

**A prize essay on the anatomy of the tongue, larynx, and pharynx of the ox /
by Joseph Sampson Gamgee.**

Contributors

Gamgee, Sampson, 1828-1886.
Royal College of Surgeons of England

Publication/Creation

London : Printed by Compton and Ritchie, 1850.

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PRIZE ESSAY

ON

THE ANATOMY

OF THE

TONGUE, LARYNX, AND PHARYNX

OF

THE OX.

BY

MR. JOSEPH SAMPSON GAMGEE.

READ BEFORE THE MEMBERS OF THE VETERINARY MEDICAL ASSOCIATION.

LONDON :

PRINTED BY COMPTON AND RITCHIE, MIDDLE STREET, CLOTH FAIR.

1850.

PRIZE ESSAY

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THE TONGUE, a moveable organ endowed with the special sense of taste, is of very general, if not universal, existence in vertebrate animals. It is contained in the oral cavity, and is appended to the os hyoides, which at the same time is the supporter of the larynx and pharynx.

In the description of these organs and their component structures in the ox, I shall, so far as compatible with fidelity of detail and perspicuity of style, confine myself to the subject of this thesis. Strictly avoiding physiological comment, I shall alone digress in enumerating the general characters of the parts anatomically related with the structures which it is now my duty more especially to describe.

The os hyoides is the basis on which the tongue, larynx, and pharynx, depend for a fixity of position. The appellation of that bone in the singular number is in reality incorrect, since it is not single, but is composed of several osseous pieces, united together by synovial articulations.

The os hyoides is connected by a flexible and fibro-cartilaginous material, with a deep concavity in the temporal bone, at the root of, and external to, the styloid process. It is directed downwards and forwards, and, in addition to the organs abovementioned, it affords attachment to several muscles; which we shall distinguish into two pairs and a single intrinsic muscles, viz. the hyoidei magni and breves, and the hyoideus transversus; besides which there are eleven pairs and two single extrinsic muscles. The former of these consist of the stylo-genio and subscapulo-hyoidei; the sterno-thyro-hyoidei; the hyoglossi longi-breves and superiores; the genio-hyoglossi; the hyopharyngei (dilators); the hyopharyngei (constrictors), and the hyothyroidei; the two single extrinsic muscles are the lingualis and hyo-epiglottideus.

The os hyoides is composed of seven pieces, which form its body, and three pair of cornua; they are characterised as the greater, the middle, and inferior cornua.

The body of the os hyoides is semi-elliptical in figure, having its concavity directed towards the larynx. At its convex and anterior border is a tubercle of inconsiderable magnitude: to it is attached the substance of the tongue. On each side of and posterior to that tubercle are two spheroidal elevations; these are synovial articulatory surfaces, corresponding to concavities in the inferior cornua.

The inferior surface of the body of the os hyoides is flat; but superiorly it presents an acute margin, which becomes more obtuse and rounded towards the extremities; where two ligaments, containing a large amount of yellow elastic tissue, affix the bone to the superior part of the anterior margin of the thyroid cartilage, which is likewise connected to the body of the hyoid bone on each side by an elastic ligamentous band.

The greater cornu is a long and flat bone, offering for description an external and an internal surface, a superior and an inferior extremity, and an anterior and a posterior border.

The superior extremity is flattened laterally, and consists of two projections. The superior of which is long and narrow, articulating with the temporal bone; whereas the inferior projection, looking downwards and backwards, is almost rectangular in figure. Between these two eminences the cornu is bounded by a concave margin in which is inserted the stylo-hyoid muscle.

The inferior extremity is irregular in figure, being prominent and rough on its external surface, concave and smooth internally: it articulates inferiorly with the middle cornu.

The external surface of the greater hyoideal cornu is concave, while a convex aspect is presented by the inner surface. Its anterior and posterior margins are almost parallel to about the middle of their length, but they diverge at either extremity, the anterior border being the most acute. Into one-half of the latter is inserted a yellow elastic expansion, which is likewise connected with the pterygoid process of the palatine bone.

The middle cornu is the shortest of the three; it articulates freely with the other two, and is almost perfectly cylindrical;

being, however, somewhat convex on its anterior surface, and concave on its posterior.

The inferior cornu is of greater bulk at either extremity than in the middle; and its internal concave and external convex surfaces join anteriorly in an acute margin. Inferiorly this cornu is related by diarthrosis with the body of the os hyoides.

Superiorly, the two greater cornua are implanted through the medium of elastic fibro-cartilage into deep concavities in the proximity of the styloid processes of the temporal bone. The two joints formed between the body and the inferior cornu, as likewise the other four articulatory connexions of the middle cornu, are lubricated by synovia and enclosed by appropriate capsules.

The tongue is a muscular organ. In its structure adipose tissue, glandular structure, bloodvessels, nerves, and mucous membrane enter as auxiliaries to its larger amount of muscular fibre. It is situated in the oral cavity, which is bounded inferiorly and laterally by the lower maxilla and molar teeth; anteriorly by the incisors; above by the anterior and superior maxilla and palatine bones; and posteriorly by the soft palate and fauces.

The shape of the tongue is that of a cone; but it is susceptible of a great variation according to the movements or position of the organ. Its base is attached to the hyoid bone, and laterally (immediately behind the last molars) by two folds of mucous membrane, which are continuous with the anterior palatine arches, constituting the lateral boundary of the isthmus faucium. Those folds are placed anteriorly to an aggregation of small glands opening into a common cavity, and are (from their situation and structure) comparable to the amygdalæ or tonsils of man and other animals.

The tongue is covered by mucous membrane which continues from the parietes of the mouth, and forms at the anterior and under surface of the organ a frenum admitting of great freedom of motion. Posteriorly the membrane is reflected over the velum palati; thence it is continuous into the pharynx and larynx, and also with the Schneiderian membrane, through the posterior nares.

The external mucous surface of the tongue is beset with papillæ, which, according to anatomical peculiarities, admit of division into three classes.

First, The papillæ vallatæ, vel circumvallatæ, from seven to

thirteen in number, are arranged in two converging rows at the posterior part of the tongue. Each of them consists of a little eminence like an inverted cone, sunk into a depression in the mucous membrane; the point of the cone is fixed, and the base is turned upwards, and surrounded by a trench, which is bounded by a prominent ridge of mucous membrane. Microscopic investigators have demonstrated that numerous ascending papillæ exist on the summit of each papilla vallata.

Secondly, The papillæ fungiformes, or capitatae, are small, and only seen on the sides of the tongue anteriorly. They resemble little inverted cones rising from the mucous membrane, having a red aspect, in consequence of the thinness of their epithelial covering.

Thirdly, The papillæ conicæ and filiformes present characters widely different from each other; but they admit of classification under one head, on account of the great development of their epithelium in the form of embricated scales. The papillæ conicæ are accumulated in an ellipsis on the medium part of the dorsum of the tongue; whereas the filiform papillæ are best seen at its apex, where they have a backward direction, and which gives rise to the feeling of roughness on passing the hand over the tongue from behind forwards.

On the posterior part of the organ are seen numerous follicles or recesses which are the openings of compound racemose muciparous glands. On each side of the frenum linguæ is a double row of conical papillæ, in the neighbourhood of which numerous little ducts pour forth the secretion of the sublingual glands. The Warthonian ducts, from the submaxillary glands, open more anteriorly than the former.

The three orders of papillæ above described are elevations of the epithelial and mucous covering of the tongue, including bloodvessels, which in the most complex papillæ form numberless loops.

As to the mode of the termination of nervous filaments in those papillæ into which they have been traced, I cannot offer a decided opinion; for the nervous loops which may be occasionally seen in a papilla under the microscope are, in all probability, not terminals of the filaments. The most recent examinations of Mr. Waller, of Kensington, are corroborative of the more probable opinion

that the nervous filaments in the papillæ of the tongue are somewhat coiled and then end abruptly.

The muscular substance of the tongue is partly intrinsic, viz. proper to the organ itself; and in part extrinsic, being attached to other parts besides the tongue. M. Lavocat arranges the intrinsic fibres of the tongue into five pairs of muscles. We cannot admit this nominal distinction, since all those fibres present two fundamental characters in common. First, They are all enveloped in the mucous membrane of the tongue, and mainly depend for fixity on the hyoid bone. Secondly, They have the same function; since the tongue of the ox does not, like that of man, admit of the numerous variations in shape which are indispensable for the articulation of sound. We shall restrict ourselves to the classification of the muscular structure of the tongue into longitudinal, oblique, and transverse fibres.

Four pairs of extrinsic muscles belong to the tongue; these are the hyoglossi, longi, breves and superiores, also the genio-hyoglossi.

The hyoglossus longus extends from the base to the apex of the tongue. It arises from the inferior and external part of the greater cornu of the os hyoides, and in its progress forwards, becoming flattened and broader, it is attached to the sides of the tongue, being continuous as far as its apex, where it joins its fellow from the opposite side. At the superior and anterior part, this muscle is covered by the mucous membrane of the tongue. It is in contact inferiorly with the sublingual gland, internally with the hyoglossus brevis and genio-hyoglossus. It is crossed by the gustatory nerve, and at its origin it lies just above the lingual nerve and artery, while along its inferior border the ranine artery takes its course.

Hyoglossus brevis or *basioglossus*, is a flattened muscle, parallel-ogramical in figure, its coarse fasciculi run from the tubercle of the os hyoides forwards and upwards to the sides and base of the tongue.

At the origin its fibres are attached to the genio-hyoideus, and are in contact with the mylohyoideus. On the external surface of the basioglossus traverse the lingual and gustatory nerves; internally the muscle is related to the lingual artery, and also to the genio-hyoglossus.

Hyoglossus superior is fine in texture, in consequence of the minuteness of its fasciculi, which run forwards and upwards with a very slight obliquity. It consists of two flat strips of muscle inserted into the base of the tongue, but having different origins; the one arises from the inner part of the inferior hyoideal cornu, and is in close proximity with the origin of the hyoideus transversus muscle. The other strip or bundle proceeds from the external and superior part of the same cornu, and is only separated from the basioglossus by a small quantity of adipose tissue.

Genio-hyoglossus is a flat muscle composed of coarse bundles of fibres, which radiate from the symphysis of the lower maxilla and tendinous origin of the genio-hyoideus towards the free portion of the tongue, perpendicularly into its substance, and backwards into its base; the fibres acquiring a firm attachment to the middle and inferior cornu of the os hyoides.

Soon after the submaxillary artery has arisen from the external carotid, it gives origin to the lingual artery, which passes between the greater and lesser cornu of the os hyoides; and traverses the hyoideus parvus muscle, anteriorly to the lingual nerve. Beneath the substance of the hyoglossus brevis or basioglossus (to which it furnishes arterial twigs), the lingual gives off the sublingual artery.

From this vessel, immediately at its origin, a branch proceeds backwards, inwards, and upwards, supplying with blood the genio-hyoideus, genio-hyoglossus, and hyoglossus brevis, and expending its ultimate ramifications at the isthmus of the fauces and base of the epiglottis.

The sublingual artery then makes a curve downwards and forwards along the inferior border of the genio-hyoglossus; it furnishes a few branches to the sublingual gland, but supplies more especially the adjacent muscles, and ends in the mucous membrane on the sides of the tongue.

After giving off the sublingual, the lingual artery passes forwards anteriorly to the lingual nerve, and in its course is crossed by the gustatory. It is related internally to the genio-hyoglossus, externally to the hyoglossus longus, to both of which it supplies branches; but the greater part of the blood conveyed by it is distributed to the substance of the tongue, to the tip of

which the lingual artery reaches, being here considerably decreased in caliber. This artery is often called "the ranine," on account of its tortuous course when the tongue is retracted into the mouth.

The tongue is supplied with nervous influence from the fifth, eighth and ninth pairs of cephalic nerves.

The gustatory nerve, springing from the inferior maxillary division of the fifth, passes between the internal masseter muscle and ramus of the inferior maxilla. At the base of the tongue it crosses the hyoglossus longus, and distributes a few filaments to the glandular structure in the vicinity, and to the genio-hyoglossus muscle.

Traversing the hyoglossus brevis, the gustatory furnishes a considerable branch to the sublingual gland, while its main trunk, in company with the lingual nerve, proceeds to the tip of the tongue.

The lingual or hypoglossal nerve (the ninth pair of Willis and twelfth of Soemmering) has its apparent origin from the medulla oblongata, by several scattered funiculi, issuing between the pyramidal and olivary bodies. Stilling has traced the deep origin of the lingual nerve to the floor of the fourth ventricle.

It makes its exit from the cranium through the foramen condyloid anterior, where the nerve is in proximity to the occipital artery; it next takes its course alongside the superior cervical ganglion, crosses the pneumogastric nerve, and the carotid artery. Posteriorly to the lingual artery, it sends filaments to the hyoglossus brevis and genio-hyoideus; and then divides into two branches, the least of which enters at once, in an oblique direction, into the substance of the tongue; while the principal division, after passing between the two genio-hyoglossi, also enters the substance of that organ.

The glosso pharyngeus (the origin and primary course of which we shall describe when treating of the pharynx) is one of the nerves of the tongue. At the supero-anterior part of the pharynx it crosses over the hyo-pharyngeus muscle, under the greater cornu of the hyoid bone, whence it proceeds to the base of the tongue, in the papillæ of which many of its ultimate fibres are traceable.

The larynx is situated at the superior part of the trachea and at the posterior part of the tongue; it is attached to the body of the os hyoides, and opens superiorly into the pharynx in a direct line with the posterior nasal apertures.

The functions which the larynx is destined to fulfil in the animal economy demand that it should maintain a definite shape, and yet admit of considerable movement. These two objects are attained by the cartilaginous structure of the organ rendering it at once solid and flexible, and by the subdivisions of the cartilaginous parietes into several pieces, admitting of a free movement; in effecting which, the active agents are appropriate muscles.

The larynx is separated from the longus colli muscle superiorly by the pharynx and origin of the esophagus. Inferiorly it is in relation with the subscapulo-hyoidei and sterno and thyro-hyoidei muscles, laterally with the parotid duct, the sub-maxillary and parotid glands, the external carotid artery, and the pneumogastric and sympathetic nerves.

Besides bloodvessels and nerves, muscles and mucous membrane, five cartilages enter into the composition of the larynx. These are the cricoid, thyroid, epiglottis, and two arytenoid.

The thyroid cartilage (so called from its shield-like form) is a broad plate, convex on its anterior and concave on its inner surface. On the inferior part of its convex margin it presents a prominence with a central depression for the insertion of muscles. Laterally it is quadrilateral and flat, being bounded by a concave border. Its superior margin presents three concavities and four convexities; the two posterior of these are united to the extremities of the body of the hyoid bone by ligamentous bands manifestly elastic, but also containing some white fibrous tissue, as denoted by their glistening aspect.

From the postero-inferior part of the thyroid cartilage, on each side, proceeds a cartilaginous cornu, curved downwards and backwards, so as to form with the cricoid two synovial articulations.

The thyroid cartilage is further united to the cricoid at its antero-inferior portion by an expansion of yellow elastic tissue; while two thyro-hyoid ligaments unite it to the body of the hyoid bone extending alongside the thyro-hyoid muscles.

The internal or superior surface of the thyroid is lined by mucous membrane; it is attached to the base of the epiglottis by the thyro-epiglottic ligament, and corresponds to the thyro-arytenoideus and crico-arytenoideus muscles.

The cricoid cartilage may be considered as the basis of the

larynx, since it forms a perfect ring, and on it the arytenoid and thyroid cartilages move freely in virtue of their synovial articulations.

Posteriorly, the cricoid is broad and elevated into a prominent ridge on its median line, which is bounded by two lateral depressions, in which the crico-arytenoidei postici are firmly implanted. Superiorly and laterally the cricoid forms two synovial joints with the arytenoids, to which it is also attached by two small ligaments. Inferiorly and laterally two synovial joints are formed with the cornua projecting from the thyroid cartilage.

Tracing the cricoid from this broad and expanded portion forwards, we find that it gradually diminishes in magnitude, being attached at its superior border to the thyroid by the crico-thyroid elastic ligament, and at its inferior margin to the first tracheal ring by mucous membrane and yellow elastic tissue.

The two arytenoid cartilages articulating with the supero-posterior part of the cricoid, and united to each other by a thin lamina of white fibrous tissue, are small in comparison to the magnitude of the other cartilages entering into the composition of the larynx, and they form the boundaries of the superior laryngeal or glottal opening. These cartilages are lined anteriorly by the mucous membrane of the larynx; posteriorly, they are in contact with the arytenoid muscle, and are also connected anteriorly by muscle and elastic ligament to the thyroid and epiglottis.

Each arytenoid is irregular in shape, but may be compared to a pyramid, the apex of which is curved backwards. The internal or anterior surface is almost flat, merely presenting a slight convexity above and a concavity below. On the exterior of the arytenoids a prominent ridge separates two surfaces, the anterior of which is the smallest, triangular-shaped, and flat. The base of the arytenoid is a concave articular surface, bounded anteriorly and laterally by two projections of cartilage extending downwards. The borders of the arytenoids are thin, the anterior one being convex, the posterior concave.

The epiglottis is of a semi-ovoid shape, and presents for consideration a base, an apex, and two surfaces. The base (which is the point of insertion of the hyo-epiglottideus muscle) is attached to the thyroid cartilage by a short ligament.

The anterior surface corresponds to the inferior border of the velum palati: it is covered by a mucous membrane, and is concave in its longitudinal axis, but convex from side to side. The posterior surface, covered by the laryngeal mucous membrane, is convex from above downwards, but laterally it is concave. It is attached by ligamentous expansion to the anterior border of the arytenoid cartilages, and with which it contributes to the formation of the glottal opening.

The apex of the epiglottis is rounded off, and directed forwards towards the posterior surface of the velum palati.

The interior of the larynx in the ox is far more simple than in the horse; in it we do not perceive any lateral ventricles or vocal ligaments.

The glottal opening, which is situated at midway the length of the larynx, is bounded anteriorly by the thyro-cricoid ligament and base of the epiglottis, posteriorly by the arytenoid cartilages, and laterally by the margins of the epiglottis and arytenoids, and by the fibrous tissue uniting them.

To the larynx belong six pairs and two single muscles; viz. the thyro-hyoidei, crico-thyroidei, crico-arytenoidei laterales, crico-arytenoidei postici, thyro-arytenoidei, and the aryteno-epiglottidei, with the arytenoideus, and hyo-epiglottideus.

The thyro-hyoideus is a flat muscle placed on each side of the larynx, and is broader anteriorly than posteriorly. It is attached anteriorly to the postero-inferior and lateral parts of the body of the os hyoides; posteriorly it is inserted into the margin of the thyroid cartilage. It is related above to the thyro and hyo-pharyngeus, below to the sterno-thyroideus. Along the border of the thyro-hyoideus is a yellow elastic ligament, stretching from the inferior part of the hyoid bone to the extremity of the thyroid cartilage.

Crico-thyroideus is a short muscle attached to the external surface of the cricoid cartilage and the posterior border of the thyroid.

Crico-arytenoideus lateralis arises from the supero-anterior border of the cricoid cartilage; its fibres then spread out and re-assemble to gain insertion into the apophysis at the posterior part of the arytenoid cartilage.

Crico-arytenoideus posticus is attached to the posterior surface of the cricoid cartilage, and to the inferior portion of the arytenoidean apophysis.

The thyro-arytenoideus is thin and broad, placed on the interior of the wing of the thyroid cartilage, whence it originates, and is inserted into the apophysis and anterior border of the arytenoid.

Aryteno-epiglottideus is a narrow muscle, situated at the superior part of each thyro-arytenoideus, its fibres running backwards and upwards. It is inserted into the inferior part of the posterior border of the epiglottis and to the sides of the arytenoid cartilage.

The arytenoideus may be considered as a single muscle, its fibres extending from the excavated and lateral parts of the arytenoid cartilages, and uniting in a median line, which is distinguished by the accumulation of a little fibrous tissue.

The hyo-epiglottideus is essentially a single, although its appearance at the supero-anterior part is that of a bifid, muscle. We may describe it as originating from the inner surface of the lesser cornu of the hyoid bone, by two fleshy bundles, which gain a common attachment to the inner surface of the body of the os hyoides, whence one muscle, partially cleft superiorly, proceeds to the base of the epiglottis.

The mucous membrane of the larynx is peculiar for its remarkable vascularity and sensibility, and likewise for the number of the muciparous glands imbedded within it. It is a prolongation of the buccal membrane, which is reflected over the anterior surface of the epiglottis, and lines the whole of the laryngeal box, being thence continuous into the minute ramifications of the air-tubes in the lungs: forming, in fact, a part of the great system of the gastro-pulmonary mucous membranes.

The larynx is in part supplied with blood by a vessel proceeding to the base of the epiglottis from the lingual artery arising near to its origin.

The pharyngeal likewise furnishes a few arterial twigs to the larynx; but the principal vessel which supplies this organ is the laryngeal artery, derived from the carotid, which gives off a branch to the thyroid body before it pierces the crico-thyroid ligament, to ramify on the mucous membrane lining the larynx.

Nervous filaments are distributed to the larynx from the sympathetic, but its chief sources of nervous supply are the superior

and inferior laryngeal recurrent nerves, both of which are derived from the pneumogastric.

The superior laryngeal nerve, after its separation from the pneumogastric, runs under the lingual and glosso-pharyngeal nerves, and pierces the postero-superior angle of the thyroid cartilage, distributing a few filaments to the thyro-arytenoid muscle, but principally to the mucous lining of the larynx. On the inner surface of the thyroid cartilage a remarkable interchange of fibres is effected between the superior and inferior laryngeal nerves.

The inferior laryngeal or recurrent nerves are ramifications of the pneumogastrics within the thorax, each of them originating at a different situation. Thus the recurrent laryngeal on the right side separates from the pneumogastric opposite the first intercostal space, whereas the left recurrent originates opposite the fourth rib; thence, taking a direction, first backwards, to embrace the aorta, and next forwards, to reach, with its fellow, the posterior part of the trachea, along which both nerves take an upward course: being related, superiorly, to the longus colli; inferiorly, to the trachea; internally, to the esophagus (to which they supply a few filaments); and externally to the carotid artery, and to the pneumogastric and sympathetic nerves. At the inferior part of the larynx the two recurrents interchange a few fibres, underneath the alæ of the thyroid cartilage, with the superior laryngeals; they are then indiscriminately distributed to the laryngeal muscles. It only remains further to add, that a considerable branch proceeds to the pharynx from each of the inferior laryngeal nerves.

THE PHARYNX.—The commonly accepted definition that the pharynx is a musculo-membranous sac, of a conical shape, is not strictly correct; since the floor of that organ is formed by the larynx, from the cartilaginous parietes of which the pharyngeal muscles gain their fixed attachment.

Laterally, it is bounded by the hyoideal cornua, and anteriorly and posteriorly it communicates with the mouth and esophagus. The pharynx is related superiorly to the cuneiform process of the occiput and to the origin of the longus colli; its sides are in contact with the submaxillary artery, the gustatory, glosso-pharyngeus and lingual nerves, while the internal carotid, the pneumo-

gastric, and superior cervical ganglion of the sympathetic nerve, are situated in its roof. Although this organ is fixed by muscular insertions to the hyoid bone and to the laryngeal cartilages, still it enjoys considerable freedom of motion by virtue of the looseness of its surrounding connexion, and the large amount of yellow elastic tissue which envelops its roof and sides.

In the interior of the pharynx we observe seven openings; viz. the aperture into the mouth, and that into the esophagus; the laryngeal and the two posterior nasal openings, besides the two apertures of the Eustachian tubes. If, however, the term pharynx be restricted to that space which, during the act of deglutition, is bounded superiorly by the soft palate (drawn backwards and rendered tense to meet the anterior dilators of the pharynx), then only three openings into that cavity deserve to be mentioned; viz., the oral, esophageal, and the glottal aperture. The last named, during deglutition, is closed by the epiglottis; the pellet of food travelling over it as crossing a bridge.

The pharyngeal muscles admit of a physiological distinction into three pairs of dilators and three pairs and one single constrictors. The former are named the stylo-ptyerygo, and hyo-pharyngei, and the latter the hyo, thyro, crico, and aryteno-pharyngei.

The stylo-pharyngeus is narrow and pointed at its origin; in its descent the fibres diverge, so that the terminal portion of the muscle is broad and flat. It arises from the root of the styloid process of the temporal bone, and is inserted into the posterior part of the velum palati and supero-anterior portion of the pharynx.

This muscle passes downwards from its origin at an acute angle from the tensor palati, and meets inferiorly with the pterygo-pharyngeus; so that these three muscles may be described as forming a triangle, of which the two former are the sides and the latter the base.

The pterygo-pharyngeus is a flat muscle, comparatively thin in texture, its fibres being directed obliquely from above downwards and backwards: on its exterior we perceive a thin stratum of yellow elastic tissue. It is attached anteriorly to the pterygoid process and crista of the palatine bones, and posteriorly into the antero-lateral part of the pharyngeal parietes.

Superiorly it is covered by the origin of the masseter internus;

anteriorly it is in contact with the glandular structure of the velum palati; and, internally, with the insertion of the stylo-pharyngeus.

The hyo-pharyngeus (dilator) arises from the under surface of the greater cornu of the os-hyoides just above its middle. It bifurcates in its downward course; one portion becomes implanted into the upper and anterior part of the thyroid cartilage, while the other slip of the muscle passes downwards and forwards to the under part of the pharynx.

This muscle is related internally to the glosso-pharyngeus nerve, and anterior constrictor of the pharynx; inferiorly and externally with the hyoideus parvus, and the tendinous insertion of the hyoideus magnus.

Of the three pairs of pharyngeal constrictors the first is the hyo-pharyngeus. This muscle may be distinguished into one main portion and several accessory fasciculi. The main portion of the muscle arises from the body of the os hyoides, and passes in a slightly oblique line upwards and forwards, to meet its fellow on a median line at the posterior part of the pharynx, where it receives some secondary fasciculi; one fasciculus proceeds upwards and backwards from the posterior margin of the middle and greater cornu across the hyoideus parvus, and then bifurcates, one portion of which goes to the under surface of the hyo-pharyngeus, while the other continues along its anterior border. The three other fasciculi, arising from the lower surface of the greater cornu of the hyoid bone, continue to the under part of the hyo-pharyngeus.

This muscle is related at its origin to the hyoideus parvus and magnus; and internally to the hyo-pharyngeus (dilator) and glosso-pharyngeal nerve.

Thyro-pharyngeus.—From the upper and outer surface of the thyroid cartilage its fibres ascend to blend with those of the opposite muscle. From its relative situation with the two other constrictors, the thyro-pharyngeus is also called the constrictor pharyngeus medius.

The crico-pharyngeus, or posterior constrictor of the pharynx, arises from the cricoid cartilage, and converges towards the raphé on the roof of the pharynx. It is in connexion posteriorly and laterally with the thyroid body; and postero-superiorly with the

commencement of the esophagus, with the fibres of which it has, however, no direct communication.

Beneath these constrictor muscles is a layer of yellow elastic tissue, which extends from the under part of the hyoid bone to the thyroid cartilage, and separates the constrictors from the aryteno-pharyngeus.

Aryteno-pharyngeus is a single flat muscle remarkably developed in the ox; it proceeds from the inner border of the arytenoid cartilages to the superior and anterior part of the pharynx; superiorly it is covered by a layer of yellow elastic tissue, while its under surface is lined by the pharyngeal mucous membrane.

The mucous membrane of the pharynx abounds in muciparous follicles; it is continuous posteriorly and inferiorly with the lining of the esophagus and trachea, superiorly and anteriorly it is extended into the mouth, nasal cavities, and Eustachian tubes. It is but slightly adherent by submucous cellular tissue, so that in consequence of the folds which it forms it admits of varieties in the caliber of the pharynx.

The main artery proper to the pharynx is the pharyngeal, a branch of the submaxillary. It supplies with blood the lymphatic glands in the vicinity and the hyo-pharyngeus (constrictor); it likewise ramifies among the muscles of the pharynx, and terminates on its lining mucous membrane.

It may have been remarked that I have omitted to describe the veins which return the blood from the tongue, larynx, and pharynx. This I have purposely done, being of opinion that in consequence of all the blood from the head being returned by the jugular veins, a cursory description of the venous branches by which the arteries before described conduct their blood would suffice.

Beneath the mucous membrane of the tongue is a net-work of veins, assembled at the inferior surface of that organ, as seen more particularly at its frenum; extending thence into the submaxillary vein, and which in its course backwards receives tributary branches from the larynx and pharynx, and then terminates in the external jugular vein. A few of the posterior laryngeal veins convey their blood into the internal jugulars.

The nerves of the pharynx are a few filaments from the superior laryngeal, also the pharyngeal branch of the pneumogastric, the glosso-pharyngeus, and a large branch from the superior cervical ganglion of the sympathetic.

The pharyngeal branch of the pneumogastric passes downwards and forwards in company with the pharyngeal artery. Between the hyo-pharyngeus (dilator) and constrictor pharyngeus anticus, it enters the pharynx to ramify on its mucous membrane.

The glosso-pharyngeus, or eighth cephalic nerve, emerges apparently from between the restiform and olivary bodies; but its fibres may be traced back to a little collection of grey matter in the floor of the fourth ventricle.

It issues from the cranium through the foramen lacerum basis cranii, together with the pneumogastric and spinal accessory, and crossing in its passage the internal carotid artery, it gives a loop or anastomosing branch to the pharyngeal division of the sympathetic. After this it takes a course downwards and forwards under the greater cornu of the os hyoides, and sends off filaments to the upper parts of the pharynx. It next crosses over the hyo-pharyngeus, and proceeds to the base of the tongue, as already described.

From the inferior part of the superior cervical ganglion issues a nerve of considerable magnitude, which descends backwards in conjunction with the trunk of the sympathetic and pneumogastric nerves and carotid artery; it then divides into several ramifications, which supply the four constrictors of the pharynx.

“Nullum sine labore natura dedit mortali homini.”

