LECTURES ON THE VARIETIES IN THE MUSCLES OF MAN.

Delivered at the Royal College of Surgeons of England.

By G. M. HUMPHRY, M.D., F.R.S.,

Lecturer on Anatomy and Physiology in the College; Professor of Anatomy in the University of Cambridge; etc.

LECTURE I.—Monday, June 2nd, 1873.—(Concluded.)

MUSCLES OF THE THORAX.

THE rectus abdominis varies a little in the number and site of its inscriptions and in the range of its attachment to the puses. The most remarkable varieties, however, associated with it, are the occasional recurrence in the thoracic part of the trunk of two muscles longitudinally disposed and situated, the one on the superficial aspect of the pectoral muscles, and the other beneath them, and lying close upon the ribs. They are interesting reminders of the primitive disposition of the sheets of the ventral muscle at this part, and as such deserve a more particular notice. The names which I would apply to them are "rectus thoracicus superficialis," and "rectus thoracicus profundus."

The former has usually been designated "sternalis." It was found by Professor Turner in about three per cent. of subjects examined; by Professor Gruber in five out of 95.* The following description, taken from a specimen in the Cambridge dissecting-room, gives a good idea of the muscle as it most commonly presents itself. The subject was a well developed muscular male. A flat, nearly vertical muscular band, about an inch wide, overlaid the costal cartilages on the right of the sternum. Below, it was attached, tendinous, to the third, fourth, and fifth costal cartilages; the tendon to the third cartilage being concealed beneath the muscle. Above, it became aponeurotic. Externally it radiated upon the pectoral muscle,† and internally it was partially attached to the middle of the manubrium, and was partially continuous with the mesial tendon of the right sterno-mastoid. The pectoralis muscle extended beneath it in the intercostal spaces, reaching, in these spaces, to the sternum; but on the costal cartilages the fibres of the pectoral stopped near the outer margin of the rectus thoracicus superficialis. Thus the range of the pectoral on this side was curtailed to some extent by the presence of the abnormal muscle. In the instance I am describing, the abnormality was confined to the right side. It has been met with, however, on either and on both sides. In some instances, it was a mere delicate slip, placed more superficially with regard to the pectoral. In some, it extended upon and was lost in the aponeurosis of the external oblique; in one instance, blending with that aponeurosis over one of the inscriptions in the rectus; but it was usually attached to the cartilages of one or more ribs below, and to the sternum. Above, it was usually attached to a costal cartilage, or it was partially or wholly continuous with the tendon of the sterno-mastoid. In some instances, it crossed the sternum to the opposite side. It has been found marked with inscriptions like those in the rectus abdominis; but it has not in any instance been distinctly traced into continuity with the fibres of that muscle. It has been divided longitudinally into two or three muscles, though usually it was undivided. The pectoral muscle was commonly curtailed more or less, as in the example I have given above. In one of Turner's cases, the pectoral muscle was perforated by the sternalis on its way from the costal cartilage to the surface; and in two cases some of the fibres of the abnormal muscle joined the pectoral near its sternal origin. Though situated laterally with regard to the sternum at its lower part, it, in most instances, inclined inwards upon the surface of the bone as it ascended. One of the interesting features of the rectus thoracicus superficialis is its variability, scarcely any two recorded specimens being alike; and, secondly, it does not correspond with any regularly developed muscle in lower animals.

With regard to its morphology, three views present themselves, and have found their advocates. First, that it is to be regarded as an extension of the rectus abdominis upwards. Secondly, that it is an extension of the sterno-mastoid downwards. Thirdly, that it belongs to the superficial or platysma series. Of these, the second hypothesis is, I think, the

most nearly correct. With regard to the first of these views, the rectus abdominis lies in a deeper plane; and when it is continued upon the thorax, in the lower animals or in Man, it lies beneath the pectoralis major, and forms what I designate the rectus thoracicus profundus.

With regard to third view, the platysma, or subcutaneous layer, is in a more superficial plane than the muscle in question. It is lost in the skin, and is not, even in this region, so far as I know, connected with the sternum or costal cartilages, with the aponeurosis of the oblique, or with the tendon of the sterno-mastoid.*

There is, I think, little doubt that the muscle belongs to a plane intermediate between that of the platysma and the rectus abdominis, and is a part or representative of the longitudinal fibres of what I have elsewhere described† as the superficial brachiocephalic layer of the ventro-lateral muscle, of that layer in which the external oblique, the pectoralis, the trapezius, and the sterno-cleido-mastoid are formed. In the primitive state, as in the Lepidosiren and the Snake, the layer is continued inwards, without interruption by a pectoralis, from the abdomen, where it forms a superficial stratum of the rectus, over the thorax into the sterno-mastoid and the trapezius. The pectoralis major of higher animals is formed by the diversion to the upper limb of the thoracic, or sternal, part of this stratum; and thus the direct connection or continuity between the sterno-mastoid and the superficial layers of the rectus, or their representative—the external oblique—is severed. The struggling efforts however, as it were, at the formation of this continuity occasionally assert themselves, and lead to the formation of the muscle in question. Being, therefore, an extension upon the thorax of that which, in the primitive condition, constitutes a superficial sheet of the rectus abdominis, but which in higher animals is converted into the aponeurosis of the external oblique, its true character and morphology are best expressed by the name "rectus thoracicus superficialis"; and it is thereby distinguished from, and its relations are shown to, the "rectus thoracicus profundus", which is an extension of the deeper layers of the rectus, that is, of those layers which form the rectus abdominis of mammals.

The not unfrequent appearance of the rectus thoracicus superficialis in Man may, perhaps, be associated with the space or vacancy afforded by the flatness or insinking of the front of his chest in this situation, which affords an opportunity for the development of these muscular fibres. This peculiarity of form, though less evident in the foetal state, may, even then, be so far a feature in the conformation of the human figure as to induce the occurrence of the anomaly in question.

I have already alluded to the extension of the rectus upon the thorax beneath the pectoral muscles forming the "rectus thoracicus" proper or "profundus." This muscle is commonly present in the lower animals, reaching as far as the first rib, but is rare in Man. Indeed, I have not met with a recorded instance which is distinctly of that nature. Muscles, however, are not unfrequently met with in Man, which may be regarded as portions of the deep rectus series, although they are not continuous with the rectus abdominis, and although they are situated somewhat more laterally than it. Such is the muscle, described as "rectus thoracicus" by Wood and Turner,‡ extending beneath the pectoralis minor, from the fifth and fourth ribs to the first rib, where it was inserted a little external to the attachment of the subclavius. It was separated from the rectus only by the breadth of the fifth rib, which, as Professor Turner remarks, is comparable with one of the tendinous intersections in the rectus. Such also is the "supracostalis" muscle of Wood and others, which has been observed passing from ribs below the first to the first, and in some instances, extending to the cervical fascia, so coming into contact with or blending with the sterno-thyroid. Such again are those extensions of the scaleni, or of muscles arising immediately in front of them from the cervical transverse processes, which are sometimes found in man and are frequent in animals, and pass down to variable distances upon the ribs.§ It will thus be seen that these several muscles—the rectus thoracicus profundus, the supracostalis, or costofascialis, as it has been also called, and the extensions of the scaleni—form a series of connecting links between the rectus abdominis, below, and the deep cervical muscles—the sterno-thyroid, the omo-hyoid, and the scaleni—above; while the rectus thoracicus superficialis is a connecting link between the elements of the more superficial abdominal stratum—the external oblique which is developed from the superficial elements of the rectus—below, and the superficial cervical muscles, as represented by the sterno-cleido-mastoid, above.

* Such a connection of the platysma with the costal cartilage is, however, indicated as having been seen by Teichmann.—Heule, 108.

† Observations in Myology, p. 132.

‡ Journal of Anatomy, ii, 392; and iv, 300. See also Guy's Hospital Reports, xiv, 439; and Bochdalek, Virchow's Archiv, 1867.

§ These are sometimes described as muscles arising from the ribs and joining the scaleni.

* Mem. de l'Acad. Imp. de St. Petersburg, l. iii, 1860.

† In two of Turner's cases (Journal of Anatomy, i, 247), the outer fibres ended superficially in the upper part of the pectoral aponeurosis.

MUSCLES OF THE NECK.

In the antero-lateral region of the neck the muscles are disposed in three layers, viz., a subcutaneous—pannicular, or platysma—layer, a superficial brachiocephalic—sterno-cleido-mastoid and trapezius—layer, and a deep brachiocephalic—sterno-hyoid, sterno-thyroid, and omo-hyoid—layer. These three layers are the produce of stratification from a single primitive sheet which, in some of the lower animals, as the limbless vertebrates, still remains, to a great extent, a single stratum, and retains its direct continuity with the abdominal part of the ventral muscle. The peculiarities of the digastric muscle, I have elsewhere* shown, are in a great measure due to the continued blending of parts of two of these layers, the posterior belly being derived from the deep layer, the anterior belly from the superficial layer, and the intermediate tendon being a remnant of one of the transverse septa of the primitive unstratified ventral muscle. I will now endeavour to show that the greater number of the muscular varieties of this region in Man are due to imperfect separation of these layers, or to imperfect limitation of the segments or muscles which are formed from them respectively.

The pannicular layer of muscle which varies so much in range and disposition in the lower animals is not subject to frequent varieties in Man. It is in him usually limited to the cervical region; though instances of its development in the back in the form of longitudinal slips overlying the trapezius have been met with.† It has also been found extending upon the sternum and connected with the sternal fascial opposite the third costal cartilage; and in one instance a band of it stretched from the sternal fascia, between the second and third ribs, obliquely downwards and outwards, to near the tendon of the latissimus dorsi.‡ Fibres also have occasionally extended transversely from over the trapezius to the parotid fascia, and from the mastoid process and the parotid fascia beneath the chin to the middle line, where they met and blended with similar fibres from the opposite side.§ Thus they formed a muscle which resembled the cervicis submaxillaris and the transversus colli of some Saurians and Snakes.

Occasional remnants, indicative of imperfect segmentation from the subjacent strata, are furnished by slips passing from the platysma to the sterno-mastoid and the sterno-thyroid.

Curious and interesting illustrations of a transverse direction of fibres associated with a blending of the subcutaneous with the deep strata are presented by the three instances of the occipito-hyoid, described by Mr. Perrin.|| The muscle passed from the occiput superficial to the trapezius, across the outer surface of the sterno-mastoid, and dipping inwards, was connected with the great cornu of the hyoid bone in one, with the same cornu and with the body of the hyoid, passing between the hyo-glossus and the middle constrictor of the pharynx, in a second, and with the body of the hyoid in a third. Such a muscle would perform the same office as the stylo-hyoid; and in the third example given that muscle was absent. In the other two examples, however, the stylo-hyoid, as well as the posterior belly of the digastric, was as usual. These occipito-hyoids, as pointed out by Mr. Perrin, much resemble the stylo-hyoid in the bird. This muscle I find in the peacock, arising from the outer side of the angle of the mandible, and passing to the hyoid and the muscles running forward from the hyoid to the tongue. It also, in this animal, receives a slip, which arises from the base of the skull, and takes its course by the inner side of the angle of the jaw, and which therefore occupies much the usual position of the mammalian stylo-hyoid. The blending of these two superficial and deep elements into the one muscle in the bird, is a feature of interest in connection with the anomalous muscle which we are considering, and shows that it may be regarded as an appendage, a superficial appendage, to the stylo-hyoid and the digastric. To this I will recur.

Among the components of what I designate the superficial brachiocephalic layer of the neck, the sterno-cleido-mastoid is sometimes imperfectly segmented from the trapezius, the continuity being maintained by one or more remaining connecting slips, which pass from the one to the other;¶ or a separate band, a cleido-occipital, segmented from between them, may pass from near the middle of the clavicle to the occiput. The muscle, thus named by Wood, is of frequent occurrence, is sometimes connected by slips with the sterno-cleido-mastoid, and is com-

monly more closely related to it than to the trapezius, being thus, I think, to be distinguished from the cephalo- and cervico-humeral slips, also of frequent occurrence, and which are more closely related to the trapezius. I may here observe, that the regular fibres of the sterno-cleido-mastoid, which arise from the clavicle, cross obliquely beneath the sternal fibres and pass to an anterior and deeper part of the mastoid process; but the fibres of the segmented, or non-combined portion, which form the cleido-occipital, instead of taking this course, are inserted behind, and in the same plane with, the sternal fibres, between them and the trapezius. We shall find that a similar disposition to connect themselves with the superficial layers of the respective muscles often holds good in the case of the supplementary fibres, frequently present in connection with the lower edges of the pectoralis major and the latissimus dorsi, although, normally, the lower fibres of these muscles form their deeper layers.

The imperfect limitation of the sterno-cleido-mastoid is further illustrated by instances in which bands have been found passing from it to the mandible and to the platysma, as well as by those, already alluded to, which it extended upon the sternum, in continuity with the rectus thoracicus superficialis.

Macalister* notes an absence of the sternal head. The clavicular portion is sometimes divided into two; but varieties in this muscle, which has important and defined functions not shared by any other muscle and not differing much in different animals, are not very frequent, or of a marked kind.

I have on former occasions† shown that the anterior belly of the digastric is a derivative from the superficial stratum of the brachiocephalic part of the ventral muscle, and that the disposition of the muscles in this submental or submaxillary region varies a good deal in different animals. In some lower animals more particularly, as Lepidosiren, Ceratodus, Snakes, and many Saurians, the stratum is composed chiefly of transverse fibres passing from the spine, the sides of the head, and the sides of the mandible, meeting or blending in the middle line, and forming the muscles designated in different animals and by different authors as subcutaneous colli, cervicis submaxillaris, compressor faucium, etc. Of these, the mylo-hyoid is the most distinct representative in Man. In some mammals, the fibres of the mesial part of the stratum take a longitudinal direction, and, passing from the sternum to the chin, form a sterno-mental;‡ or it may, as in the Hippopotamus,§ be broken by connexion with the hyoid, in front of which it forms a hyo-mental muscle; whereas behind the hyoid it seems partly to be blended with the sterno-hyoid, and partly with the thick transversely fibred subcutaneous colli. Of these longitudinal muscles—of the hyo-mental part, at least—the anterior belly of the digastric is the representative in Man; and the frequent and numerous varieties to which it is subject in him are interesting reminders of the instability of the muscles of this region, and of the different combinations which the fibres of this part of the stratum undergo in different animals. I have not met with an example of the absence of the anterior belly of the digastric; indeed, its variations are on the side of excess, rather than of deficiency. It is often—in 7 or 8 per cent. of subjects examined—double, or furnished with additional slips. These, or the additional belly, may take a more or less transverse direction, after the manner of the transversely disposed fibres in lower animals. Thus they may pass outwardly to the mandible near its angle, or to any point between the angle and the chin—so constituting, in some instances, simply a wider insertion of the muscle; or it may be a slip passing from the angle of the jaw to the muscle; or the additional portion may pass inwardly, blending with a similar slip or belly from the opposite side, or meeting it in a *raphé* in the middle line, or decussating with it, and inserted into the opposite side of the mandible; or there may be a slip passing from the muscle of one side across the middle line to that of the other side. In one instance, the two anterior bellies simply decussated, each being inserted in the usual site, but on the opposite side from that in which it sprang.|| Again, the anterior belly, or the additional belly or slip, may be imperfectly segmented from—that is, may remain blended with—the mylo-hyoid. On the other hand, the additional portion may take a longitudinal direction, and represent, more distinctly than the regular anterior belly does, the hyo-mental or the fore part of the sterno-mental of the Hippopotamus or the Chlamydophorus. Thus a muscle has been

* *Observations on Myology*, p. 136.

† Turner and Perrin, *Journal of Anatomy*, v, 116 and 241.

‡ Wood, *Proceedings of the Royal Society*, 1866, p. 229; and 1867, p. 522.

§ It was named "accessorius menti" by Kelch, who met with two instances; and is also described by Wood, *Proceedings of the Royal Society*, 1867, p. 522.

|| *Journal of Anatomy*, v, 251. One of these was two-bellied—that is, judging from the drawing, was interrupted over the sterno-mastoid by a fibrous interval. I have seen a similar, though less distinct, interruption in the trachelo-mastoid, where it lay over the transverse process of the atlas. Such intersections in muscles, when they lie upon other muscles or bones, are for the purpose of diminishing their bulk at those parts, and are not uncommon.

¶ In one instance (*Guy's Hospital Reports*, xiv), such a band passed from the sternal portion across, behind the clavicular origin, to the trapezius.

* *Proceedings of the Royal Irish Academy*, April 23rd, 1866.

† See my *Observations on Myology*, p. 136.

‡ *Observations on Myology*, 137.

§ This muscle is well developed in the little Chlamydophorus, passing clear over the hyoid and quite unconnected with it. The "sterno-fascialis", found by Gruber (*Mélanges Biologiques*, 1872, viii, 564), arising, in a man, from the sternum behind the right sterno-mastoid and losing itself in the fascia beneath the hyoid, is probably a representative of this muscle.

|| It is an interesting fact in connection with this muscle, that it decussates and blends with that of the opposite side more often than any other in the body.

found on each side passing from the jaw near the middle line to the surface of the hyoid near the stylo-hyoid.* It is no uncommon thing, for instance, as found this winter in a subject in the dissecting-room at Cambridge, for the tendon of the digastric to be continued from its connexion with the hyoid across the middle line, to be united with a similar tendon from the opposite muscle, and to give off from the anterior surface of this tendon muscular fibres which run forwards to the mental part of the jaw. These fibres filled up the angle which usually exists between the two digastrics. A disposition similar to this is described in the Norway Rat by Wood; and it exists in some other animals. Hallett found a third belly on each side, commencing at the anterior part of the tendon of reflection, and united with that of the opposite side in the median line. Branches of the mylo-hyoid nerve were traced into it. Macalister found the anterior belly in one instance inseparably united with the mylo-hyoid, and in another sending a slip to the fascia under the chin. It is remarked by Hallett, that an increased size of the digastric sometimes replaces the mylo-hyoid.

All these anomalous arrangements and additions to the anterior belly of the digastric are corroborative of the view which I have taken of the morphology of this part of the muscle, and are in accordance with the varied disposition of the fibres of the superficial layer of the brachio-cephalic stratum in the submaxillary region. A continuation of the muscle backwards in the same superficial stratum would seem to be suggested by the occipito-hyoid of Perrin. Indeed, it is evident from the disposition of the corresponding muscle in the Peacock, that the stylo-hyoid and hinder belly of the digastric, regarding them as one, consists, in its entirety, of a superficial and a deep element. Of these, the former predominates in the Bird, but is absent in Man, except in the occasional anomalous instances in which it appears as an occipito-hyoid, and puts in a claim to recognition.

The hinder belly of the digastric and the stylo-hyoid bring us to the deeper stratum of the brachio-cephalic extension of the ventral muscle, which reaches forwards from the sternum to the skull. These two muscles are evidently two segments of an anterior part of that muscle, and they are marked off from the post-hyoidean portion (sterno-hyoid) of the stratum by the hyoid bone and the other remnants of the transverse intermuscular hyoidean septum; just as the anterior belly of the digastric is a segment of the superficial stratum, and terminates posteriorly in the same septum, which thus forms the uniting tendon between the two bellies. I observed in my lectures last year, that the purpose served by this connexion of the anterior belly of the digastric, or chief depressor of the jaw, with the posterior belly, or chief elevator of the hyoid, is to keep the hyoid and base of the tongue fixed during the opening of the mouth and the movements of the jaw in mastication.

The stylo-hyoid may, therefore, be regarded as the one of the two which retains more the primitive form; and the reflection of the posterior belly of the digastric into the superficial hyo-mental muscle which forms the anterior belly, may be regarded as the modification destined to serve a particular purpose. Yet—and it affords an illustration of the principle that utility dominates over other influences in the evolution of muscle—we find that the hinder belly of the digastric varies little and seldom; whereas many varieties of the stylo-hyoid have been described, and they are not infrequent.† This muscle, indeed, seems to be almost supererogatory. Accordingly, it is not unfrequently absent on one or both sides. In some cases, it has been partly or wholly merged in the digastric. In some, it has been split in two, both parts passing to the hyoid; or one part to the hyoid, and one to the digastric; or one part to the posterior, and the other to the anterior, belly of the digastric.‡ In one interesting example,§ it showed a retention of the primitive form by passing the hyoid, and being connected by fascia with a supernumerary portion of the omo-hyoid. It has been found passing in front, and in other instances behind, the digastric; and in one instance a slip was inserted into the front, and in a second a slip was inserted into the back, of the digastric tendon. In several instances, a second stylo-hyoid has been met with, inserted into the great or the lesser cornu of the hyoid, sometimes replacing the stylo-hyoid ligament, or connected with the muscles in front of the hyoid.|| Gruber¶ found three stylo-hyoids arising and taking their

course separately. In a few instances, the additional muscle has taken the form of a stylo-maxillary muscle, passing alongside, or in the place of, the stylo-maxillary ligament; and Bradley* found a muscle passing from the styloid process to the back of the interarticular cartilage of the temporo-maxillary joint. Thus it appears that, in this muscle, the varieties resulting from imperfect concentration are about as numerous as those from imperfect segmentation, and as those from imperfect development.

In the infrahyoid members of the deep brachio-cephalic stratum—the sterno-hyoid and sterno-thyroid—the occasional persistence of an inscription is a reminder of the transverse septa of the primitive ventral muscle. Other varieties are infrequent. Both muscles are occasionally connected with the corresponding muscles of the opposite side by slips passing across the middle line, and they are now and then joined to one another by connecting slips. This is, however, less frequent than the close superposition of the sterno-hyoid upon the sterno-thyroid, and the similarity and harmony of their action, might have led us to expect. They are, however, now and then, imperfectly segmented from the omo-hyoid, which is a member of the same stratum; and, like it, they occasionally present an attachment to the clavicle. This, which is more frequently the case with the sterno-hyoid, accords with the disposition of the muscles in the Scinc, and harmonises with the view that the clavicle is an ossification in one of the septa of the ventral muscle, in that septum in which the coracoid and the upper part of the sternum are developed. For the clavicle, though lying in a superficial plane to the coracoid, and partly also to the sternum, affords a ready medium for the extension of insertion and for the continuity of the muscles passing from the hyoid to both these bones. Otto† found a slip from the sterno-hyoid ranging to a greater distance, and inserted into the scapula beneath and front of the omo-hyoid. Hallett‡ gives two instances in which the sterno-hyoid was attached to near the middle of the clavicle instead of to the sternum and first rib. The same author found the sterno-thyroid double, wholly or partially, in four instances, the additional muscle being superimposed upon the other. It has also been found divided into two lateral portions, running parallel with one another. Additional instances of imperfect limitation of the sterno-thyroid have been afforded, first, by an extension of a slip from its outer edge upon the sheath of the vessels;§ secondly, by a slip uniting with one from the omo-hyoid, reaching the great cornu of the hyoid, and blending with the hyo-glossus and middle constrictor of the pharynx, thus presenting an example of continuity of the ventral and pharyngeal muscles;|| and, thirdly, by a slip passing over the hyoid to the submaxillary fascia.¶ It is interesting also to note that the division between the sterno-thyroid and the thyro-hyoid, which is imperfect in the fœtus, sometimes fails altogether. In such cases, the sterno-thyroideus, missing its attachment to the thyroid, is continued bodily up to the hyoid, a specially segmented thyro-hyoideus being thus partially, or wholly, absent. (*Guy's Hospital Reports*, xvi, 150.)

The only example of absence of the sterno-hyoid, or of the sterno-thyroid, which I have seen recorded, is that of the sterno-thyroid, quoted by Macalister.

I have intimated that the division between the sterno-thyroid and the thyro-hyoid is not always complete, so that fibres of the former are sometimes continued uninterruptedly to the hyoid. I have observed in the fœtus, that the line of demarcation between the two is less marked than in the adult, and I have observed the same incompleteness of segmentation in the fœtus, between the sterno-thyroid and the middle constrictor of the pharynx, and indeed between some other muscles. This, probably, was an indication merely that the work of separation of the several muscles was only in progress, and that it is completed at a later period of foetal, or in extra-uterine life.

The thyro-hyoid occasionally presents a lateral sector, and more fre-

* BRITISH MEDICAL JOURNAL, 1868, p. 478.

† *Seltene Beobacht.*, s. 39. Gruber (*Mélanges Biologiques*, 1872, viii, 723) describes a cleido-hyoideus on the right side, passing from the clavicle, beneath the sterno-cleido-mastoid, crossing superficially to the sterno-hyoid, and inserted near the middle of the hyoid. On the left side in the same subject was a "supraclavicularis" extending from the sternum and head of the clavicle into some of the tendinous fibres of the sterno-cleido-mastoid, and differing from other specimens of the supraclavicularis, which extended from the sternum to some part of the clavicle. Other examples of these two muscles are referred to.

‡ *Edinburgh Medical and Surgical Journal*, 1849, p. 5.

§ Such a slip has been traced across the posterior triangle of the neck to the rib. (*Guy's Hospital Reports*, xvi, 150.)

|| Wood, *Proceedings of the Royal Society*, 1868, p. 485. This anatomist also here mentions an instance in which the omo-hyoid passed between the normal origin of the sterno-thyroid and an abnormal slip to that muscle from the junction of the middle and outer thirds of the clavicle.

¶ *Guy's Hospital Reports*, xiv. Here is also mentioned an instance in which it fell short of the thyroid, being connected with the cricoid only and another, in which it was joined by a slip from the clavicle.

* *Guy's Hospital Reports*, xiv. Macalister (*Proceedings of the Royal Irish Academy*, vol. ix) describes and figures a small mento-hyoidean band, single in one subject but double in another, arising from the inferior surface of the mental ridge on the lower jaw and running backwards to be inserted into the middle of the body of the os hyoideus, quite separate from the digastric. This is a good representative of the hyo-mental of the Hippopotamus. (*Observations in Myology*, p. 13.)

† See paper by Macalister on Varieties of the Styloid Muscles (*Journal of Anatomy*, v, 28).

‡ Wood, *Proceedings of the Royal Society*, 1868, p. 486.

§ Wood, *Proceedings of the Royal Society*, 1867, p. 519.

|| *Journal of Anatomy*, May and November, 1870; *Guy's Hospital Reports*, xvi, 150.

¶ Müller's *Archiv*, 1848, p. 424.

quently a median sector, on one or both sides, which constitutes the levator glandulæ thyroideæ.

The scaleni also belong to the deep brachio-cephalic stratum; and they often extend in man, as we have already seen, beyond their usual boundary upon the surface of the thorax, in the same manner as they normally do in many of the lower animals. They may thus approach the rectus thoracicus profundus, when it is present, and so form an almost continuous "rectus" series, extending from the abdomen over the chest, and reaching nearly, or including the rectus capitis, quite to the head. They are sometimes imperfectly segmented from the levator scapulæ; and the frequency of their imperfect segmentation from one another is in accordance with their parallel direction and with their usual harmonious co-operation in action. The connecting slips sometimes pass across the subclavian artery, or between the artery and the brachial plexus of nerves.

LECTURES

ON THE

PATHOLOGY, DIAGNOSIS, AND TREATMENT OF BRIGHT'S DISEASE.

By GEORGE JOHNSON, M.D., F.R.S.,

Physician to King's College Hospital; Professor of Medicine in King's College, London; etc.

LECTURE VII.—THE TREATMENT OF ACUTE AND CHRONIC BRIGHT'S DISEASE.

I HAVE endeavoured to prove to you that the various forms of Bright's disease are physiological results of the excretory function of the kidney. In accordance with the now fashionable language of modern biologists, we may say that the different forms of Bright's disease are results of a physiological process of evolution, and not of new pathological creations. The kidney is one of the main channels by which effete and noxious materials are cast out of the circulation. During the process of excreting abnormal products, the tissues of the kidney—primarily the gland-cells, secondarily the blood-vessels and the connective tissue—undergo structural changes. It follows from this interpretation of the pathological changes in the kidney, that a leading principle of treatment is to lessen as much as possible the excretory work of the kidney by instructing the patient to avoid the exciting causes of his malady, by a carefully regulated diet, and by such remedial agencies as experience has proved to be beneficial.

In all cases of *acute Bright's disease*, whatever may have been the exciting cause, rest in bed and in a room of moderate uniform temperature, well ventilated, but without chilling drafts of cold air, is an essential part of the treatment. In a large proportion of cases, rest in bed, with a scanty diet and a liberal use of diluent drinks, will suffice for the cure. A convincing proof and illustration of the effect of exercise, food, and cold, upon the amount of albumen in the urine, is afforded by the fact that, in most cases of albuminuria, the urine passed after rest in bed and before breakfast contains much less albumen than that which is secreted after exercise in the open air and after an ordinary meal.

The diet may consist of milk alone, if milk do not disagree, as it does with some patients. Milk is especially suitable for children; and it serves both for meat and drink, so that no other food or liquid need be taken. It may be taken cold or tepid, from half a pint to a pint at a time. An adult will take sometimes as much as a gallon in the twenty-four hours. Children will take less, in proportion to their ages. If the cream disagree, causing heartburn, diarrhoea, headache, or other symptoms of dyspepsia, the milk may be given skimmed. One reason, amongst others, for giving the milk as a rule unskimmed—that is, with the cream—is, that constipation, which is one of the most troublesome results of an exclusively milk diet, is to some extent obviated by the cream in the unskimmed milk. The advantage of milk as a main article of diet is that, as a rule, it is easy of digestion; and that, taken freely, it supplies an abundance of liquid, which, by its diluent action, has a diuretic influence, and so favours the removal of the dropsy. There are some patients with whom, unfortunately, milk in any form, even in small quantities, so decidedly disagrees, that we have to find a substitute in beef-tea, chicken, veal, or mutton-broth, with an egg or two, and some farinaceous addition, such as barley-water, arrowroot, rice, or sago, or a small quantity of

bread. Under this regimen, adopted and rigidly carried out at the very commencement of acute Bright's disease, the urine soon becomes copious, while the albumen diminishes and gradually disappears, and the dropsy quickly passes away.

In my second lecture, I gave you the physiological explanation of the copious flow of urine which usually occurs during convalescence from acute Bright's disease, and especially when there has been a copious dropsical effusion. This abundant flow of urine usually occurs without aid from diuretic drugs, or, indeed, from drugs of any kind. Stimulating diuretics, such as squills, cantharides, or turpentine, would be injurious by increasing congestion of the kidney. The best diuretics in cases of acute Bright's disease are those means which tend to lessen congestion of the kidney; such as dry cupping or hot poultices or fomentations over the loins, warm baths, and a free use of diluent drinks, one of the pleasantest and most efficacious being the "imperial drink", made with cream of tartar and lemon.

Warm baths are particularly useful in the early stage of an acute attack, and more especially when exposure to cold has been the exciting cause of the renal disease. A warm water bath, at a temperature of 98 or 100 deg., may be given every night during the first few days of an acute attack; or a hot-air lamp-bath; or, what I believe in most cases to be still more efficacious, a wet sheet and blanket bath. A sheet is wrung out of warm water; and the patient, either naked or covered only by his shirt, is enveloped in the wet sheet up to the neck. Then three or four dry blankets are closely folded over the wet sheet. He may remain thus packed from two to four or six hours, or even longer. Recently, a boy in the hospital with acute renal disease and almost complete suppression of urine, consequent on scarlet fever, was kept packed incessantly for four days without serious discomfort, and with great relief from very distressing and alarming symptoms. When he left the hospital, all traces of his malady had disappeared. If the packing be long continued, the sheet has to be rewetted as soon as it becomes dry. The evaporation and consequent drying of the sheet will be slow in proportion to the closeness of the blanket packing. If the outer blanket be covered by a mackintosh cloth, the sheet remains wet for a much longer time than when no waterproof covering is used; but patients often complain of a feeling of oppression when surrounded by the impervious mackintosh. The advantage of the blanket-bath over a warm water or a hot air bath, is, that it requires no special apparatus, that the diaphoretic action may be more prolonged, and that in most cases it is more agreeable to the patient. The hot air bath not infrequently causes an unpleasant throbbing in the head, or a feeling of exhaustion and even faintness. When the wet pack is removed, the patient should be quickly rubbed dry, and enveloped in dry blankets.

The diaphoretic action of any form of warm bath is assisted by copious libations of simple diluent drinks, and it may also be aided by the internal administration of the solution of acetate of ammonia. It has been objected on theoretical grounds, that to promote perspiration in these cases is injurious by diverting to the skin the water which is required to wash out the uriferous tubes. To meet this objection, you have only to bear in mind that the dropsical patient is oppressed by an excess of water, which has been poured into the areolar tissue and the serous cavities, in consequence of defective urinary secretion resulting from the inflammatory engorgement and obstruction of the kidneys. If, therefore, by the relaxing effect of external warmth, you divert a large amount of blood to the surface, you thereby lessen the congestion of the kidney, increase the freedom of the renal circulation, and so favour the occurrence of that copious secretion of urine which is one of the surest signs of satisfactory progress, and by which the uriferous tubes may be effectually flushed and cleansed. Whatever fluid is lost by perspiration, may be quickly restored by the liberal use of diluent drinks, which again assist the secretory activity of both the skin and the kidneys. In fact, one of the main objects of treatment is to increase the freedom of the circulation, more especially through the kidneys; and thus to get rid of the excess of stagnant water which has accumulated in consequence of defective action of the skin and kidneys.

Purgatives may be usefully combined with other means for lessening dropsical effusion. In ordinary cases of acute Bright's disease, I do not, as a rule, advise the frequent employment of drastic purgatives. I reserve this method of treatment for cases in which there is an excessive and increasing dropsical effusion which does not yield to other means of cure, but more especially for cases in which cerebral symptoms, the result of uræmia, are either present or apparently impending. Dr. Abercrombie and others, who wrote on brain-disease before Dr. Bright's discovery had led on to our present knowledge of uræmic nervous symptoms, published cases of cerebral disease which they took to be of an inflammatory or an apoplectic character, in which the most strikingly