- w.* Arytenoid cartilage.
- x.* Chordæ vocales.
- y.* Cricoid.
- z.* Trachea.

} of the Sternoglossus.

} of the Genioglossus.

PLATE XXXIX.

Fig. 1. The parotid salivary gland and duct, and the superficial muscles of the jaws, tongue, mouth, nose, and ear.

- a. Fascia covering the temporalis muscle.
- b. Masseter; *b'*, its maxillary origin.
- c. Levator nasi.
- d. Retractor anguli oris.
- e. Retractor alæ nasi.
- f. Retractor labii inferioris.
- m. Retractor labii superioris.
- q. Orbicularis oris.
- r. Orbicularis accessorius.
- s. Dermolabialis anticus.
- t. Dermolabialis posticus.
- u. Buccinator.
- v. Levator auriculæ, anterior (protractor) portion; *v'*, occipital (retractor) portion.
- w. Depressor auriculæ.
- x. Parotid gland.
- y, *y'*. Its duct.
- z. Labial gland.

[The other letters signify the same parts as in the previous plates.]

Fig. 2. Muscles of the head, tongue, and neck.

- a. Temporalis.
- b. Masseter; *b'*, its maxillary origin.
- d. Duct of submaxillary gland.
- e. Soft part of nasal canal behind the skull.
- fa. Fauces or dilated part of mouth behind the skull.
- f. Ceratopharyngeus.
- g. Epipharyngeus.
- h. Hyopharyngeus.
- i. Thyropharyngeus.
- i'. Cricopharyngeus.
- j. Posterior part of mylohyoideus.
- k. Retractor pharyngis.
- l. Insertion of geniohyoideus.
- m. Ceratohyal.
- n. Ramal origin of genioglossus.
- o. Gular fasciculi of ditto, blending with those of
- p. Sternoglossus.
- q. Intercornualis.

- r. Cricothyroideus.
- s. Thyrohyoideus.
- tr. Trapezius.
- t. Atlanto-acromialis.
- u. Atlantoscapularis.
- w. Axioscapularis.
- v. Stylohyoideus.
- w. Sternomaxillaris.
- x. Parotid gland.
- y. Sternocervicalis.
- z. Sternomastoideus.

Fig. 3. The oral and nasal canals, pharynx, larynx, and beginning of the œsophagus and trachea, vertically and longitudinally divided.

- a. Opening of the mouth.
- b. Tongue.
- c. Style passed through the external nostril into the cranial part of the nasal canal *c-c*.
- e-e*. Postcranial part of the nasal canal.
- i, i*. Sternoglossi.
- a, p*. Prelingual part of the mouth : the faucial fasciculi of the genioglossus are seen through the thin membrane of the dilated part of the mouth.
- q, s*. Postlingual part of the mouth.
- s*. Prehyoid pouch.
- t*. Tonsil.
- u*. Uvular part of soft palate.
- v*. Epiglottis.
- w*. Arytenoid cartilage.
- x*. Chorda vocalis.
- y*. Cricoid cartilage.
- z*. Trachea.

PLATE XL.

Fig. 1. Head and fore part of body of the Weasel-headed Armadillo (*Dasypus sexcinctus*), dissected to show the submaxillary glands and reservoir.

Fig. 2. Lower jaw, larynx, submaxillary gland and reservoir of the *Dasypus Peba*.

Fig. 3. Salivary structures of the Small Anteater (*Myrmecophaga didactyla*). All the figures are of the natural size : the letters indicate the same parts in each.

- a. Labial gland.
- b. Postorbital gland.
- c. Submaxillary (subcervical) gland.
- d. (fig. 1) Slender anterior prolongation of ditto.

- d.* (fig. 3) Ducts leading from submaxillary gland into
- e.* Salivary bladder or reservoir.
- f.* Duct continued from ditto.
- g.* Dermal muscular fasciculi, adapted to compress the salivary reservoirs.
- h.* Sternomaxillares.
- i.* Mylohyoidei.
- k.* Hyoglossi.
- l.* Lingual nerve.
- m.* Larynx.
- n.* Trachea.
- o.* Thyroid gland.
- p.* Pectorales muscles.
- q.* Parotid.

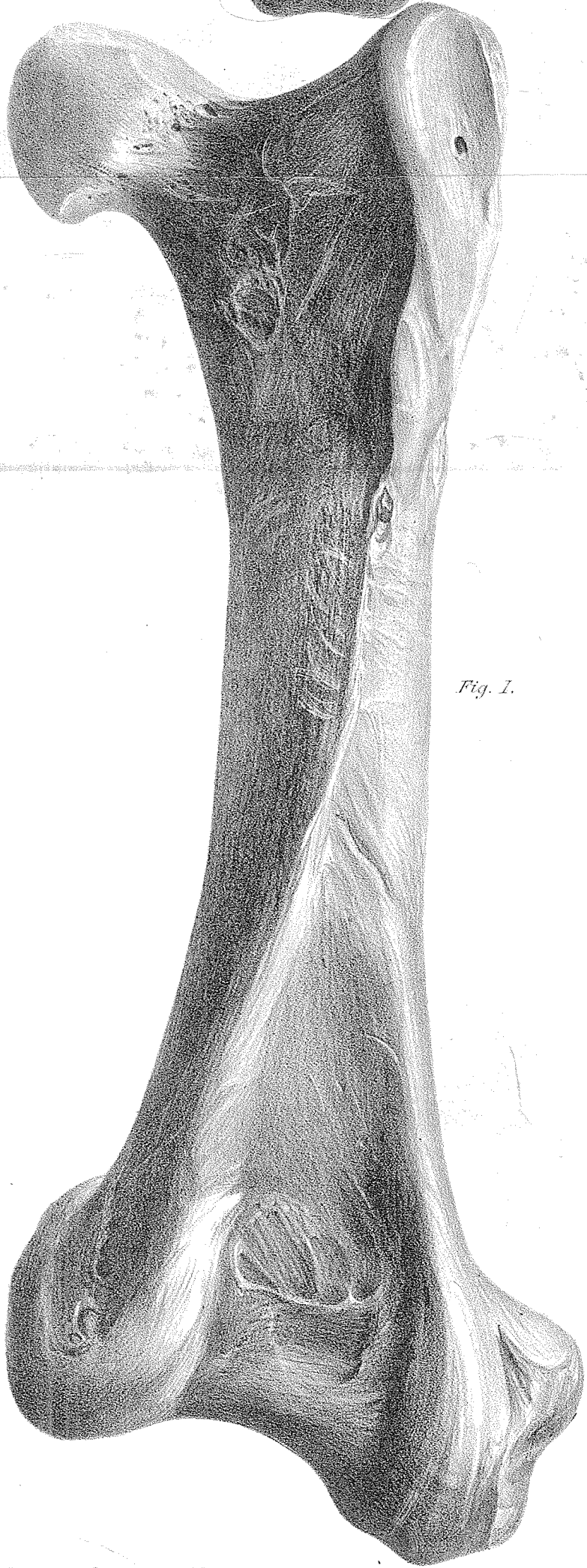


Fig. 1.

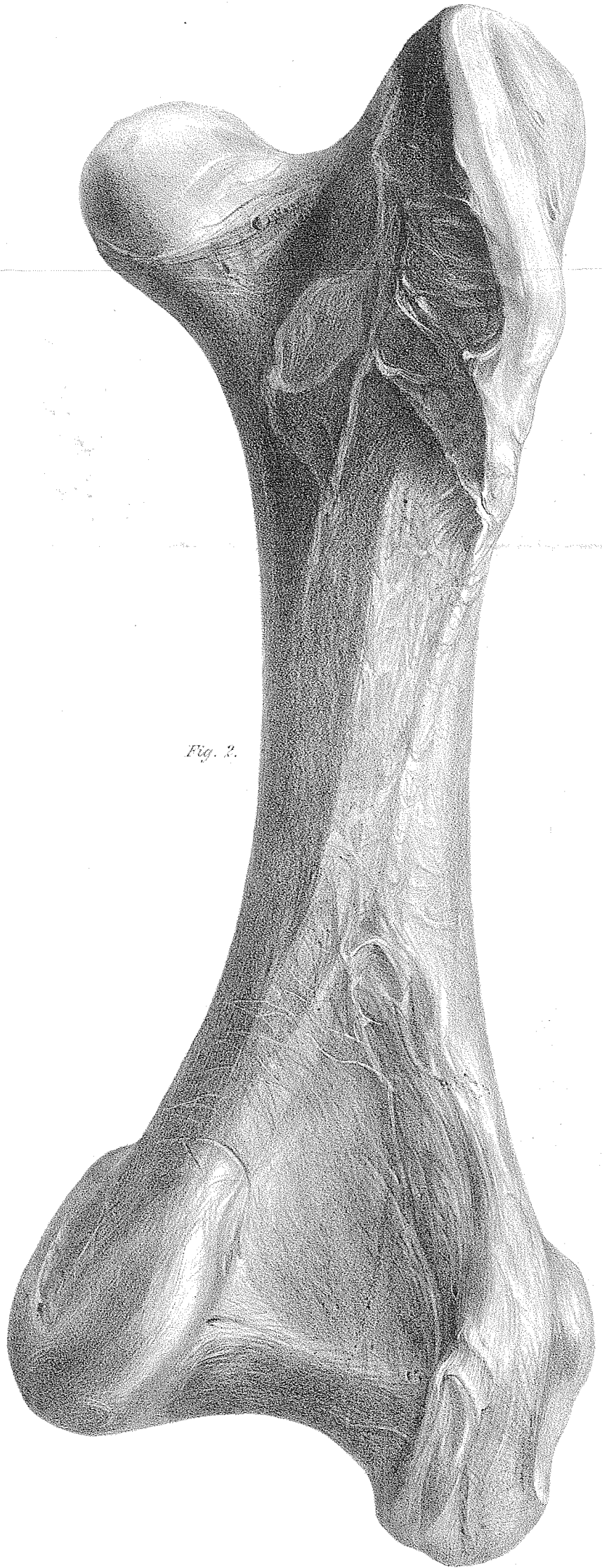


Fig. 2.

From Nat. on Stone by J. Exelber.

Day & Son, Lith. to the Queen.

Trans. Zool. Soc. Vol. 4. Pl. 41. p. 141.

Fig. 1 & 3. Dinornis gracilis. Fig. 2 & 4. Dinornis struthioides.

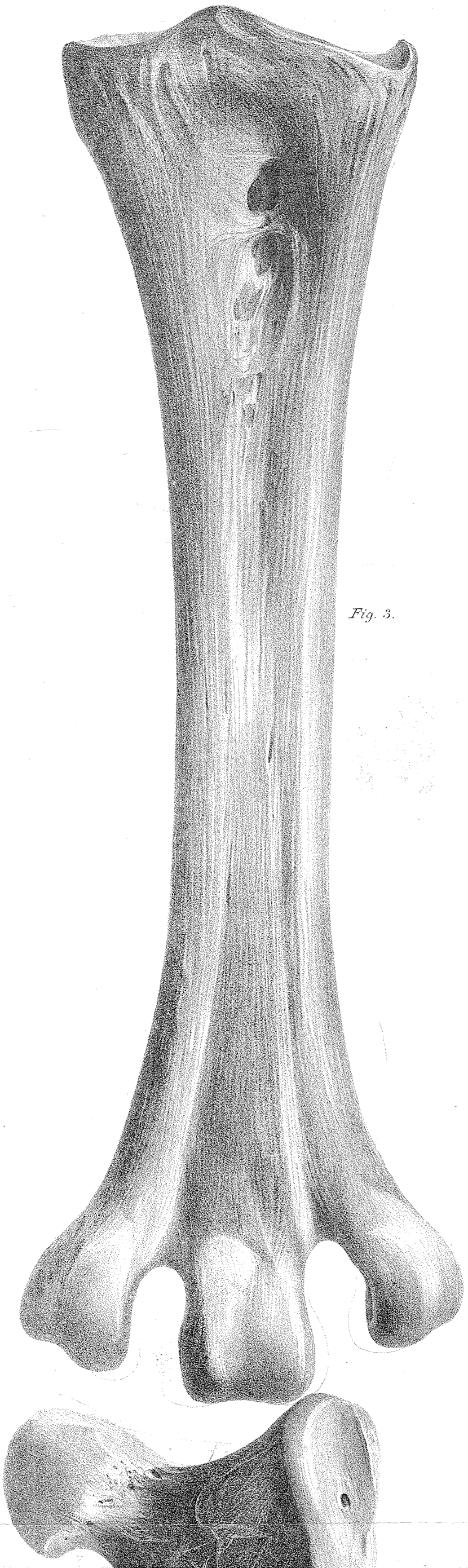


Fig. 3.



Fig. 4.



Fig. 1.



Fig. 2.

From *Nat. on Stone* by J. Erxleben.

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

Trans. Linn. Soc. Lond. Vol. 1. Pl. 141.

Fig. 1. *Dinornis gracilis*. — Fig. 2. *Dinornis struthioides*.

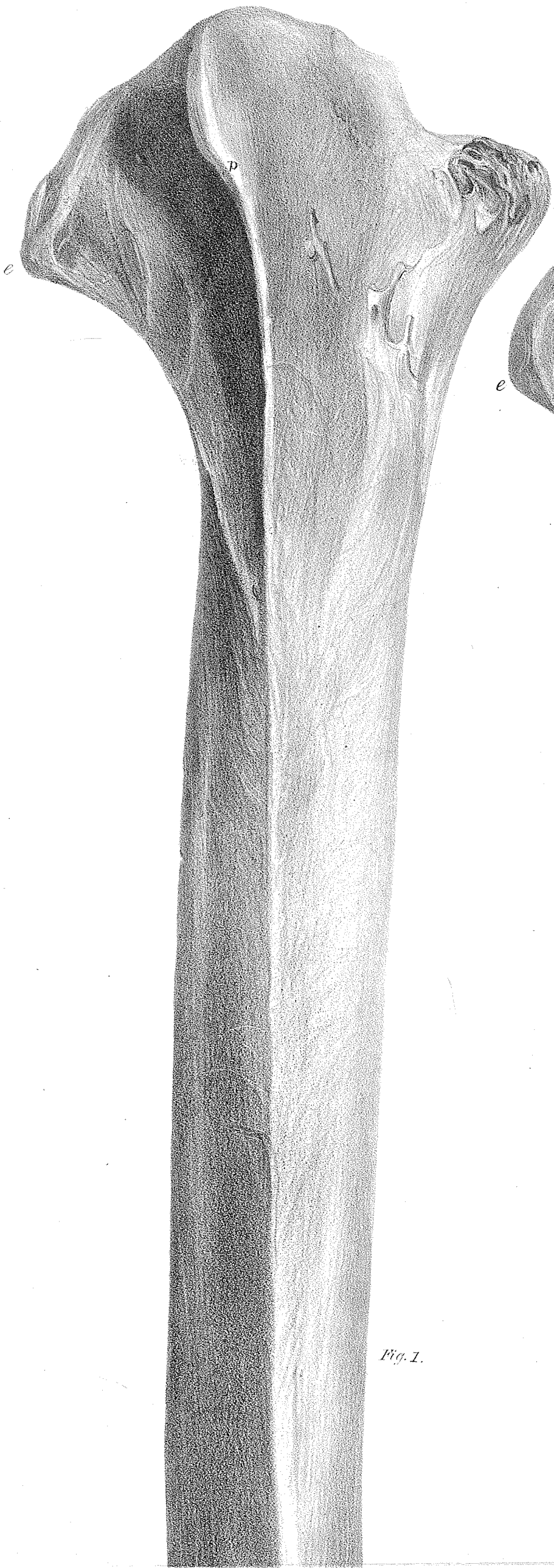


Fig. 1.

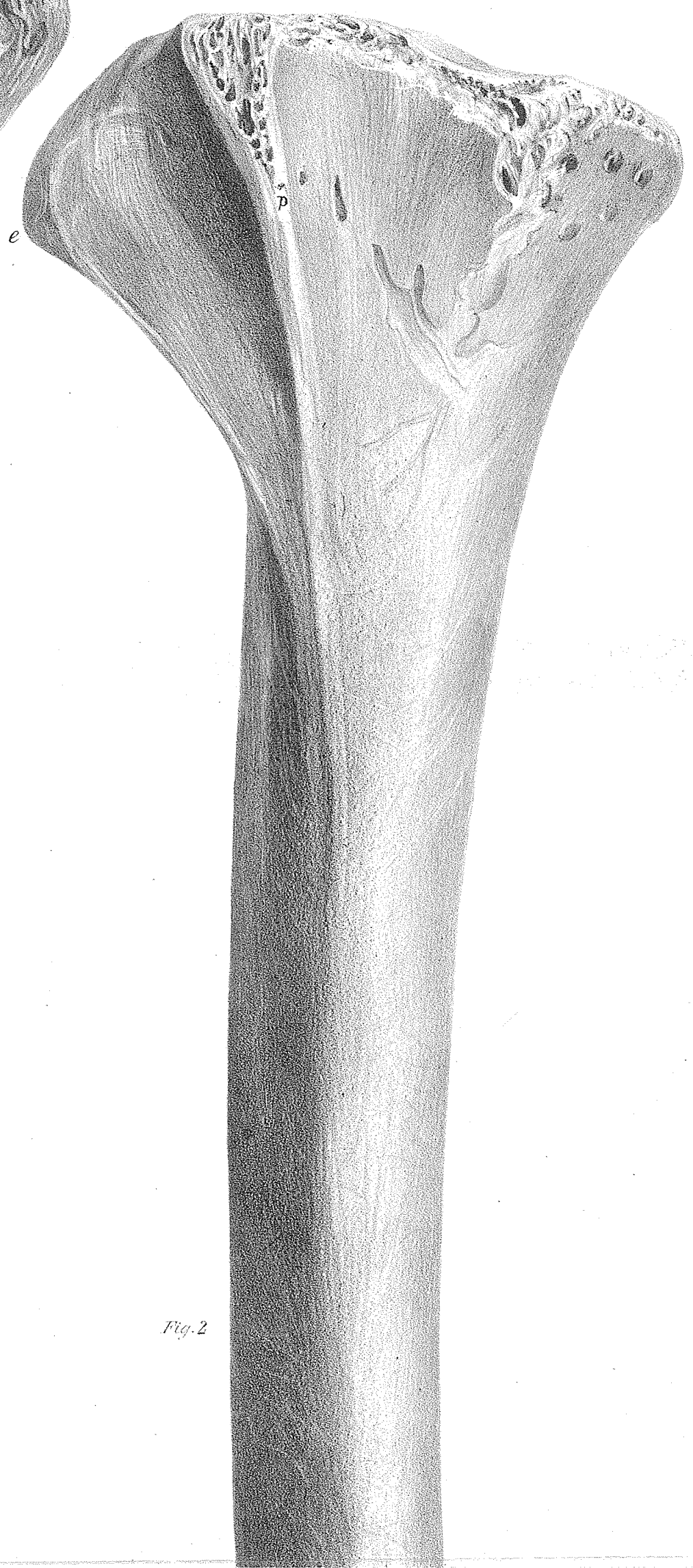


Fig. 2.