

On the shoulder-tip pain, and other sympathetic pains, in diseases of the liver / by D. Embleton.

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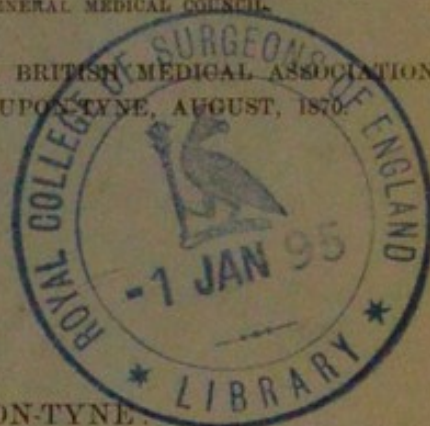
DISEASES OF THE LIVER.

BY

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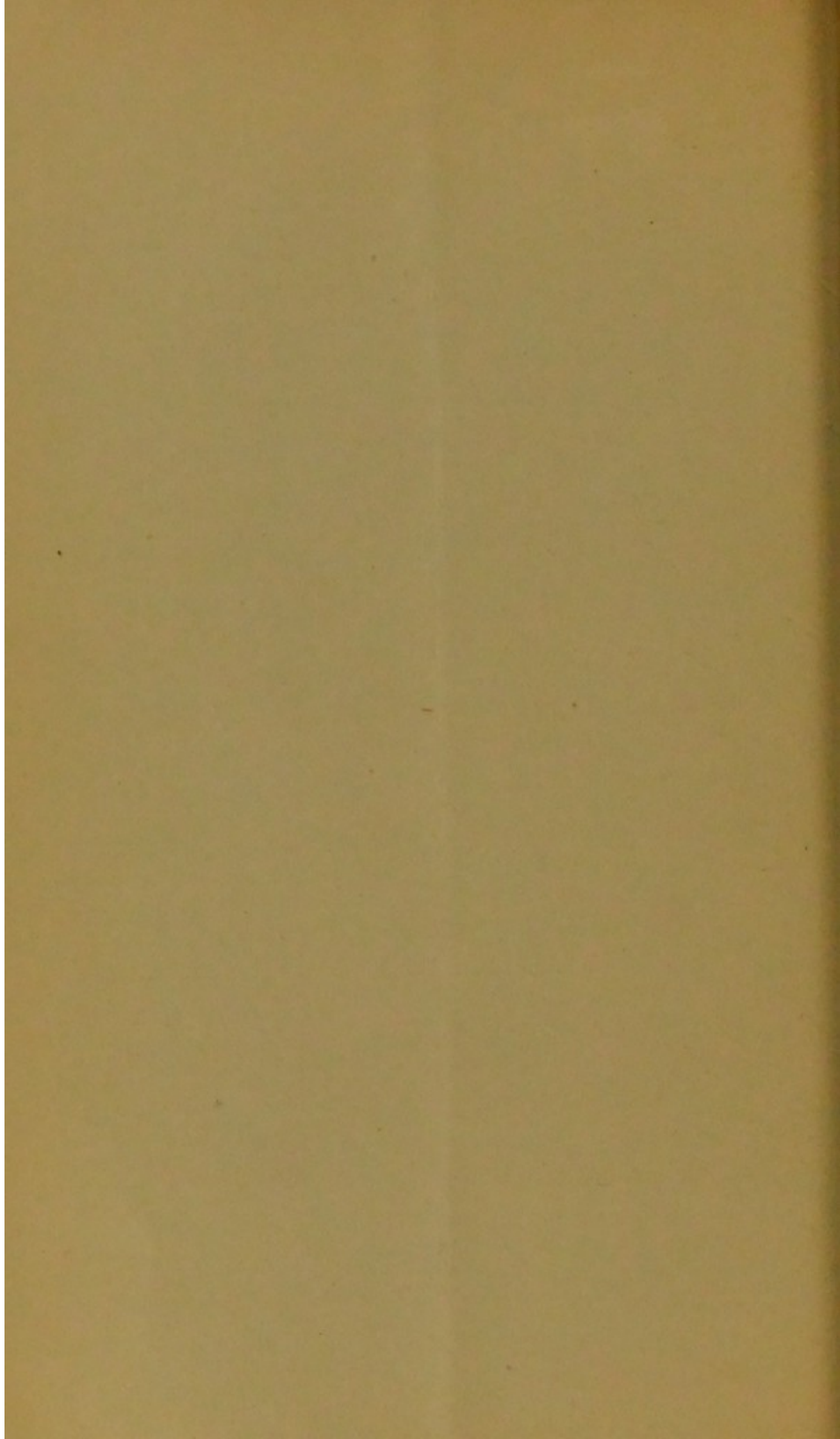
A PAPER READ AT THE MEETING OF THE BRITISH MEDICAL ASSOCIATION,
MEDICAL SECTION, IN NEWCASTLE-UPON-TYNE, AUGUST, 1870.



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1870.



*A. W. McClure Esq M.D. &c
with Dr Embleton's kind regards*

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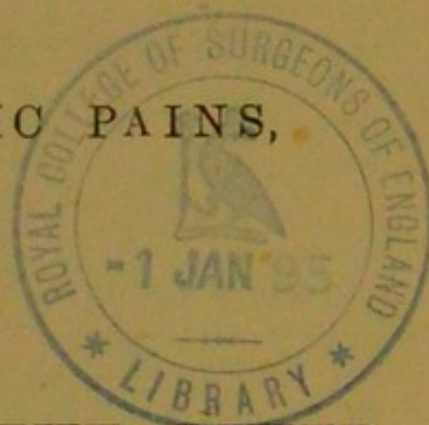
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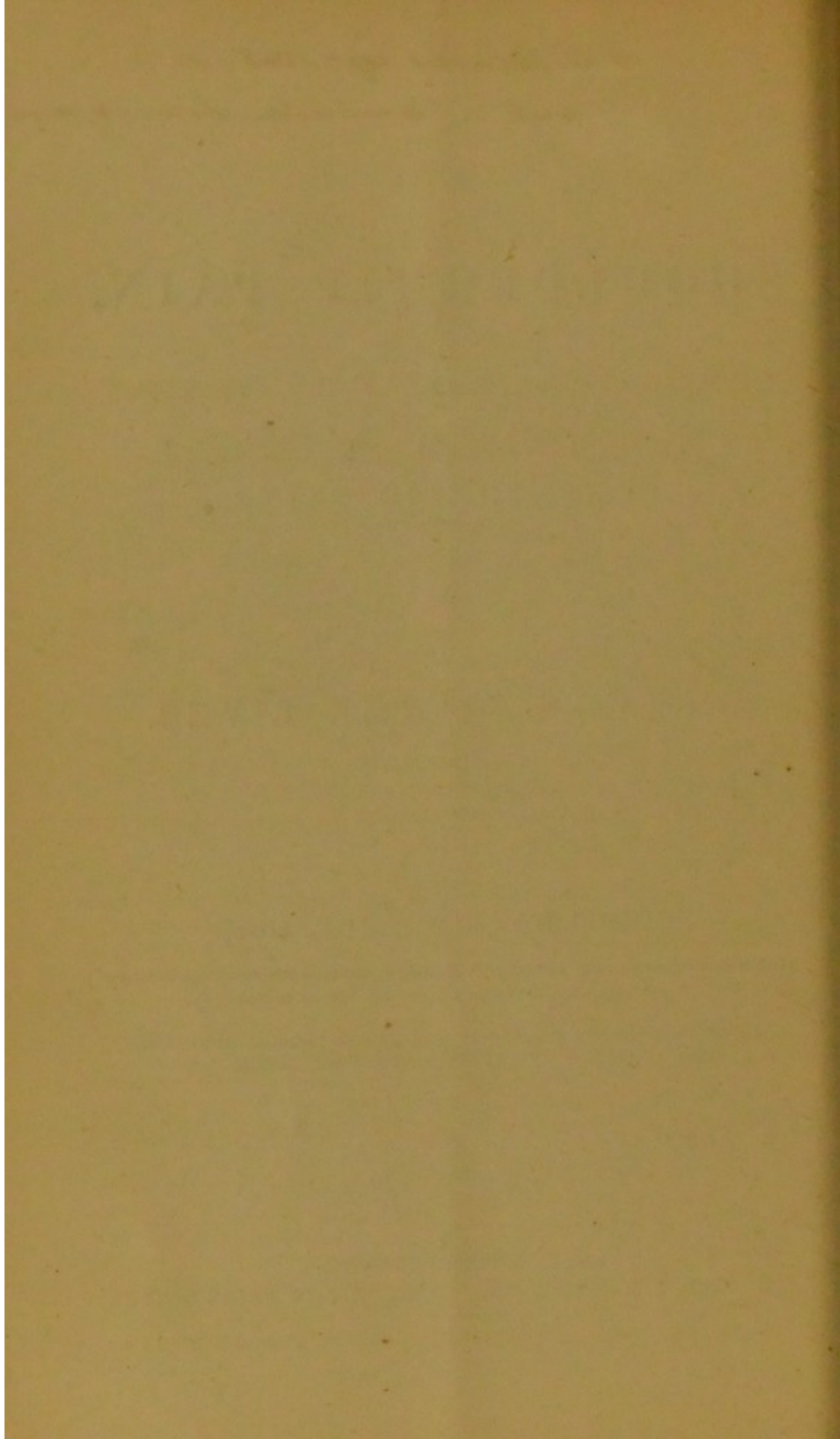
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PAINS, IN DISEASES OF THE LIVER.

OF the group of symptoms ordinarily representing a disease of some internal organ, there are usually a few primary, central, and distinctive members, forming, as it were, the nucleus, and which are directly referable to the organ itself; to these are frequently added others more outlying or peripheral and less characteristic, indicating the influence exerted by the diseased organ upon parts more or less distant it may be, but more or less importantly connected with it.

Parts thus secondarily affected have been said to sympathise with the primarily diseased organ.

The study of the sympathies, whether morbid or healthy, of the different organs or parts of the body, obscure, intricate, and, therefore, difficult as, in the absence of a correct anatomy, such study must be, has from the earliest ages riveted the attention, and baffled the acumen of Physicians, who in their earnest strivings after truth in ancient, mediæval, and even comparatively modern days, have been led astray into the wildest conjectures and vainest hypotheses.

Within the last century or two, however, an increasing light has been dawning upon this part of our science, and one that will no doubt extend itself to our diagnosis, and our treatment of disease.

Thus we can, to a certain extent, account for the pain in the knee in hip-joint disease, through the connection of the knee and hip-joints, by means of branches of the anterior crural and obturator nerves; for the pain at the extremity of the urethra in irritation of the bladder from calculus; for pain in the thigh and testis in renal disease; for the tickling uneasiness and irritation in the larynx or trachea in bronchitis and other inflammatory affec-

tions of the lungs; for pain in the left arm in disease of the heart or pylorus; for hemicrania in tooth caries, dyspepsia, &c.; for bowel affections and convulsions during difficult teething, and for other and similar sufferings, through the nervous communications, now known to exist in each case, between the parts sympathetically affected with pain, and the organ actually diseased.

It must, however, be allowed that these explanations, such as they are, are neither full nor satisfactory; they only show that these pains, &c., do occur in certain cases, and that the parts concerned have certain, more or less direct, nervous interconnections, but they fail to inform us of the nature or essence of the sympathy existing, of the mode in which it is evoked, and of the good, if there be any, that comes of it, and the mystery of sympathy remains as great as before.

And yet there can be little doubt that all the sympathetic pains we meet with are susceptible of satisfactory explanation could we only examine them with sufficient care, and by reference to trustworthy anatomy.

The shoulder-tip pain in liver disease belongs confessedly to the same category of sympathetic affections as those just named, but I have not been able to find in books any sufficiently satisfactory explanation of it, even to the extent to which explanation has been carried in the other instances.

The object proposed in this paper is to attempt an explanation which shall be plain and satisfactory, and shall dispel some of the ancient mystery which hangs around and obscures the morbid sympathy of organs.

As a preliminary, however, it may be interesting to glance at what has been written on the subject, for this pain has received a good share of attention from the time of the father of medicine, and probably long before, down to the present day.

For convenience, quotations have been placed in foot notes.

1. *Ancient Authors*.—Hippocrates,* Celsus,† Galen,‡

* “νοσος ἥπατιτις. ἡ δὲ νοσος γίνεται ἀπὸ χολῆς μελαίνης, ὁκόταν ἐπιβῆναι ἐν τῷ ἥπαρ. πρὸς πίπτει δὲ μάλιστα μετοπῶρον, ἐν τῇσι μεταβολῆσι τοῦ ἐνιαυτοῦ. τὰδε οὖν πάσχει. ἐς τὸ ἥπαρ ὀδύνη ὀξεὶν ἐμπίπτει αὐτῷ, καὶ ὑπὸ τὰς νεύρας πλευρὰς καὶ ἐς τὸ νῶμον καὶ ἐς τὴν κληΐδα καὶ ὑπὸ τὸν τιτθον, καὶ πρὶξ ἔχει ἰσχυρὴν.” &c.

ΤΟΥ ΜΕΓΑΛΟΥ ΙΠΠΟΚΡΑΤΟΥΣ ΑΛΗΘΑ ΠΕΡΙ ΤΩΝ ΕΝΤΟΣ ΠΑΘΩΝ.
—By C. G. Kühn, Lipsiæ, 1826. Tom. ii., pp. 477-8.

“Αὐτὸ δὲ ἐν τοῖσι ὤμοισι γενόμεναι ὀδύνας ὁκόσαι μὲν ἐς τὰς χεῖρας ἐπικαταβαίνουσαι νάρκας τε καὶ ὀδύνας παρέχουσιν, ταύτησιν ἀποστάσεις μὲν οὐκ ἐπιγίνονται, ὑγιάζονται δὲ μελαίνας χολὰς ἐμέοντες. ὁκόσαι δὲ αὐτοῦ μένουσι ἐν τοῖσιν ὤμοισιν. ἢ καὶ ἐς τὸν νῶτον ἀφικνέονται, ταύτας πῦρον ἐμέσαντες ἐκφυγγάνουσιν, ἢ μελαίναν χολῆν.”

Ibid. Tom. i. ΠΡΟΠΗΤΙΚΟΝ ΒΙΒΑΙΟΝ Β.—p. 229.

† In Acute Hepatitis.—“Dextra parte sub præcordiis vehemens dolor est; idemque ad latus dextrum et ad jugulum humerumque partis ejusdem

Aretæus,* Cœlius Aurelianus,† Paulus Ægineta,‡ Haly Abbas,|| and Rhazes,§ all mention the existence of pain in liver disease in the shoulder, clavicle, or throat of the right side.

Prosper Alpinus** notices it as occurring in the right side of the throat and the right scapula.

2. *Modern Authors.*—Almost all agree in mentioning the pain in the shoulder, clavicle or throat, as an accompaniment of certain liver diseases, but they differ as to the frequency of its occurrence, and its intensity.

pervenit: nonnunquam manus quoque dextra torquetur.”—(A. Corn. Celsi. Med., libri octo., by Milligan, lib. iv., viii.)

‡ “ὅτ’ ἂν μὲν οὖν ἐν τοῖς κάτω μέρεσιν των πλευρῶν ἡ φλεγμονὴ γένηται, τὸ διάφραγμα τευόμενον ὀδυνᾶται μᾶλλον ὅτ’ ἂν δ’ ἐν τοῖς ἄνω, κατὰ τὴν κλεῖν ἢ ἰδύνη διασημειναι τῶ μὲν τῆς κινήσεως λόγῳ, τὸ διάφραγμα, τῷ δὲ τῆς σκληρότητος, ἢ κλεῖς ἐργαζομένη τὴν ἀνίαν. ἡπατος δὲ μεγάλως φλεγμαίνοντος ἢ σκιρρωθέντος, ἢ κατὰ τὴν δεξιὰν κλεῖν ὀδύνη γινομένη τῇ τάσει τῆς κοίλης φλεβὸς ἐπιεται μᾶλλον ἢ τῇ τῶν ὑμένων.”

ΚΛΑΤΑΙΟΤ ΓΑΛΗΝΟΤ ΑΠΑΝΤΑ, by C. G. Kuhn, Lipsiæ, 1824. Tom. viii. p. 102.

“ἀλλὰ τὸ γε κατὰ τὸ δεξιὸν ὑποχόνδριον βάρος, ἢ τ’ ἀνασπῶσα ἐξεπίτηδες ὄλον τὸ ὑποχόνδριον ὀδύνη, τὸ τ’ εἰς τὴν κλεῖν ἀλγῆμα διατεῖνον, καὶ γὰρ καὶ τοῦτό ποτε γίγνεται; βηχία τε σμικρά.”—*Ibid.*, p. 348.

* *Of Acute Diseases of the Liver.*—“The diaphragm and succingens (pleura) are dragged downwards, for from them the liver is suspended as a weight. For this reason, a strong pain extends to the clavicle of the same side.”—(Extant Works of Aretæus the Cappadocian, by F. Adams, L.L.D. Book ii., cap. vii., p. 27. Syd. Soc., 1856.)

Of Chronic Diseases.—“If it (the liver) be converted into pus, a sharp pain possesses the parts as far as the clavicle and the tops of the shoulders, for the diaphragm, from which the liver is suspended, is dragged down by the weight, and the diaphragm drags the membrane lining the ribs, to which it is attached, and this membrane (the pleura) is stretched up to the clavicle and top of the shoulders, which also are dragged down.”—*Ibid.*, book i., p. 319.

† “The symptoms of scirrhus of the liver are a round circumscribed tumour, felt below the ribs, the colour jaundiced, the urine muddy, pain extending to the throat of the affected side, &c.”—(The Seven Books of P. Ægineta, by F. Adams, L.L.D., book iii., p. 566. Syd. Soc., 1848; or, Cœlius Aurelianus de Morbis Acut. et Chron., lib. iii., cap. iv.—De Jecorosis. Amstelodami, CIῶIῶCCIX.)

‡ “When the liver is inflamed, there is, in all cases, pain in the right hypochondrium, extending upwards as far as the clavicle.”—(The Seven Books of P. Ægin., by F. Adams, L.L.D., book iii., sect. xlvi., p. 560. Syd. Soc., 1848.—On Affections of the Liver.)

|| *Ibid.*, p. 567.

§ *Ibid.*, p. 568.

** “Hæc deprehenditur a dolore in dextro hypochondrio tensivo juxta costas spurias (cum quadam illiusce partis gravedine) aliquando ad jugulum, et ad scapulam protenso, qui non nisi in magnis gibbæ partis phlegmonis observari solet in qua parte calorem quoque non obscurum sentiunt.”—(Prosper Alpin. de Med. Methodica, Edit. Sec. Lugd. Batav., 1719, lib. vii., cap. xiv., p. 423.—On Hepatitis.)

John Hunter,* in his *Essay on Gun Shot Wounds*, published in 1794, says:—"From a wound in the liver there will be pain in the part, of the sickly or depressing kind; and if it is in the right lobe, there will be a delusive pain in the right shoulder, or in the left shoulder from a wound in the left lobe."

The same illustrious Physiologist and Surgeon, in his *Lectures on the Principles of Surgery*, chap. x., On Sympathy,† in which he treats copiously of the various kinds of natural and diseased sympathy, mentions more than once the shoulder pain in liver disease.

He says, however, very truly, that the sympathy is not reciprocal, that "the liver never sympathises with the shoulder."

Abercrombie‡ also mentions the shoulder pain as occurring in acute and chronic inflammation, and in "Encephaloid Ramollissement" of the liver.

Annesley|| as well, as having been often observed in hepatitis and abscess of the liver, and he believed that the pain indicated with certainty that the convex portion of the right lobe was diseased.

W. Thomson§ names it as being by some considered as peculiar to hepatitis, but shows that it had been observed also in cases of passing gall stones, and points out the fact that it had never been properly explained.

* The works of John Hunter, F.R.S., by James F. Palmer, 1837, vol. 3, p. 560.

† *Ibid.*, vol. 1, p. 317.

‡ *Acute Inflamm.*—"There is generally fever, but this is often in a slight degree; there is sometimes jaundice, but this is often entirely wanting; and, frequently, there is pain extending to the right shoulder, but this is by no means a uniform symptom."—(*Pathol. and Pract. Researches on Dis. of Stom., Intestinal Canal, Liver, &c.*, p. 347, 2nd Edit., Edinb. 1830).

Chronic Inflamm.—"There is generally a feeling of distension and oppression in the epigastrium and right hypochondrium, often vomiting, and pain or a dragging sensation referred to the right shoulder."—*Ibid.*, p. 365.

Encephal. Ramoll.—Pain of right shoulder is a symptom.—*Ibid.*, p. 362.

|| *Sketches of Diseases of India, &c.*, 1831.

§ Tweedie's *Library of Medicine*, vol. iv., p. 178, no date, but last vol. of series, 1842.—"It is well known that in hepatic affections, the right shoulder is frequently the seat of sympathetic pain; a fact of which no satisfactory explanation has yet been proposed; nor is it well ascertained what are the affections of the biliary organs in which it occurs. Its frequent occurrence in hepatitis has led to the idea of its being a pathognomonic symptom of this disease. It is, however, far from being uniformly present in this affection, although when it does occur in a case resembling hepatitis in other respects, it may be considered conclusive of the nature of the disease. But though hepatitis may be the affection in which this symptom is most commonly observed, it does not follow that it is exclusively confined to it; most authors concur in stating that it also accompanies the passage of gall stones through the gall ducts."

Dr. Copland* in his deservedly celebrated Dictionary of Medicine, under the head of hepatitis shows his familiar acquaintance with the pain in question.

The pain is noticed by Sir Thomas Watson† as occurring in the clavicle and shoulder, not only of the right side, when the right lobe of the liver is diseased, but also of the left side when the left lobe is affected, thus exactly agreeing with what Hunter, as already quoted, says with regard to the pain after gun shot wounds.

Dr. Budd‡ has had his attention pointedly arrested by this

* Diction. of Med. vol. ii., p. 733.—“It (the pain) is sometimes referred to the top of the right shoulder, frequently to the right shoulder blade, occasionally to both scapulæ. In a few instances, it is felt in the right clavicle and side of the neck. It more rarely affects the left shoulder and shoulder blade only. When pain is present at the top of the right shoulder, it indicates disease of the right lobe of the liver; but this symptom is often absent.”

p. 734.—“When the outer surface and part of the right lobe is chiefly affected, the pain is most severe in the right hypochondrium, and at the margins of the ribs, sometimes extending to the right scapula and top of the shoulder. When the concave surface is the seat of disease, sometimes the pain extends to the right shoulder, and right side of the neck.”

The same testimony is given at p. 766, under “Organic Lesions of the Liver.”

† “The pain sometimes extends to the right clavicle, and to the top of the right shoulder. The existence of this pain makes it probable that the inflammation affects the convex surface of the right lobe of the liver. Occasionally, the left shoulder is painful; the left lobe of the liver being involved in the disease.”—(Lectures on Principles and Practice of Physic, 4th Edit., vol. ii., p. 587.)

‡ “The pain of the shoulder is far less frequent in such cases (of abscess of the liver) than is generally imagined, but it existed in five of the fifteen cases I had to treat at the *Dreadnought*. In one of these there was a small abscess on the convex surface of the right lobe, and the peritoneum covering the abscess adhered for the space of a shilling to the reflected layer of of the peritoneum. There were old adhesions of the lung to the pleura costalis. The lungs were sound.

“In another, in which the abscess was on the convex surface of the liver, and formed a prominent tumour, the pain of the shoulder was so severe as to cause the patient to moan. It continued extremely severe for a long time, and at length was relieved on our opening the abscess.”

In a third case, where the abscess likewise formed a prominent tumour, the patient complained of an aching pain in the right shoulder, extending to the shoulder-blade, and up the right side of the neck.

In a fourth, pain in the shoulder varied in intensity with pain in the right side. When the side was easy the shoulder was easy also. The two pains were evidently related. In this case there were five or six abscesses of various sizes in the liver—one opened into the lung; another was on the convex surface of the right lobe. In the fifth case, the abscess was single, and was likewise situated on the convex surface of the right lobe. There was no recent inflammation of the lung or pleura.

The pain is usually described as a gnawing, aching pain. There is no swelling or redness of the shoulder, and the pain is not much increased by

pain, and gives a more definite account of its connection with abscess of the liver, than any other previous author I have consulted. He mentions this pain as occurring also in a case of abdominal aneurism pressing on the liver. The subjoined extracts will be found of considerable interest.

Louis,* in his paper on Abscess of the Liver, as quoted by Dr. Budd, states that none of his patients, five in number, had any pain of the shoulder, and he hesitates to believe that this symptom really belongs to disease of the liver. He conjectures that, when present, it may depend on concomitant disease of the lung or pleura.

Professor Broussais† tells us that in hepatitis, “Les douleurs se propagent quelquefois à l'épaule, au bras droit, et jusque dans la hanche de ce côté.”

Professor G. Andral‡ witnesses to the occasional presence of the pain in acute hepatitis, and to its being then sufficient to make the patient cry out, and to its existence in cases of impacted biliary calculi.

He also notices|| the pain as one purely sympathetic, and occurring less frequently than had been previously said, but

pressure—sometimes, indeed, it is relieved by holding or pressing the shoulder, *but it is often increased by pressure on the liver.* This sympathetic pain in the shoulder is occasionally felt in other diseases of the liver—in cases of cancer and of hydatid tumour.

In a case of abdominal aneurism, this formed a tumour the size of a man's head immediately behind the liver, which it had very much flattened, but there was no trace of inflammation about the organ. The bodies of the 1st, 2nd, and 3rd lumbar vertebræ were partially destroyed.”—(On Diseases of the Liver, 2nd Edit., 1852, p. 105, et seq.)

* Clinique Medicale de l'Hotel Dieu de Paris. Transl. by Spillan, 1836, p. 902

† Cours de Pathologie et Therapeutique Générale, 1835, tom ii. p. 183.

‡ Cours de Pathologie Interne, 1836, tom ii. p. 195 et seq.—“Une douleur dans l'hypochondre droit s'étendant souvent à la poitrine, et jusqu'à l'épaule du même côté.”

In intense cases.—“L'hypochondre est d'une sensibilité exquise, la douleur de l'épaule arrache quelquefois des cris au malade.”

In cases of biliary calculi.—“La douleur du dos se prolonge parfois, dans le sein droit, le cou, et l'épaule du même côté.”—*Ibid*, p. 233.

|| Clinique Medicale, 1837, tom iv. pp. 190 and 430.—“Il y a d'autres douleurs qui ne se manifestent plus seulement là où existe le foie, mais en des lieux plus ou moins éloignés; elles sont purement sympathiques, et resultent d'une simple irritation nerveuse. Ainsi on a depuis long temps noté, sans pouvoir trop s'en rendre compte, la douleur fixée à l'épaule droite qui accompagne un certain nombre d'affections du foie; cette douleur nous a paru exister moins souvent qu'on ne l'a dit; cependant dans plus d'un cas nous l'avons observée d'une manière bien tranchée.

Under Obs. 32, of a case of abscess in the right lobe much nearer to the under than the upper surface.—“Cette observation est la première dans laquelle nous trouvons, au nombre des phénomènes morbides qui se mani-

as one at times well marked, and quotes the first case in which he had observed it.

He quotes Roche,* who states, that in inflammation of the convexity of the liver, "C'est seulement dans ce cas que la douleur s'étend à la poitrine, au cou, et à l'épaule du même côté," and that in inflammation of the concavity, "La douleur ne se propage ni à l'épaule, ni au cou, ni même à la poitrine," and Roche quotes, as one of the symptoms given of acute hepatitis by Frank, propagation of pain to the right shoulder and clavicle.

Trousseau† names the pain as occurring during the passage of gall stones, and in cases of hydatids of the liver.

Frerichs‡ mentions, in liver abscess, the pain in the shoulder, scapula and arm, and says it ceases as soon as the pus finds an outlet; the same pain also in cases of cancer and of gall stones.

Dr. S. H. Ward,|| Physician to the *Dreadnought*, among the symptoms tolerably conclusive of abscess of the liver, mentions after "Pain direct, distant pain referable to the right shoulder, and especially localized about the acromion."

festent pendant le cours d'une maladie du foie, la douleur de l'épaule droite."

This was, "Une douleur incommode et continuelle vers l'épaule droite; elle ne cessa pas depuis de se faire plus ou moins sentir." See also Obs. 20.

* Dictionnaire de Médecine en xv vol. tom ix.

† Clinique Médicale de l'Hotel Dieu, 1865, tom iii. pp. 219 and 249 — "Coliques hépatiques." "Calculs biliaires."—"Cette douleur descend dans l'abdomen et en quelques cas simule la colique néphritique; plus ordinairement elle remonte dans la poitrine, jusqu'au cou, et, phénomène singulier, qui se reconte chez beaucoup d'individus, elle retentit dans l'épaule droite."

‡ A Clinical Treatise on Diseases of the Liver, 1860, vol. ii. p. 125. New Sydenham Society.

Abscess of the Liver.—"In addition to the local pain, there exists in many cases (according to Louis, in 28 out of 163 cases, or in 17 per cent.), a sympathetic pain, usually having its seat in the right shoulder, but sometimes complained of in the scapula and arm; the sensation is that of tightness or tension, and sometimes of an intolerable boring, and it is aggravated by every concussion of the hepatic region. This symptom usually lasts for a few days only, and ceases as soon as the pus finds an outlet."

Cancer of the Liver, p. 301.—"From time to time the symptoms undergo aggravation, the pains become more acute, and extend towards the shoulders and hips."

Gall Stones, p. 518.—"These pains (at the margin of the liver and in the epigastrium) are, in most cases very severe, and of a burning or boring character, &c.; not unfrequently they extend over both hypochondria, and also radiate towards the back, the right shoulder, the neck, &c."

|| *The Lancet*, August 1st, 1868.

Dr. Murchison* notices the pain under the heads of congestion and of cancer, and gives a case of hydatids of the liver implicating the right side of the chest in which the same symptom occurred.

Dr. Aitken† and Dr. Tanner‡ both mention the pain.

The occurrence, then, of this pain in the top of the shoulder, scapula, clavicle, arm, or side of the neck—in one or more of these parts, and in connection with inflammation, abscess, near both the convex and the concave surfaces, cancer, and hydatids of the liver, and with the passage of gall-stones, has been well ascertained, both in ancient and modern times; and although not always present, it is sufficiently often so, and then frequently so severe, as to arrest the attention of patient and of physician.

It is, therefore, of sufficient importance to demand a serious investigation, and a proper explanation, if such can be found, the more so as there appears to be a prevalent feeling that its occurrence has not as yet received a satisfactory elucidation.

The explanations of this pain that I have seen are these:—

I. Aretæus,|| in treating of acute and of chronic affections about the liver, says, that in abscess, a sharp pain is felt in

* Clinical Lectures on Diseases of the Liver. &c., 1868.

p. 121. *Congestion*.—"The pain and feeling of uneasiness may stretch up to the right shoulder—"

p. 190. *Cancer*.—"A cancerous liver is almost always painful and tender on pressure, and very often the pain radiates to the shoulder, back, and loins."

p. 196. *Case of Cancer of Liver and Ovary*.—"Sudden pain in epigastrium, and right hypochondrium, and both shoulders, accompanied with great languor." "Liver greatly enlarged, and studded all over with cancer nodules; its interior contained similar matter."

† Dr. Aitken relates that the most prominent symptoms of hepatitis are "some tumefaction, pain, or uneasiness of the liver, or of the adjoining parts, as the thorax, abdomen, or right shoulder, &c.;" and again, "frequent, settled, and increasing pains in the shoulder and back," are, with others, "pathognomonic signs of suppurative inflammation going on in the liver."—(*The Science and Practice of Medicine*, 3rd Edit., 1864, vol. ii., pp. 815 and 816.)

‡ Dr. Tanner tells us, "it is well known, that in hepatic affections, the right collar bone and shoulder become the seats of gnawing and aching sympathetic pains; while sometimes also (probably when the left lobe of the liver suffers) pain is referred to the left shoulder." He also quotes Annesley, who says, "pain in the right shoulder is a sure indication that the disease is in the right lobe." Again, when treating of hepatic calculi, "They may give rise to dull pains about the liver, sometimes shooting to the shoulder."—(*The Practice of Medicine*, 6th Edit., 1869, vol. i., pp. 109 and 139.)

|| *The Extant Works of Aretæus*, by Adams, 1856. *Chron. Dis.* book i., chap. xiii., p. 319. *Syd. Soc.*

the tops of the shoulders and clavicle, "for the diaphragm, from which the liver is suspended, is dragged down by the weight, and the diaphragm drags the membrane lining the ribs, to which it is attached, and this membrane (the pleura) is stretched up to the clavicle and top of the shoulders, which are also dragged down."

2. Avicenna,* Rhazes†, and Haly Abbas‡ repeat the same account.

3. John Hunter|| states that some sympathies are beneficial and of great value in the economy; that others, again, are injurious, and goes on to say—"Some sympathies are opposite in their action: pain in the liver is depressing, that in the shoulder rousing. Nature is incapable of sustaining the former, and sets up the rousing pain in the shoulder to continue life."

4. Mr. Hilton, in his Hunterian Oration, 1867, p. 28, after showing that Hunter knew the fact of the existence of the pain, but failed to explain it, proceeds thus—"He had not arrived at the anatomical and physiological elucidation which we have deduced from the fact that the right phrenic nerve, arising from the third and fourth cervical, gives off a branch which takes its course under the inferior cava, through the *fissura venosa*, into the porta of the liver, and finally also one or two filaments to the round ligament."

5. Sir Thomas Watson§ writes, as to the pain, as follows; "Thus, filaments of the phrenic nerve penetrate the diaphragm, and communicate with the ganglia that lie around the *cœliac* artery; other filaments are distributed to some of the muscles about the shoulder, and in this way has been explained the well-known fact that disease or irritation of the liver is very apt to be accompanied with pain in the shoulder."

6. Professor Rolleston, in his Address on Physiology at the Oxford Meeting of the British Medical Association, 1868, alluded indirectly to the subclavius nerve and its connection with the phrenic, and so with the shoulder-tip pain in liver disease.

These connections of the nerve of the subclavius muscle—a twig from the fifth, or fifth and sixth, cervical—with the phrenic, and of the phrenic nerve with the liver, through the great sympathetic ganglia, are undoubted facts. I do not find the

* The Seven Books of P. Ægineta, by Adams, vol. i., pp. 567-8. Syd. Soc.

† *Ibid.*

‡ *Ibid.*, p. 567.

|| Hunter's Life, by Palmer, vol. i., p. 331.

§ Lectures, 4th Edition, 1857, vol. i., Lect. xxxix., p. 720.

direct passage of phrenic twigs to the porta of the liver, and round ligament given in any book (see Ellis and Swan),* but if present, they are maintained by very small twigs, which are not accessible to examination, and it would be extremely difficult, if not impossible, to prove that the shoulder pains in liver disease are located in the phrenic nerve and its branches. This nerve does not appear to give off any other branches in the neck, except those to the sympathetic, and to the subclavius muscle.† It is true that there are, at times, pains in or close to the clavicle in some cases of hepatic disease, and possibly they may be accounted for by the connections pointed out or alluded to by Sir Thomas Watson, Mr. Hilton, and Professor Rolleston, but the ordinary seat of the shoulder-tip pain is not in the clavicle, but in the edge of the trapezius muscle behind it, as will presently be pointed out, and the above explanation does not, therefore, answer for this pain.

Now, there exists an important, though a somewhat distant, line of nervous connection between the liver and the top of the shoulder—one that has not hitherto been noticed in print—but by means of which a more intelligible and satisfactory explanation is capable of being given of the occurrence of the shoulder-tip pain in liver diseases; and, by submitting the following observations, noted before special reference was made to what had been previously written on the subject, I shall best be able to show the line of connection just referred to.

These observations were made on cases of hepatic congestion with enlargement, of cancer of the liver, and of passing gall-stones, cases which had, from time to time, come under my notice in public and in private practice; and with regard to the frequency of the pain at the shoulder-tip, I had come to a conclusion the reverse of that stated by Andral, Budd, and others. It appears to me to occur more frequently than is generally believed. That it is seldom severe, I agree; but that it is often present in some degree, though little complained of by patients, and will be discovered, on investigation, to exist, I feel sure.

The pain, when present and well marked, occurs at the top of the shoulder, being referred especially to the angular space

* "One or two filaments of the right nerve join in a small ganglion, with branches to the diaphragm, which are derived from the solar plexus of the sympathetic; and from the ganglion twigs are given to the suprarenal capsule, the hepatic plexus, and lower vena cava."—(Quain, &c., 7th Edit., part ii., p. 641.)

† A subclavian twig is not mentioned in Quain's Anat., 7th Edition, 1866.

between the acromial end of the spine of the scapula, and the adjacent end of the clavicle, where the upper and outer part of the trapezius muscle, as it goes to be inserted into the bones just named, is lodged. At this part, the external division of the Spinal Accessory nerve, after having supplied the sterno-cleido-mastoid, and anastomosed with the second and third cervical nerves, enters the trapezius, forming a small plexus with twigs of the third and fourth cervical nerves, and is continued on along the vertebral border of the scapula, supplying the trapezius in its course, and communicating with twigs of the intercostal nerves.

It occurs often when there is much pain in the liver. It varies in intensity from a feeling of weight, or dull aching, to a sharp, lancinating, darting, or boring pain, and then the part at which it is felt becomes more or less tender on pressure, (but no swelling or redness, as Dr. Budd has stated, is observable).

It appears to be severe in proportion to the degree of pathological (hyperæmic or inflammatory) disturbance raging in the liver, and is at times accompanied with pains passing from the liver up into the interior of the chest, and the liver itself is very tender on pressure.

When not severe, it appears confined to the shoulder-tip; when severe, it shoots downwards to the lower angle of the scapula, and occasionally obliquely upwards along the side of the neck, as far as the base of the skull, in front of the vertebral column, or, in other words, along the track of the external division of the spinal accessory nerve, the only nerve lying in that direction.

In a case favourable for observation, a little examination will show that this nerve is really tender to pressure from the seat of pain at the shoulder-tip up to that part of the sterno-cleido-mastoid muscle through which the nerve is known to pass, and also thence as far towards the base of the skull as it is accessible to pressure. This muscle is tender where the nerve passes through, if its deeper layers are moderately pinched up, but above and a little way below the line of transit of the nerve the muscle is not at all tender to pressure.

The trunk of the Pneumogastric nerve also of the same side will be found, in such a case, abnormally sensitive to pressure, and it will be so in proportion to the amount of pain in the shoulder, and to the tenderness of the spinal accessory; and the sensitiveness will be found greater as we trace the nerve down to the clavicle, at a little below the level of which the nerve ceases to be amenable to examination; upwards in the

neck, this sensitiveness appears to be continuous with that of the spinal accessory.*

Pressure applied upon one or both of these nerves will now and then give rise to an increase of pain in the shoulder, or to pain in the head, and upon the vagus will excite or increase pain in the liver.

The above observations have been often repeated in the presence of clinical students and others at the Newcastle Infirmary, and are full of interest, as they seem to afford the real or chief clue to the difficulty of accounting for the shoulder-tip pain in question.

Before, however, concluding that this clue has really been found, it is necessary to trace the courses of the spinal accessory and of the par vagum, their connections with each other, and their relations to the shoulder and the liver.

On referring, therefore, to the best and most recent anatomical works, in English, French, and German, that I have been able to consult, I find that all pretty well agree as to the connections of the par vagum and spinal accessory,—that they are more intimately connected with each other than either of them is with the glosso-pharyngeal, and that they have, in the foramen lacerum posterius, a common vascular network, from which the glosso-pharyngeal is excluded.†

The course, distribution and office of the external division of the spinal accessory appear not to be in doubt. That the

* As it has been matter of dispute whether or not the par vagum is sensitive to irritation or violence, the opposite views on this question are here appended. Dr. Carpenter, in his *Human Physiology*, 4th Edit., p. 519, has the following passage, "Now if this nerve excites the motions of respiration, by its powerful action in producing sensation, we should expect to find its trunk endowed with considerable sensibility, *which is not the case*; for all experimenters agree in stating that when its trunk is pinched or pricked, the animal does not exhibit signs of pain nearly so acute, as when the trunks of the ordinary spinal nerves, or of the 5th pair, are subjected to similar treatment."

On the other side, Dr. John Reid, in his *Physiological, Pathological, and Anatomical Researches*, p. 163, states that "Haller, Brunn, Dumas, Dupuy, Mollinelli, Mayo, Majendi, Brachet, and himself, all concur in stating that the pinching, cutting, and even stretching of the nervous vagus in the neck, are, in the majority of instances, attended by indications of severe suffering."

In the ordinary and healthy state of the body, the vagus in the neck, as any one may satisfy himself, is usually not at all tender. Under ordinary degrees of pressure by the finger or thumb, no pain is produced. In animals, when the nerve is pricked, cut, or ligatured, great pain, as I know from experiment, is the immediate consequence.

† See Quain's *Anat.*, 7th Edit., part ii., p. 618, and plate, p. 619; also, Flower's *Plates of the Nerves*.

internal division joins the trunk of the par vagum at the ganglion of the trunk, and contributes to the formation of the pharyngeal and laryngeal nerves with the vagus is not doubtful; but we are ignorant as to how far the remaining part of the spinal accessory, which is incorporated with the vagus, goes along with it, and we do not accurately know to which organs it is finally distributed. These two points are of necessity, from the nature of the parts, of most difficult, if not of impossible, determination by the scalpel.

By some anatomists,* this spinal accessory portion of the vagus is believed to be given to the lungs, heart, and stomach, which it is said to animate more or less with motor power, and if this be true, there seems no reason why the liver, kidneys, and other parts—such as the suprarenal bodies, the pancreas, and the small intestine—should not receive branches from the spinal accessory portion of the vagus, as well as from the vagus itself.

In such case, we should have the seat of the sympathetic pain supplied by the external division, and the seat of disease in the liver supplied, in part at least, by the internal division of the same nerve—the spinal accessory—the two divisions being in intimate connection beneath the skull. But, although it is probable that the internal division of the spinal accessory is distributed to the same organs as the vagus itself, there are not as yet sufficient anatomical grounds for such a conclusion.

It nevertheless appears that the par vagum, accompanied or not by the spinal accessory, *does* reach the liver, either directly from the gastric branches themselves, or indirectly from them through the great sympathetic ganglia, or by both routes, but the accounts of anatomists as to the mode and the amount† of nervous supply from the par vagum to the liver, vary greatly from each other.

The following extracts will show this discrepancy. No doubt many varieties of distribution exist which will, to some extent, account for the varying descriptions that we find in anatomical books; and the dissection of the parts is beset with difficulties, particularly as many of the twigs of the pneumogastric pass through ganglia, and join with nerves, of the sympathetic system, and are not easily distinguished from sympathetic

* See Hirschfeld and Leveillé, *Nevrologie et Æsthésiologie*, 2me Edition, Paris, 1866, p. 218 et seq.

† "Some small twigs from the accessory join the pulmonary and cardiac plexuses; the remainder accompany the vagus to the stomach, when they are lost."—(Cyclop. Anat. and Physiol., vol iii., p. 690.—John Reid on Par Vagum.)

twigs; but repeated and faithful researches will give us a more uniform, more correct, and more reliable account, both of the course and ultimate distribution of these important nerves.

These extracts are from Quain and Sharpey, Dr. John Reid, Cruveilhier, Swan, Hirschfeld and Leveillé, Dr. J. Kollmann, and others.

1. Quain and Sharpey* say, that from the left nerve "some filaments are continued between the layers of the small omentum to the hepatic plexus," a part of the right nerve "is continued from the stomach to the left side of the cœliac plexus, &c.," but no mention is here made of hepatic branches.

But, again, in part III, p. 867, we find that "the nerves of the liver are derived partly from the cœliac plexus, and partly from the pneumogastric nerves, especially the left."

2. Dr. John Reid† tells us that from the concavity of the curve formed by the *left vagus* as it passes from the cardia towards the right side, several small branches run upwards, and to the right between the layers of the small omentum to join the left hepatic plexus, and then "The few branches of the *left vagus* which reach the pyloric orifice are partly distributed upon the walls of that portion of the organ, and partly throw themselves into the cœliac plexus. Some of the filaments of the latter portion may be traced into the numerous plexuses surrounding the gastroduodenalis branch of the hepatic artery, into the right hepatic plexus, and may, sometimes, be followed as far as the artery of the gall bladder."

The *right vagus*, after giving its branches to the cardia and posterior surface of the stomach, sends "a considerable portion,—so large as generally to present the appearance of being the continuation of the trunk of the nerve, from the posterior surface of the cardiac region of the stomach, backwards and downwards to the left side of the cœliac axis, sending branches to the splenic, the coronary, and to the superior mesenteric plexuses, to the plexus surrounding the pancreatic branches of the splenic artery, and it ultimately terminates in the left semilunar ganglion."

3. Cruveilhier‡ lays it down that one set of branches of the *left vagus* "enters the gastro-hepatic omentum, and is conducted by it to the transverse fissure of the liver, and enters that gland." The *right* "gives a smaller number of branches to the stomach than the left, and joins the solar plexus, of which it

* Anat., 7th Edit., part ii., p. 623.

† Cyclopædia of Anat. and Physiol., Lond., 1847, vol. iii., p. 889.

‡ Cruveilhier's Anatomy, Lib. Pract. Med., vol. viii., pp. 1137 and 1162.

may be regarded as one of the principal origins ;” and again, under heading—sympathetic nerve, cœliac plexus, “the anterior hepatic plexus accompanies the hepatic artery, and is formed by some twigs from the right pneumogastric, and by several large branches from both semilunar ganglia.”

4. In Swan’s *Demonstration of the Nerves of the Human Body*, p. 51, London, 1834, we read of the par vagum:—“Right side. After it has passed the diaphragm it gives filaments to the cardiac extremity of the œsophagus, some of which communicate with similar ones from the left side. It sends a branch to terminate on the posterior surface of the stomach, after giving a branch to the splenic plexus. It sends a branch to terminate on the lesser curvature of the stomach. It gives a branch to communicate with branches of the left trunk on the superior gastric artery, and others from the part of the right hepatic plexus on the pyloric artery to terminate on the stomach. It sends a branch to communicate with those from the cœliac plexus, accompanying the superior gastric artery. The continuation or principal part of the trunk then passes downwards, and ends in the cœliac plexus.”

“The Left, having passed the diaphragm, sends several filaments to the cardiac end of the œsophagus and to communicate with those from the left side. It sends several branches to join the left hepatic plexus, and a considerable branch to the broad end of the stomach. It sends several branches on to the lesser curvature, some of which terminate at once on the stomach, and others pass along the superior gastric artery to meet the branch accompanying the pyloric artery from the right hepatic plexus, as well as filaments from the branch of the right or posterior trunk.

5. From Hirschfeld and Leveillé* I gather the following passages:—“Le cordon gauche donne des branches dont les unes vont à la grosse tubérosité de l’estomac, dont les autres longent la petite courbature entre les deux feuilletts de l’epiploon, et se perdent à la face antérieure de l’estomac ; les dernières remontent entre les mêmes feuilletts, dans le sillon transverse du foie, accompagnent les vaisseaux hépatiques, s’anastomosent avec le plexus hépatique du grand sympathique, et se distribuent au foie.”

“Le droit se divise derrière le cardia en deux faisceaux ; l’un plus petit, se perd à la face postérieure de l’estomac où il s’anastomose avec le gauche par l’intermédiaire des ganglions plats ; l’autre se dirige vers l’extrémité interne du ganglion

* *Nevrologie ou Description et Iconographie du Système Nerveux*. Paris, 1853.

semilunaire droit, et s'anastomose avec le plexus solaire. J'ai pu poursuivre quelques filets jusqu'au plexus nerveux mésentérique supérieur."

6. Valentin, and other German and French Anatomists, describe very minutely the supply of the par vagum to the liver, but do not agree with each other.

7. Dr. Sharpey has kindly given me a copy of a Prize Essay, entitled "Über den Verlauf des Lungenmagennerven in der Bauchhöhle," by Dr. J. Kollmann z. z. Assistent an der kgl. Anatomie in München, Leipzig, 1860, with two lithographic plates of the distribution of the par vagum.

In the summary at the end of the Essay we find the following:—"Der vordere Lungenmagennerv endigt an dem magen und der leber," and

"Der hintere Lungenmagennerv begiebt sich nur mit dem kleinern theile seiner fasern zum magen, mit dem bei weitem grössern verzweigt sich an der leber, der milz, der niere und nebenniere, der Bauchspeicheldrüse und dem ganzen Dünndarme."

In this Essay there is also given an excellent resumé of the researches of previous German and French Anatomists, into the distribution of the par vagum in the abdomen.

The account of the liver nerves by Kollmann, appears to be more in accordance with what might be expected from analogy, and from pathological observation and inference, than the descriptions of the other authors. But the vagueness and unsatisfactory state of our knowledge on the above subject, must now be evident.

Besides, although some Anatomists mention anterior and posterior hepatic plexuses, yet only few, as John Reid, Swan, and Valentin, appear to have distinguished plexuses, or nerves of the right, from plexuses, or nerves of the left lobe, and we know little as to the ultimate destination of the nerves in the interior of the liver.

As to this ultimate distribution, the substance of the knowledge we appear to possess is as follows:—The combined sympathetic and pneumogastric branches "enter the liver supported by the hepatic artery and its branches, along which they may be traced a considerable way in the portal canals, but their ultimate distribution is not known." "The gall bladder receives nerves along the hepatic artery from the cœliac plexus."*

Ellis† says, "the hepatic plexus is continued on the vena

* Quain's Anatomy, 7th Edit., 1867, part iii., pp. 867 and 868.

† Ellis's Demonstrations, 3rd Edit., 1852.

portæ, hepatic artery, and bile duct, to the transverse fissure, where it enters the liver, and ramifies on the vessels."

Cruveilhier* that the hepatic plexus of the sympathetic (which comprises the pneumogastric hepatic nerves), "gains the transverse fissure of the liver, divides like the vena portæ and hepatic artery, and may be traced, for some distance, in the capsule of Glisson."

If we can argue analogically from the other pneumogastric organs, we should conclude that the liver branches of the par vagum are guided, by the blood vessels enveloped in the capsule of Glisson, to the acini of the organ, ramifying within and around these, and that they are destined to the bile ducts, and their continuations down to the transverse fissure, and to the duodenum. We know already that the gall bladder and cystic duct are provided with plexuses proper to themselves from these and the sympathetic nerves.

Now, the system of bile ducts constitutes the essential secreting portion, so to speak, of the liver, as the bronchi and air cells do of the lungs; the mucous membrane, with its gastric glands, of the stomach; and the lining membrane and muscles, of the heart—and these are the parts, in these several organs, to which their pneumogastric nerves are distributed. But to prove or to disprove that the hepatic twigs are really given to the system of bile ducts, and the sympathetic twigs to the blood vessels, a more minute and correct anatomy is wanted.

In the absence, however, of satisfactory anatomical information as to the symmetrical arrangement of the hepatic nerves of the par vagum in reference to the right and left lobes, it may not, perhaps, be unreasonable to conjecture that the right vagus supplies *mainly* the right, and the left vagus *mainly* the left lobe.

For the liver, at an early period of foetal life, is an almost symmetrical organ, the two lobes being equal, or nearly so.† Thus, this organ resembles the other members of the pneumogastric series—the pharynx and larynx, the trachea and lungs, the heart, the stomach, the kidneys, &c.—and these are all supplied, *mainly* on their right side by the right, and on their left, by the left pneumogastric. It is well understood that branches are interchanged from side to side, but a symmetrical arrangement of the nerves corresponds, on the whole, to the symmetrical form of the organs. Is it likely, I would ask,

* Cruveilhier's Anatomy, vol. ii., p. 1162, Tweedie's Library of Medicine, 1842.

† Quain's Anatomy, 7th Edit., Part III., p. 879.

that the liver will be an exception to this rule? I find no reason to think that it will prove so to be, since, in its complicated structure, it contains, like the other organs of the pneumogastric series, canals of mucous membrane,—surfaces of impression, surrounded by walls of muscular fibre, for motor purposes, viz., in the ductus communis choledochus, the hepatic and cystic ducts, and the gall bladder.

Again, the blood vessels,—the portal veins, and hepatic arteries, the lymphatics and the hepatic ducts, are all so far symmetrically arranged as the differing size of the two great lobes will admit; and no doubt the nerves are subjected to the same arrangement.

Further, analogy, as to disposition of parts, structure, and distribution of their nerves, in the other members of the series, is in favour of the above conjecture, which receives strength also from the pathological observations of John Hunter, Sir Thomas Watson, and others, viz., that it is the right shoulder that is pained when the right lobe of the liver is diseased, and the left shoulder when the left lobe is affected. These observations clearly imply that the lobes and the nerves of the liver are symmetrically correspondent.

There is a want of anatomical proof, I am aware, but how is this proof attainable? Observations and facts are wanting, and fresh investigations by competent anatomists urgently called for in this very difficult field of labour.

From what has been adduced, the conclusion is drawn, that the true path of sympathy from a diseased liver to a pained shoulder lies along the lines of the Pneumogastric and the two divisions of the Spinal Accessory nerves.

In a case of hepatitis, ending in abscess of the liver, the nerves, along with the other components of the organ, necessarily become irritated, inflamed, and in part destroyed. The result naturally to be expected will be, *inter alia*, pain in the liver, but, as we know, though we cannot account for the fact, the symptoms are often latent, or not observed; when, however, this latency does not exist, as the disease progresses the disturbance of the nerves tends to spread more or less intensely and rapidly to the hepatic plexuses and the nerves that supply them, whether sympathetic or pneumogastric; the great sympathetic ganglia behind the stomach will receive the influence, and transmit it to their offsets, or some of them, and these to the viscera supplied by them, hence the epigastric and other abdominal symptoms. The splanchnic and other spinal nerves will carry the influence to the dorsal and lumbar part of the spine,

hence the pains in the walls of the chest, the loin, hip, and thigh.

The diaphragm will suffer, more or less, owing to its contact with the inflamed organ, and through the irritation carried to it along the phrenic twigs of the liver, and so the influence may pass up the trunk of the phrenic nerve to the brachial, and even the cervical plexus, and thus the subclavius nerve and others be affected, which may account for pain about the clavicle, and partly for that in the side of the neck, and even in the arm.

But, it is not difficult to conceive that the inflammation, or irritation, will travel at least as readily along the nerves of the pneumogastric system as along those of the sympathetic or spinal systems, and that it will easily be propagated to the trunk of the vagus on the œsophagus from the gastro-hepatic branches, and pass up the chest; and if the hypothesis of the right vagus going to the right lobe of the liver be correct, then, in the case of the hepatitis and abscess being in the right lobe, the right vagus trunk will suffer more than the left, the nerve irritation running up higher and higher, till the cardiac, pulmonary, laryngeal, and pharyngeal nerves are reached, and eventually the base of the skull and the side of the medulla oblongata, and spinal cord, whence the par vagum and spinal accessory take their origin. Hence, we might expect, and do actually find, pain running up the inside of the chest, dyspnoea, and cough, palpitation of the heart, throat affections and thirst, cephalalgia, vertigo, &c.

Again, we know that the internal division of the spinal accessory forms a part of the trunk of the vagus in the chest and in the neck, and that, under the base of the skull it has intimate connections with the external division, and this again with the pneumogastric. The supposed inflammation, therefore, or irritation, is propagated along this lateral communication also, as far as the terminations of the external division of the spinal accessory in the sterno-cleido-mastoid and in the trapezius muscles, where, particularly in the latter situation, it is felt as active pain, or merely as tenderness on pressure. It is worthy of reiteration, that the pains and other disturbances in the organs and parts named, are precisely those which we meet with in liver diseases that are not latent.

The shoulder pain varies with the affection of the liver in intensity: as the latter increases, the pain corresponds; as it diminishes, the pain subsides. After the pus of an abscess has been evacuated, and tension is removed, the shoulder-pain lessens or disappears.

The pain has been noticed by authors in the following liver diseases, viz :—

Congestion ; acute and chronic inflammations (hyperæmia), whether of the upper or under parts ; hepatitis, with abscess ; cancer ; hydatids, producing great hepatic disturbance ; gall stones, impacted and detained in the ducts ; occlusion of ductus communis choledochus, with dilatation above from cancer of head of pancreas ; and in a case of abdominal aneurism compressing the liver.

As to the nature of the sympathy, it has, of late, generally been called nervous irritation, a term difficult to be understood.

Dr. Copland, in his Dictionary, tells us that Baglivi attributed the sympathies of organs to membranous connection ; Bordeu to the cellular tissue ; Willis and Vieussens to the agency of the nerves ; and Whytt and Bronssais chiefly to the brain ; Prochaska to the sensorium commune, to which he believed all the nerves to be continued ; Dr. Klein Grant defines sympathy as “ that relation of the organs and parts of a living body to each other, whereby an action excited in one part induces a corresponding action in another part.”

The doctrine of sympathy held in the 17th century, and which arose out of the then prevalent theory of magnetism, was thus defined by Dr. Walter Charleton, Doctor in Physic, and Physician to the late King, in his “ Ternary of Paradoxes,” 1650 :—“ The secret power of natural actives, working on analogous and determinate passives, by invisible emanations, or an influential energy transmissive to remote distances.” !

I believe, from the pain and tenderness of the nerves, and from the state of the hepatic organs, that the sympathetic state subsisting between the shoulder-tip and the liver is a real hyperæmic or inflammatory condition of the nerves concerned, and of their sheaths.

To this it may be objected that it is not likely that a long nerve, like the par vagum, should be inflamed and continue to be so from end to end, without the inflammation being communicated to the tissues in contact with the nerve along its course, but it may be cited in answer that the sciatic and other nerves are, for example, in rheumatism, so affected, and may, for months, continue to be so, and yet the inflammation does not spread much, or at all, to adjacent parts. It has been suggested that, as the pain intermits, it may not be of an inflammatory nature ; but we know that sciatic and other rheumatic pains of indisputably inflammatory nature, are most commonly of an intermittent or remittent character.

There is no post mortem evidence adducible that would

imply the presence of inflammation in the par vagum during life, and if there is any peculiar state of a nerve which, without being inflammatory, will produce pain, I confess my ignorance of its nature, though I cannot deny that such a state may exist.

If the sympathy of the shoulder with the liver in its diseases consist in an inflammatory state of the nerves connecting these parts, as I believe it does, then the mystery which has so long hung over morbid sympathies is dissolved and disappears, and we get rid of an ancient incubus.

With regard to the diagnostic value of the shoulder-tip pain in liver diseases:

It has only attracted attention in cases in which it has been severe, but as has been previously remarked, it often exists when it does not amount to a prominent symptom, and may be detected when the patient is questioned, and the shoulder and neck are examined by pressure, and as patients are unacquainted with the knowledge of the track of the nerves, it is not easy for the observer to be deceived.

It is a symptom corroborative of the others, and must be taken into account with them. In proportion to its severity, in hepatic disease, it indicates the amount of inflammatory action going on in the liver, and the extent of damage done to the structure of the organ; it may, however, occur in disease of the corresponding lung, or of the corresponding wall of the stomach. We must then attend to and estimate the other symptoms present in the case before us.

Full credit, however, appears due to Hunter, Sir Thomas Watson, and others, who say that a right shoulder-tip pain indicates disease in the right lobe of the liver, and that a left shoulder-tip pain points to mischief in the left lobe, whilst if the pain be in both shoulder-tips, both liver lobes are involved.

The observations of some authors quoted, as Dr. Copland and Professor Andral, show that no faith can be placed in the assertion of Roche and others, that pain of the right shoulder-tip is clear evidence that the upper and not the lower surface of the liver is the exact seat of disease, for in affections of the lower surface the very same sign is recorded.—See Copland and Andral *loc. citat.*

It is highly probable, from what has been previously stated, that the nerves are distributed symmetrically according to the lobes, rather than according to the surfaces of the organ.

In cases of calculi, impacted in the gall ducts, the shoulder-tip pain recorded has been that of the right side, but closer

observation may show that upon the actual position of the impacted calculus may depend the right or left situation of the shoulder pain.

Lastly, there arise the questions:—What is the use of this sympathetic pain? Why should it be present in some cases only, and absent in the majority? To the latter of these questions, I do not pretend to answer further than this, that persons are differently constituted, their nervous systems may be differently arranged, and their susceptibilities diverse.

To the former question, I would say, that one can scarcely be satisfied with John Hunter's reason, that the liver pain being depressing, nature sets up a rousing pain in the shoulder to continue life, for the shoulder pain is at times so severe, as to be worse than that in the liver itself, and such pain can only, and of necessity, exist at a great expenditure of material and of nerve power, and, therefore, of vitality.

Other authors mention the pain merely as a symptom, without assigning any use to it.

A more satisfactory answer, it is submitted, than that of Hunter, is that the shoulder pain, has, in proportion to its severity, the effect of paralysing, more or less, the sternocleido-mastoid and trapezius muscles, and thus these agents of voluntary inspiration are thrown out of gear, so to speak, and the side of the chest is kept to a certain extent inactive and quiet, a condition necessary and congenial to a diseased liver. The pains in and around the chest will similarly limit the action of the diaphragm and of the intercostal muscles, and thus the quiet of the diseased organ is materially provided for.

In the same way, it is believed, that the pain of the knee in hip-joint disease does good service, by greatly impeding the action of the muscles of the leg.

On some other occasion, I propose to show that this same shoulder pain occurs in the same way on one side or on the other, in various diseases of the other organs of the pneumogastric series.