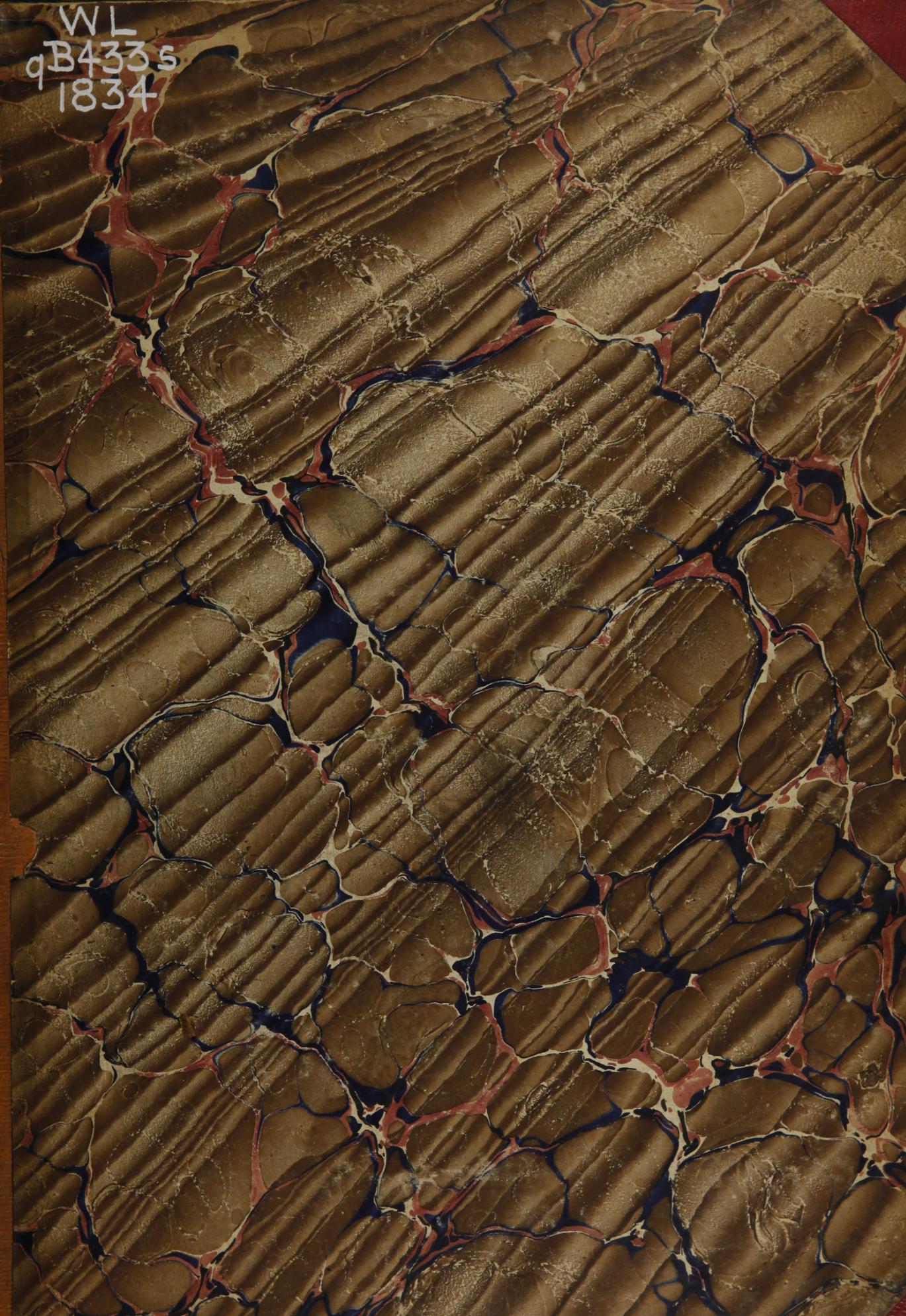
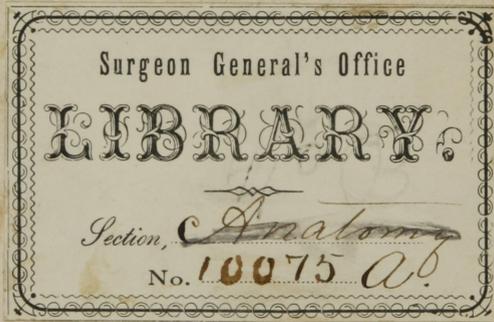


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A
SERIES OF ENGRAVINGS,
EXPLAINING THE
COURSE OF THE NERVES.

WITH
AN ADDRESS TO YOUNG PHYSICIANS

ON THE
Study of the Nerves.

BY CHARLES BELL,

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PREFACE

TO

THE FIRST EDITION.

IN making these Plates of the Nerves, the Author has completed the intention, which he intimated in the Preface to the Plates of the Arteries. The views are given with simplicity, so as to facilitate an intricate study, and to enable the student to prosecute this department of Anatomy with increasing interest, and to greater minuteness.

It has been the Author's ambition to dedicate the first years of his profession to the investigation of the strict anatomy of the human body; and to supply the imperfections of the introductory school-books.

He has been encouraged by these thoughts, in such works as have had it in view, to assist the anatomical student in the lessons which lay the sure foundation of all his future improvement. Having given an easy Introduction to the Study of the Arteries, and of the Nervous

System; having displayed the Anatomy of the Brain, with that splendour with which the excellence of the artists in this country enable us to illustrate professional subjects; having also undertaken to complete the Anatomical Works of his brother, Mr. John Bell; he has lastly endeavoured, in the composition of a system of dissections, so to calculate his views of the Anatomy as to forward the progress of the Dissector, and keep his attention to the proper objects of inquiry.

If in these attempts to facilitate the initiatory studies of his pupils, and to enable them more early to appreciate the practical Lectures, and to derive from them the due advantage and improvement, he has been in any degree successful, may he not also be allowed to hope that he may have contributed to the general improvement of Anatomy.

INTRODUCTION:

BEING

AN ADDRESS TO YOUNG PHYSICIANS

ON THE

STUDY OF THE NERVOUS SYSTEM.

IF I could address my reader with the same freedom, and with the same examples before me with which I speak to my pupils on this subject, I think I could interest him in it; I think I could convince him that he neglects a very essential branch of study, in resting satisfied with what is commonly delivered on the Nervous System.

The study of the Nerves is a part of Anatomical Education the best suited to bring the Student acquainted with the Phenomena of living Animals, and with the Symptoms of Diseases—in truth the best foundation of Medical Knowledge. I would have the young Physician to strive against the rising distaste from the first appearance of intricacy which this subject presents, as well as from the evident fallacy of the opinions which prevail.

He may contemplate the subject in this manner,—he may say, I see in this Dissection of the Nerves of the Head, Neck, and Chest, an intricacy of connexions, which would require the labour of many months to disentangle. He may be inclined to think this apparent confusion accidental. But what does he say when he sees a second and a third body thus dissected? He is forced to declare that there is here perfect order! That each little knot or twig of Nerve, visible in one body, is seen also in all the others. That the parts are infinitely minute, but that intricacy or confusion are words not applica-

ble to Animal Structure; thus surveying the dissection of the Nerves of the Human Body, he will be led to the following conclusions:

1. The Nerves do not run to their destination as the Blood Vessels do. The parts are supplied from the nearest arterial or venous Trunk. But a Nerve will come to a part in a direction the most circuitous, and from a remote source.

2. Never more than one Artery goes into an Organ; but many Nerves are necessary to the supply of one Organ.

3. We next observe that certain Cords of Nerves take a course so as to supply certain Organs which are already bountifully supplied with Nerves from other sources. The known phenomena of life inform us, that these Organs are united or dependant on each other. And we are induced to believe that those Organs are thus united by the Cord which passes among them.

4. It is naturally asked, Is the course of these Nerves, and their branching, and their numerous connexions, accidental? We must again answer, that there is nothing accidental in the Body—that the Nerves are laid in perfect order; and that they are the bonds of union betwixt Organs connected in their functions. Another question is obviously suggested. These Cords, being the media of union in the natural state of the parts, are they also the source of the symptoms indicative of disease? We can have no hesitation in saying they are. And the only difficulty in coming to this conclusion is, the apparent variations in these symptoms. And here we may observe that the symptoms of disease, depending upon this connexion of Nerves, appear at first irregular and accidental. But it is only an apparent confusion, which, like the seeming confusion in the distribution of the Nerves themselves, disappears on a just comparison. These Nervous Affections, the consequence of internal disorder, are regulated by laws uniform in their influence. To the Physician who has not the knowledge of structure, they are distracting; but seen in connexion with the Anatomy, they appear in their true light, that is, as necessary consequences of the morbid irritation; and therefore they become the distinctive marks of the seat and nature of disease.

5. The influence of Visceral Diseases on remote parts is very remarkable:

particularly on the tongue, throat, and larynx; sometimes there is a paralysis which prevents the patient articulating; sometimes he loses his taste, and retains his speech; sometimes he retains both speech and taste, but loses the power of swallowing.

These symptoms are not so frequent as a foul tongue, or a tickling cough, or a viscid secretion in the larynx, from disorder of the stomach; but they nevertheless arise from the same connexion, and proceed from the deranged function of the Viscera.

There are Physicians who look upon such occurrences as very curious, but their wonder does not seem to lead them to inquiry. They do not desire to know how such singular phenomena came to pass. And in the same way pains in the head, the shoulders, the back, the loins, the hip, are classed together as *Nervous Affections*. And the very term relieves their minds from all labour of scrutiny. The very acknowledgment that the symptoms depend upon the Nerves, is an apology for neglecting the study of them.

6. It is not saying too much to affirm, that the Anatomy of the Nervous System gives a satisfactory explanation of these otherwise disjoined and irregular symptoms of disease. And out of muscular pains which appear irregular, and feelings in parts, which to the mind of the patient, are too far removed from their cause, to be by him considered as consequences, a system of signs may be formed, which will add very materially to the accuracy of the Diagnosis. By this also a part of Medical Study, embracing things vague and conjectural, will, through Anatomy, become united to legitimate Science.

7. To perfect the system of signs through the Nerves, it will be necessary to attend to a class of them very much neglected; I allude to the Cutaneous Nerves. These are in general small fibrils, which, branching from the greater nerves, emerge, and run just under the skin; and from their being very small and cutaneous, they are counted of no importance during demonstration. But I have always urged the necessity of attending to those Cutaneous Nerves, for they furnish us with an explanation of the pains which accompany internal diseases.

The fact that internal irritation shows itself by external pain, is of the first consequence in ascertaining the place and nature of disease. The explanation of this circumstance may be attempted hypothetically, thus. Draw

a Nerve A. distinguishing its filaments by parallel lines: represent this nerve diverging in branches B. to the parts internal, C. to parts external.—When morbid irritation affects the branch B. it will not be felt in the seat of the complaint, but in the parts to which C., the cutaneous or external branch, is sent. This in fact holds universally; pain actually seated in the eye, throat, heart, lungs, and stomach, great intestines, uterus, testicles, is announced or accompanied by pains external, that is, in parts to which the corresponding Cutaneous Nerves are transmitted.

The Nerve B. not being a Sentient Nerve, and not for the purpose of conveying impression, the irritation upon it is not presented to the Sensorium, until the disturbance is communicated to the accompanying parallel fibrils of the external or Cutaneous Nerve, and then it is transmitted to the Sensorium. But the pain hence arising, is attributed to the extremities of this Cutaneous Nerve, that is, to parts external. If this be still obscure to the reader, the next law of the system will perhaps explain the difficulty.

8. A Nerve excited any where in its course, produces the idea of pain in the extremity of that Nerve. The knowledge of this will also enlarge the Physician's means of ascertaining the seat of disease. Thus, pain and cramp in the lower extremities will sometimes declare a disease to be seated in the Pelvis.—Of this more presently.

9. In the last place, the Nerves called *Vital*, that is, the Nerves of the Viscera, although they form a system, and seem to be limited to the great cavities, do in fact stretch out their branches, and mix with the Nerves of the head, arms, and lower extremities. By this we may understand the reason of those varying pains of the remote parts of the frame, in consequence of disorders of the Viscera which are not otherwise made manifest.

These are a few of the motives which I would hold out to the Medical Student, to induce him to pay very particular attention to this part of Anatomy. Some further illustrations are subjoined in connexion with the Views of the Nerves given in the following plates.

Of the Symptoms of Disease explained by Plate I.

THE Sympathetic Nerve *m.* is generally described as descending. It is an ascending branch of the nervous system of the Viscera. Here it forms connexions with the fifth, sixth, seventh; and by this there is established a correspondence betwixt the operations of the economy going on in the lower cavities, and the organs in the head. Hence those sensations in the head indicative of disordered bowels.

1. Indistinctness of Vision, and of a degree of *Amaurosis*.
2. Buzzing and singing in the ears.
3. False impression of unpleasant odours.
4. Rheums and pain of the forehead and occiput.
5. The Clavis Hystericus.
6. The irritation and picking of the nose; and the grinding of the teeth in sleep,—with many other affections as it is termed by sympathy, but not intelligible till this cord is traced.

When we observe these several nerves in the head, connected with each other, the cause of many symptoms is made evident.

1. The connexion between the eye and the nose [by the *Nasalis Ophthalmica*].
2. The affection of the ear from tooth-ache. The setting the teeth on edge by harsh and acute sounds.
3. The pain and tickling of the ear from impressions on the Gustatory Nerve.
4. The cough occasioned by tickling the ear.
5. The pain in the back of the head from inflammation of the eye.

These sympathies are chiefly to be attributed to the universal connexions formed by the *Portio Dura* of the seventh nerve.

Symptoms explained by Plate II.

A FULL acquaintance with this part of Anatomy, will give the Physician a key to many phenomena.

1. These three Nerves passing to the Tongue, are for the purpose of connecting this Organ with different arrangements of Muscular Actions.

- a. The Gustatory Nerve connects with the Salivary Glands and Muscles of Mastication.
- b. The Ninth is the Nerve of Speech, and connects the Tongue with the Muscles of the Larynx and Trachea.
- c. The Glosso-pharyngeal Nerve associates the Tongue and Pharynx, in the action of deglutition.

And now we comprehend how the Tongue, being put into action through the intervention of distinct Nerves, may be deprived of one faculty, and retain the others. Thus affections of the Brain, and sometimes the disorders of the Bowels, deprive the patient at one time of taste, at another of speech, or at another of swallowing.

2. In the distribution of the Branches of the Eighth Nerve to the Larynx and Glottis, we remark that connexion which so intimately unites the Larynx and Lungs. We observe how the slightest irritation on the former calls into activity the whole Respiratory System.

3. In the connexions of the Seventh, the Ninth, the *Nervous Superficialis Cervicalis*,* the Roots of the Phrenic, and that which I call the external Respiratory, we see the means of many combinations.

- a. The expression and consent of parts in sneezing, coughing, vomiting.
- b. The expressive spasmodic actions during violent passion.
- c. The spasms in Hydrophobia and Tetanus.

* There is a Superficial Plexus on the side of the Neck, formed of the connexions of the Seventh of the Head, the Third Cervical Nerve, and the Descendens Noni.

4. In the connexions of the Phrenic Nerve with the Cervical Nerves, we may observe the source of that remarkable sympathy which makes the affection or wound of the Diaphragm, attended with pain in the shoulders, or convulsive rising and shrugging of the shoulders.

5. In the connexions of the Lower Ganglion of the Sympathetic Nerve in the Neck with the Brachial Plexus, we see why disease of the Heart causes pain in the Arms and Mammæ.

In Plate III.

THERE are exposed a few of those thousand Nerves of the Viscera, which ought to be the great object of the Physician's study. They will afford an exercise to his talents for observation, and give an interest even to common matters of practice.

1. The attention is first drawn to the Par Vagum 2, 6, 7, 9.*—Why does this long Nerve descend from the Brain to the Viscera, which are already so bountifully supplied through the Sympathetic? Because the sympathetic, in ordering those secret operations of the economy over which the will has no control, does not bestow sensibility; therefore the Par Vagum is sent down to bestow sensibility, and to connect parts which are united in function.

When the Eighth pair of Nerves are cut, an animal having poison introduced into its stomach, dies without evidence of suffering pain. When the same poison is introduced without the connexion betwixt the Sensorium and the Stomach being thus intercepted, by the cutting of the Nerves, the animal dies howling, and apparently in agony.

2. The Par Vagum connects the Larynx, Pharynx, Lungs, Heart, and Stomach; and the sympathies it produces in health and disease are very many.

- a. Disorder of the Stomach deranges the Secretion of the Larynx.
- b. A vomit or nauseating medicine will loosen the Viscid Secretion of the Larynx and Pharynx.
- c. Disorders of the Stomach acting through the Pulmonic Plexus, will occasion cough; and medicines acting on the Stomach will alleviate Asthma.

- d. Through the Plexus of this Nerve the Heart and Lungs are united, ever corresponding in action.
- e. When life seems extinguished by suffocation (in experiments on animals), pricking the Heart will be followed by Respiration.—And in the apparently drowned, the play of the Lungs in artificial breathing, brings after it the action of the Heart.
- f. It is well known how disease of the Lungs affects the Heart; but it is not so generally observed how much disease of the Heart resembles Pulmonary disease.
- g. Looking to the distribution of the Par Vagum on the Stomach [* 16.] and the Plexus of the Nerve, in its course upon the Œsophagus [1] it will not appear surprising that disorder of the Uterine System affecting the Stomach, and also Primary disorders of the Stomach itself, should produce the *Globus Hystericus*, or Paralysis, or Spasms of the Pharynx and Œsophagus.
- h. Although the Heart and Stomach be divided by the Diaphragm, yet through this Nervous cord they are united, and this explains why disorder of the Stomach should produce such changes on the Heart's action. The pause, or intermission of the pulse, which in many diseases is a fatal symptom, is often produced in a manner less alarming, merely by irritation of the Stomach.
- i. Seeing these many connexions of the Stomach with the vital parts through this Nerve; our surprise ceases at a blow on the Stomach proving instantly fatal.

2. Of the Respiratory Nerves a small part only is shown in these Plates. To enter fully on the subject, it would be necessary to explain more than is seen here; we should be led to consider the *external Respiratory Nerve*, and the connexions high in the neck, betwixt the seventh, the Par Vagum, the ninth, the Phrenic, and the external Respiratory Nerve.

The consent established betwixt these nerves, is the cause of all which is most curious in the expression of the body, when under the influence of passion. It would be foreign to our present purpose to enter on this subject.

3. These connexions which I have just enumerated, form the union betwixt

the internal Respiratory Organs and the Muscles of Respiration; and they are also the means of union of the internal and external Respiratory Muscles.

4. The origin of the Respiratory Nerves explains why the Diaphragm continued its motion when Galen cut across the Spinal Marrow at the sixth Vertebra. It explains also how injury of the Spine higher up, kills by stopping the act of respiration, and suffocating.

5. Experimenters are ever leading themselves into errors, and making fruitless dissections of living animals from inattention to the lessons of Anatomy. The Par Vagum is the bond of union betwixt the vital organs, not the source of their life and sensibility. When the Par Vagum is cut, the animal dies from the embarrassment of the respiratory action. The bond of union betwixt the Heart and Lungs and Respiratory Muscles is cut asunder. The Heart continues to answer to stimulus, but its action is not followed by a consent of the Muscles of Respiration; the functions cannot, therefore, proceed.

6. The Par Vagum in its connexions with the Phrenic and external Respiratory Nerves governs the actions of the Muscles in Respiration; and being also the Nerve of the Stomach, by the same connexions, it governs the Muscles in vomiting, combining them in a different manner to produce that action.

7. In vomiting and in respiration, the same Muscles are in action, but they are differently combined; and Muscles which in respiration are opponents, become coadjutors in vomiting. The variety of combinations, of which these Muscles are capable, explains the meaning of that intricacy and minuteness of subdivision, which characterize the Nerves of the Neck and Chest; for I have no doubt that different fibrils of Nerves minister to each new combination of Muscles.

THE Reader's attention may now be directed to the whole extent of the Sympathetic Nerve. It is seen to be a great system of Nerves, which unites the several Viscera, and controls them in those operations which constitute the economy of an animal body. Through the agency of these Nerves, the most curious and minute actions are going on, without consciousness, that is, without any controlling influence of the mind.

But it is important to remark, that although the fine operations of the Viscera are proceeding in their healthy state without consciousness, yet, when they are disturbed, that is, when morbid irritation prevails, there follow both painful sensations of the body, and great disturbance of the mind.

1. Passion affects the Intestines, producing Spasm and Diarrhœa.
2. Torpor of the Bowels, and accumulation in the intestinal Canal, affects the mind, obscures every happy vision, and induces a sombre and melancholy cast of thought.
3. The mind and Viscera mutually influencing each other, produce Hypochondriasm.
4. In the Hypochondriac's feelings all is not imagination. Pains and odd sensations, attributable to external and remote parts, do actually proceed from the disturbance of internal Nerves.

Of Symptoms explained by Plates IV. V. VI.

By these Nerves, which in Plate 5, are seen coming from betwixt the ribs, and which are called *Intercostales humerales*, are produced those external pains indicative of internal disease.

Thus during inflammation of the heart, in Spasm, in palpitation in the disease called Angina Pectoris, pains are felt in the arms and in the mammæ and shoulders.

For example, pain in the arms from Angina Pectoris. *Dr. Parry, of Bath.*

Pain in the left shoulder, from Rupture of the Heart. *Lieutaud.*

Pain about the left Scapula in inflammation of the Pericardium. *Hildanus.*

Pain in the Scapula from inflammation of the Heart. *Riverius.*

Pain in the left shoulder, from blood in the Pericardium. *Med. Observ. Vol. iv. p. 330.*

I could furnish several examples of Paralysis of the Muscles, suspending the shoulder, from disturbance of the bowels. This is a circumstance not easily credited, until we recollect that in the Colica Pictonum, and in other disorders of the bowels, even more partial defects of Muscles will be exhibited.

Of Symptoms illustrated by the Plates of the Nerves of the Lower Extremities.

HAVING observed that the Cutaneous Nerves give rise to symptoms of internal disorder, we consider with more interest the Cutaneous Nerves of the hip, groin, and thigh.

1. When there is disease of the kidney, or stone in the ureter, there is pain in the fore part of the thigh, and in the testicle.

2. A pain like Rheumatism will be produced in the thigh and testicle, by Fæces in the Colon.

3. Pain actually seated in the testicle is referred to the loins; thus, while we inject a hydrocele, the pain is in the lumbar region.

4. Why an injury of the testicle has a sickening and subduing influence, more than the injury of any other external part, is made obvious by the division of Visceral Nerves, which are given to it.

5. The Plexus of Nerves which in the male departs from the Renal Plexus to the testicle, in women goes to the Uterus. Hence we comprehend the pain and weakness in the lower part of the back during menstruation, fluor albus, gestation, labour, and other more dangerous conditions of the Uterus.

6. As disorder of the thorax and abdomen gives rise to external pain; such we shall find to be the consequence of disease of the Viscera of the Pelvis.

a. In a stricture with irritation of the bladder, there is often a fixed pain in the groin or lower part of the belly.

b. A weariness and stiffness of the loins will proceed from the same cause.

c. A fixed pain high in the back part of the thigh, I have found accompany disease of the Rectum.

7. Portal gives us an instance of pain in the great toe, the consequence of a curvature of the spine, by which the point of the lower rib was made to press on the loins. There are many symptoms to be accounted for on the same principle.

8. Thus when the child's head rests in the Pelvis during delivery, the free circulation in the roots of the Ischiatic Nerve is impeded; hence come indescribable pains and spasms of the Muscles of the leg.

9. In taking leave of this subject, I must remind my reader that the Sympathetic Nerve, the great cord of connexion among the Viscera, does not terminate in the Pelvis, but forms connexion with the Nerves of the lower extremity; the connexion thus subsisting betwixt the extremities and the intestines is made evident by many sympathies.

- a. Disorder in the bowels produces cramp in the muscles of the leg.
- b. Cold water thrown on the legs promotes the action of purgatives, warm bathing of the legs soothes the intestines.

I have thrown out these examples, of what are called Sympathies, as a suitable introduction to this elementary book, and for the purpose of showing in how many instances the consent of parts is in exact concurrence with the distribution of the Nerves. My desire is to bring the medical student to a just sense of the value of this part of Anatomy, inasmuch as it will give him a more correct judgment, and will lead him to the observation of Symptoms which will else escape him. I hope it may induce him to found all his reasoning on the sure groundwork of Anatomy.

EXPLANATION

OF

PLATE I.*

THIS figure is not to be considered as an accurate representation of those intricate Nerves, which take their course through the bones of the face, but merely as a plan, of the first seven Nerves of the Cranium.

2. The OPTIC NERVE, which is expanded into the Retina.
 3. The Motor Oculi, [Third Pair of Nerves] being that Nerve which supplies the muscles moving the eye in general.
 4. The TROCHLEARIS [Fourth Pair of Nerves] being that which passes to the Superior Oblique Muscle.
 5. The FIFTH NERVE, or TRIGEMINUS, from its three great divisions.
 - A. The FIRST DIVISION, or OPHTHALMIC BRANCH of the FIFTH PAIR, which divides into—
 - B. The FRONTAL, or SUPERCILIARY NERVE.
-

* The Student will find it advantageous, while consulting these plates, to advert to JOHN BELL's "*Engravings of the Muscles and Joints*," and CHARLES BELL's "*Engravings of the Arteries*," to which references are made in the subsequent pages.

- c. The LACRYMAL NERVE.
 - d. The NASAL NERVE.
 - e. The SECOND DIVISION of the FIFTH PAIR, or SUPERIOR MAXILLARY NERVE.
 - f. That branch of the Superior Maxillary Nerve, which passes under the Orbit, and is called, the INFRAORBITAL NERVE; it escapes by the infraorbital foramen upon the cheek.
 - g. The SPHENO-PALATIN GANGLION, formed by branches of the Superior Maxillary Nerve.
 - h. Branches descending upon the Palate and Throat.
 - i. The Videan Nerve, passing back from the Spheno-palatin Ganglion, through the Petrous Portion of the Temporal Bone, to unite with the Portio Dura in the ear.
6. The SIXTH NERVE, the last which passes into the Orbit, viz. to supply the Abducens Muscle.
- k. The Origin of the GREAT SYMPATHETIC NERVE.
 - l. Its additional origin from the Videan Nerve.
 - m. The Superior Cervical Ganglion of the Sympathetic Nerve.
 - n. The THIRD DIVISION of the FIFTH NERVE, or INFERIOR MAXILLARY NERVE.
 - o. The division of the Inferior Maxillary Nerve, which passes into the Tongue, viz. the GUSTATORY NERVE.
 - p. That Nerve which passes back from the Gustatory Nerve to the Ear, and which, passing through the Tympanum to join the Portio Dura of the Seventh Pair, is called CHORDA TYMPANI.

- q. That division of the lower Maxillary Nerve, which passes into the lower Jaw, supplies the Teeth, and comes out upon the Chin.
7. The Seventh Pair of Nerves, consisting of the Portio Mollis, viz. the AUDITORY or ACOUSTIC NERVE; the Portio Dura, being that Nerve which comes out from the Stylo Mastoid Foramen, and is distributed upon the side of the Head and Face.

The Student can, by this simple scheme, arrange all these intricate Nerves. The FIRST Pair of Nerves passes to the Nose.

The SECOND Pair, the THIRD, FOURTH, a division of the FIFTH, and the SIXTH NERVE, pass into the Orbit.

The FIFTH Pair of Nerves is divided into three great branches to the Eye, the upper and the lower Jaw.

The SIXTH Nerve passes into the Orbit, but gives off also the origin of the Sympathetic.

The SEVENTH Pair is divided into the Portio Mollis and Dura. The Portio Dura has two connexions with the Fifth Pair, the Videan Nerve 1. and the Chorda Tympani p.

EXPLANATION

OF

PLATE II.

BEING A VIEW OF THE NERVES OF THE NECK.*

-
- A. The PAROTID GLAND, turned up from its seat, so as to expose the Portio Dura of the seventh pair of Nerves.
 - B. The SUBMAXILLARY GLAND.
 - C. The Os HYOIDIS.
 - D. The THYROID CARTILAGE.
 - E. The THYROID GLAND.
 - F. TRACHEA.
 - G. The MASTOID MUSCLE.
 - H. Part of the Trapezius Muscle.
 - I. The arch of the AORTA.
 - K. The PULMONIC ARTERY.
 - L. The HEART pulled to the right side, so as to expose the recurrent Nerve of the left side.
 - M. The LEFT AURICLE of the Heart, with the Pulmonary Veins of the left side of the Lungs seen entering it.
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* See Engravings of the Muscles and Joints, (Philadelphia edition) Plates II. and III.; and Engravings of the Arteries, Plates II. III. and IV.

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- N. The PERICARDIUM.
- O. O. The LUNGS.
- P. The DELTOID MUSCLE.
- Q. The GREAT PECTORAL MUSCLE.
- R. The CLAVICLE.

NERVES.

1. The PORTIO DURA of the SEVENTH PAIR of NERVES, or the COMMUNICANS FACIALIS. It comes out by the Stylo Mastoid Foramen, and is extensively distributed over the Face.
2. The NINTH NERVE of the Scull, passing to the Muscles of the Tongue.
3. A branch of the fifth nerve, which pierces the substance of the Tongue, and is the GUSTATORY NERVE.
4. The SPINAL ACCESSORY NERVE, where it is about to pierce the Mastoid Muscle, to be distributed upon the back of the Neck and Shoulder.
5. The SUPERIOR CERVICAL GANGLION of the GREAT SYMPATHETIC NERVE.
6. The LOWER CERVICAL GANGLION of the SYMPATHETIC NERVE. Betwixt those enlargements of this Nerve it is very delicate, and lies close upon the Spine. It will be observed also to give out several small twigs forward.
7. The Ganglion formed by the Sympathetic Nerve below the Subclavian Artery. From this part the Nerve continues its course by the side of the Spine, as seen in the succeeding Plate.
8. 8. The PAR VAGUM, being part of the eighth Nerve of the Cranium.

9. 9. The RECURRENT BRANCH of the eighth pair.
10. The PAR VAGUM, continuing its course, and splitting on the Œsophagus.
11. The GLOSSO PHARYNGEAL NERVE, a division of the eighth pair of Nerves.
12. The DESCENDENS NONI, a branch of the ninth Nerve, which passes down upon the straight Muscle of the fore part of the Throat.
13. 13. 13. Those are the ROOTS of the CERVICAL NERVES, which are in a great measure covered by the Mastoid Muscle g.
14. 14. The AXILLARY PLEXUS of NERVES, formed by the four lowest Cervical Nerves, and the first of the Back.
15. 15. The PHRENIC OR DIAPHRAGMATIC NERVE, arising from the Cervical Nerves and passing to the Diaphragm.
16. The PAR VAGUM of the left side.
17. The RECURRENT BRANCH of the PAR VAGUM of the left side, seen turning round the arch of the Aorta.
18. The Phrenic Nerve of the left side; it is here separated from the Pericardium, to which it is naturally attached.

We observe also here the Nerves descending from the Par Vagum and Sympathetic Nerves upon the great Vessels of the Heart.

These are so minute that it would be impossible to define them accurately in a drawing upon so small a scale as this.

EXPLANATION

OF

PLATE III.*

IN this Plate, we have a view of those Nerves which are prolonged from the Brain, and take a course amongst the Viscera of the Thorax and Abdomen.

- A. The MASTOID MUSCLE turned aside.
 - B. The TRACHEA and THYROID GLAND.
 - C. The CAROTID ARTERY.
 - D. The SUBCLAVIAN ARTERY.
 - E. The ARCH of the AORTA.
 - F. The VENTRICLES of the HEART.
 - G. The Right Auricle of the Heart.
 - H. The LUNGS of the left side.
 - I. The ŒSOPHAGUS.
 - K. The DIAPHRAGM.
 - L. The STOMACH distended, and held to the left side.
 - M. The KIDNEY.
 - N. The RECTUM.
-

* See Engravings of the Muscles and Joints, Plates X. and XI.; and Engravings of the Arteries, Plates II. VII. and VIII.

- o. The BLADDER of URINE.
- p. The Symphysis of the Os Pubis. Part of the right side of the Pelvis is cut away, to show the termination and final connexion of the Sympathetic Nerve with the Lumbar and Crural Nerves.

NERVES.

1. The SPINAL ACCESSORY NERVE, piercing the Mastoid Process.
2. The PAR VAGUM, or division of the eighth pair.
3. The SYMPATHETIC NERVE.
4. The PHRENIC NERVE, derived from the Cervical Nerves.
6. 6. The RECURRENT BRANCH of the Par Vagum, which is seen to pass round the Subclavian Artery, and ascend behind the Trachea, to the Larynx.
7. The SUPERIOR LARYNGEAL NERVE.
8. Nerves which pass to the Heart and Great Arteries, from the Sympathetic Nerve, the Par Vagum, and its recurrent branch.
9. The PAR VAGUM of the right side, descending to the Stomach, upon the Œsophagus, and splitting to form a network with the Nerve of the other side.
10. 10. The Sympathetic Nerve, descending by the side of the Spine into the Abdomen.
11. The Anterior Branches of the Sympathetic Nerve in the Thorax, forming the SPLANCHNIC NERVE. It is this Nerve which, upon passing the Diaphragm, forms the SEMILUNAR GANGLION.
12. A Thread holding out the PHRENIC NERVE.
13. Expansion of the Phrenic Nerve into the substance of the Diaphragm.

14. 14. The SYMPATHETIC NERVE, continuing its course by the side of the Vertebræ of the Loins. Here this Nerve is receiving twigs from the Lumbar Nerves, &c. giving them out to the Solar Upper and Lower Mesenteric Plexus, to the Renal and Spermatic Plexus.
15. The SEMILUNAR GANGLION, formed by the Splanchnic Nerve.
16. This Number is placed upon the Trunk of the Cœliac Artery; but surrounding the vessels, we see a great network of Nerves, viz. the SOLAR PLEXUS.
- * The PAR VAGUM coming down with the Œsophagus into the Abdomen. They are seen extensively distributed over the Stomach; some of their lesser twigs are at the same time seen to join the Solar Plexus.
17. The SUPERIOR MESENTERIC PLEXUS, formed by the Solar Plexus being continued down upon the fore-part of the Aorta, and by lateral Branches of the Sympathetic Nerve.
18. The LOWER MESENTERIC PLEXUS. This Plexus also is formed by the Superior Mesenteric Plexus, and the lateral Branches of the Sympathetic Nerve, and is continued into the Pelvis, so as to join the Hypogastric Plexus.
19. The HYPOGASTRIC PLEXUS.
20. The termination of the Sympathetic Nerve in the Hypogastric Plexus and Nerves passing to the lower extremity.
21. The ANTERIOR CRURAL NERVE.
22. The GREAT ISCHIATIC NERVE.

EXPLANATION

OF

PLATE IV.*

THE Arm, from which this drawing was taken, was so placed as to foreshorten it, and the Muscles being dissected loose, gives to the drawing a shapeless appearance; it displays the Nerves of the Arm in a general view.

- A. The PECTORAL MUSCLE.
 - B. The DELTOID MUSCLE.
 - C. The LATISSIMUS DORSI MUSCLE.
 - D. The SERRATUS MAJOR ANTICUS MUSCLE.
 - E. The BICEPS FLEXOR BRACHII.
 - F. The round Tendon of the Biceps Muscle.
 - G. The broad expansion of the Biceps Muscle into the Fascia of the Fore-arm.
 - H. The TRICEPS EXTENSOR MUSCLE.
 - I. The BRACHEUS INTERNUS MUSCLE.
 - K. The CORACO-BRACHIALIS MUSCLE.
 - L. The SUPINATOR BREVIS.
-

* See Engravings of the Muscles and Joints, Plates V. and VI.; and Engravings of the Arteries, Plates VI. and additional VI.

- m. The SUPINATOR LONGUS.
- n. EXTENSOR RADIALIS LONGIOR.
- o. The powerful mass of the Flexor Muscles.
- p. The FLEXOR DIGITORUM PROFUNDUS.
- q. The FLEXOR CARPI ULNARIS.
- r. The Annular Ligament of the Wrist.
- s. The Short Muscles forming the Ball of the Thumb.
- t. The FLEXOR and ABDUCTOR MINIMI DIGITI.

NERVES.

- 1. 1. The RADIAL NERVE.
- 2. 2. The ULNAR NERVE.
- 3. The PERFORANS CASSERII, or EXTERNAL CUTANEOUS NERVE.
- 4. The MUSCULAR SPIRAL NERVE. This Nerve is seen to pierce the Triceps Muscle, and to pass behind the Arm Bone, while the last mentioned pierces the Coraco-brachialis Muscle, and passes before the Bone.
- 5. A communicating Branch from the Perforans Casserii to the Radial Nerve.
- 6. The ARTICULAR NERVE.
- 7. The INTERNAL CUTANEOUS NERVE.
- 8. The PERFORANS CASSERII, or External Cutaneous Nerve, where it comes out from betwixt the Biceps and Bracheus Internus Muscles, to descend upon the outside of the Fore-arm.
- 9. The Branch of the Perforans Casserii, which passes to the back of the Thumb.
- 10. The MUSCULAR SPIRAL NERVE, where it lies by the side of the

Supinator Longus. Branches are seen passing off to the Supinator and Extensor Muscles, while one stretches to the Ligaments of the Wrist.

11. A Branch of the Muscular Spiral, which passes to the back of the Hand and Wrist.
12. The **RADIAL NERVE**, which we see to have been very well named **Medius** by Winslow, since it passes down the middle of the Fore-arm, and is betwixt the Muscular Spiral (or Radial of Winslow) 10. and the Ulnar Nerve (or Cubital of Winslow) 13.
13. The **ULNAR NERVE**.
14. A Branch of the Ulnar Nerve, which passes to the back of the Hand.
15. Distribution of the Median Nerve to the Thumb, fore, middle, and one side of the Ring Finger.
16. Distribution of the Ulnar Nerve to the ring and little Finger.

EXPLANATION

OF

PLATE V.*

IN this Figure, while the Pectoral Muscle is forcibly raised, that we may see further into the Axilla, the Arm is bent, to show the distribution of the Nerves on the outside of the Fore-arm.

- A. The PECTORAL MUSCLE, drawn up with a cord.
 - B. The DELTOID MUSCLE.
 - C. The SERRATUS MAJOR ANTICUS.
 - D. The Tendon of the LATISSIMUS DORSI.
 - E. The BICEPS FLEXOR HUMERI.
 - F. The BRACHIALIS INTERNUS.
 - G. The CORACO-BRACHIALIS.
 - H. The SUPINATOR LONGUS.
 - I. The EXTENSOR CARPI RADIALIS LONGIOR.
 - K. EXTENSOR CARPI RADIALIS BREVIOR.
 - L. The Extensor Muscles of the Thumb.
 - M. EXTENSOR DIGITORUM COMMUNIS.
 - N. EXTENSOR CARPI ULNARIS.
-

* See Engravings of the Muscles and Joints, Plates V. and VI.; and Engravings of the Arteries, Plate VI.

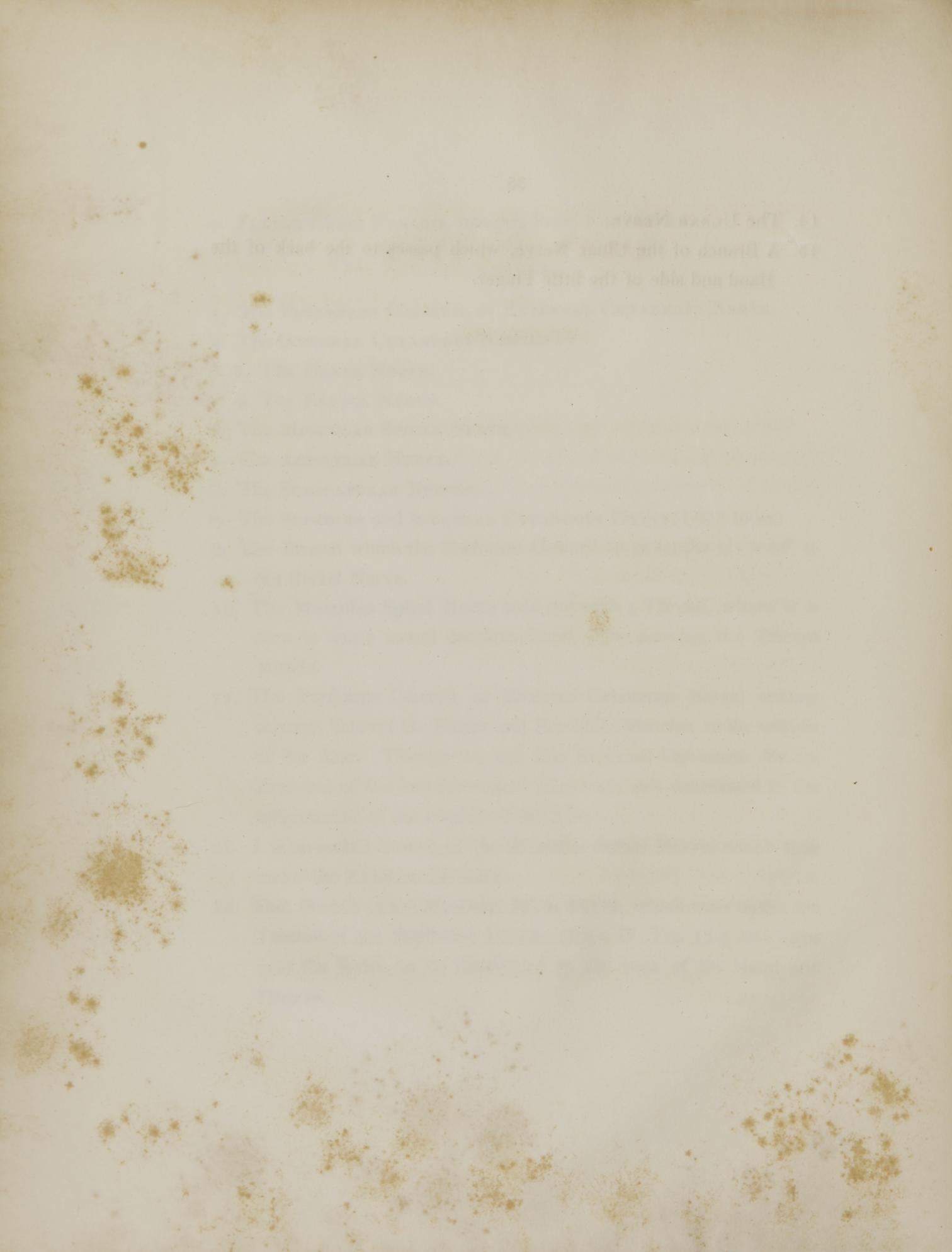
- o. **FLEXOR CARPI ULNARIS**, hanging loose from the bone.

NERVES.

1. The **PERFORANS CASSERII**, or **EXTERNAL CUTANEOUS NERVE**.
2. The **INTERNAL CUTANEOUS NERVE**.
3. 3. The **ULNAR NERVE**.
4. 4. The **RADIAL NERVE**.
5. The **MUSCULAR SPIRAL NERVE**.
6. The **ARTICULAR NERVE**.
7. The **SUBSCAPULAR NERVES**.
8. The **SUPERIOR and INTERNAL CUTANEOUS NERVE**, lying loose.
9. The Branch which the **Perforans Casserii** so generally gives off to the **Radial Nerve**.
10. The **Muscular Spiral Nerve** held out with a Thread, where it is seen to come round the **Arm Bone**, after piercing the **Triceps Muscle**.
11. The **Perforans Casserii**, or **External Cutaneous Nerve**, coming through betwixt the **Biceps** and **Brachialis Muscles**, to the outside of the **Arm**. Though we call this **External Cutaneous Nerve**, Branches of the last mentioned Nerve are also distributed to the **Integuments** of the outside of the **Arm**.
12. A deep-seated Branch of the **Muscular Spiral Nerve**, which runs under the **Extensor Muscles**.
13. That Branch of the **Muscular Spiral Nerve**, which runs under the **Tendon** of the **Supinator Longus** (Plate IV. Fig. 11.) and turns over the **Wrist**, to be distributed to the back of the **Hand** and **Fingers**.

14. The ULNAR NERVE.

15. A Branch of the Ulnar Nerve, which passes to the back of the Hand and side of the little Finger.



EXPLANATION

OF

PLATE VI.*

WE have in this view the dissection of the Veins and Nerves at the bend of the Arm.

- A. The Biceps Flexor Cubiti.
 - B. The condensed Cellular Membrane, which involves the Muscle and Cutaneous Nerves, and which is particularly firm and condensed in a strong Man.
 - C. The Integuments of the Fore-arm dissected off.
 - D. The BASILIC VEIN.
 - E. The CEPHALIC VEIN.
 - F. The MEDIAN VEIN.
 - G. The MEDIAN CEPHALIC VEIN.
 - H. The MEDIAN BASILIC VEIN.
-
- 1. CUTANEOUS BRANCHES of the MUSCULAR SPIRAL NERVE.
 - 2. Very small Twigs of Nerves, which sometimes come out by the outer edge of the Biceps Tendon: they are derived from the

* See Engravings of the Muscles and Joints, Plates V. and VI.; and Engravings of the Arteries, Plate VI.

External Cutaneous Nerve, and frequently play upon the integuments over the Median Cephalic Vein.

3. Branches of the EXTERNAL CUTANEOUS NERVE.

4. The INTERNAL CUTANEOUS NERVE.

EXPLANATION

OF

PLATE VII.*

THIS Plate represents the superficial dissection of the Veins and Nerves of the Thigh and Leg, being the Branches seated above the general Fascia.

- A. The Integuments dissected off the inside of the Thigh and Groin.
- B. The Fat and Glands of the Groin.
- C. C. The FASCIA of the Thigh where it covers the Vasti Muscles.
- D. The GREAT SAPHENA VEIN.
- E. A Branch of the Saphena Vein, which comes round from the inside of the Thigh.
- F. INGUINAL VEINS passing down to unite with the great Femoral Vein; they are accompanied by some minute Twigs of Nerves.
- G. The SAPHENA VEIN, upon the inside of the Leg.
- H. The same upon the inner Ankle; it is seen to take its origin from the fore part of the Foot.
- I. The PATELLA, or Knee-pan.
- K. The SPINE of the TIBIA.

* See Engravings of the Muscles and Joints, Plates XII. and XIII.; and Engravings of the Arteries, Plates IX. and X.

- L. The **TIBIALIS ANTIQUS MUSCLE**, but with the **Extensor Muscles** of the **Toes** still bound down by the **Fascia**.
- M. The **EXTENSOR MUSCLES** of the **Toes**.
- N. The **Tendons** of the long **Extensors**.

1. The **EXTERNAL CUTANEOUS NERVE** of the **Thigh**.
2. The **MIDDLE CUTANEOUS NERVE**.
3. The **ANTERIOR CUTANEOUS NERVE**.
4. 4. The **INTERNAL CUTANEOUS NERVE**.
5. The **EXTERNAL PUDIC NERVES**.
6. A small **Nerve** to the **Integuments** on the **inside** of the **Thigh**.
7. The **LONG CUTANEOUS NERVE**, or **SAPHENUS**. It is here passing on the **inside** of the **Knee**, and connected with the **Saphena Vein**.
8. The continuation of the **Cutaneus Longus**, dividing and subdividing, but still connected with the **Vein**.
9. The same **Nerve**, where it passes upon the **inner Ankle**.
10. Branches of the **FIBULAR NERVE**, seen through the **Fascia**.
11. The termination, on the side of the **Foot**, of the **NERVUS COMMUNICANS TIBIALIS**.

EXPLANATION

OF

PLATE VIII.*

WE see that here the Fascia has been dissected off from the Thigh and Leg, and that the Muscles are loose, so as to show the general course of the Nerves of the Thigh and Leg.

- A. The VASTUS EXTERNUS.
 - B. The RECTUS CRURIS.
 - C. The VASTUS INTERNUS.
 - D. D. The SARTORIUS.
 - E. The GRACILIS.
 - F. TRICEPS, or Adductor Muscles.
 - G. The PECTINALIS.
 - H. The PSOAS and ILIACUS INTERNUS Muscles.
 - I. The Femoral Ligament, or Poupart's Ligament.
 - K. The FEMORAL ARTERY, where it passes the Tendon of the Triceps.
 - L. The Tendon of the Triceps Muscle, through which the Artery passes to gain the Ham.
 - M. The PATELLA.
-

* See Engravings of the Muscles and Joints, Plates XII. and XIII.; and Engravings of the Arteries, Plates IX. and X.

- n. The **TIBIALIS ANTICUS**.
- o. The **EXTENSOR POLICIS and COMMUNIS DIGITORUM**.
- p. The **GASTROCNEMIUS MUSCLE**.
- q. The **SOLEUS MUSCLE**.
- r. The **FLEXOR BREVIS DIGITORUM**.
- s. The **Annular Ligament**.

NERVES.

1. The **ANTERIOR CRURAL NERVE**. It comes out in a lash of Nerves, which immediately divide into those supplying the Extensor Muscles of the Limb.
2. Cutaneous Branches of Nerves, derived from the Lumbar Nerves, or more immediately from the Anterior Crural, while it is yet within the Ligament.
3. Branches of the Anterior Crural Nerve to the **Vastus Externus Muscle**.
4. Branches to the **Rectus Muscle**.
5. A division of the Crural Nerve, which, besides supplying the **Sartorius and Rectus Muscles**, sends down a long superficial Branch upon the **Vastus Internus**.
6. A Branch which penetrates the **Pectinalis and Triceps**.
7. A Branch to the **Rectus and Vastus Internus Muscles**.
8. That division of the Anterior Crural Nerve, which accompanies the **Femoral Artery**, and which is very often included in the same ligature with it, during operations.
9. The last subdivision of this Nerve to the Muscles, viz. to the **Triceps and Gracilis**.

10. The **OBTURATOR NERVE**, or middle Nerve of the Thigh. It comes down through the Thyroid Hole, and is distributed deep amongst the Adductor Muscles of the Thigh.
11. A Branch of the Obturator Nerve, which passes down before the Triceps Muscle to the inside of the Knee.
12. 12. The continued Branch 8, which passes down with the Femoral Artery through the Tendon of the Triceps Muscle. It does not pass into the Ham with the Great Artery, but again pierces the Tendon with one of the perforating Arteries. It is the great Saphenus Nerve, and passes down upon the inside of the Leg and Foot.
13. The Lesser Saphenus Nerve, a Branch of the last.
14. The superficial division of the Fibular Nerve, or **NERVUS PERONEUS PROFUNDUS**.
15. The deep division of the Fibular Nerve.
16. The **RAMUS Dorsalis Pedis, PROFUNDUS, and SUPERFICIALIS Nervi Peronei Profundæ**.

EXPLANATION

OF

PLATE IX.*

WE have in this Plate a view of the back of the Thigh and Leg, and particularly of the whole course of the Ischiatic Nerve.

- A. The SACRUM.
 - B. The Os ISCHII.
 - C. The SYMPHISIS of the Os PUBIS.
 - D. The GLUTEUS MAJOR, dissected up so as to show the Ischiatic Nerve and its Branches.
 - E. The GLUTEUS MEDIUS.
 - F. The lesser Muscles, which roll the Thigh, Piriformis Gemini, and Quadratus Femoris.
 - G. The Long Head of the BICEPS CRURIS.
 - H. The Short Head of the BICEPS.
 - I. The GRACILIS.
 - K. The TRICEPS.
 - L. The SEMITENDINOSUS.
 - M. The SEMIMEMBRANOSUS.
-

* See Engravings of the Muscles and Joints, Plates XII. and XIII.; and Engravings of the Arteries, Plates IX. and X.

- N. The GASTROCNEMIUS.
- O. The SOLEUS.
- P. The TENDO ACHILLIS.
- Q. The Tendon of the TIBIALIS POSTICUS.
- R. The FLEXOR COMMUNIS DIGITORUM LONGUS.
- S. The FLEXOR POLICIS PEDIS LONGUS.
- T. The FLEXOR COMMUNIS DIGITORUM BREVIS.
- X. The FLEXOR BREVIS and ABDUCTOR POLICIS PEDIS.
- Y. The FLEXOR MINIMI DIGITI.
- Z. The OS CALCIS.

NERVES.

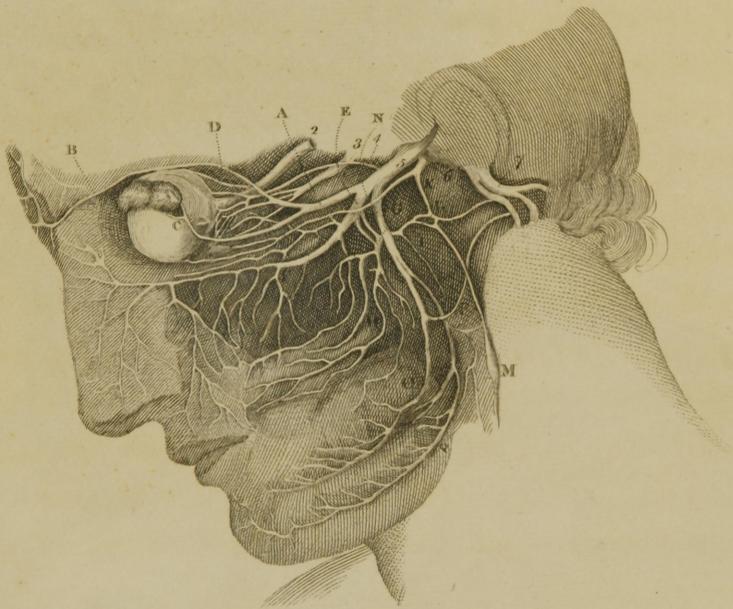
1. The GREAT ISCHIATIC NERVE, where it escapes from the Pelvis, and passes over the Piriformis Muscle.
2. Nerves to the Glutei Muscles.
3. A Nerve which passes by the side of the Ischium to the Private Parts.
4. Nerves derived from the same source, and which take a superficial course on the Hip, and top of the Thigh.
5. A deep Muscular Branch to the Quadratus Femoris, and parts about the Joint.
6. Nerves to the head of the Semitendinosus and Semimembranosus.
7. A Nerve which is extended superficially on the outside of the Thigh.
8. The SUPERIOR INTERNAL CUTANEOUS NERVE.
9. 9. The LOWER INTERNAL CUTANEOUS NERVE.
10. Branches to the Biceps Cruris, chiefly to the Short Head.

11. Branches to the Triceps.
12. Branches to the Semimembranosus and Semitendinosus.
13. A Branch of the Fibular Nerve, to the Short Head of the Biceps.
14. The TIBIAL NERVE.
15. The FIBULAR NERVE. Even in this View, and before it turns round the head of the Fibula, it is seen to split.
16. 16. Branches of the Tibial and Fibular Nerves, which unite and run down upon the Calf of the Leg, to the outside of the Heel and Foot, viz. n. COMMUNICANS TIBIALIS.
17. Branches of the Tibial Nerve to the Head of the Gastrocnemius Muscle. The other Branches of the Tibial Nerve, to the Gastrocnemius and Soleus, are concealed by those Muscles, some of these are partially seen 18.
19. The TIBIAL NERVE, in its course under the Soleus, and amongst the Flexor Muscles. It gives off no considerable Nerve until it divides in the Sole of the Foot.
20. The INTERNAL PLANTAR NERVE.
21. The OUTER PLANTAR NERVE.

THE END.

11 Branches to the ...
12 Branches to the ...
13 Branches to the ...
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30 Branches to the ...

Scheme of
THE NERVES of the FACE
& EYE



Drawn by Cha: Bell.

Eng: by Jacob J. Hecker.

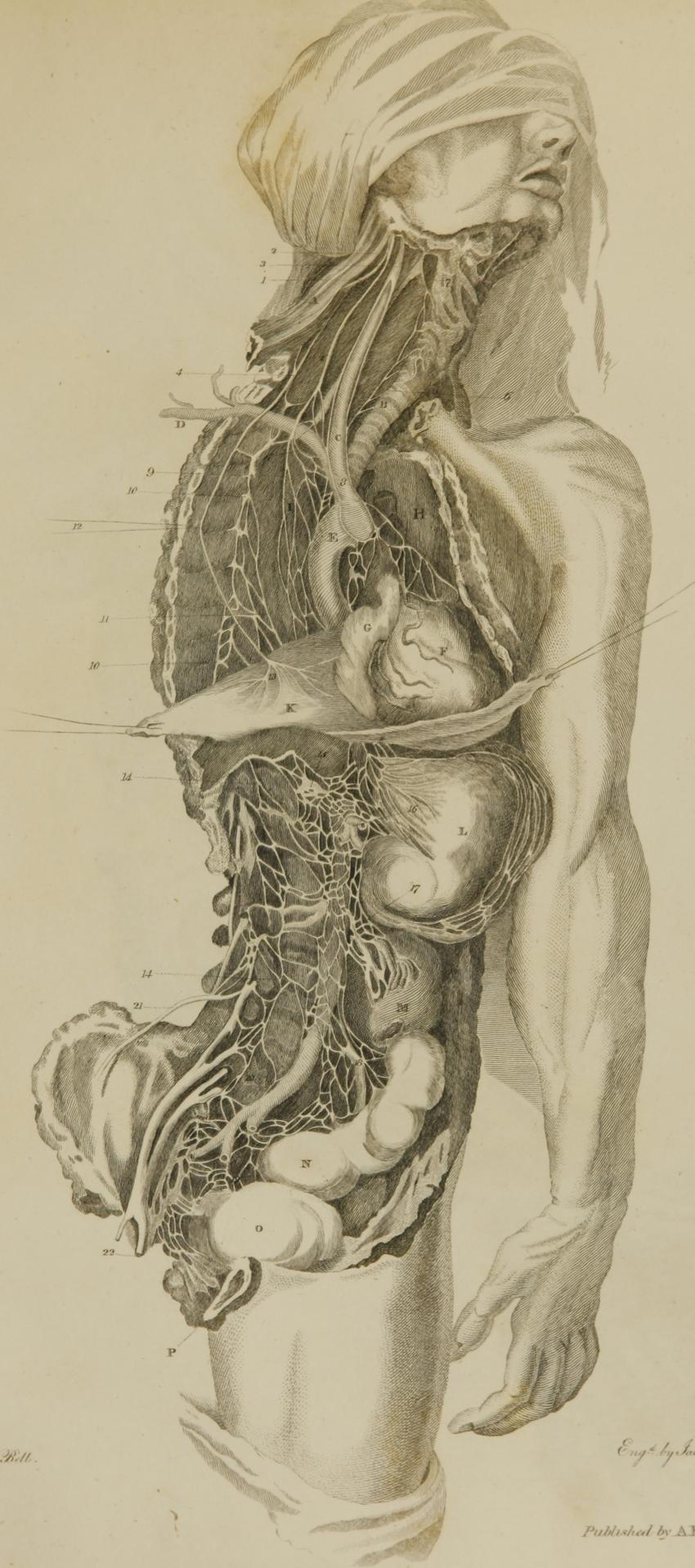
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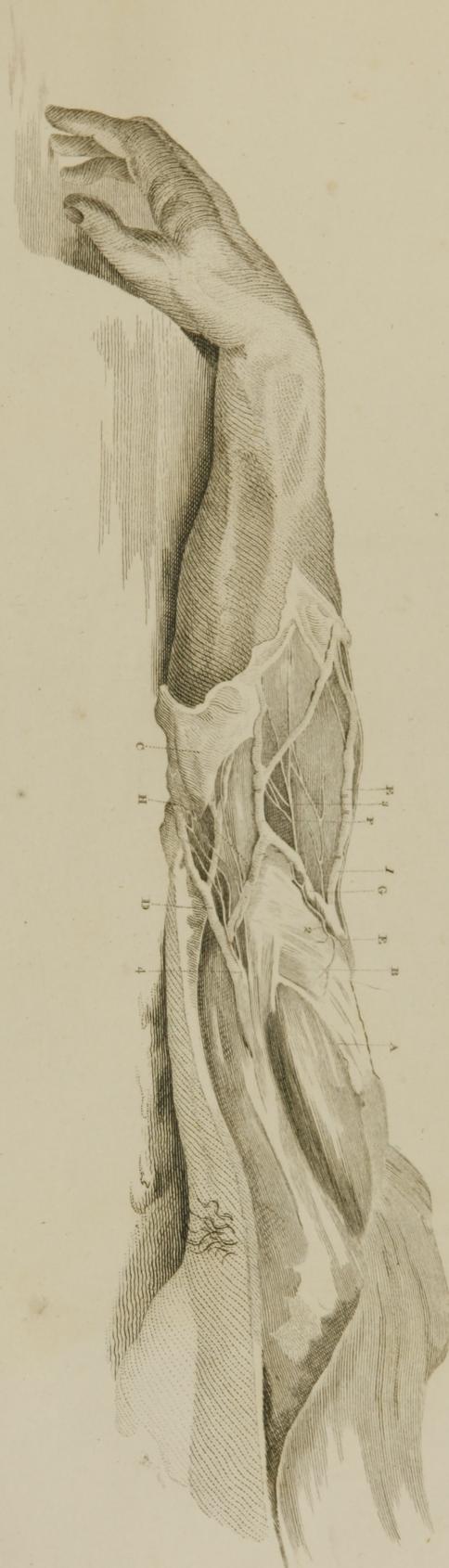
Eng^d by Jacob Boucher.



Drawn by Chas. Bell.

Eng^d by Jacob S. Plocher.

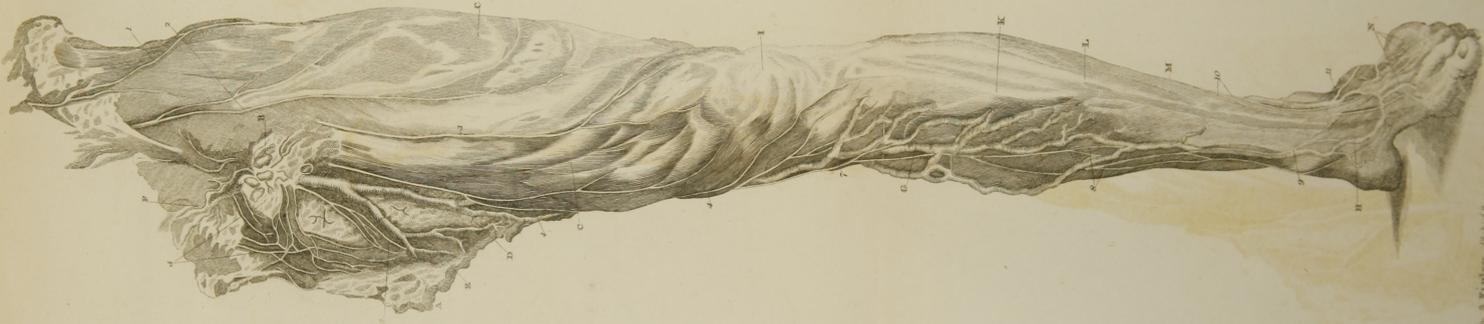
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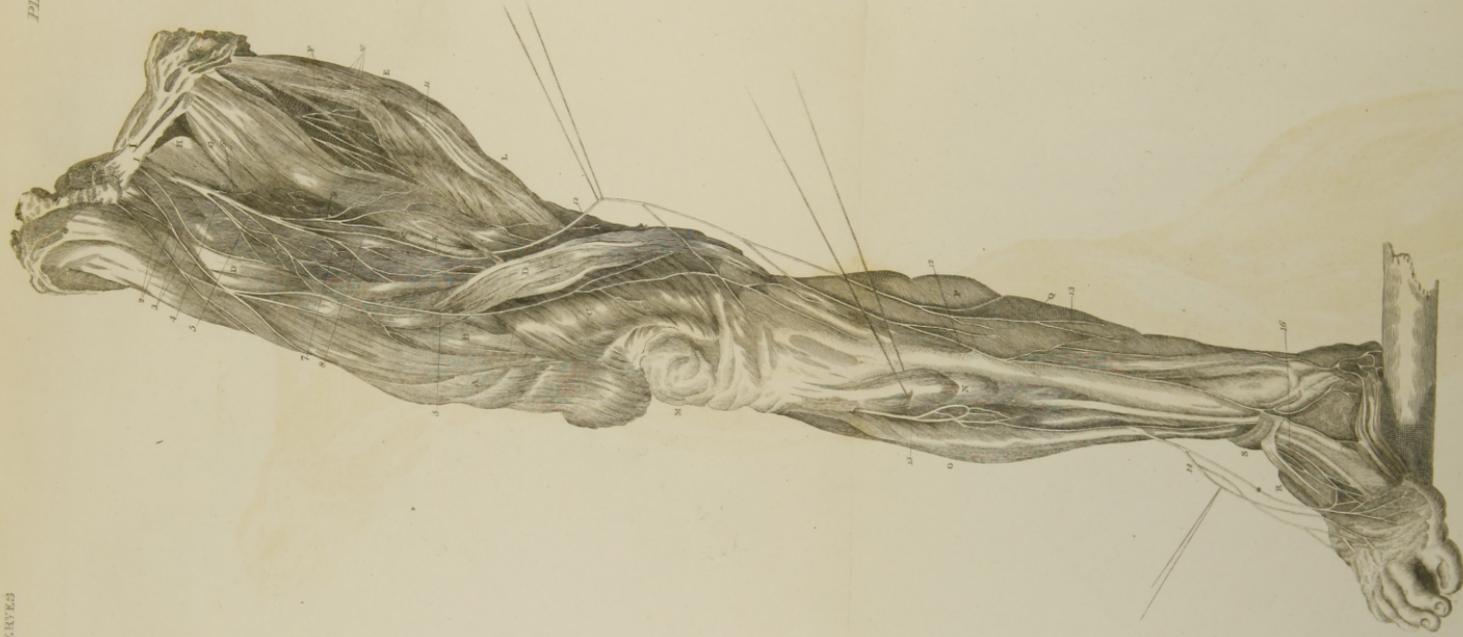


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Engr'd by Jacobus Stedman.

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Drawn by Wm. Bell

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Engr'd by Jacob Richter

