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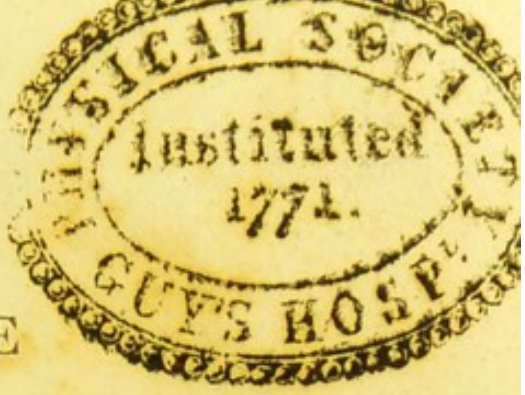
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A

TREATISE

ON

NERVOUS DISEASES.

By JOHN COOKE, M.D. F.A.S.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, AND LATE PHYSICIAN TO THE LONDON HOSPITAL.

IN TWO VOLUMES.

VOL. I.

ON APOPLEXY,

INCLUDING

APOPLEXIA HYDROCEPHALICA,

OR

WATER IN THE HEAD;

WITH AN

INTRODUCTORY ACCOUNT OF THE OPINIONS OF ANCIENT AND MODERN PHYSIOLOGISTS,

RESPECTING THE

NATURE AND USES OF THE NERVOUS SYSTEM.

Read at the College, as the Croonian Lectures of the Year 1819.

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PREFACE.

It was the opinion of a late eminent physician, that more real service may be rendered to medicine by the illustration of what is already known on the subject, than by any attempts to promulgate new theories or new modes of practice.

Impressed with the justice of this opinion, and the propriety of acting upon it, I have taken considerable pains in endeavouring to collect, to arrange, and to communicate, in plain clear language, a variety of useful observations from the best authors, both ancient and modern, respecting the principal diseases of the nervous system.

If the example which I have presumed to set should be followed — if persons, better qualified for the task than myself, would

investigate other important diseases on a similar plan, a system of medicine would be formed which might prove eminently useful, both by lessening the labours of the student, and affording practical facilities to persons actually engaged in the duties of the profession.

After an experience in medicine of many years, I have ventured occasionally to introduce into this compilation my own opinions and practice, as well as to comment upon those of others; but I trust that in this I have betrayed no signs of dogmatism, or self-confidence.

I have been very solicitous to obtain from the most distinguished professional characters of the present day, with many of whom I have the honour of being intimately acquainted, such information respecting their opinions of the nature and method of cure of the diseases treated of in this volume, as would have enabled me to render my account of them more complete; but in this I have not succeeded to the extent of my wishes and expect-

ations. I have, however, well-grounded reason to hope, that in the investigation of *palsy* and *epilepsy*, the subjects of the second part of this work, I shall receive from my friends a more general assistance. To those of them who have already favoured me with valuable communications, I beg to return my most grateful thanks.

The introductory account of the opinions of physiologists respecting the nature and uses of the nervous system, though received with indulgence by the learned body to which it was read, is necessarily superficial; for it would have been impossible for me, consistently with my plan, to have entered deeply into a consideration of the great variety of matter which that account embraces: but I have endeavoured to supply its deficiencies by references to the best writers on the subject, and I flatter myself that they will be found correct.

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ERRATA.

Page 37. note, for "ἀιϑήσεως" read "ἀισϑήσιως"
69. line 8. dele "however"
92. line 20. for "devotedly" read "devoutly"
112. note, for "σύματι" read "σωματι"
138. note, for "ἀιϑήματὰ" read "ἀισϑήματὰ"
144. line 16. dele the semicolon.
148. line 27. substitute a full point for the first note of interrogation.
154. line 23. substitute a full point for the note of interrogation.
164. note, for "ἀναιϑησία" read "ἀναισϑησία"
191. line 25. for "these" read "the"

ON THE

NATURE AND USES

OF THE

NERVOUS SYSTEM.

THE celebrated Dr. Whytt, in his book on nervous diseases, remarks, "that there are "few disorders which may not in a large "sense be called nervous." He confines himself, however, to the consideration of "those which, in a peculiar sense, deserve "the name; inasmuch as they are owing "to an uncommon delicacy, or unnatural "sensibility of the nerves."

In this publication, I propose to treat of those diseases which consist in, or depend upon, a more general affection of the powers of sensation and motion, particularly *Apoplexy*, *Palsy*, and *Epilepsy*.

A knowledge of the physiology of parts is highly useful in the illustration of their pathology; therefore, before I enter on the consideration of the diseases of sensation and motion, I shall give a short account of the nature and uses of the organs concerned in them.

The organs of sensation and motion are the cerebrum, cerebellum, medulla oblongata, medulla spinalis, and the nerves, constituting what has been generally called the Nervous System.

For an account of what relates to the anatomy of these organs, I refer to systematic anatomical writers.

The investigation of the physiology of the nervous system, seems to have been at all times a favorite study. We have some notices of it in the works of very ancient writers. *Hippocrates*, *Plato*, *Aristotle*, and others, have speculated upon this subject, though in obscure and confused language.

Hippocrates, in his book concerning the glands, says that the brain is like a gland, and that humours flow from it, which, if free in their course, purify the brain *; but

* Ἐγκεφάλου λύματα. *De Gland.* p. 53.

if restrained or obstructed, give occasion to various diseases. These humours, he asserts, sometimes become acrid and corrosive, producing much disturbance in the system, with derangement of mind, and convulsions of the brain, which affect the whole body. He considers the brain as an organ of great consequence and power in the human frame *; but his notions of its structure are very indistinct: he calls it, however, the seat of sense and intelligence. It is by this, he says, chiefly, that we think, and understand, and see, and hear, and know what is base and honourable, evil and good, pleasant and unpleasant, &c. And again, The brain is the messenger or instrument of the intellect. † And a little afterwards, Some say that we think and are intelligent by means of the heart; but it is not so. Yet in the book *De Corde*, published among the works of Hippocrates, it is positively asserted, that the human

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* Κατὰ ταῦτα νομίζω τὸν ἐγκέφαλον δύναμιν πλείστην ἔχειν ἐν τῷ ἀνθρώπῳ. *Lib. de Morb. Sacr.* p. 354.

† Ἐς δὲ τὴν σύνεσιν ὁ ἐγκέφαλός ἐστιν ὁ διαγγέλλων. *Lib. de Morb. Sacr.* p. 354.

mind is placed, or originates, in the left ventricle of the heart. * Hippocrates knew nothing distinctly concerning the nature and uses of the nerves, though he seems to have had some confused notions respecting the nervous power, which, however, he places in the veins. If the spirit, he says, which flows through the veins be stopped or interrupted, the part in which it is stopped becomes impotent †: thus, in sitting or lying down, when the veins are compressed so that the spirit does not pass through them, a torpor is immediately ‡ induced. He confounds the nerves sometimes with the veins §, sometimes with the ligaments and tendons. ‖

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* Γνώμη γὰρ ἡ τοῦ ἀνθρώπου πέφυκεν ἐν τῇ λαιῇ κοιλιῃ.
De Corde, p. 50.

From this circumstance, it appears highly probable, that the book, περὶ καρδίης, ought to be placed among the spurious works which bear the name of Hippocrates.

† Ἀκρατὲς γίνεται.

‡ Εὐθυς νάρκη ἔχει.

§ Ἐς τοὺς ὀφθαλμοὺς φλέβια λεπτὰ ἐς τὴν ὄψιν.
De Locis in Homine, p. 2.

‖ Yet Galen, in the 14th chapter, *De Locis Affectis*, speaking of Herophilus and Eudemus, says, Τῶν πρώτων μεθ' Ιπποκράτην νεύρων ἀνατομὴν ἐπιμελῶς γραψάντων. *De Loc. Aff.* l. iii. c. 14.

Plato considers the brain as the seat of the governing principle. * In the Phædo, Socrates says, I gave myself up in the early part of life to the study of nature with great ardour; and, amongst other things, was anxious to know whether we have sense and intelligence by the blood, or by air, or fire; or whether the sense of hearing, and seeing, and smelling, depend upon the brain. †

Aristotle considers the brain as a composition of earth and water. ‡ He says that it contains no blood, and therefore has no feeling; that in its nature it is extremely cold, and that its use is to moderate the heat and fervour of the heart. § He places the sentient principle, not in the brain, but in the heart. The heart, according to

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* Ἐν ᾧ ἀ ἀγεμονία.
Plat. Tim. Locr. de Anima Mundi, p. 100.

† Καὶ πότερον τὸ ἅιμα ἐστιν ᾧ φρονοῦμεν, ἢ ὁ ἀὴρ, ἢ τὸ πῦρ.
Plat. Phæd. p. 96.

‡ Ὁ ἐγκέφαλος κοινὸς ὕδατος καὶ γῆς.
De Part. An. l. ii. c. 7.

§ *De part. anim.* l. ii. c. 7.

Aristotle, is the organ first formed; it is that in which the life of animals resides, together with the faculties of perceiving and feeling, though some, he says, are of opinion that the powers of perceiving and feeling are in the brain. * Of the origin, nature, and distribution of the nerves, both Aristotle and Plato seem to have been entirely ignorant.

From the time of Hippocrates, Plato, and Aristotle, to that of Galen, who lived many centuries after them, we do not find, in the writings of the ancients, any account of the nervous system worthy of notice.

Galen, who flourished about one hundred and fifty years after the Christian æra, was the most eminent physician, and the most voluminous writer of that age. His works probably contain every thing of importance then known in anatomy, physiology, and medicine. It has been very generally supposed that Galen borrowed much of his knowledge from Erasistratus and Herophilus, two very eminent physicians, who

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* Δοκεῖ τισιν ἀισθάνεσθαι τὰ ζῶα διὰ τὸν ἐγκέφαλον.
De Juvent. et Senect. c. iii.

taught medicine in the school of Alexandria. To the works of these great men he, as well as Cœlius Aurelianus, and others, make frequent reference. *

Galen has presented us with a very clear description of the nervous system. His account of the brain and its membranes, the cerebellum, the medulla spinalis, and the nerves, with the distribution of them to the various parts of the body, is highly interesting; and, all things considered, wonderfully accurate; and his conjectures concerning the nature and uses of these organs are very ingenious.

Galen considers the brain as the grand organ of intellect. The rational soul dwells

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* Erasistratus and Herophilus lived in the time of the Ptolemies, kings of Egypt, and under their patronage enjoyed very extraordinary opportunities of acquiring anatomical and physiological knowledge. Celsus informs us that they were permitted to dissect the bodies of criminals even while living (etiam spiritu remanente), that they might see those things which nature had hitherto concealed; that they might view the position, colour, figure, and magnitude of parts, their order, hardness, softness, &c. *Vide Cels. Med. Præf.* p. 7.

in the brain, he says, and by it we *reason. In his first chapter of the third book, *De Hippocratis et Platonis Placitis*, he gives us the opinion of Chrysippus concerning the seat of the soul, which he strongly opposes. Chrysippus maintained that the soul is an innate spirit, pervading the whole body, but distributed to particular parts for special purposes: to the trachea for the voice, to the eyes for sight, to the ears for hearing, to the nostrils for smelling, and to the whole body for the sense of touch; that all these portions of spirit unite in the heart, and that the passions reside in the heart: and hence he infers syllogistically, that the governing principle is in the heart. Where the passions of the soul are, there the governing principle is: but the passions of the soul are in the heart, therefore the governing principle is in the heart. These opinions and conclusions Galen opposes, maintaining that the governing principle is in the brain. It is by the nerves, he says,

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* Τὴν λογιστικὴν ψυχὴν οἰκεῖν ἐν ἐγκέφαλῳ.
De Usu Part. l. ix. c. 4.

we have sensation and voluntary motion; and it is reasonable that we should place the soul, the presiding principle, which acts by means of them, at their origin: but the origin of the nerves is in the brain, therefore the governing principle is in the brain. Galen says that Chrysippus confounded the faculties of the soul with the soul itself. Thought, he observes, is not a part, but an energy of the soul. The governing principle *, he thinks, is seated in the brain, and acts through the medium of the animal spirit, which is the immediate instrument of sensation and motion, being carried by the nerves to the parts which feel and move. This animal spirit is first generated by what he calls the vital spirit, which is formed by the heart and arteries. It is further prepared by an apparatus of a curious vascular construction, which he denominates the wonderful net-like plexus †; and it is finally elaborated in the ventricles of the brain, to which it is carried from the net-like plexus. In this plexus the animal spirit remains for a considerable time; for

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* Κυριώτατος ἁπάντων. † Τὸ δικτυοειδὲς πλέγμα.

nature, when desirous of preparing any matter very accurately, detains it long in the instruments of its preparation. * He farther observes, that in proportion as the matter to be produced is of consequence to the system, the organs which prepare it are of a delicate construction : thus the vessels which prepare the semen and the milk are very delicate, these being fluids of much importance ; but the vessels which prepare the animal spirit are of a still more admirable organization. The animal spirit, on which sensation and motion depend, is contained, he thinks, in the ventricles of the brain ; for, on opening them, he observes that the spirit escapes, and an animal is immediately deprived of sensation and motion. Hence some may suspect, he says, that if the soul be incorporeal, the animal spirit is its immediate habitation ; but if corporeal, that the animal spirit is the soul itself. He is of opinion, however, that the animal spirit is neither the essence of the soul nor its habitation, but its prime

* *Hip. et. Plat. Placit.* lib. vii. c. 3.

instrument*, both in sensation and motion; the soul itself, whatever it may be†, residing in the body of the brain. If the animal spirit were the substance or essence of the soul, an animal, he says, would immediately perish on its evacuation. But this is not the case; for although, under these circumstances, sensation and motion are lost for a time, they return again when the animal spirit is again collected. ‡

Galen describes very minutely, and, generally speaking, very accurately, the distribution of the nerves, from the brain and spinal marrow to the various parts of the body. He is of opinion that the mind acts upon the body by means of the animal spirit and nerves; and that the will being placed in the brain, at the origin of the nerves, gives the principle § or beginning

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* Ὄργανον πρῶτον.

† Τι ποτ' ἂν ᾖ.

‡ Galen says, that an animal does not become senseless or motionless on cutting into the brain, until one of the ventricles is opened.

Οὐδ' οὕτως τὸ ζῶον ἀκίνητον ἢ ἀναίθητον γίγνεται πρὶν ἐπί τινα τῶν κοιλιων αὐτοῦ τὴν τομὴν ἐξικέθαι.

De Hip. et Plat. Placit. l. vii. c. 3.

§ Ἀρχὴν κινήσεως. *De Loc. Aff.* l. iii. c. 8.

of motion to the first nerves, and by them to the muscles. He thinks that some of the nerves, but not all of them, are hollow tubes. Speaking of the optic nerves, he says that they have foramina; and that, in the dissection of large animals, a * lucid spirit may be seen flowing through them both at their origin and at their insertion into the eyes. He admits the possibility that the spirit may flow through the minute branches of nerves, though, on account of their extreme tenuity, it is not visible; but he inclines to think that the nerves are not all hollow tubes †, and that in some cases the nervous power is propagated by a kind of impulse given to the nerve. We cannot absolutely pronounce, he says, whether the power flows from the brain through the nerves to the limbs, and the essence of the spirit reaches the feeling and moving parts; or whether it, in some way or other, strikes the nerves so as to induce in them a powerful change ‡, which is propagated to the

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* Αὐγοειδὲς πνεῦμα.

† Μὴ πᾶσι τοῖς νεύροις ὑπάρχειν πόρους.

‡ Ὡς ἀλλοιῶσαι σφοδρῶς αὐτά.

parts to be moved: whether there is in each nerve an innate spirit belonging to it, and which is struck by something coming, as a sort of messenger from the first principle; or whether the spirit flows from the brain to parts, on every occasion, when we will to move them *: or whether, in the third place, there is merely a change in the qualities of parts contiguous to each other, (which appears to me to be hinted at by some who say that the influence is a power without substance,) I am not able easily to determine. * What the immediate connection between the animal spirit and nerves is, he is at a loss to pronounce. †

The anatomy and physiology of Galen seem to have been implicitly received and taught by Ætius, Oribasius, Alexander Trallianus, Cœlius Aurelianus, and the Greeks who followed them; and by the

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* *De Hip. et Plat. Placit.* l. vii. c. 4.

† For an account of the minute anatomy of Galen respecting the brain and nerves, reference may be made to Oribasius, who has given a very beautiful abstract of it in his work entitled, Οριβασιου ανατομικα εκ των Γαληνου.

Arabians and their successors, down to the time of Vesalius, who flourished in the fifteenth century.

Vesalius was the most celebrated anatomist of his time. He took great pains in endeavouring to detect and expose the errors, and to detract from the reputation, of Galen, to whom the medical world had looked up for many centuries. He not only calls in question the anatomical knowledge of Galen, but states his firm belief that that celebrated person had never dissected the human subject, but had obtained what knowledge he possessed by the examination of the bodies of apes and other brute animals. *

Vesalius denies the existence of the net-like plexus, which he, in derision, calls blessed and wonderful; asserting that it was a creature of Galen's imagination. He reprobates what he calls the nonsense of the Greeks, who pretend to learn the structure

* Mihi inde non vulgariter persuadeam humanum corpus nunquam a Galeno fuisse aggressum.

Vesal. l. iii. c. 8.

of the human body from the dissection of the bodies of brute animals, following the wild fancies of their own imaginations; yet in his account of the nervous system, he has not been able to point out more than two or three errors of Galen, the greatest part of whose anatomy and physiology on this subject he is under the necessity of adopting. With Galen, he considers the brain as the seat of the rational soul, which acts on the sentient and moving parts by the animal spirit and nerves; and with Galen he thinks that from the blood-vessels, in their winding course, the vital spirit is formed, from which, with a portion of air insinuating itself into the brain, the animal spirit is first prepared, which is afterwards elaborated in the ventricles of the brain, whence a portion of it is carried into the ventricle of the cerebellum, and into the spinal marrow, and so to the nerves arising from the spinal marrow, the spirit passing from the other ventricles into those nerves which have their origin near to them, and by them to the organs of sense and voluntary motion. The account which Vesalius

gives of the origin and distribution of the nerves, does not materially differ from that of Galen. He admits, with Galen, that the nerves vary with respect to hardness and softness; the former being for the purposes of motion, the latter for sense. In his account of the brain and nerves, he could not, indeed, consistently, much differ from Galen; because he admits that the structure of those organs in brute animals is not materially different from that of the human subject, and he does not call in question the knowledge of Galen relative to the anatomy of brute animals.

This attack of Vesalius called forth the general indignation of the anatomists and physiologists of that time, and many of them stood forth in defence of Galen. Amongst these, Laurentius, who lived in the beginning of the seventeenth century, distinguished himself. In the first book of his anatomical work, Laurentius devotes a whole chapter to the praises of the divine Galen, and repels the abuse of Vesalius, and others, whose attempts to injure his reputation he compares to the vain beat-

ings of the waves against a rock. * Laurentius, in a great measure, adopted the anatomy and doctrines of Galen, relative to the nervous system. In his whole history of the brain, he says, I do not see that Galen has erred, except as to the plexus mirabilis, which in man is so small, as almost to escape the eye. With respect to the nature, uses, and distribution of the nerves, Laurentius very generally agrees with Galen. He says that the faculty of feeling and moving flows from the brain to the whole body by the nerves; but whether this faculty alone flows, or with it something corporeal †, admits of dispute. He says that the nerves have no perceivable cavities, but that their substance is fistulous and spongy; yet he thinks it possible that the animal spirit, which is the most subtile of all things, may flow through cavities in nerves which we cannot discern. Lauren-

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* Sed quemadmodum fluctus in scopulos impingentes, quanto violentius sese inferunt, tanto miserius dissipantur. Abeant, ergo isti calumniatores.

Laurent. Hist. Anat. chap. 1.

† Σωματικον quid.

tius does not agree with Galen in his opinion that the nerves of sensation arise from the brain, and those of motion from the spinal marrow; nor does he admit, universally, that the nerves for motion are hard, and those for sensation soft. He offers some ingenious conjectures in explanation of the circumstance, that feeling sometimes remains when the power of moving is lost, and the contrary. *

Among the anatomists and physiologists of later times, who have distinguished themselves in the investigation of the nervous system, Haller is conspicuous. This diligent enquirer has well described the brain and cerebellum, with their various cavities, protuberances, blood-vessels, and investing membranes; also the medulla oblongata, the medulla spinalis, and the nerves; and has offered many ingenious conjectures respecting their ultimate structure and uses. †

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* *Laurent.* lib. iii. quæst. 11.

† For the minute anatomy of Haller respecting the nervous system, reference may be made to the fourth volume of his celebrated work entitled *Elementa Physiologiæ.*

With respect to the uses of the brain and nerves, Haller entertains opinions a good deal resembling those of Galen. He considers the brain as the seat of the intelligent principle, which he places not in any one particular part, but in the whole of the medulla of the cerebrum and cerebellum, which he calls the sensorium commune; where the senses, he says, are exercised, and whence all muscular motions arise.* Sense and motion have their source in the medulla, there therefore will be the seat of the soul.† Sensation is produced when pressure is made upon the medulla by the spirit which an external object has excited to motion. The ideas of things, he says, are preserved in an admirable order in the brain, and the impressions of the senses are arranged in particular regions of the brain, in classes, genera, and species according to their affinities. Often when I am seeking for something which had gone out

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* Sensorium commune in quo omnes sensus exercentur, et unde omnes motus musculares oriuntur.

† Et sensus et motus in cerebri medulla, scaturiginen suam habent, erit ergo ea animæ sedes.

Hal. Phys. tom. IV. lib. x. sect. 8.

of my memory, by means of the series of genera, as by a clue, he says, I am led to the specific idea I want. * When this order is disturbed, the faculties of the mind are injured, or even wholly abolished. In confirmation of this view of the subject, he adduces a great number of very curious cases. He does not pretend to determine what are tne ends and uses of the tubercles in the brain, or to assign any particular office separately or peculiarly to the nates or testes, or isthmus, &c., different from that of the whole encephalon. † In discussing the question, whether the different faculties of the soul reside, or not, in different parts of the brain and cerebellum, he treats the opinion of those who maintain the affirmative with great contempt. ‡ Hypotheses of this kind, he says, have at all times prevailed in the writings of physiologists,

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* *Hal. Phys.* tom. IV. p. 317.

† Ibid. p. 398.

‡ Laurentius says that this was a favourite doctrine of the Arabians. Universa Arabum schola mansiones multas in cerebro statuit et singulis facultatibus singulas sedes assignat. *Laurent.* lib. x. quest. 2.

Do we not see here the foundation of Galls' doctrine?

equally weak, frail, and of short duration. Haller says but little respecting the uses of the cerebellum, medulla oblongata, and medulla spinalis, but minutely discusses the question whether the cerebellum is, or is not, more immediately connected than the brain with the life of animals; and after having enumerated many cases of the fatal effects of injuries by wounds, or otherwise, in both, he comes to the general conclusion, that the cerebrum and cerebellum do not materially differ in this respect; great læsions in both producing death, and smaller ones, effects which may be endured. He also, from these cases, concludes, in contradiction to the opinion of Willis, and others, that the moving and feeling power is sent to the vital organs by the cerebrum, and to the parts subject to the will, by the cerebellum. *

A very considerable part of the fourth volume of Haller's great work is employed by him in giving a very minute and accurate account of the origin, distribution, nature, and uses of the nerves. He enters,

* *Hal. Phys.* tom. IV. p. 351.

at considerable length, into an examination of the various theories which have been formed respecting the modus operandi of the nerves; particularly whether they act as solid vibrating chords, or by means of a fluid, passing through cavities in them. He leans to the latter of these opinions. From the earliest times, he says, the existence of a most subtile fluid, passing through the nerves, was admitted, to which the name spirit was given; a fluid invisible, but of very great power. This doctrine for many ages was adopted by the schools, but of late has been doubted by men of the highest authority. On the supposition of the existence of such a fluid we must endeavour, he says, to find out its nature.* It is necessary that it should be most moveable, and moving with the greatest celerity; therefore, most fluid, most subtile, so as to be no way cognizable by our senses; it must flow through tubes too small to be

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* Inveniendum est ergo fluidum elementum quod phænomenis sensus motusque sufficiat.

Hal. Phys. tom. IV. p. 371.

perceived even by the help of the microscope, and it must be of such a nature that no vivid taste, or odour, or colour, or heat, or any other quality strongly striking our senses, can be excited by it. Hence, he says, it follows, that it cannot be aqueous or albuminous, or of an acid or sulphureous spirit, or aerial, or of the nature of æther. It is more easy to determine what this spirit is not, than what it is, since it is not cognizable by our senses. If I were obliged to give my opinion, however, concerning the nature of this spirit, he says, I should conceive it to be an active element, most apt for sense and voluntary motion; flowing with the greatest rapidity; so subtile as to escape the most accurate observation of our senses, yet so far more substantial than the matter of heat, æther, electricity, or magnetism, as to be capable of being contained and confined in vessels, or by other mechanical means; and, finally, it must manifestly be of such a nature as to be regenerated and repaired by our food. I have some suspicion, that no small part of this fluid consists of what has been called

the spiritus rector of plants.* He adds, what hinders us from thinking that as fire is something different from light, &c., that this element may be of its own peculiar nature, and to be only known by its effects.

The principal anatomists and physiologists, who, since the time of Haller, have directed their attention to the nervous system, are Reil, Behrends, Scarpa, Prochaska, De la Torre, Fontana, Monro, Hunter, and Home, who have chiefly employed themselves in the investigation of the ultimate structure of the brain and nerves; and Whytt, Brodie, Richerand, Dumas, Bichat, and Le Gallois, who have made experiments and observations on their powers and uses. The two last mentioned of these physiologists have taken new views of the

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* Si vero cogitata nostra de ipsa natura spirituum proferre juberemur, *activum* ad motum a voluntate et a sensu concipiendum aptissimum, celerimum, omni sensuum acie subtilius tamen hactenus igne et æthere, et electro, et magnetica materie crassius faceremus elementum, ut et contineri vasis et vinculis coerceri aptum sit, et denique manifesto ex cibis nostris nasci et reparari queat; non sine suspicione partem tamen ejus fluidi, non exiguam, ex rectore illo stirpium spiritu constare.

Hal. Phys. tom. IV. p. 381.

relative powers of the different parts of the nervous system, and have supported their opinions by ingenious and accurate experiments.

M. Bichat published his opinions and observations on this subject, in his *Anatomie generale*, in the year 1801, and in his *Recherches Phisiologiques sur la Vie et la Mort*, in 1805; and M. le Gallois has detailed his experiments in his work entitled *Experiences sur la Principe de la Vie*, in the year 1812.

M. Bichat considers life as of two kinds, animal and organic, each possessing two orders of functions. The first in the animal life, is from the exterior of the body to the brain; the second, from the brain to the organs of loco-motion and voice. The impressions of objects affect successively the senses, the nerves, and the brain. The first receive, the second transmit, and the last perceives these impressions; which thus received, transmitted, and perceived, constitute our sensations. In the first order of these functions, an animal is almost wholly passive, in the second, (which results from the successive actions of the

brain, whence volition springs,) he becomes active. External bodies act upon animals by the first order of functions, and animals react upon them by the second. In like manner a double motion takes place in the organic life; one continually forming the composition, the other the decomposition of animals. M. Bichat says, that hitherto anatomists have considered the nervous system as an uniform system; but he thinks that the different branches of this system ought to be viewed as constituting two general systems, essentially distinct; the one having for its principal centre the brain and its dependencies, the other, the ganglions. The first belongs to the animal life, the second to the organic, being almost entirely distributed to the organs of digestion, circulation, respiration, and the secretions. Neither of them, however, is strictly confined either to the one or the other life; thus the nerves of the brain send some prolongations to the glands, and to the involuntary muscles, whilst the nervous system of the ganglions sends some branches to the voluntary muscles; it is on the ge-

neral disposition that the two systems are founded.

M. Bichat is of opinion that every thing relating to the understanding belongs to the animal life, and what relates to the passions, to the organic; and he attempts to prove, that the state of the internal organs influences the passions, and the passions the organic functions, both in health and disease.

M. Bichat describes, very much in detail, the external form, the organization, the properties, and the developement of the nervous system of the animal life; he then proceeds to make some general remarks respecting the nervous system of the organic life; after which he particularly describes the situation, form, relations, organisation, properties, and developement of the ganglions, the principal centres of the organic life.

M. Bichat states that the view which he has taken of the nervous system is different from that of all former anatomists. He considers each ganglion as a particular centre, in its action independent of the others, furnishing or receiving, like the brain, its own nerves, and having nothing

in common with other analogous organs, but by anastomosis. There is, then, this remarkable difference between the nervous system of the animal life, and that of the organic, that the first has an *unique* centre, the brain, to which sensation comes, and from which motion proceeds, while in the second, there are as many little distinct centres, and consequently as many little secondary nervous systems, as there are ganglions. All anatomists, even those who have called the ganglions little brains, have considered them as dependencies or enlargements of nerves in their progress; and since the greatest part of them occupy the grand sympathetic, they have presented them as a distinguishing character of that nerve; but, says M. Bichat, after the idea I have just given of the ganglions, it is evident, that this nerve, in reality, has no existence; it is a suite of nervous communications, a series of branches which the ganglions, placed one above another, reciprocally send off, and not a nerve proceeding from the brain or the spinal marrow. M. Bichat maintains that the nerves of the ganglions have properties which are entirely

distinct from those of the cerebral system, that they do not serve for sensation or voluntary motion, and that we only see them on the organs of the interior life; thus we find them concentrated in the trunk, in the breast, and more especially in the abdomen, and scarcely at all in the head, where the organs appertaining to the animal life are, or in the limbs, which depend exclusively on that life. The ganglions and their nerves, he remarks, are not symmetrical like the nervous system of the animal life, but are very irregular both in number and in form. Scarcely any two ganglions are similar, or disposed in the same manner. They are sometimes lenticular, sometimes triangular, sometimes divided into several portions, and their most common position is along the vertebral column, where we see them successively one above another, the cervical, the intercostal, the lumbar, and the sacral, the communicating branches of which chiefly constitute the grand sympathetic. M. Bichat points out many particulars in which the matter of the ganglions differs from that of the brain and nerves; he then makes some remarks re-

specting the origin, course, termination, structure, and properties of the nerves of the organic life, and he finishes his account of the nervous system of the organic life, with declaring, that there is no subject which is more deserving of the attention of physiologists than this; all the others, he says, offer a series of phænomena already well known, while on this we scarcely have a glimmering of light.

M. le Gallois, in his *Experiences sur le Principe de la Vie*, has likewise considered the nervous system in a new point of view, and has proved, by a series of most cruel but decisive experiments, that the phenomena of life, sensation, and motion, are not in so great a degree to be attributed to the brain and cerebellum, as has generally been supposed by physiologists.

M. le Gallois says, that the characteristic faculties of animals are sensation and motion, and that the true end of their organisation is the production and maintenance of these two faculties. In order to know in what the essence of life consists, it is necessary, he observes, that we should be able to distinguish what, in the organisation of an

animal, the precise condition is, on which sensation and motion immediately depend. If sensation and motion immediately depend upon a particular principle produced by organisation, we must enquire into the nature and seat of this principle. One might be led to suppose, he says, that this principle has its seat in all the parts of the body, since all, in a greater or less degree, seem to partake of sensation and motion; but observation has taught us, that this is not the case. We find that the division of a nerve, in any part, instantly takes away sensation and motion from all the parts below that division, we are, therefore, forced to admit that sensation and motion are not in those parts, but in the origin of the nerves; and as the nerves spring from the brain and spinal marrow, we are under the necessity of placing the focus of life in the brain and spinal marrow. A great number of facts prove, he says, that the destruction or even a certain degree of læsion of the brain, produces sudden death, and that a transverse section of the spinal marrow paralyses all the parts below the section, while the superior parts continuing to communicate

with the brain preserve both sensation and motion; hence the brain has been considered as the sole origin of the nervous power, and consequently the only seat of the principle of life. It has been observed, also, that certain parts of the brain may be injured or even destroyed with impunity, and hence it has been concluded that the seat of this principle is not in the whole of the brain, but in a certain circumscribed part, called the sensorium commune. This conclusion, however, M. le Gallois maintains, cannot be reconciled to establish facts. Certain reptiles, such as turtles, lizards, &c. will live for months after decapitation; and some, even of the warm blooded animals, such as birds, continue to live and move for some time after the separation of the head from the body. The celebrated Fontana, after having decapitated rabbits and guinea-pigs, was able to preserve those animals alive for a very considerable length of time, by tying up the vessels of the neck, and thus preventing hæmorrhage; and by blowing air into the lungs. These experiments clearly prove that in mammiferous adults even, as well

as in reptiles, the life of the trunk does not immediately depend upon the brain.

M. Le Gallois found that by pulmonary insufflation, &c. he could preserve life in very young animals for several hours after decapitation; hence he concludes that the principle of sensation and motion does not, as has been generally thought, reside wholly or exclusively in the brain. He is of opinion that decapitation destroys animals by depriving them of the power of breathing; for he found that on the separation of the head from the body, the inspiratory motions of the thorax become instantly annihilated. He asserts that the power of respiration does not, however, depend upon the brain, but upon a circumscribed part of the medulla oblongata near the occipital opening towards the origin of the eighth pair of nerves.* If we open the head of a young rabbit, he says, and cut away, by slices, the whole of the brain and cerebel-

* Sauvages says, "Nonne organum ad motus vitales sustinendos maxime necessarium est illud quo nullum animal orbatur, scilicet initium medullæ spinalis."

Sauvag. Nos.-Method. v. i. p. 824.

lum, and even some part of the medulla oblongata, the animal will continue to respire; but if we comprehend in the section the origin of the eighth pair of nerves respiration suddenly ceases. An animal, he maintains, may be so decapitated that it will continue to live for a considerable time, even without the aid of pulmonary insufflation. It is only necessary that we direct the cutting instrument so, that in taking away the cranium and other parts, we leave untouched that part of the medulla oblongata, in which the primum mobile of respiration resides, and preserve its continuation with the substance of the spinal marrow.

From a great variety of experiments, M. Le Gallois concludes that the principle of sensation and motion, so far as relates to the trunk, resides in the spinal marrow. * If

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* Galen appears to have been acquainted with what M. Le Gallois has here stated as the result of his experiments. Galen says, from dissections we learn that all the parts of an animal below the neck, which are moved voluntarily, have the nerves moving them, from what is called the spinal marrow. He also says, you have seen, in dissections, that the nerves moving the thorax arise from that part of the spinal marrow which is in the

in a rabbit, he says, which has been decapitated, but kept alive by pulmonary in-

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neck. Ἐμάθομεν δὲ ἐν τᾶις ἀνατομᾶις, ἁπάντων των καθ' ὁρμὴν τῦ ζώου κινουμένων μορίων, ὅσα κάτω τῦ τραχήλου, τούτων τὰ κινητικὰ νεῦρα τὴν ἔκφυσιν ἔχειν ἐκ του καλουμένου νωτίαιου μυελου· Ἐθεάσασθε δὲ καὶν τᾶις ἀνατομᾶις, τὰ τὸν θώρακα κινοῦντα νεῦρα, ἐκ τοῦ κατὰ τὸν τραχήλον ἐκφυόμενα νωτιάιου. *Gal. De Loc. Aff.* l. iii. c. 14.

On these principles he advises his disciples, in the treatment of partial paralysis, to endeavour to discover the part primarily affected, and the nature of the affection; for unless they accurately know this, he says, they cannot rightly cure the disease: and he relates a curious case in illustration of his doctrine. Pausanias, the sophist, having had occasion to visit Rome, perceived, soon after his arrival there, a diminution of the power of feeling in the two little fingers and in a part of the middle finger of his left hand; and the disease having been improperly treated, sensation in the parts was soon entirely lost. Galen, on being called in, made particular enquiry into all the circumstances of the case, and he found, that on his journey Pausanias had been thrown from his carriage, and had received an injury in the back, which, in a short time, however, disappeared. The physicians who had attended him applied their remedies to the fingers, with a view to restore their power of feeling; but I, says Galen, applied them to the part first injured, and thus soon cured the patient. Ἃ τοῖς δακτύλοις ἐκεινοι προσέφερον φάρμακα, ταυτ' ἐκέλουσα κατα τοῦ πληγέντος τίθεσθαι μορίου, καὶ ὕυτως ὁ ἀνὴρ διὰ ταχέων ὑγιάσθη. *Gal. De. Loc. Aff.* l. iii. c. 14.

sufflation, the whole of the spinal marrow be destroyed by a stylet thrust though the whole vertebral canal, life will instantly and irrecoverably disappear, irritability only remaining, which, we know, remains for some time after death. If, instead of decapitation, an opening be made in the vertebral canal near to the occiput, and by an instrument introduced through this opening the whole of the spinal marrow be destroyed, although the brain and its nervous communications with the trunk remain perfectly untouched, life will be instantly and irrecoverably destroyed in the trunk, the head alone remaining alive, as is apparent from its gapings.* If we cut a young rabbit transversely into halves, each half will remain alive for a number of minutes. If we immediately destroy all the spinal marrow of the one half, life will instantly cease in it, though it continues in the other, but if we only destroy a portion of its marrow, all the parts which receive

* M. Le Gallois considers these gapings, which continue for some time after decapitation, as the vain efforts of the head for respiration.

their nerves from that portion will be immediately struck with death, whilst the rest of the half remains alive. If, instead of destroying the marrow, we only make transverse sections of it, the parts corresponding to each segment, will possess sensation and voluntary motion, but without harmony. In these cases there are as many distinct centres of sensations as there are segments of marrow.

These experiments prove not only that the life of the trunk depends upon the spinal marrow, but that the life of each part depends especially on that portion of marrow from which it receives * nerves. M. Le Gallois then proceeds to show, by a most shocking experiment, that sensation and motion in the trunk belong exclusively to the spinal marrow. If we open, he says, the breast and abdomen of a rabbit, and tear out the heart, the lungs, the diaphragm, the intestines, and all the viscera of these

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* Galen was of opinion that the spinal marrow receives the power of sensation and voluntary motion from the brain.

Αυτη τῶ νωτιαίου, τὴν τε τῆς αἰσθήσεως καὶ τὴν τῆς καθ' ὁρμὴν κινήσεως δύναμιν ἐξ ἐγκεφάλου λαμβάνοντος.

two cavities, and if, in addition, we cut off the head, leaving only the skeleton, the muscles, and the spinal marrow, the animal will still continue to live; but if we destroy the spinal marrow wholly or partially, it will immediately be wholly or partially struck with death.

It is then certain, says M. Le Gallois, that the life of the trunk has its immediate principle neither in the brain nor in any of the viscera of the breast or abdomen, but in the spinal marrow; yet it is no less certain, that all these are necessary to the maintenance or continuance of the life of the animal;—the brain, because the mechanical phenomena of respiration depend upon it, and the viscera of the breast and abdomen, because they are necessary to the formation and circulation of the blood. The viscera of the abdomen serve to prepare the materials necessary to supply the losses which this fluid continually experiences from the different secretions, the lungs to impress its arterial character, and the heart to distribute it to all the parts of the body.

M. Le Gallois thinks that life is the result of a certain impression of the arterial

blood upon the brain and spinal marrow, and that it cannot be maintained, but by a constant renewal of this impression. Sensation and motion will, indeed, remain, even after the heart has been detached from the body; but they remain only for a very short time. The two conditions necessary for the maintenance of life in any portion of an animal are, the integrity of the corresponding spinal marrow, and the continuance of the circulation. By a series of experiments showing the effects produced upon the circulation of the blood by different læsions of the spinal marrow, M. Le Gallois proves that the destruction of the spinal marrow suddenly stops the circulation of the blood, and hence concludes that the motions of the heart derive all their power from this marrow. Those motions which subsist after the destruction of the spinal marrow, or after the separation of the heart in any other manner from the action of the nervous power, and which imposed upon Haller and those of his school, are motions, M. Le Gallois says, without force, and perfectly analogous to the motions of irritability which we observe in other

muscles for a longer or shorter time after death. It is a principle formed in the brain and spinal marrow, he thinks, which, under the name of nervous power, and by the medium of the nerves, animates all the rest of the body, and presides over all the functions. The heart borrows all its power from this principle, just as other parts borrow from it the sensation and motion with which they are endowed, with this difference, — that the heart borrows its power from all points of the spinal marrow; whereas other parts are only animated by that portion of the marrow from which they receive their nerves, a difference which serves to explain the intensity of the power of the heart, and its uninterrupted continuance, from the time of conception to the time of death.

M. Le Gallois says, that the heart receives its principal nervous threads from the grand sympathetic, and that it is solely by this nerve enabled to borrow its power from all points of the spinal marrow, the grand sympathetic having its roots in this marrow. All the questions, then, which have been agitated concerning the origin

of this nerve, namely, whether it arises from the brain or spinal marrow, or whether, as Bichat maintains, its different portions are only communicating branches of ganglions, which this author considers as so many little brains forming a distinct system independent of the brain and spinal marrow: all these questions, hitherto undetermined by anatomists, are completely resolved by the experimental method; and at the same time it is demonstrated, that the ganglions ought not to be considered as little brains. M. Le Gallois says it should be always remembered that a real and very important distinction is to be made between the organs which receive their nerves from the grand sympathetic, and those which receive their nerves immediately from the medulla oblongata and spinal marrow. The first have their principle of action in the whole nervous power; their functions are not under the influence of the will; they are in exercise through the whole of life, or at most have only remissions: whereas the latter, on the contrary, have their principle of action in a circumscribed portion of the nervous power; their functions are under

the influence of the will; they are temporary, and can only be renewed after complete intermissions of greater or less duration. This distinction, he says, comprises very nearly the same organs as that of the two lives; but it evidently rests upon a very different basis, since the organs of the organic life, which, in the system of the two lives, are considered as independent of the brain and spinal marrow, are precisely those which receive from them the most powerful influence.

As the maintenance of life in any part of the trunk of an animal depends upon the integrity of the corresponding part of the spinal marrow and its nervous communications, and the circulation of the blood in the part, it is possible for us, M. Le Gallois says, to preserve alive any part of an animal we please, so long as we can preserve these conditions. For example; we may preserve the anterior parts of an animal alive, after the posterior have been struck with death, by the destruction of the corresponding spinal marrow; or the posterior may be kept alive after the anterior have in similar man-

ner been deprived of life. Although the destruction of the whole, or, under certain circumstances, of a part of the spinal marrow, occasions an immediate stoppage of the circulation of the blood, the motion of the heart in a degree remains ; this motion, however, independent of the influence of the spinal marrow, is not sufficiently strong to carry on the circulation, and death ensues : but by tying up blood-vessels, and thus limiting the circulation, M. Le Gallois found that he could preserve life for a considerable time ; not, indeed, after the destruction of the whole of the spinal marrow, but after the destruction of the cervical, or other part of the marrow; the power of the heart being sufficient to carry on such a circumscribed circulation, though not sufficient to carry on a more extended circulation. In these experiments, for the purpose of limiting the circulation, M. Le Gallois always found decapitation indispensable, so that in order to preserve life in the trunk, he was under the necessity of removing the head. After a very great number of trials (an account of the particulars of which I am glad to avoid by refer-

ing to his book *), M. Le Gallois succeeded in preserving life for three quarters of an

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* The writer of a criticism in the Edinburgh Review, on Mr. Brodie's experiments on vegetable poisons, says, " Some object of a practical nature, some prospect of discoveries likely to benefit mankind more than by the mere gratification of a learned curiosity, however natural, or even laudable, is almost requisite, in order completely to justify the expense of animal life, the large amount of torment, as well as death, which such investigations demand." Ed. Rev. August, 1811.

I most cordially agree in sentiment on this subject with the learned reviewer; and I have great pleasure in stating, that Mr. Brodie has for some time past adopted a mode of making experiments on living animals, which does great credit to his feelings. He informs me, that he has been in the habit of stupifying the subjects of his experiments, by inoculation with the Woorara poison, and when they cease to breath by their own efforts, he has maintained the action of the heart by inflating the lungs artificially. Under these circumstances, he found that he could destroy the spinal marrow without giving pain to the animal, or producing that spasmodic action of the muscles which the destruction of the spinal marrow otherwise occasions. In this way Mr. Brodie says he was able to avoid two great sources of difficulty—error and confusion. — Mr. Abernethy, in his physiological lectures, expresses sentiments on this subject which do him great honour. He says, " Before we make experiments on sensitive beings, we ought to consider whether the information we seek may not be attainable by other means. I am aware of the advantages which have been derived from such experiments, when made by persons

hour in the breast of a rabbit, after that part had been completely detached from all other parts of the body.

A committee from the French Institute, appointed to make a report on M. Le Gallois's memoir, gave it as their opinion, that his experiments completely warrant his deductions, and establish the following principal points: —

First. That the principle of all the inspiratory motions has its seat about that part of the medulla oblongata which gives rise to the nerves of the eighth pair.

Secondly. That the principle which animates each part of the body, resides in that portion of the spinal marrow from which the nerves of the part arise.

Thirdly. That in like manner the heart draws from the spinal marrow the principle of its life and of its powers; not, however,

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of talent, and who have properly prepared themselves; but I also know that these experiments tend to harden the feelings, which often leads to the unnecessary and inconsiderate performance of them. Surely we should endeavour to foster, and not to stifle benevolence, the best sentiment of our nature, that which is productive of the greatest gratification and advantage, both to its possessor and to others." *Abernethy, Phys. Lect.* p. 166.

from any one circumscribed portion only, but from the whole of its marrow.

Fourthly. That the grand sympathetic originates in the spinal marrow, and that it is the particular character of this nerve to put each of the parts to which it is distributed under the immediate influence of the whole nervous power. *

Although M. Le Gallois, in speaking of the functions of the brain, has only considered its action upon the inspiratory motions, and that which it exercises upon the interior organs by the nerves of the eighth pair, he is far from thinking that the brain has not upon the other parts of the body an influence equally great and necessary. He says it is the brain which determines and regulates all the acts of the animal functions. † For example; when I move my arm, the principle of this motion emanates from the spinal marrow, and not from the brain; but it is

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* Dr. Wilson Philip, in his Experimental Enquiry into the Laws of the Vital Functions, &c. has given a translation of this report of the committee from the French Institute. Vide chap. i. p. 2.

† This was the opinion of Galen.

De Loc. Aff. l. iii. c. 14.

the brain which wills this motion, and directs it in the appropriate sense to the object for which I make it. Cold-blooded animals furnish an evident proof of this. When a lizard has been decapitated on the first vertebræ, it will continue to live for many days; but although it moves its body and its limbs with as much force as is necessary to transport it from one place to another, it remains in the same place; and if we examine all the motions that it makes, we see that they are irregular and without meaning. In order to produce these phenomena, M. Le Gallois observes, that it is not necessary for us to decapitate an animal; the simple section of the spinal marrow made at the occiput is sufficient for the purpose. In this last case, the head, as well as the rest of the body, remains alive, as is apparent by the motions of the mouth and eyes; and yet the animal is absolutely in the same state as if it had been decapitated, being no longer capable of governing its motions; a situation truly singular, in which the head and the body have a separate life without the power of acting on each other; the head living as if without the body, and the body as if without the head.

M. Le Gallois says, it may happen that reptiles will continue to walk and to regulate their motions after having been decapitated; but, if we observe, we shall find that in all these cases the decapitation has been only partial, that it has been made upon the cranium, and that the posterior part of the brain has remained in union with the body. This indicates that the faculty which animals have of regulating their motions, resides in some place in this posterior part. In order to find this place, it will be sufficient if we remove successively the anterior portions of the brain, and continue the operation till we find the point at which the animal suddenly loses the power of walking. The enquiries which he has already made on this subject lead him to conclude that this point is seated somewhere about the medulla oblongata. He observes, however, that in order to arrive at a more precise determination, it would be necessary to have reptiles much larger than such as he has been able to procure.

Decapitation, and the section of the spinal marrow at the occiput, he observes, produce similar phenomena in the warm-

blooded animals; these, however, he found much less suitable for his experiments than the cold-blooded animals, as the former cannot be kept alive after decapitation without the aid of pulmonary insufflation, &c. which prevents us from leaving them to themselves in order to study their motions.

M. Le Gallois here mentions a very curious fact. He says that a living trunk, without a head, seems often to be influenced by a sort of instinct or will. Guinea-pigs and kittens, on recovering from the stupor produced by decapitation, seem strongly to feel pain from the wound in the neck, as appears by the alternate motions of their hind-feet towards the part.

"There are facts, says Sir G. Blane, which show that instinctive actions, even in animals endowed with brain and nerves, do not depend on sensation. I took a live kitten, a few days old, and divided the spinal marrow by cutting it across at the neck. The hind-paws being then irritated by pricking them, and by touching them with a hot wire, the muscles belonging to the posterior extremities were thrown into contraction, so as to produce the effect of

shrinking from the injury. The same effects were observed in another kitten, after the head was entirely separated from the body. In repeating this experiment, I found that when the spinal marrow was cut through between the lumbar vertebræ and the os sacrum, the posterior extremities lost their irritability, but the tail retained it. It might therefore be said that the spinal marrow served as a sensorium.*"

How the brain regulates the motions of the body, without furnishing their immediate principle, M. Le Gallois is at a loss to determine: his experiments bear but little on the question. He conjectures that the brain may act upon the spinal marrow, as the spinal marrow acts upon the parts which it animates. The spinal marrow transmits its action by the nerves, and the nerves appear to be formed of the same substance as the white and medullary part of the brain and marrow. He conceives that the white part of the spinal marrow is composed of nervous threads which have their origin

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* Sir Gilbert Blane's Lecture on Muscular Motion, read at the Royal Society in 1788.

or termination on the one part in the brain, and on the other in all the points of the marrow; and that it is in the cineritious part of the marrow that the spinal nerves and the principle which directly animates them originate. The action of the brain, he observes, upon each point of the marrow has not only the effect of determining and regulating motions, but it seems to increase their energy. The motions in a decapitated animal are always weaker than in an animal which has not been decapitated, unless we immediately touch the end of the marrow; for in that case the motions become very violent, and even convulsive. The intimate relation betwixt the brain and spinal marrow assists us in the explanation of certain facts, says M. Le Gallois, which, at first view, appear very difficult to reconcile with my experiments; such as that of a paralysis of the whole of one side of the body, produced by causes which act only upon the brain: but, even supposing we had no means of reconciling these facts, it would still be true, that on the one part an affection confined to the brain alone may take away sensation and voluntary motion from one half

of the body, and on the other, that sensation and voluntary motion may subsist and be preserved in a decapitated animal. However opposed these facts may appear to be, we ought to remember, he says, that of two facts well established, one can never exclude the other, and that the apparent contradiction depends upon this, — that there is between them something intermediate, some point of contact, which escapes our observation.

The general notion of the nervous power which M. Le Gallois entertains is, "que son siége constitue à lui seul l'individu, comme être vivant;" all the rest of the organization of an animal serving only to establish the relative connection between the nervous power and external objects, or to prepare and furnish the materials necessary to its maintenance and renewal. He only sees in the scale of animals all possible combinations of organs capable of preserving the nervous power with qualities as various as these combinations; but, in reality, of the same nature in all. Amongst these combinations, those which are the most simple, and in which the conditions necessary for

the preservation of the nervous power exist in all their parts, are susceptible of being divided into portions, in each of which life may continue as in an entire animal, or rather each portion becomes a new animal. Those, on the contrary, in which these conditions are concentrated in certain parts, do not admit of similar divisions with the same success; for life cannot continue in the separate segments of these parts longer than the nervous power can subsist by itself and without renewal.

The committee of the French Institute consider this work of M. Le Gallois as one of the most beautiful, and certainly the most important, that has been offered in physiology since the scientific experiments of Haller.

The experiments of M. Le Gallois have been repeated by Dr. Wilson Phillip, Mr. Brodie, and other physiologists; but their account of them is by no means so favourable as that of the committee of the French Institute. Dr. Phillip, who admits the accuracy of these experiments, is of opinion that they do not warrant any of the positions

stated by the committee as the result of them.

Dr. Phillip has made a great many experiments with a view to ascertain the laws of the vital functions, from which he draws conclusions very different from those of M. Le Gallois. He begins with the consideration of the sanguiferous system, which, he says, may be divided into three parts, whose functions differ,—the heart, the vessels of circulation, and the vessels of secretion; and he endeavours to ascertain the principle on which their action respectively depends, and the relation which each of them bears to the nervous system. He maintains that the powers of the heart, of the vessels of circulation, of the muscles of voluntary motion, of the peristaltic motion of the stomach and intestines, and of the vessels of secretion, are all independent both of the brain and spinal marrow; but he asserts, that all these organs are capable of being influenced through the nervous system. This doctrine of independence on the brain and spinal marrow, and influence through them, appears inconsistent, and of this Dr. Phillip is aware; for he observes,

" if it be said that the results of these experiments imply a contradiction; that we cannot suppose the power of the heart and vessels to be wholly independent of the brain and spinal marrow, and yet influenced by agents applied to them, the reply is, that such are the facts, of the truth of which any one may easily satisfy himself."

For an account of his experiments adduced to prove that the heart, the vessels of circulation, &c. may be influenced through the brain and spinal marrow, I refer to his work. *

Dr. Phillip says, however, that " although the *vessels* of secretion are independent of the nervous influence, the *function* or power of secretion is very far from being so; for the function of secretion is destroyed by dividing the nerves of the secreting organs."

He observes, "that the secreting power of the stomach is almost as much deranged by destroying a considerable part of the spinal marrow, as by dividing the eighth pair of nerves; that a similar observation applies to the secreting power of the lungs, and that the stomach and lungs, like the sanguife-

* Phillip, p. 257. second edition.

rous system, are influenced by every part of the brain and spinal marrow. * "

Dr. Phillip maintains, that "the vessels of circulation possess a power capable of supporting a certain motion of the blood independently of the heart; that the ganglions are a secondary centre of nervous influence, whose nerves are as extensively distributed as those which proceed from the brain and spinal marrow, and that the ganglions are the means by which the influence of every part of the brain and spinal marrow is bestowed on the parts which he found influenced by every part of these organs; that the influence of every part of the brain and spinal marrow is bestowed on all parts directly or indirectly necessary to the due performance of secretion, this function requiring the influence of every part of these organs; that we have reason to believe that the great sympathetic nerve arises from the spinal marrow; that the various functions of the animal body may be divided into sensorial, nervous, and muscular; that the sensorial power is not wholly confined to the

* Phillip, p. 259, 260.

brain, nor the nervous power to the spinal marrow, both powers in a greater or less degree residing in both organs; and that what we call death is the ceasing of the sensorial power alone, the nervous and muscular powers still continuing." *

These immediate inferences from his experiments and observations, and many others, for an account of which I refer to his book, have led Dr. Phillip to the following conclusions: "The power of the muscles, both of voluntary and involuntary motion, is independent of the nervous system, and arises from the mechanism of the muscular fibre itself. Both these sets of muscles are equally capable of being excited by the nervous influence; but while this influence is the sole stimulus to which the muscles of voluntary motion are subject, it acts only occasionally on the muscles of involuntary motion, which are excited in all their usual actions by stimuli independent of it, and consequently of the will. When the latter muscles are excited by the nervous influence, it is not applied to them in the same

* Phillip, p. 257 to 264.

way as to the muscles of voluntary motion, to which it is sent directly from the brain and spinal marrow, each muscle receiving its nervous influence from a particular part of these organs: while to the muscles of involuntary motion, it is sent through the great chain of ganglions, each muscle receiving its nervous influence from every part of the brain and spinal marrow."

Besides these conclusions from his experiments and observations, Dr. Phillip draws some others, which are detailed in the latter part of his work, to which reference may be made.

From my friend Mr. Brodie, whose diligence and accuracy in physiological enquiries, cannot be too much commended, I have received some valuable information relative to this part of our subject. Mr. Brodie has repeated the experiments of M. Le Gallois with great care, and has found them correct; but he cannot admit some of the principal conclusions which M. Le Gallois draws from them. M. Le Gallois maintains, that every part of the body derives its principle of vitality and irritability from that portion of the spinal marrow from

which it receives its nerves. To prove the incorrectness of this opinion, Mr. Brodie adduces the following experiments, selected from a great number made by him on the subject.

Experiment I.—Mr. Brodie divided in a dog the skin and muscles which lie before the axillary plexus of nerves, and afterwards the nerves themselves. He then divided the remaining skin and muscles, the cellular membrane, and every other part connecting the anterior extremity to the trunk, with the exception of the axillary artery and vein; so that the vessels were completely insulated, and formed the only connection between the limb and the trunk. The divided edges of the skin were united by sutures. Twenty hours afterwards, an incision having been made in the fore-arm, the arteries bled freely, and the blood was of a bright scarlet colour. The muscles, by means of the Voltaic battery, were readily made to contract, and when several pairs of plates were employed, the contractions of the muscles did not appear to be less powerful than those which arise from the stimulus of the will.

Experiment II.—Mr. Brodie removed the whole of the posterior part of the spinal marrow of a frog. The wound readily healed, but the hind legs became of course paralysed. Five months afterwards the muscles of the hind-legs were found still capable of powerful contractions under the influence of the Voltaic battery. At the end of six months more, the muscles still retained their contractile power. The frog was then killed; the wound was found completely cicatrized; there was not the smallest appearance of regeneration of that portion of the spinal marrow which had been destroyed. From these experiments Mr. Brodie thinks himself warranted in concluding that the second deduction of M. Le Gallois is not correct, viz. that the principle, which animates each part of the body, resides in that part of the spinal marrow from which the nerves of the part arise.

Mr. Brodie has also favoured me with the communication of some experiments formerly made by him, which strongly militate against the opinions of the celebrated Haller, respecting some important physiological points. As the experiments and the opi-

nions of Mr. Brodie on this subject have not been made public, the account of them here introduced will probably be read with a considerable degree of interest. *

" Haller supposed, says Mr. Brodie, and the opinion is still, I believe, generally received, that the immediate cause of the contractions of the heart, is the stimulus of the blood applied to the inner surface of its cavities; so that the circulating fluid is to the movements of this organ what volition, communicated by means of the nerves, is to the movements of the voluntary muscles. The following experiments have induced me to doubt the correctness of Haller's doctrine on this subject."

Experiment I.—" In a rabbit nearly full grown, I divided, at one incision, both the carotid arteries near their origin, and also the other vessels in the lower part of the neck. There was a profuse hæmorrhage, and

* These experiments, as well as those which relate to the doctrines of Le Gallois, were read to the Royal Society in the year 1813, and were ordered to be printed; but the publication of them was postponed at the desire of Mr. Brodie, who wished for farther time to enable him to complete the subject by additional experiments.

in thirty seconds, all appearance of sensibility and voluntary motion had ceased. Two minutes after the division of the blood-vessels, I opened the chest, and I found the heart acting one hundred and forty times in a minute. The contractions were regular and vigorous. The muscular parietes were firm and unyielding to the touch, and the appearance of the heart did not at all differ from that in the living animal, except that it was of a smaller size in consequence of its cavities not being distended with blood. An incision having been made in the right ventricle, a very small quantity of blood oozed from it; but the left ventricle was entirely empty."

Experiment II.—"A rabbit was inoculated with the Woorara poison, and when apparently dead, the circulation was kept up by means of artificial respiration, as explained by me in the Philosophical Transactions for the years 1811, 1812. The thorax having been opened, the heart was found acting one hundred and forty times in a minute. I divided the aorta and vena cava inferior immediately below the heart. There was of course a profuse discharge of blood, and

* This experiment appears to me to prove only the greater excitability of the heart after the stimulus of blood and not the absence of stimulus afforded by blood.

the heart became almost instantly empty; but this produced no alteration in its action. At the end of two minutes the contractions were still as regular, frequent, and vigorous, as in the living animal. From this time the contractions became less frequent, and also feeble and irregular."

"In these experiments, Mr. Brodie says, the action of the heart continued apparently unaltered for at least two minutes after that viscus and the great blood vessels were empty of blood; a circumstance which cannot well be explained on the supposition that the contractions of the heart are produced by the stimulus of the blood in its cavities; since it is to be supposed that the contractions of a muscle would cease immediately on the removal of the stimulus which produced them. It is well known, Mr. Brodie observes, that if an animal be suffocated the heart continues to act, circulating dark coloured blood for a certain space of time after respiration has ceased;" but in prosecuting this enquiry further, he found "that a *regular* and *vigorous* action of the heart continues for a *longer* period, when it is com-

pletely empty of blood, than when it is distended with blood of a dark colour."

"Is it not probable, says Mr. Brodie, that the immediate cause of the contractions of the heart may be certain impressions communicated through the nervous system, rather than the stimulus of the blood in its cavities? Do not many circumstances, besides the experiments just related, tend to show that this is a more just and satisfactory explanation of the circulation of the blood than that proposed by Haller?"

Mr. Brodie remarks, 1st. "That if a person lose a considerable quantity of blood, the contractions of the heart are rendered more frequent; as if by the more rapid circulation to make up for the diminished quantity of the circulating fluid. Were the blood the stimulus which excites the heart to contract, the loss of blood ought to diminish the frequency of the contraction; since a longer time would be necessary for a sufficient quantity of the stimulus to be accumulated in any one of the cavities."

2d. "As the valves of the heart open in the direction of the circulation, the auricle and ventricle of each side, with respect to

the blood entering the heart, may be considered as forming a single cavity, of which, if the blood were the stimulus producing the contraction, the whole should dilate and contract at the same instant, instead of the auricle and ventricle dilating and contracting in succession, as we find to be the case."

3dly. " The action of the heart is rendered more frequent and more powerful in one case; more slow and feeble, or perhaps altogether suspended in another case, where the mind is agitated by rage, fear, joy, or any other violent emotion. These circumstances are almost inexplicable on the supposition that the blood is the stimulus by which the action of the heart is excited; but they may be easily explained on the supposition that the contractions of the heart depend upon certain impressions communicated through the nervous system."

4. " This last hypothesis is more conformable to what is observed in other organs. For example, respiration is produced by the never-ceasing action of the diaphragm, as the circulation of the blood is by that of the heart; and no one can doubt that the diaphragm is stimulated to contract by im-

pressions which it is constantly receiving through the medium of the phrenic nerves, for if we divide these nerves it ceases to contract. The uterus, in parturition, is excited to contract, not by the stimulus of its contents, but by the influence of the nervous system, as is proved by this circumstance, that in cases of extra-uterine conception, when the uterus contains only the membrana decidua, it begins to contract at the same period of time as in common pregnancy, when it contains the fœtus and other membranes."

In enumerating the opinions of modern physiologists respecting life, motion, and sensation, I must not omit to mention those of Mr. Hunter, whose sentiments on these subjects, however, I find considerable difficulty in collecting, as they are not specifically and distinctly stated in any particular part of his writings.

Mr. Hunter, if I understand his doctrine, supposes the existence of a principle pervading all animated nature, which he denominates materia vitæ diffusa, of which every part of an animal has its portion. It exists both in the blood and in the solids: it

makes a necessary constituent part of them, forming with them a perfect whole, giving to both the power of preservation, and the susceptibility of impression, and, from their construction, a consequent reciprocal action. This is the matter which principally composes the brain. "I consider," Mr. Hunter says, "that something similar to the materials of the brain is diffused through the body, and even contained in the blood, between which and the brain a communication is kept up by the nerves; I have therefore adopted terms explanatory of this theory, calling the brain, the materia vitæ coascervata; the nerves, the chordæ internunciæ; and that diffused through the body, the materia vitæ diffusa." * Mr. Hunter thinks, that the blood has as much of the materia vitæ diffusa as the solids, and that it is the support of life in every part of the body; that no animal can be perfect without the blood, which must be kept alive, and for that purpose must have motion, and that in a circle. "Here, then," he says, "would appear to be three parts, body, blood, and

* Hunter on the Blood, &c. vol. i. p. 155.

motion, which latter preserves the living union between the other two, or the life in both. These three make up a complete body, out of which arises a principle of self-motion; a motion totally spent upon the machine, or which may be said to move in a circle for the support of the whole; for the body dies without the motion of the blood upon it, and the blood dies, without the motion of the body upon it; perhaps pretty nearly in equal times. * Life is in some degree, in proportion to this motion, either stronger or weaker; so that the motion of the blood may be reckoned, in some degree, a first moving power." † Mere composition of matter however, Mr. Hunter says, does not give life, for the dead body has all the composition it ever had, nor do organization and life depend in the least on each other. Organization, he observes, may arise out of living parts, and produce action; but life can never rise out of, or depend upon organization. An organ is a peculiar conformation of matter, (let that matter be what it

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* Hunter on the Blood, &c. vol. i. p. 150, 151.

† Hunter, *ibid.*

may) to answer some purpose, the operation of which is mechanical; but mere organization can do nothing, even in mechanics: it must still have something corresponding to a living principle; namely, some* power. This opinion Mr. Hunter supports by observations made on the process of incubation. He acknowledges, however, that "life is a property we do not understand; we can only see the necessary leading steps towards it." † Its effects may, however, he thinks, somewhat illustrate its nature: "thus it is something that prevents the chemical decomposition, to which dead animal and vegetable matter is so prone, that regulates the temperature of the bodies it inhabits, and is the cause of the actions we observe in them." ‡

To the operations of the materia vitæ diffusa, Mr. Hunter refers irritability, nervous action, and all the phenomena of life; but his description of the mode of its operation, particularly in the production of sens-

* Hunter on the Blood, &c. vol. i. p. 136.

† Ibid, vol. i. p. 159.

‡ Abernethy's Enquiry, (Introductory Lectures, edit. 1815.) p. 15.

ation and motion, is, in some parts, very obscure. An ingenious illustration of Mr. Hunter's doctrines, in their application to the explanation of the animal and vital actions, is contained in Mr. Abernethy's Physiological Lectures, delivered to the Royal College of Surgeons; and to them I have great pleasure in referring for many interesting particulars, which, consistently with my plan, I cannot detail. The following observations, however, I extract, as expressive of some of Mr. Abernethy's own opinions on this curious subject: "Most reflecting persons," he says, "in all ages, have believed, and indeed it seems natural to believe, what modern physiology also appears to teach, that in the human body there exists an assemblage of organs, formed of common inert matter, such as we see after death, a principle of life and action, and a sentient and rational faculty; all intimately connected, yet each apparently distinct from the other. So intimate, indeed, is the connection, as to impose on us the opinion of their identity. The body springs and bounds as though its inert fabric were alive; yet we have good reasons

for believing that life is distinct from organization. The mind, and the actions of life, affect each other; failure or disturbance of the actions of life, prevent or disturb our feelings, and enfeeble, perplex, or distract our intellectual operations. The mind equally affects the actions of life, and thus influences the whole body. Terror seems to palsy all its parts, whilst contrary emotions cause the limbs to struggle, and become contracted from energy. Now, though these facts may countenance the idea of the identity of mind and life, yet we have good reasons for believing that they are perfectly distinct. Whilst, therefore, on the one hand, I feel interested in oppugning those physiological opinions which tend to confound life with organization, I would, on the other, equally oppose those which confound perception and intelligence, with mere vitality. * In vegetables, and in some of the lowest kinds of animals, no traces of a nervous system are discoverable; yet the irritability of life is manifest in all. In the ascending series of animals, in proportion

* Abernethy's Enquiry into Hunter's Theory, p. 64, 65.

as the brain becomes large and complex, we have evidence of the perceptions and intelligence increasing; a circumstance which would lead to believe that these faculties were connected with that part of the nervous system. We have also equal reason to believe, that neither such perception nor intelligence is requisite for the mere functions of life; for these appear to be carried on as effectually in animals that have no brains, nay, in those which seem destitute of any nervous system, as in those which possess such organs. Indeed, many of the most vivacious and irritable animals have the *least* nervous system. *

With respect to Mr. Hunter's opinions concerning the *nature* of the materia vitæ diffusa, I do not find any thing stated distinctly in his works; but from Mr. Abernethy's Lectures, I collect that he conceived it to be some subtile, mobile, invisible substance, superadded to inert matter, as magnetism is to iron, or as electricity is to the various substances with which it may be connected. "Mr. Hunter doubtless

* Abernethy's Enquiry, p. 68.

thought," says Mr. Abernethy, " and I believe most persons do think, that in magnetic and electric motions, a subtile invisible substance, of a very quickly and powerfully mobile nature, puts in motion other bodies which are evident to the senses, and are of a nature more gross and inert." * " It is not meant to be affirmed," Mr. Abernethy says, " that *electricity* is life. There are strong analogies between electricity and magnetism, and yet I do not know that any one has been hardy enough to assert their absolute identity. I only mean to prove, that Mr. Hunter's theory is verifiable, by showing that a subtile substance of a quickly and powerfully mobile nature, seems to pervade every thing, and appears to be the life of the world; and therefore it is probable that a similar substance pervades organized bodies, and produces similar effects in them. †

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* Abernethy's Enquiry, p. 33.

† It may be matter of surprise to some, perhaps, that Mr. Abernethy should have ascribed to Mr. Hunter doctrines which are not be found in any of his published works. Mr. Abernethy authorises me to state, that these doctrines have been communicated to him by Mr. Hunter,

Mr. Hunter's opinions much resemble those of the Pythagoreans, of which some account may be seen in the works of Plato, and which are so beautifully described in the celebrated lines of Virgil, in the sixth book of the Æneid.

Principio cœlum, ac terras, camposque liquentes.
Lucentemque globum Lunæ, Titaniaque astra
Spiritus intus alit, totamque infusa per artus
Mens agitat molem, et magno se corpore miscet.
Inde hominum pecudumque genus, vitæque volantum
Et quæ marmoreo fert monstra sub æquore pontus.
Igneus est ollis vigor, et cœlestis origo
Seminibus: quantum non noxia corpora tardant,
Terrenique hebetant artus, moribundaque membra.

Mr. Lawrence, who is not disposed to admit Mr. Hunter's opinions on this subject, has communicated his ideas respecting life, in lectures lately delivered at the Royal College of Surgeons, of which the following

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both in his conversations and in his lectures. In a letter with which I have been favoured by Mr. Abernethy on this subject, he says, " Mr. Hunter's illustration of his notions of life, by saying that it was superadded, as electricity and magnetism may be to substances in which they may inhere, was given in his lectures, and I have heard it from his own mouth. It made a strong impression upon my mind; because it did not affirm what electricity, magnetism, and life were, but only stated an analogy.

is a brief abstract. "The matter that surrounds us," Mr. Lawrence says, "is divided into two great classes, living and dead. The latter is governed by physical laws, such as attraction, gravitation, chemical affinity; and it exhibits physical properties, such as cohesion, elasticity, divisibility, &c. Living matter also exhibits these properties, and is subject in great measure to physical laws. But living bodies are endowed moreover with a set of properties altogether different from these, and contrasting with them very remarkably. These are the vital properties or forces which animate living matter so long as it continues alive, are the source of the various phenomena which constitute the functions of the living animal body, and distinguish its history from that of dead matter." * "Organization," Mr. Lawrence says, "means the peculiar composition which distinguishes living bodies: in this point of view they are contrasted with inorganic, inert, or dead bodies. Vital properties, such as sensibility and irritability, are the means by which organization is

* Lawrence's Lectures, p. 121, 122.

capable of executing its purposes; the vital properties of living bodies correspond to the physical properties of inorganic bodies, such as cohesion, elasticity, &c. Functions are the purposes which any organ or system of organs executes in the animal frame; there is, of course, nothing corresponding to them in inorganic matter. Life is the assemblage of all the functions, and the general result of their exercise. Thus organization, vital properties, functions, and life are expressions related to each other, in which organization is the instrument, vital properties the acting power, function the mode of action, and life the * result." The vital properties, among the more remarkable of which are sensibility and irritability, " are the causes of vital functions, in the same way as chemical affinity is the cause of the combinations and decompositions exercised among the component particles of bodies, or as attraction is the cause of the motions that occur among the great masses of matter. Whatever we see in astronomy, hydraulics, mechanics, &c.

* Lawrence's Lectures, p. 120, 121.

must be ultimately referred, through the concatenation of causes, to gravity, elasticity, &c. In the same way the vital properties are the main spring, at which we arrive, whatever phenomena we may be contemplating in respiration, digestion, secretion, and inflammation." * To call life a property of organization, Mr. Lawrence says, " would be unmeaning — it would be nonsense. The primary or elementary animal substances are endued with vital properties: their combinations compose the animal organs, in which, by means of the vital properties of the component elementary structures, the animal functions are carried on. The state of the animal, in which the continuance of these processes is evidenced by obvious external signs, is called life. †

Mr. Lawrence endeavours to ascertain the nature of life by its effects, as Mr. Hunter had done. " The regulation of animal temperature is a remarkable illustration of the operation of vital powers; it

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* Lawrence's Lectures, p. 150, 151.

† Lawrence on the Theory of Physiology, p. 82.

attracted the notice of Mr. Hunter, and was made by him the subject of numerous and highly interesting experiments. "You know how soon," says Mr. Lawrence, "heat becomes equally diffused through all surrounding inert bodies, the temperature of any one that is either higher or lower than those around it, being speedily reduced or exalted to a level with them. Animals, however, maintain a certain standard temperature under all circumstances. The human body has one and the same heat in the intense colds of Siberia, Spitzbergen, and Greenland, where mercury freezes in the open air; and in the parched atmosphere of equinoctial Africa or America, where the thermometer has exceeded 120°, in the heated rooms of experimenters, where it has stood at 260°, and in the stoves used for drying grain, where it has been as high as 290°, and where a heat of 270° was borne for a quarter of an hour." * Mr. Lawrence also, with Mr. Hunter, observes the power of living bodies in resisting chemical action. "We see them maintaining a composition

* Lawrence's Lectures, p. 129—135.

apparently constant and identical, yet keeping up an incessant motion and change of their particles, in which the old materials are discharged and new ones converted into their own substance, producing new bodies, the seat of similar active powers with themselves, yet terminating their own existence by the very action of the principle that has so long preserved them. * Mr. Lawrence does not "profess to explain *how* the living forces in one case, or attraction in the other, exert their agency. But some, he says, are not content to stop at this point; they wish to draw aside the veil from nature, to display the very essence of the vital properties, and penetrate to their first causes; to show, independently of the phenomena, what life is, and how irritability and sensibility execute those purposes, which so justly excite our admiration. They endeavour to give a physical explanation of the contraction of a muscle, and to teach us how a nerve feels. They suppose the structure of the body to contain an invisible matter or principle, by which it is put in

* Lawrence's Lectures, p. 127, 128.

motion. Such is the ενορμων or impetum faciens of Hippocrates, the archæus of Van Helmont, the anima of Stahl, materia vitæ of Hunter; the calidum innatum, the vital principle, the subtle and mobile matter of others; — there are many names for it, as each successive speculator seems to have fancied that he should establish his own claim to the offspring, by baptising it anew. These notions Mr. Lawrence ridicules. "Either of the names, and either of the explanations may be taken as a sample: they are all equally valuable, and equally illustrative." * If the properties of living matter are to be explained in this way, he observes, "why should we not adopt the same plan with physical properties, and account for gravitation or chemical affinity by the supposition of appropriate subtle fluids? Why does the irritability of a muscle need such an explanation, if explanation it can be called, more than the elective attraction of a salt? To make the matter more intelligible, this vital principle is compared to magnetism, to electricity, and

* Lawrence's Lectures, p. 165, 166.

× The late theory of Mossotti does perfectly to explain these phenomena as well as those observed in living bodies.

to galvanism; or it is roundly stated to be oxygen. You have only to grant that the phenomena of the sciences just alluded to, depend upon extremely fine and invisible fluids, superadded to the matters in which they are exhibited, and to allow, further, that life and magnetic, galvanic and electric phenomena, correspond perfectly: the existence of a subtle matter of life will then be a very probable inference. On this illustration you will naturally remark, that the existence of the magnetic, electric, and galvanic fluids, which is offered as a proof of the existence of a vital fluid, is as much a matter of doubt as that of the vital fluid itself. It is singular also that the vital principle should be like both magnetism and electricity, when these two are not like each other." * "To the question," says Mr. Lawrence, "what opinions I would substitute in the place of those to which I object, I answer, none. I profess an entire ignorance of the nature of the vital properties, except in so far as they are disclosed by experience, and find my knowledge on

* Lawrence's Lectures, p. 169, 170.

this subject reduced to the simple result of observation, that certain phenomena occur in certain organic textures." * "All the efforts to penetrate the nature of the first cause of the vital phenomena," Mr. Lawrence says, "have been equally unsuccessful from the commencement of the world to the present time." He concludes his lecture on life by the following quotation from Lucretius:

> Ignoratur enim quæ sit natura animai;
> Nata sit, an contra, nascentibus insinuetur,
> Et simul intereat nobiscum morte dirempta,
> An tenebras orci visat, vastasque lacunas.

Among the anatomists and physiologists who have distinguished themselves in the investigation of the nature and uses of the nervous system, Doctors Gall and Spurzheim may be mentioned. I shall give a short account of their peculiar doctrines.

Doctors Gall and Spurzheim do not admit of a common origin of the nervous system. They think that it must be divided and subdivided, and that each part of these divisions and subdivisions has its particular

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* Lawrence's Reply, &c. p. 14.

origin. They do not allow, therefore, that the spinal marrow and nerves originate in the brain and cerebellum. They are of opinion that the great sympathetic nerve has its source in various ganglia dispersed through the abdomen and thorax, independently of the brain. "The different parts of the brain, of the spinal marrow, the pretended cerebral nerves, and the nerves of the abdomen and thorax," Dr. Spurzheim says, "have their separate origin. The various parts are brought only into communication with each other." They consider the cineritious substance of the brain as the origin of the medullary, which they say is of a fibrous structure, and whenever any augmentation of medullary matter takes place, it is invariably traceable to a portion of cineritious substance. "In the fœtus," says Dr. Spurzheim, "the whole brain consists of a cineritious mass, and it is only by degrees that the fibres appear." The fibrous nature of the medullary substance may be discovered by inspection in cases of dropsy, or by immersion of a portion of it in alcohol, mineral acids, or boiling oil." Drs. Gall and Spurzheim maintain

that the brain and cerebellum are originally derived from bundles of fibres contained in the medulla oblongata, and that all the parts of the nervous system, the brain, the cerebellum, and the spinal marrow, are double, and have a common connection by means of commissures, ganglia, or nervous cords, each set of nerves having a connection more or less intimate, according to the particular functions which they are destined to perform. They think that the convolutions of the brain are formed by an union or tissue of diverging and converging fibres, beyond which tissue each duplication may be easily separated into two layers by gentle extension with the fingers, by the injection of water, or by the application of a small but constant force, as in hydrocephalus; and thus the doublings may be evolved into a kind of membranous expansion, covered externally by grey substance. In cases of hydrocephalus, where the brain has been considered as destroyed, the mental faculties remaining, these anatomists assert that the convolutions are not destroyed, but only evolved or stretched.

For the minute anatomy of the brain and

nerves, according to the system of these physiologists, and a particular account of the manner in which the various organs within the cranium are formed and developed, reference may be made to their great work entitled *Anatomie et Physiologie du Systeme Nerveux en general, et du cerveau en particulier;* they tell us, however, that it is almost impossible for a person fully to understand their anatomy without having often witnessed and repeated their demonstrations, and without being well acquainted with the principles which direct them.

With respect to the uses of the nervous system, Drs. Gall and Spurzheim entertain some opinions materially different from those of the generality of modern physiologists. In man, and the more perfect animals, the manifestations of all the faculties, they allow, "are more or less subordinate to the influence of the nervous system. Besides the functions of the five external senses, all the instincts, propensities, sentiments and intellectual faculties, all affections and passions, all the characteristics of humanity, are manifested only by means of the nervous

system." But they maintain that all the functions of the animal as well as of the automatic life are *innate*, and in proof of this they allege "the constancy of the human character; the uniformity of the nature of man at all times, and in all countries; the tendency of natural genius; the determinate character of each of the sexes; the peculiarities of every individual; the relation between the organization and the manifestations of the respective faculties; and the circumstance that man is a created being." * "Man," says Dr. Spurzheim, "has been created as well as every other being, consequently it is rational to think that his faculties are determinate, and ordered by creation. We consequently maintain that every faculty of man is innate." †

Doctors Gall and Spurzheim likewise maintain, that the functions of the automatic life, and a great number of the functions of the animal life, "voluntary motion for instance, and the five external senses, depend on organization;" and that the "manifestations of every moral sentiment, and every intel-

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* Spurzh. p. 94. † Ibid. p. 88.

lectual faculty, also depend upon organization." They do not assert, however, that they are the result of organization, they "never venture beyond experience." * The functions, however, which take place without consciousness, as "digestion, circulation, and nutrition," they consider "as the effect of organization or of irritability." † The brain is considered by these physiologists as exclusively the organ of the manifestations of the mind, but they do not regard it "as one single organ, but as composed of as many particular and independent organs as there are particular and independent manifestations of the mind." The form of the skull they assert to be the result of the form of the brain. They do not however explain the growth of the skull in a mechanical way, by the action of the brain. Such an explanation, Dr. Spurzheim says, "would be quite incorrect, for if the brain were exposed to the least compression, its functions would be deranged;" but they think that "the bony mass is deposited according to the form and size of the brain. If the whole

* Spurzh. p. 103. † Ibid. p. 187.

brain, or some parts, increase or decrease, the ossification of the skull follows always the size and form of the brain." * In order to measure the intellectual faculties, " it is necessary to compare each special faculty only with its relative organ." They have endeavoured to obtain the knowledge of organs, and to establish the connection betwixt them and the faculties, by carefully observing and considering whether, in persons distinguished by any particular faculty, there is any particular conformation of head; and they maintain, that they are warranted in concluding from ample data, that some particular projections of the cranium indicate an evolution of a part of the brain below, and the possession of some faculty of which it is the organ. The organs are not confined to the surface of the brain; they extend from the surface to the great swelling of the occipital hole, (medulla oblongata,) and probably to the commissures; for the whole mass of the brain constitutes the organs. †

The internal organs of the manifestations

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* Spurzh. p. 250. *vide* p. 4. † Ibid. p. 265.

of the mind, are the organ of amativeness, of philoprogenitiveness, of inhabitiveness, of adhesiveness, of combativeness, of destructiveness, of constructiveness, of covetiveness, of secretiveness, of self-esteem, of love, of approbation, of cautiousness, of benevolence, of veneration, of hope, of ideality, of conscientiousness, of firmness, of individuality, of form, of size, of weight and momenta, of colouring, of locality, of order, of time, of number, of tune, of language, of comparison, of causality, of wit, and of imitation. *

For an account of the situations of these various organs, I refer to the plates published by Doctors Gall and Spurzheim; and for the illustration of their doctrines relative to these organs in particular, reference may be made to their various works, especially to the publication of Spurzheim in 1815.

The doctrines of Gall and Spurzheim have been very differently estimated by different physiologists; some speaking of

* Of these the organs of size, weight and momenta, of order, and time, are given with some degree of diffidence by Spurzheim.

them in terms of high commendation, others treating them with great contempt. Their mode of dissecting the brain, however, seems to have been pretty generally approved. Dr. Leach, in a letter to Mr. Forster, says, "What Dr. Spurzheim has asserted respecting the structure of the brain, is perfectly correct, and this structure may be seen by any anatomist who may be disposed patiently to examine that organ after the mode directed by Dr. Spurzheim." * The commissioners of the French Institute, appointed to examine the memoir of Dr. Gall on this subject, allow that these anatomists have pointed out new methods of dissecting the brain, new connections and directions perceived between the different masses, and the organic elements which compose them, and new peculiarities in some of their parts.

Those who have studied the *pneumatology* of Gall and Spurzheim, give very different opinions respecting it; a few admiring and wholly receiving their doctrine, some admitting them in part, and others rejecting them as unfounded, ridiculous, and

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* Forster, p. 122.

extravagant. Dr. Leach says, "respecting the indications of the propensities and faculties, named organs by Drs. Gall and Spurzheim, I am of opinion, that certain manifestations are satisfactorily proved to exist, that others are rendered probable, and that the remainder are extremely fanciful, not being in any manner supported by evidence. I believe that a developement of the crown of the head is a certain indication of moral feelings, that a developement of the upper part of the forehead indicates a reflecting mind, whilst a developement of the lower part, manifests a disposition to acquire knowledge, and that a developement of the whole forehead, (as every one must have observed) indicates a strength of the intellectual faculties in general." Mr. Abernethy, speaking of Drs. Gall and Spurzheim, says, "The speculations of these gentlemen appear to me very ingenious, and calculated to unravel some of the intricacies of the human character, as well as to establish a just distinction between the faculties of brute animals and those of man." And again, "There is nothing in the assertions of Gall and Spurzheim, contradictory to the

results of general observation and experience." * On the other hand, the writer of a critique on their system in the Quarterly Review, speaks of it as being quite unworthy the attention of persons of sense and discernment. He says, "but for the disgraceful circumstances that there are some even of the faculty in this country, who profess the faith of this New Jerusalem in philosophy, we should certainly owe some apology to the more sensible part of our readers, for having so long detained their attention upon a book so utterly unworthy of their notice." And again, speaking of Spurzheim, he says, "we take him to be a simple good natured man, and as he is clearly gifted with no greater share of sense than we should suppose indispensable for the common purposes of life, we make no doubt that he devotedly believes in all the amazing absurdities which he preaches." †

This criticism, as applied to the whole of the system of Gall and Spurzheim, will by many be thought too severe. The found-

* Ab. Lect. ii. p. 91, 92.

† Quarterly Review, vol. xiii. p. 178.

ation of their doctrines may, perhaps, without absurdity, be admitted. The doctrine which teaches that the different faculties and propensities of the mind are referable to different parts of the brain, seems to be as respectable as that which assigns to the soul a local habitation, and places all its powers in some one particular part of that organ. That the faculties and propensities of the mind may be in some degree known by viewing the form of some parts of the head, particularly of the forehead, is a very general opinion. Almost all persons are, in a greater or less degree, craniologists or physiognomists, and form judgments respecting the characters of those around them, from craniological or physiognomonical observations. If, however, we admit that there is a foundation in nature for these doctrines, I think it must also be admitted that they have been carried to an extravagant length, particularly by Gall. Of this, indeed, Spurzheim is aware; speaking of inhabitiveness, he says, " Dr. Gall observed in animals which have a great propensity to elevated situations, as in the chamois and wild goat, a protuberance, which he identi-

fies with the organ that in mankind produces pride and haughtiness. I think that the instinct to assume physical height, and the sentiment of self-love, cannot be ascribed to the same organ." And again, "It seems to me impossible to confound the instinct of physical height with the moral sentiment of self-love and pride." Spurzheim thinks that Gall has gone too far; and the generality of physiologists think that Spurzheim himself has gone too far. The doctrines of Gall and Spurzheim appear to me to have been injured by their own enthusiasm and that of their disciples, and by the circumstance that the craniologists are by no means agreed among themselves, either as to the number or the locality of the organs of the manifestations of the mind.

The anatomists and physiologists who have principally distinguished themselves in the investigation of the nervous system, so far as relates to its minute and ultimate structure, are Ruysch, Leeuwenhoek, Haller, De la Torre, Prochaska, Fontana, Reil, Monro, and Home. These ingenious and accurate enquirers have taken great pains on this subject; but, though assisted by the

most powerful instruments, their observations do not agree, and have led to very different conclusions.

Ruysch and Leeuwenhoek maintain, that the matter of the brain, spinal marrow, and nerves, is vascular, and to this opinion Haller subscribes; but Albinus denies that the medulla is vascular, or at least that it can be ascertained to be so, either by the microscope or by injection.

De la Torre asserts, that the cerebrum, cerebellum, medulla spinalis, and the medullary part of the nerves, consist of a mass of innumerable transparent globules swimming in a diaphanous fluid.

Prochaska, a professor of anatomy at Prague, maintains that the substance of the brain, both cortical and medullary, is formed of innumerable globules, united by a transparent elastic cellular membrane, disposed in right lines, and appearing like a longitudinal fibrous structure. *

Monro asserts that the brain and nerves are composed of convoluted fibres, and that the real diameter of an object of the ap-

* Structura nervorum. Vind. 1779.

parent size of these convoluted fibres would be nearly equal to the 1-9000th part of an inch. He adds, however, that on extending his observations to the vegetable and mineral kingdoms, and sifting and more coolly considering every circumstance, he suspected some optical deception.

Fontana informs us that after many useless attempts to ascertain the primitive structure of the nerves, he at length succeeded in finding "many very small cylinders, more or less transparent, seemingly composed of a pellicle, and partly filled with a transparent gelatinous humour, and with small unequal globules;" these cylinders he calls primitive nervous cylinders, and they are covered with another substance, the nature of which is perhaps cellular. "I have very often seen," says Mr. Fontana, "these two parts that compose the primitive nervous cylinder *, the ex-

* Some experiments of Reil seem to strengthen the observations of Fontana. Reil thinks that he has actually decomposed the primitive nervous cylinder, and affirms that the external cellular covering appears to be soluble in the mineral acids, and the medullary pulp of the nerves in alkalis. *Reil, Exercit. Anat.*

terior one unequal and rugged, the other a cylinder, which seems formed of a particular transparent and homogeneous membrane, that appears to be filled with a gelatinous consistent humour. A very great number of transparent cylinders form together an almost invisible nerve, presenting the exterior of white bands, and several of these nerves united form the larger nerves seen in animals."

With respect to the medullary substance of the brain, he says: "I have assured myself that it is not a simple collection of venous and arterial vessels; that it is not simply formed of spheroidal globules or corpuscles; but that it is an organized particular substance, composed of irregular cylinders, or transparent canals, which fold as the intestines do."*

Sir E. Home, on examining transparent sections of the optic nerves of a horse, says: "It was evidently composed of two parts; one opake, the other transparent. When the opake parts were attentively examined

* Skinner's Translation of Fontana on Poisons, vol. ii. p. 245.

in a favourable light, and the nerve was in a recent state, they were found to be made up of a great number of smaller portions, each of which appeared to be also opake. In order to determine whether the nerve had the same structure in its whole course, transverse sections of it were examined in different parts of the nerve; near the brain, towards the middle, and near the eye." — "From this experiment, says Sir Everard, the internal structure of the optic nerve appears to be made up in the following manner: At its origin from the brain it consists of thirty or forty fasciculi, or bundles of extremely small opake pulpy fibres, the interstices between which are filled with a transparent jelly. As the nerve goes further from the brain, the fasciculi form smaller ones of different sizes. Similar experiments were made on other nerves, with a similar result." Sir Everard asserts, "that the nerves do not consist of tubes conveying a fluid, but of fibres of a peculiar kind, different from every thing else in the body with which we are acquainted." *

* Philosophical Transactions, vol. lxxxix. p. 1.

Chemistry throws no light upon this subject. Dumas, from Fourcroy, says, the matter of the brain submitted to analytical processes, gives first a clear water, and afterwards a gelatinous matter. The residuum is salino-terreous, from which may be extracted phosphates of lime, ammonia, and soda. Distillation disengages from the substance of the brain several kinds of gas, the nature of which has not been determined by chemists. *

But physiologists have not confined their attention to the consideration of the structure, distribution, and relative power of the different parts of the nervous system ; they have entered into deeper speculations, and have hazarded conjectures concerning the immediate nature and uses of this system, its connection with the thinking principle, the nature of this principle, its seat, and the mode of its action through the brain and nerves, in the production of sensation and motion.

The ancients, with the exception of Socrates and Plato, seem to have been very

* Dumas, Principes de Physiologie, p. 204.

generally of opinion, that the thinking principle is a modification of matter of a very subtile nature. They have compared it to air, vapour, light, and fire. Aristotle, in his first book, De Anima, gives us the sentiments on this subject of several philosophers, whom he calls the ancients. Democritus, he observes, affirms that the soul is a sort of fire and heat.* It has been thought to be fire, Aristotle says, because fire is the most subtile, most moveable, and most moving of all the elements. Some of the Pythagoreans maintain that the soul is light, or lucid particles floating in the air.† Diogenes pronounces it to be air; that being of all things most subtile, and most moveable. Anaxagoras believes that it is the principle of motion. Thales says, that it is something most apt to move, and that the stone which moves iron has a

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* Πῦρ τι καὶ θερμὸν.

† Ἔφασαν γὰρ τινὲς αὐτῶν ψυχὴν εἶναι τὰ ἐν τῷ ἀέρι ξύσματα. By the word ξύσματα, Aristotle probably means lucid particles; for in another passage he speaks of ξύσματα ἃ φαίνεται ἐν ταῖς διὰ τῶν θυρίδων ἀκτῖσιν.

De Anima, l. i. c. 2.

soul.* Aristotle mentions several other opinions of the ancients on this subject, some of which he opposes: thus he maintains that the soul is neither motion, nor number, nor harmony, nor a composition of various elements; but although he has employed two chapters in endeavouring to give a definition of the soul, it is not easy to ascertain his opinion. The soul is not body, he says, but it is something belonging to body; it is that by which we live, and perceive, and understand.† Plato, who speaks the sentiments of Socrates, asserts that the soul is something entirely distinct from the body; that it is placed in the highest part of the body, and leads to heavenly contemplation; that it was created before the body, and will live after it; that it is invisible, indestructible, and consequently immortal.‡ Socrates is repre-

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* Εἴπερ τὸν λίθον ἔφη ψυχὴν ἔχειν ὅτι τὸν σίδηρον κινεῖ.

De An. l. i. c. 2.

† Σῶμα μὲν γὰρ οὐκ ἔξι, σώματος δὲ τι ἡ ψυχὴ δὲ τοῦτο ᾧ ζῶμεν, καὶ αἰσθανόμεθα καὶ διανοούμεθα πρώτως.

De An. l. ii. c. 2.

‡ Plat. Tim. p. 44., and Phæd. p. 73.

sented as saying, in his last conversation, that the souls of the just, on leaving the body, will be freed from all error, ignorance, fear, wild passion, and other human ills, and will be admitted into a holy place, and into the presence of a just and wise Divinity.* Hippocrates speaks of the soul as a vapour, or composition of fire and water†; yet in his book, De Insomniis, he considers it as something distinct from the body; for, he says, the soul is in motion while the body is at rest. Epicurus, who lived about three hundred and forty years before Christ, maintained the doctrine of the materiality of the soul, which was, he thought, a substance of a most subtile nature. "The mind," says Mr. Good, "was supposed by Epicurus to be the result of a combination of the most volatile and etherial auras or gases, diffused over the whole body, though traced in a more concentrate form in some organs than in others. Nor

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* Παρὰ τὸν ἀγαθὸν καὶ φρόνιμον θεὸν. *Phæd.* p. 80.

† Ἡ δὲ ψυχὴ τοῦ ἀνθρώπου σύγκρησιν ἔχουσα πυρὸς καὶ ὕδατος. *Hip. de Diæta*, p. 380.

could any conception be more correct or happy: it is the very philosophy of the present day, boldly predicted and accurately ascertained." * Mr. Good points out a strong resemblance between the aerial gases of the Epicureans and those of modern chemists, without meaning, however, to detract from the claims of later periods. "It is sufficient," he says, "to have proved that Epicurus and his followers contended for the existence of gases, most singularly similar to the caloric, the oxygen, the Galvanic aura of the present day." †

Lucretius, who lived about 250 years after Epicurus, has adopted and most eloquently illustrated, the doctrines of that celebrated philosopher concerning the nature of the soul, which he supposes to consist of the same principles as the ‡ life, and to be as completely material as any

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* Good's Lucretius, Introd. p. lxxxviii.

† Good, vol. i. p. 413.

‡ Hæc eadem ratio naturam animi, et animai,
Corpoream docet esse. *Good's Lucr.* vol. i. p. 400.

other part of the human frame.* "Lucretius," says Mr. Good, "who has endeavoured to demonstrate

> That all the sentient forms the sight surveys,
> Whate'er their powers, from senseless atoms spring,

now enters upon the great business of applying this axiom to the peculiar constitution of man; hereby maintaining that the human soul, or principle of vitality and thought, is as purely material, as essentially derived from simple primordial corpuscles, as any other part of him. This he undertakes to prove in a series of twenty-eight arguments."† "The sentient principle, upon the Epicurean hypothesis," Mr. Good remarks, "is a system or combination of gases, communicated to the lungs and heart from the air of the atmosphere, in the act of respiration; and either secerned or separated by the oper-

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* Primum, animum dico, mentem quem sæpe vocamus
In quo consilium vitæ, regimenque, locatum est,
Esse hominis partem nihilo minus, ac manus, et pes,
Atque oculei, partes animantis totius exstant.
Ibid. vol. i. p. 392.

† Good, vol. i. p. 388.

ation of these organs. Of these various gases, our poet enumerates four—heat, air, and vapour, and a substance so recondite in its nature, and so fugitive in its action, as totally to elude all power of visual detection, and hence to have had no specific name appropriated to it; but whose existence, he tells us, is as certain, from the effects it is traced to exhibit, as that of any other gas or aura whatever." * I pretend not to affirm what was the immediate aura understood by Lucretius, as the fourth and most important substance in the composition of the animal spirit; and which, he tells us, was so recondite as to be incapable of being traced otherwise than by its effects. To the oxygenous and the Galvanic gas, it has an equal and an astonishingly striking resemblance. If we suppose that he intended something like the former, although he has not given it its modern name, he has described the very thing itself, endowed it with its characteristic properties, asserted its entire supremacy, and established it in

* Good, vol. i. p. 409.

its immediate seat of empire, the heart and lungs. He has given us indeed, whether we allow this to be a fact or not, as complete a statement of the gases of which the animal breath or spirit consists, as if he had lived in the present day." * Mr. Good makes a very ingenious comparison between the analysis of respirable air of Lavoisier and that of Lucretius, and points out very clearly a striking resemblance between them. †

Galen plainly confesses that he is in a state of doubt upon this subject. ‡ Sometimes he calls the soul a principle §, sometimes a body ‖, sometimes an essence. ¶

These notions of the ancients respecting the nature of the soul, particularly that of

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* Good, vol. i. p. 411. † Ibid.

‡ Ἥτις ποτ' ἂν ἡ κατὰ τὴν οὐσιαν.
De Hip. et Plat. Plac. l. vii. c. 3.

§ Ἀρχὴ. ‖ Σῶμα. ¶ Οὐσία.

On this subject M. Le Clerc, in his Histoire de la Médecine, refers to a passage in Galen, which he thus translates: "Qui n'a rien de commun avec le corps;" from which he infers that Galen believed in the immateriality of the soul. This passage I have not been able to find.

its being a material substance of extreme tenuity, analogous to light, fire, vapour, &c. seem to have been very generally received, from the time of Galen to that of Descartes, who flourished in the beginning of the seventeenth century. He made a distinction between matter and mind. "Descartes," says Dr. Reid, "must be allowed the honour of being the first * who drew a distinct line between the material and intellectual world, which, in the old systems, were so blended together, that it was impossible to say where the one ends, and the other begins. In the world of Descartes, we meet with two kinds of beings only, to wit, body and mind; the first, the object of our senses, the other of consciousness; both of them things of which we have a distinct apprehension, if the human mind be capable of distinct apprehension at all. To the first, no qualities are ascribed but extension, figure, and motion; to the last, nothing but thought, and its various modifications, of

* Perhaps this honour is more justly due to Socrates or Plato.

which we are conscious. He could observe no common attribute, no resembling feature in the attributes of body and mind, and therefore concluded them to be distinct substances, and totally of a different nature; and that body, from its very nature, is inanimate and inert, incapable of any kind of thought or sensation, or of producing any change or alteration in itself."

Descartes, in his second meditation, says, that, on contemplating his own frame, he perceived that he had a face, hands, arms, and a whole machinery of parts, like what may be seen in a dead body, and also that he had a power of moving, feeling, and thinking, which actions he referred to what he called the soul; but what this soul might be, he at first had not accurately considered, or had imagined it to be something, he knew not what, extremely subtile, like wind, or fire, or æther, infused into the grosser parts of his frame.* On mature reflection, he

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* Sed quid esset hæc anima vel non advertebam, vel exiguum nescio quid instar venti vel ignis vel ætheris, quod crassioribus mei partibus esset infusum.

Med. ii. p. 10.

convinced himself that he was something more than a *compages membrorum*, that he was *res cogitans*, and that thought, the essence of his existence, differs entirely from matter, to which, however, it is so closely bound, and with which it is so intimately mixed, as to form one composition.

The sentiments of Descartes on this subject were very generally adopted, although his followers differed in some respects from each other; and they have almost universally prevailed down to the present time, insomuch that to doubt the distinction between matter and mind, seems by many to have been considered as bordering on impiety. Some modern philosophers, however, at the head of whom we may place Dr. Priestley, have ventured to call in question the generally received opinion of Descartes, and to have revived the ancient doctrine of the materiality of the soul. Dr. Priestley, in his Introduction to Hartley's Theory of the Human Mind, on the principle of association, says: "I am rather inclined to think, though the subject is beyond our comprehension at present, that man does not consist of two principles, so

essentially different from one another as matter and spirit. I rather think that the whole man is of some uniform composition, and that the property of perception, as well as the other powers that are termed mental, is the result, whether necessary or not, of such an organical structure as that of the brain."

Mr. Good conceives that there is no physical or metaphysical inconsistency in supposing that matter itself, in its most elaborate state of tenuity and activity, may be made capable of evincing all the powers which are ordinarily ascribed to the human mind or spirit; to be capable of separating, at death, from the grosser and corruptible matter of the body, and of maintaining a distinct and spiritualised or etherialised existence; the power that is capable of giving personality and consciousness to matter, in its denser and more embodied form, being equally able, without a doubt, to bestow the same qualities on matter in its most attenuate and evanescent state. This opinion, however, Mr. Good says, " I offer as a speculation to be pursued, rather than as a doctrine to be pre-

cipitately accredited. Yet its tendency is by no means idle or unimportant; since, if capable of establishment, it will, in a considerable degree, remove the objections which attach to the common systems of materialism, elucidate the Mosaic account of the first formation of the soul from a divine *breath* or *aura* infused into the body, and give stability to universal tradition, by developing the nature of that evanescent shadowy texture under which, among all nations, the soul has ever been supposed to exist." *

Dr. Priestley's doctrine is supported by Mr. Cooper and a few others; and opposed by Dr. Price, Professor Stewart, Mr. Drummond, &c. † Mr. Drummond thus expresses himself upon the subject: "We may imagine matter as much refined from matter as we will, and we may fatigue fancy

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* Good's Lucretius, Life, p. xc.

† For an account of this controversy, *vide* Priestley's Introduction to Hartley's Theory; Priestley's Disquisitions on Matter and Spirit; Essays Philosophical, Historical, and Literary, vol. ii.; Price's Correspondence with Priestley; and Cooper's Tracts, Ethical, Theological, and Political, vol. i.

in describing its tenuity, but we shall find it, under all its forms, equally incapable of thought and intelligence. To suppose mental perception to be the result of material mechanism, is, indeed, a bungling artifice of shallow philosophy. There is no resemblance between an idea and any thing which may belong to body, between active intellect and inert matter, between the mind which thinks and the organ which is said to receive and convey sensation." *

Physiologists have differed much in opinion respecting the seat of the soul. Some, with Chrysippus † and ‡ Laurentius,

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* Drummond's Academical Questions, vol. i. p. 287. The arguments for the doctrine of the materiality of the soul are given at great length by Lucretius. Reference may be made to his third book, De Rerum Natura, and the learned notes of my friend Mr. Good, which accompany his translation of that work. Mr. Lawrence has lately collected and urged, with considerable power of language, the principal arguments in favour of this doctrine. See his Lectures on Physiology, Zoology, and the Natural History of Man.

† Chrysippus says: ἡ ψυχὴ πνεῦμά ἐϛι σύμφυτον ἡμῖν συνεχὲς παντὶ τῷ σώματι.

Galen de Hip. et Plat. Plac. lib. iii. c. 1.

‡ Laurentius, speaking of the soul, says: "At hæc tota est in toto, et tota in qualibet corporis particula."

Laurent. lib. i. c. 1.

maintain that the soul is diffused through all parts of the body; but the prevailing notion seems at all times to have been, that the thinking, willing principle is seated in the brain, either generally in its whole organized substance, or in some particular part.—Galen says, from what we have observed it seems consonant to reason to place the soul in the body of the brain.* He also observes that the will, placed in the brain at the origin of the nerves, gives the beginning of motion to the first nerves, and by them to the muscles.† Descartes places the soul on the pineal gland, La Peyronie in the corpus callosum, Richeraud in the annular protuberance, Willis in the corpora striata, Sœmerring in the water of the ventricles, and Digby in the septum lucidum. Sir Isaac Newton and Mr. Locke consider the soul as

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* Την μεν ψυχὴν αὐτὴν ἐν τῷ σώματι τοῦ ἐγκεφάλου κατῳκῆσθαι. *Gal. de Loc. Aff.* lib. iii. c. 9.

† Ἡ κατὰ τὴν ἀρχὴν των νευρων ἐν ἐγκεφάλῳ τεταγμένη προάιρεσις, ἀρχὴν κινήσεως πρωτοις μὲν τοῖς νέυροις, δι' αὐτων δὲ καὶ τοῖς μυσὶν δίδωσιν. *Ibid.* lib. iii. c. 8.

seated in that part of the brain where the nerves were supposed chiefly to meet, and which was thence called sensorium commune. * Haller says that neither the corpus callosum, nor the septum lucidum, nor the pineal gland, nor the corpora striata, nor any other particular part of the brain, can be admitted to be the seat of the soul. He seems to place it in the whole of the medulla of the brain and cerebellum; for, he says, the medulla is the seat of sense, and generates the cause of muscular motion. † Marherr, in his Prælectiones, says, that we cannot, with any show of probability, assign any particular part of the brain as the seat of the soul; but if he were to conjecture on the subject, he would place the soul in that part from which all voluntary motions arise, and in which all sensation terminates. He thinks that it is

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* "Is not the sensorium of animals," says Newton, "the place where the sentient substance is present, and to which the sensible species of things are brought through the nerves and brain, that they may be perceived by the mind present in that place."

† Haller, Elem. Phys. vol. iv. lib. x. sect. 23.

diffused through the brain, the cerebellum, and the medulla spinalis. *

The nature of the medium through which the mind acts and is acted upon, in sensation and voluntary motion, has also been a subject of much speculation. By many, the nerves are supposed to be hollow tubes, through which a subtile fluid passes with inconceivable velocity from the brain to the muscles, for the purpose of voluntary motion; and from the sentient extremities to the brain for sensation: by others, sensation and motion are referred to vibrations in the brain and nerves, either directly or by means of an elastic æther; and some have considered the nervous power as something analogous to Galvanism, or some other modification of electricity. The first of these opinions has at all times been the most prevalent. It was the opinion of Galen and his followers, of Descartes, Hal-

* Erit ergo animæ sedes et per cerebrum diffusa et per cerebellum et per ipsam denique medullam spinalem, ubicunque nimirum stamina medullaria principium sumunt. *Marherr, Prelect.* vol. ii. p. 383.

ler, Boerhaave, Sauvages*, Marherr, Monro, Richerand, and many other celebrated physiologists. "Descartes," says Dr. † Reid, "has shown how, by the animal spirits going and returning in the nerves, muscular motion, perception, memory, and imagination are effected. All this he has described as distinctly as if he had been an eye-witness of all these operations. But it happens that the tubular structure of the nerves was never perceived by the human eye, nor shown by the nicest injections; and all that has been said about animal spirits, through more than fifteen centuries, is mere conjecture." Monro and Marherr, however, speak with particular confidence on this subject. Monro says, "The existence of a liquid in the cavities of the nerves is supported by little short of demonstrative evidence." ‡ Marherr observes: "Some anatomists have positively denied that the

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* "Præpeditus itaque transitus, id est, influxus, vel refluxus fluidi nervei ab animæ sede ad organum, et reciprocè ab organo ad sedem animæ, est conditio," &c.

† Reid's Essays, p. 82.

‡ Observations of Monro, in Cheselden's Anatomy.

nerves are hollow tubes, because they could not, by the most minute examination, discover their cavities." This reasoning he is not disposed to admit. "It does not follow, he says, that what is imperceptible to our senses does not exist. It is unworthy of a philosopher to deny the existence of those things which his senses do not comprehend, if reason implies the necessity of their existence."* Sir Everard Home, however, is persuaded that the nerves do not consist of tubes conveying a fluid, but of fibres of a peculiar kind. M. Le Gallois is of opinion, that through the whole extent of the nerves there is a secretion analogous to that which takes place in the brain and spinal marrow, by which the action of the nervous power is transmitted to the parts to which the nerves are distributed. The re-

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* Non enim sequitur id non existere quod sensibus nostris perceptibile non est. Indignum est philosopho earum rerum existentiam negare, quas sensibus comprehendere non potest, si tamen ratio firma necessariam illarum existentiam evincat.

Marherr, Prelect. vol. ii. p. 383.

searches of MM. Reil and Prochaska*, he says, render this opinion very probable; and M. Nysten has shown, that in the most complete palsies irritability is preserved in the limbs which are paralyzed, just as well as in those that are not paralyzed. This opinion of M. Gallois is confirmed by an experiment made by himself, which he relates in the thirteenth page of the introduction to his work. "It appears, then," says M. Le Gallois, "that through the whole extent of the nerves there is a secretion of a particular principle, which, once produced, subsists by itself after the entire cessation of circulation, just as in the brain and spinal marrow, but for a longer time." M. Le Gallois had been of opinion, that it is by the intermediation of this principle of the nerves that the brain and spinal marrow exercise their action upon the different parts

* Prochaska thinks that the nervous power is generated throughout the whole extent of the nervous system, even in the smallest nerves; and that it can exist for a certain time in the nerves of any part independently of the brain. *Script. Neur. Min. Select. Ludwig.* lib. iii. p. 4.

of the body, not by the translation of their own principle, but by a sort of agitation of the principle of the nerves, very nearly in the same manner as sound is transmitted by the air. With a view to verify this opinion, he made some experiments; but although he did not succeed in them, he says that he does not yet entirely renounce his conjecture. Mr. J. Hunter says, "Nothing material is conveyed from the brain by the nerves, nor *vice versa* from the body to the brain; for if that was exactly the case, it would not be necessary for the nerves to be of the same materials with the brain; but as we find the nerves of the same materials, it is a presumptive proof that they only continue the same action which they receive at either end." *

That sensation and motion depend upon vibrations of the medullary substance of the brain and nerves, either directly or through the medium of an elastic æther, was the opinion of Stahl, Sir Isaac Newton, Hartley, and some others; but this doctrine has been very generally opposed, particularly

* Hunter on the Blood, &c. vol. i. p. 156.

by Stewart, Reid, and Drummond. "How can we expect," says Dr. Reid, "any proof of the connection between vibration and thought, when the existence of such vibrations was never proved. We have five senses, whose sensations differ totally in kind. By each of these, excepting, perhaps, that of hearing, we have a variety of sensations which differ specifically, and not in degree only. How shall we find varieties in vibrations, corresponding to all this variety of sensations which we have by our five senses only." * The doctrine of vibrations is ridiculed by Mr. Drummond in the following terms: — "Is it possible to avoid smiling, when we read the history of vibrations, and the genealogy of ideas, as they are stated in the solemn and positive language of Hartley? It is pleasant to be told, in the concise style of Euclid, that natural vibrations are begotten by certain full-blooded arteries upon the medullary substance; that external objects, also, impress this same susceptible substance, and are the fathers of preternatural vibrations;

* Reid, Essay ii. chap. 3.

that a commerce ensues between natural and preternatural vibrations, whence springs a numerous progeny of vibratiuncles," &c. *

Dr. Young has attempted to illustrate the opinions of Newton respecting the vibrations of the nerves, in his Natural Philosophy †, by the analogy of certain electrical and optical phenomena, which prove the perfect possibility of the conjecture, as far as the mechanical conditions of the nerves are concerned; and in his Medical Literature ‡, he has examined the nature of sensation somewhat more particularly, observing, " that although it may be probable that sensation in general may be transmitted by means of regular vibrations, yet that there seems to be an arrangement, both in the eye and the ear, for dispensing the mind from the necessity of any thing like a numerical estimate of the frequency of these vibrations, and for confining those of a similar nature to a single nervous filament: and he thinks it necessary, from certain op-

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* Drummond's Acad. Questions, vol. i. p. 294.

† Vol. i. p. 740. ‡ P. 98, 99.

tical phenomena, to attribute to every sentient point of the retina three such filaments; and from considering the structure of the ear, to suppose a number of filaments, almost unlimited, to belong to the different parts of the semicircular canals, and the cochlea of the internal ear as a single system."

That nervous influence may depend on Galvanism, or some other modification of electricity, has been lately, with several physiologists, a favourite hypothesis. The subtilty of the Galvanic power, the velocity of its motion, its action on muscles through the nerves, and the means of diminishing, extinguishing *, and renewing the susceptibility of animals to its influence, are circumstances alleged in support of this doctrine. Professor Aldini, from his experiments, infers that a peculiar etherial fluid is continually generated in the animal

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* Both the Galvanic and nervous power are destroyed by an exposure to sulphuretted hydrogen gas, carbonic vapours, &c. See Account of Experiments on Galvanism, in the Supplement to the Encyclopædia Britannica, vol. i. p. 681.

economy; that it is connected with the functions of life; and that as there is a metallic pile, composed of metals and fluids, so there is also an animal pile, consisting of living animal substances. Dr. Valli remarks, that substances which conduct electricity, are likewise conductors of the nervous fluid; and substances which are not conductors of electricity, are not conductors of the nervous fluid. Pfaff, in his dissertation concerning animal electricity, mentions a very curious fact, if indeed it be a fact, viz. that the muscles of involuntary motion cannot be affected by Galvanism.

In confirmation of the supposed analogy, or, according to some, identity, of the nervous power and Galvanic or electric power, the well-known influence of the torpedo, gymnotus electricus, and other electrical animals, has been adduced. These animals can at pleasure give a shock, very much, if not entirely, like that of electricity; and the apparatus by which this is effected appears to be nervous. Mr. Good says, "the torpedo is endued with organs which have a close resemblance to the Voltaic pile, and if this structure be injured by the division

to hob certain experiments by Edwards, just on division of par vagum there dealt on this?

of its nerves, the torpefying effect is lost. The Galvanic and electric auras appear to be the same; at least the difference is so minute as to elude all detection." *

Mr. Good, after adverting to the opinion that oxygen may be the cause of fibrous irritability, and observing that it was never conceived altogether competent to the production of muscular motion and sensation, says: "Hence other gases have alternately been glanced at, as affording the chief forms of this recondite and attenuate power. Electricity has been principally studied with this express view; and the study has, at length, been crowned with a success, which, though by no means perfect, opens to us, perhaps, the way to perfection. In consequence of the experiments of Cotugno, Vassali-Eandi, Galvani, Volta, and many other celebrated philosophers, it has ultimately been demonstrated that animals are capable of generating or exciting an electric aura in their own bodies, as well as of receiving it from without; that this electric

* Good's Lucretius, vol. i. p. 119.

aura is possessed of all, or nearly all, the properties of common or metallic electricity.* The mode by which the body, or rather the nerves, become possessed of this mysterious and truly spiritual aura, is still doubtful. That it is rather received from the surrounding atmosphere than communicated by our food, is, I believe, generally admitted; and hence, like caloric and oxygen, it commonly enters into the system in the act of respiration, and forms a constituent part of the calor ventusque vitalis of the poet.† Fishes, he adds, absorb atmospheric air in general, not by the lungs, for they have none, but by gills, which answer their purpose; and several of them, as the torpedo, gymnotus electricus, and silurus, secern the Galvanic aura, of which it contains the basis, not by the brain, but by an organ which enables them to secern it in a much larger quantity, and at will; an organ which is a natural Voltaic pile, and like the Voltaic pile, enables them to communicate it, in an aggregate state, to other

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* Good, vol. i. p. 412. † Lucretius.

animals, upon contact, in the mode of sensible and often very severe shocks." *

Speaking of the Galvanic and electric auras, which he considers as the same, Mr. Good says: "It is almost reduced to a certainty, that this common aura constitutes the nervous fluid; and, in man, at least, it should seem therefore to be secreted from the brain, and hence diffused over the body by the course of the nerves." †

Dr. Wilson Philip is of opinion, that the nervous and Galvanic influence are the same, and endeavours to prove their identity by several experiments, the first of which he thus describes: "The hair was shaved off the stomach of a young rabbit, and a shilling bound on it. The eighth pair of nerves were then divided, and about a quarter of an inch of the lower part of each coated with tin foil. The tin foil and shilling were connected with the opposite ends of a Galvanic trough, containing fifty-two four-inch plates of zinc and copper, the intervals being filled with muriatic acid

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* Good, vol. i. p. 413. † Ibid. p. 119.

and water, in the proportion of one of acid to seven of water. The Galvanic influence produced strong contraction of the muscles, particularly of the fore-limbs. For five hours the animal continued quite free from the symptoms which follow the division of the eighth pair of nerves in rabbits. It had neither vomited, nor been distressed with dyspnœa." * Dr. Philip shows, that as the power of the trough became weaker, the effect on the muscles was less, and respiration became gradually exceedingly disordered; but on the renewal of the Galvanic process, the power of respiration returned. The animal died in six hours after the division of the nerves. On examining the stomach, it was not found larger than usual, and the digestion seemed to be nearly as perfect as it would have been in the same time in a healthy rabbit. After relating several other experiments, he says, " We here see the influence of the brain removed, that of a Galvanic trough substituted in its place, and the result the same as if the

* Philip, p. 127. first edition.

influence of the brain had still * continued. We have reason to believe that the nervous influence is the Galvanic fluid, collected by the brain and spinal marrow, and sent along the nerves; Galvanism being, not only, of all artificial means of exciting the muscles, that which seems best adapted to this purpose, but capable of both forming the secreted fluids, and causing an evolution of caloric from the blood, after the nervous influence is withdrawn. †

Is it possible to explain, says Dr. Philip, the result of these experiments, without admitting the identity of the nervous fluid and Galvanism? We must either admit this, or that there is another power capable of performing the most characteristic and complicated functions of the nervous system."

Without giving an opinion upon the question, I wish to remark that the inferences from Dr. Philip's experiments are not correct, unless we admit that the power of secretion is dependent upon the nervous

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* Philip, p. 132. old edit. † Ibid. p. 255. old edit.

system; a doctrine which Dr. Phillips maintains, but which is denied by Mr. Brodie and some other eminent physiologists.

With a view of investigating the accuracy of Dr. Phillip's experiments, and the conclusions which he draws from them, the following experiments were made at the request of some of the members of the Royal Society.

Experiment I. — Two rabbits which had had no food for seventeen hours, were allowed to eat as much parsley as they chose; the nerves of the par vagum were then divided at the neck of both the rabbits. One of the rabbits was subjected to the influence of a Voltaic battery, and the process was continued for five hours; the other rabbit was allowed to remain quiet. At the end of five hours the two rabbits were killed, and on examining the stomach of both, the appearances were exactly alike, except that the contraction of the centre was somewhat greater in the galvanised stomach than the other.

Experiment II. — In a young cat, the termination of the nerves of the eighth pair on the cardia of the stomach were

carefully divided, the animal was perfectly well afterwards, was lively, ate its food as usual, and the respiration was not affected. At the end of a week, and three hours after having been fed with meat, the cat was killed. On dissection, digestion was found to be going on as usual, the food in the stomach was in a great measure dissolved, and the thoracic duct and the lacteals were distended with chyle, having the ordinary appearance. The nerves were carefully traced, and it was ascertained that not the smallest filament had been left undivided. This experiment was repeated with exactly the same results.

These experiments, the editor of the Quarterly Journal observes, "appear to set the inquiry at rest, and to disprove the experiments made by Dr. W. Phillip." *

Mr. Brodie informs me that he has made a great number of experiments on the influence of the nervous system on the functions of other organs, more especially on secretion; the result of which has been

* Quarterly Journal.

× did not subsequent experiments prove that no abnormal effect followed unless the divided edges were separated to some distance? Vide Bostocks Physiology. Vol. II.

that the influence of the brain and spinal marrow is not necessary to secretion generally, although particular secretions are in some degree subject to it. He has found that the nerves of the par vagum are by no means necessary to digestion, which will go on as well without as with them, provided that the division of them be made in such a manner as not to affect respiration, and the free oxygenation of the blood.

The editor of the Quarterly Journal says, that "one of the gentlemen employed in making the experiments above mentioned, started many objections to dividing the par vagum in the neck. He stated that if the nerves of the eighth pair be divided in the neck, the digestion of the animal is impaired; but this affords no satisfactory proof of these nerves exercising a direct influence over the functions of the stomach, since these functions may be affected in consequence of the disturbed state of the respiration this injury occasions, and of the imperfect alteration of the blood in the lungs."

In the experiment last related, the nerves were divided below the origin of the

branches which are distributed to the lungs, and his success was complete.

Mr. Brodie, in his inquiries respecting the influence which the nervous system exercises over the process of secretion, experienced considerable difficulty: he says, "From the circumstance that the glandular organs are so constituted that it is almost impossible to divide all the nervous branches going to any one of them, so completely as to make it the subject of a satisfactory experiment. But growth, suppuration, and the healing of wounds must be referred to the same class of functions with the secretions of the glands, and observations on the former may be made with more facility than on the latter."

"In one of my experiments I divided and removed about a quarter of an inch of the anterior and posterior crural and sciatic nerves of a dog, in the upper part of the thigh: the limb, of course, became immediately benumbed and paralysed. A wound was then made in the leg, and the claws of all the feet were cut so as to make them of the same length. The wounds suppurated and healed as readily as if the nerves had

× Some minute physiologists attribute secretion not to the Cerebro Spinal but to the Organic System. Inflammation may be produced readily when Cerebro Spinal influence is destroyed.

been entire. At the end of five weeks another wound was made in the same leg, which suppurated and healed also. At the end of seven weeks I measured the claws of the four feet, and found that those on the paralysed limb had grown equally with those of the other."

"The experiment was repeated on guinea-pigs, and with the same results. In one of them the tibia was broken, and the bone readily united."

"I have already mentioned," says Mr. Brodie, "an experiment in which I removed the posterior part of the spinal marrow of a frog, so as to destroy the origin of the nerves of the lower extremities. In this case, the bones of one leg were broken; and when the animal was killed I found the bones united, partly by callus, partly by bony substance. It was evident that the power of forming new bony matter, continued notwithstanding the destruction of the nerves; and the circumstance of the union being incomplete, may be reasonably attributed to the animal being in a torpid state, and remaining apparently without nourishment for many months.

" These experiments, and others of the same description, have led me to conclude that the brain and spinal marrow are not necessary to the animal secretions; at the same time, there can be no doubt, and a multitude of facts show, that certain secretions are very much under their influence; and a question may still remain, what properties the nerves themselves may possess, independent of the brain and spinal marrow, from which they have their origin?"

Mr. Carlisle, in a communication with which he has favoured me respecting the nature of the nervous power, says: " The facts elicited by Galvanic discoveries, added to the former proofs of electrical discharges from the nervous systems of the gymnotus* and torpedo, and these genuine electrical sparks being clearly is-

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* " A particular adaptation for the nerves which supply the electrical batteries of the torpedo and gymnotus, Mr. Carlisle says, is observable on the exit of each from the scull; over which there is a firm cartilage acting as a yoke, with a muscle affixed to it, for the obvious purpose of compression; so that a voluntary muscle probably governs the operations of the battery."

Phil. Trans. 1805. p. 11.

sued at the voluntary discretion of those animals, formed a series of leading points, very promising of some improvements in the knowledge of the brain and nerves; but no such result has yet occurred which might become applicable to the healing art. I have long entertained suspicions that both animal volition, and the more remarkable secretory changes, are governed by electricity, and have ventured to mention those conjectures in the two Croonian Lectures printed in the Transactions of the Royal Society of London, for the years 1804 and 1805; but any conclusive inductions to be drawn from such intricate and multifarious phenomena, require more extensive researches and more undivided attention than I am able to bestow. Whatever the main spring of life may be in complicated and bulky animals, it is less obscured in those of a more homogeneous composition, and of more simple structure; yet, in all creatures, some traces of a directing sensorial power occur; although in the humbler orders of vermes, the intellectual authority seems never exercised, unless

some external stimulus irritates or awakens its corporeal residence. From a continued series of faithful descriptions of the nervous structures, and their relations in animal fabrics, extending from the most abstract example of a distinct animal up to man, some important results may be gained; but neither my experience as a medical observer, nor my researches as a naturalist, have hitherto produced any satisfactory explanation of the proximate causes of nervous diseases, of the rational means for treating them, or of the intrinsic nature of that quality or power which belongs peculiarly to the brain and nerves of animals."

With respect to the manner in which the mind immediately acts through the brain and nerves, in the production of sensation and motion, we find much difference of opinion amongst physiologists. Whether the mind perceives objects directly, or by images of them in the brain, is a question which has been often agitated; the latter has been the prevailing opinion, both in ancient and modern times. It was the opinion of Pythagoras, of Plato, and of

Aristotle *, among the ancients; and of Descartes, Locke, and many others among the moderns. Plato, in his seventh dialogue, De Republica, maintains that we perceive only the shadows of things. He illustrates his meaning, by supposing a number of men, placed in a subterraneous cave, and so bound, that they can only look forwards; and that behind them there is a brilliant fire, from which they are separated by a screen or partition, over which the light from the fire may pass to that part of the cave in which they are. He then supposes that a number of persons, carrying vessels or statues, &c. are placed behind the screen, between it and the fire, the shadows only of whom are seen by the men bound in the anterior part of the cave. In like manner, he says, we perceive nothing but the shadows of external objects. † Aristotle says, that in vision we behold images or phantasms, which, though perceivable, are not ma-

* Οὐδέποτε νοεῖ ἄνευ φαντάσματος ἡ ψυχὴ.
De Anima, lib. iii. c. 8.

† Πλὴν τὰς σκιὰς.

terial *; — that our senses receive images or forms, or what he calls sensible species without matter, as wax receives the form of the seal without any of its matter. It was the opinion of several of the ancients, that bodies send out to the organs of sense something material, but of a very subtile nature. Descartes thought that we only perceive the ideas or images of things in the brain. Speaking of the heavens and the earth, &c. he says: "What do I distinctly perceive of these things but the images or thoughts of them which are present to my mind." † Mr. Locke was of the same opinion. "It is evident he says, that the mind does not perceive things immediately, but only by the intervention of the ideas it has of them ‡; and again, methinks the understanding is not much unlike a closet wholly shut from light, with only

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* Ὅταν δὲ θεωρῇ ἀνάγκη ἅμα φάντασμά τι θεωρεῖν τὰ γὰρ φαντάσματα ὥσπερ αἰσθήματά ἐσι, πλὴν ἄνευ ὕλης·
De Anima, lib. iii. c. 9.

† "Quid autem de illis clare percipiebam? nempe talium rerum ideas, sive cogitationes menti meæ obversari." *Med.* iii. p. 15.

‡ Essay on the Human Understanding, book ii. ch. 2.

some little opening left to let in external visible resemblances, or ideas of things without. Would the pictures coming into such a dark room but stay there, and lie so orderly as to be found upon occasion, it would very much resemble the understanding of a man in reference to all objects of sight, and the ideas of them." Mr. Locke seems to have thought that ideas in the mind are resemblances of what he calls primary qualities, as they really exist in bodies themselves; and Leïbnitz was of the same sentiment, considering the soul as a living mirror of the whole universe. Descartes thought otherwise; he does not admit that the ideas of things must necessarily be perfectly like what they represent. Dr. Porterfield adopts the opinion of Mr. Locke, respecting the perception of ideas or images in the brain. "How body acts upon mind," he says, "or mind upon body, I know not; but this I am very certain of, that nothing can act or be acted upon where it is not, and therefore our mind can never perceive any thing but its own proper modifications, and the various states of the sensorium to which it is present; so that

it is not the external sun and moon which are in the heavens that our mind perceives, but only their image or representation impressed on the sensorium."* Some philosophers have thought that the images of things are impressed upon the mind itself†; but the generality have conceived that they take place in the brain, and are there perceived by the mind.

The celebrated Dr. Berkeley, Bishop of Cloyne, maintains the doctrine of ideas, and divides them into ideas of sense and ideas of imagination. "The ideas imprinted on the senses by the Author of nature, he says, are called real things; and those excited in the imagination, being less regular, vivid, and constant, are more properly termed ideas or images of things which they copy and represent." Mr. Hume distinguishes our perceptions into impressions and ideas. "By the term impression, he says, I mean

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* Porterfield's Treatise on the Eye.

† These philosophers, however, do not attempt to explain the nature of mind, or to give such a representation of it, as to enable us to conceive how it is capable of receiving impressions.

all our more lively perceptions, when we hear, or see, or feel, or love, or hate, or desire, or will; and impressions are distinguished from ideas, which are the less lively perceptions of which we are conscious, when we reflect on any of those sensations or movements above * mentioned." "Nothing," he says, "can be present to the mind but an image or perception. The senses are only the inlets through which these images are conveyed, without being able to produce any immediate intercourse between the mind and the object." † All philosophers, says Dr. Reid, from Plato to Mr. Hume, agree in this, that we do not perceive external objects immediately, and that the immediate object of perception must be some image present to the mind."

On the theory of ideas of Descartes and Locke, Berkeley founded his ideal system, and Hume his universal scepticism. "By what argument," says Mr. Hume, "can it be proved that the perceptions of the mind must be caused by external objects entirely different from them, though resembling

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* Essays, vol. ii. sect. 2. † Ibid. vol. ii. sect. 12.

them (if that be possible), and could not arise either from the energy of the mind itself, or from the suggestion of some invisible and unknown spirit, or from some other cause still more unknown to us. It is acknowleged that, in fact, many of these perceptions arise not from any thing external, as in dreams, madness, and other diseases; and nothing can be more inexplicable than the manner in which body should so operate upon mind as ever to convey an image of itself to a substance supposed of so different and even contrary a nature."* Berkeley maintains, "that by our senses we have the knowledge only of our sensations, ideas, or those things that are immediately perceived by sense, call them what you will; but they do not inform us that things exist without the mind, or unperceived like to those which are perceived.† As there can be no notion or thought but in a thinking being, so there can be no sensation but in a sentient being; it is the act or feeling of a sentient being;

* Hume's Essays, vol. ii. sect. 12.

† Principles of Human Knowledge, sect. 18.

its very essence consists in its being felt. Nothing can resemble a sensation, but a similar sensation in the same, or in some other mind. To think that any quality in a thing that is animate can resemble a sensation, is absurd, and a contradiction in terms." He maintains that by our senses we have no knowlege of any thing but sensations, and that our sensations have no resemblance to any thing in a material world." Hence he denies the existence of an external material world, or at least denies that we have the power of proving its existence. Bishop Berkeley, however, does not deny the existence of a world of spirits.

" Mr. Hume, says Dr. Reid, shows no such partiality in favour of the world of spirits. He adopts the theory of ideas in its full extent; and, in consequence shows that there is neither matter nor mind in the universe; nothing but impressions and ideas. What we call a body, is only a bundle of sensations; and what we call mind, is only a bundle of thoughts, passions, and emotions, without any subject."

The chief leaders of the idealists, says Mr. Good, were Berkeley and Hume.

The former, dissatisfied with Locke's explanation of the mode by which sensation is communicated to the mind, incapable of tracing the connection between external objects and the mind itself, boldly denied such an existence, and maintained that sensations and ideas were mere modifications of the soul, concatenated by a system of laws immutable and universal; whence the existence and necessary connection of cause and effect, the proof of identity, and the demonstration of an intelligent Creator.

The system of Hume was founded upon that of Berkeley, but extended to a still more extravagant length. Hume, in imitation of Berkeley; contended that the external world was incapable of proof; that the mind or soul was nothing more than a consciousness of existence, and that such consciousness depended alone on a succession of ideas produced either by sensations or impressions; but he maintained, exclusively, that he could no more trace any necessary catenation between such ideas or sensations, between one event and another, than he could trace the existence of external objects. Facts, he admitted, con-

joined with facts, but not necessarily conjoined with each other; and hence, to assert "that such connection was produced by a system of operative laws, was, in his opinion, to presume, but by no means to reason. Upon this theory, therefore, there is nothing existing in all nature but impressions and sensations, and the ideas thence resulting; there is no such thing as causation, no proof of identity, none of a God. Yet it would be injustice to Mr. Hume to assert, that he denied the being of a God: on the contrary, he admitted it, and pretended to found his belief of such a being on a kind of *innate impression*, though he would not allow it the name of an innate idea; a sort of moral sentiment as developed by Hutchinson." *

Dr. Reid enters very minutely into an examination of the ideal theory, and denies the doctrine of Descartes and Locke, on which it is founded; he does not admit, that the soul has its seat in the brain, or that there are images formed in the brain of all the objects of sense, or that the mind

* Good's Lucr. App. p. 190.

perceives these images in the brain, or that it perceives not external objects immediately, but only by means of those images. He will not allow to Berkeley, that by our senses we have the knowledge of our sensations only; nor to Hume, that all the perceptions of the human mind resolve themselves into two kinds, impressions and ideas. Dr. Reid distinguishes between perceptions and sensations, which by the advocates of the ideal theory have been considered as synonimous terms, a clear conception of which distinction, Mr. Stewart says, is the key to all that Dr. Reid has written in opposition to the Berkeleyan system. In the discussion of the ideal theory, Dr. Reid refers to common sense and first principles. Some of our judgments, he maintains, are intuitive. "It is not in our power," he says, "to judge as we will; the judgment is carried along necessarily by the evidence, real or seeming, which appears to us at the time; there are propositions which are no sooner understood than they are believed; the judgment follows the apprehension of them necessarily; there is is no searching for evidence, no weighing of arguments; the

proposition is not deduced or inferred from another; it has the light of truth in itself, and has no occasion to borrow it from another. Propositions of this kind, when they are used in matters of science, have commonly been called *axioms;* and on whatever occasion they are used, are called *first principles of common sense, common notions, self-evident truths.* Of this nature Dr. Reid considers the propositions, that an external material world exists; that every thing that happens in nature must have a cause, &c. On this part of the subject Dr. Reid adopts the sentiments of Mr. Locke, who says, "There is a part of our knowledge which we may call intuitive: in this the mind is at no pains in proving or examining, but perceives the truth, as the eye does light, only by being directed towards it; and this kind of knowledge is the clearest and most certain that human frailty is capable of. This part of knowledge is irresistible, and, like bright sunshine, forces itself immediately to be perceived, as soon as ever the mind turns its view that way." *

* Lib. iii. ch. ii.

Dr. Reid's view of this difficult subject, although not perfectly satisfactory, is perhaps as satisfactory as any we can take. To me it appears rational to say, that our belief in the existence of an external world is instinctive, involuntary, and as strong as any of which we are capable, unless it be that of our own existence. It must be admitted, however, that the strength of our belief is no proof that it is well founded. It irresistibly mixes with all our thoughts and expressions, so that the very arguments in favour of the ideal theory cannot be communicated without it. When Mr. Hume and Bishop Berkeley speak of impressions and sensations, we may reasonably ask, do they not in terms admit the existence of something external? If we receive impressions, must we not receive them from something exterior which impresses? If we have sensations, must not something exist exterior to ourselves which produces those sensations?

Mr. Hume speaks of images conveyed through the senses;—images of what? Of the intercourse betwixt the mind and the object? What object? Surely something

different from the mind itself with which it has intercourse. Sensation seems to be the consequence of impression, and necessarily to require an impressing power. Perception implies the existence of a perceiving power, and also of an object perceived. How the perceiving power acts, or is acted upon in this process, we cannot comprehend; but our inability to comprehend it does not alter the fact. The arguments of Bishop Berkeley and Mr. Hume are ad ignorantiam, and by no means satisfactory, though extremely ingenious. It is indeed not unreasonable to suppose, that these acute and learned men really thought on this subject as other persons think, and that by these disquisitions they merely meant to divert themselves by puzzling persons of inferior intellect. What Mr. Hume says of Pyrrhonians, may, I think, be fairly applied to Bishop Berkeley and himself. "Though a Pyrrhonian may throw himself, or others, into a momentary amazement and confusion by his profound reasoning, the first and most trivial event in life will put to flight all his doubts and scruples, and leave him the same in every

point of action and speculation with the philosopher of every other sect, or with those who never concerned themselves with *any* philosophical researches. When he awakes from his dream, he will be the first to turn the laugh against himself, and to confess that all his objections are mere amusement." *

The opinions and reasonings of Dr. Reid are highly approved by Mr. Stewart, who, speaking of the overthrow of the ideal theory, founded on the hypothesis of perception by means of images or pictures, although he admits that Dr. Reid's speculations amount only to a negative discovery, says, " few positive discoveries in the whole history of science can be mentioned, which found a juster claim to literary reputation, than to have detected so clearly and unanswerably the fallacy of an hypothesis which has descended to us from the earliest ages of philosophy, and which, in modern times, has not only served to Berkeley and Hume as the basis of their sceptical sys-

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* Hume's Essays, vol. ii. § 12.

tems, but was adopted as an indisputable truth by Locke, by Clarke, and by Newton."

By having overthrown the theory of perception, by images or pictures, Dr. Reid seems to have thought, that he had more strongly established the belief of the existence of an external material world; but the correctness of this conclusion may be doubted. The theory of perception, by images or pictures, necessarily implies the existence of something external, of which they are pictures or images.

The learned author of a critique in the Edinburgh Review, on Stewart's life of Dr. Reid, speaking of the ideal theory, says, " After considering the subject with some attention, we must confess that we have not been able to perceive how the destruction of the ideal theory can be held as a demonstration of the real existence of matter, or a confutation of all those reasonings which have brought into question the popular faith upon this subject. The theory of images and pictures, in fact, was in its original state more closely connected with the supposition of a real material prototype, than the theory of direct perception; and

the sceptical doubts that have since been suggested appear to us to be by no means exclusively applicable to the former hypothesis. He who believes that certain forms or images are actually transmitted through the organs of sense to the mind must believe, at least, in the reality of the organs and the images, and probably in their origin from real external existences." *

From this slight sketch, introductory to the consideration of nervous diseases, a general notion of the opinions, both of the ancients and moderns, respecting the nature and uses of the nervous system, may be formed; and hence it appears, that notwithstanding the laborious investigations of

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* Ed. Rev. v. iii. p. 281.

On these subjects reference may be made to Berkeley's works; to Hume's Essays, particularly those in the beginning of the second volume; to Dr. Reid's Enquiry into the Human Mind, and his Essays on the Intellectual Powers of Man; to Stewart's Philosophical Essays, and his Elements of the Philosophy of the Human Mind; to Drummond's Academical Questions, and a very able critique on that work in the 7th volume of the Edinburgh Review, and to Good's Appendix to his Life of Lucretius, p. 90.

the subject by philosophers in various ages of the world, the physiology of the nervous system, as to many particulars, remains involved in impenetrable obscurity.

The sensible qualities of the organs of the nervous system, the form, size, colour, relative situation, protuberances, cavities, and division of parts of the various substances contained within the cranium and spine, have been accurately described; but no satisfactory explanation has been given of their intimate nature, and of the manner in which they immediately act in producing sensation and motion. The most minute examination of the brain and nerves has thrown no light on this mystery. That the perceiving, intelligent, willing principle in man, is in some way connected with the brain, seems highly probable; and that sensation and motion depend upon the brain and nerves, can be proved by experiment. By these organs we have knowledge of the external world, and communication with it. By the brain and nerves, the volitions of the mind influence the muscles in voluntary motion, and by the nerves, impressions made on the sentient extremities are car-

ried to the brain, and sensation is produced; but of the manner in which this is done, and of the connection between the mind and the nervous system, and their influence on each other, we are wholly ignorant. Whatever may be our conjectures respecting the nature and seat of the intelligent principle; of the ultimate structure of the brain and nerves; of the nature of the medium of nervous communication; or of the mode of perception, directly, or by the intervention of images in the brain; we are utterly at a loss to form any rational conception, concerning the manner in which the mind acts, and is acted upon in sensation and motion.

We cannot take a single step, says M. Voltaire, towards arriving at the slightest knowledge of the cause of life and thought. These questions appear sublime: what are they? The questions of the blind, who ask of others equally blind, what is light? *

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* Nous n'avons point le moindre degre, ou nous puissions poser le pied, pour arriver a la plus legere con-

"The influence of the will over the body," says Mr. Stewart, "is a mystery which has never yet been unfolded;" and this acute metaphysician acknowledges, that the statement of Dr. Reid, in which he agrees, amounts merely to this, "that the mind is so formed, that certain impressions produced on our organs of sense, by external objects, are followed by corresponding sensations, and that these sensations, which have no more resemblance to the qualities of matter, than the words of a language have to the things they denote, are followed by a perception of the existence and qualities of the bodies, by which the impressions are made; that all the steps of this process are equally incomprehensible; and that for any thing we can prove to the contrary, the connection between the sensation and the perception, as well as that between the impression and the sensation, may be both arbitrary; that it is therefore

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naisance de ce qui nous fait vivre et de ce qui nous fait penser.

Ces questions paraissent sublimes, qui sont elles? Des questions d'aveugles qui dirent a d'autres aveugles, qu'est ce que la lumiere. *Dictionaire Philosophique.*

by no means impossible, that our sensations may be merely the occasions on which the correspondent conceptions are excited, and that at any rate the consideration of these sensations which are attributes of mind, can throw no light on the manner in which we acquire our knowledge of the existence and qualities of body. From this view of the subject it follows, that it is the external objects themselves, and not any species or images of these objects that the mind perceives; and that, although by the constitution of our nature, certain sensations are rendered the constant antecedents of our perceptions, yet it is just as difficult to explain how our perceptions are obtained by their means, as it would be, upon the supposition that the mind were all at once inspired with them, without any concomitant sensations whatever." *

Physiologists have often erred by paying more attention to the investigation of the nature of the subjects of their enquiries, than to that of the laws by which they

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* Elements of the Philosophy of the Human Mind, chap. i. § 3.

are governed. Of the *ultimate nature or essence*, either of mind or matter, or of that compound which we call the nervous system, we know nothing; but of the laws by which it is governed, or rather the circumstances by which it is influenced, we know enough to enable us, in some degree at least, to understand the nature and causes, and to explain the phenomena of many of its morbid affections. Instead, therefore, of perplexing ourselves in vain efforts to comprehend what the great Author of nature has placed beyond our reach, and indulging in speculations which, however interesting, can lead to no satisfactory conclusion, let us turn our attention to a subject better suited to our powers, namely, the investigation of the diseases of the nervous system.

ON

NERVOUS DISEASES.

Nervous diseases have been distinguished by nosologists as they affect the animal, the vital, or the natural functions. The nervous diseases of the animal functions are particularly worthy of consideration, for they frequently occur, and are highly dangerous. The most important of them are Apoplexy, Palsy, and Epilepsy.

OF APOPLEXY.

CHAP. I.

Definition and History.

The term Apoplexia * was employed by the Greeks, and is still used, to denote a disease in which the patient falls to the

* From *αποπλήσσω, percutio.*

ground, often suddenly, and lies without sense or voluntary motion. Persons instantaneously thus affected, as if struck by lightning, were, by the ancients, denominated ἐμβρονητοι, *attoniti*, *sy*derati.

This disorder appears to have at all times engaged the attention of physicians, and we find definitions, or short descriptions of it, in the works of the earliest medical writers. Hippocrates, in his work De Morbis, lib. ii. without making use of the word apoplexy, thus characterizes the disease: --- A pain in the head suddenly seizes a person in health; he immediately becomes speechless; he snores with his mouth open; and if any one call to him or move him, he groans, but understands nothing. * In another part of his works, however, although the disease is less clearly described, the term apoplexy is introduced. He says, when the humours which flow from the head are obstructed, or become acrid, the brain is affected with phlegm †, the whole body becomes convulsed, the power of speech is lost, and suffocation

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* Στενάζει μοῦνον συνίει δὲ οὐδὲν, *Hip. de Gland.*

† Σπατει.

succeeds. This disease, he adds, is called apoplexy.* Apoplectic persons, says Galen, suddenly become senseless, and lose all motion except that of respiration.† When, from an affection of the common origin of the nerves, says Paulus Ægineta, all parts of the body have lost together sense and motion, the affection is called apoplexy; in which disease persons lie without voice, without motion, without sense, and without fever.‡ Ætius, and others, give similar accounts. Alexander Trallianus does not treat expressly of apoplexy, but in his chapter on epilepsy he mentions many of its characteristic symptoms. He speaks of a disease in the head, in the origin of sensation and motion, in the paroxysm of which, persons can neither hear nor see, nor at all understand or remember any thing, being not unlike to dead persons.§

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* Ἀποπληξίη τῷ πάθει τοὔνομα.

† Ἀπόπληκτοι ἐξαίφνης ἀναίσθητοι τὲ καὶ ἀκίνητοι γίνονται παρὰ τὸ σῶμα, πλὴν μόνης τῆς ἀναπνοῆς.

Gal. Comment. on the Aph. of Hipp.

‡ Ἄναυδοι ἀκίνητοι τὲ καὶ ἀναίσθητοι καὶ ἄπυρετοι. Lib. iii. c. 18.

§ Πάσης αἰσθήσεως ἔρημοι κεῖνται, καὶ νεκρῶν οὐδεν ἀπέχοντες.

Al. Tr. l. i. c. 15.

× probably meant for animal heat

The Greek writers seem to have considered apoplexy and palsy as diseases of the same nature. Aretæus says, apoplexia, paraplegia, paresis, and paralysis, are all of the same kind, and consist in a defect of sensation, or of motion, or of both. Apoplexy is a palsy of the whole system; of mind, of sense, and of motion. * — Galen says, when all the nerves have lost sense and motion together, the disease is called apoplexy: when this happens to a part only, whether the right or the left, it is called palsy. † The sentiments of Aretæus and Galen on this subject were, I believe, adopted by all the Greek physicians. Dr. Kirkland, however, has represented Alexander Trallianus as entertaining a different opinion. Dr. Kirkland quotes as follows: "The diseased resolution which the Greeks

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* Η γὰρ κινήσι@, ἢ ἀφῆς, ἢ ἀμφοῖν ἐςι ἔκλειψις κοτὲ καὶ γνώμης, κοτὲ καὶ της ἄλλης αἰσθήσι@· Αλλ' Αποπληξίη μὲν ὅλω τω σκήνε@, καὶ της αἰσθήσίος τε, καὶ γνώμης, καὶ κινήσιός ἐςι παράλυσις. *Aræt. de Sign. et Caus. Diut. Morb.* l. i. c. 7.

† Πάντων μὲν οῦν ἅμα των νέυρων απολεσάντων ἄισθησίν τε καὶ κίνησιν ἄποπληξία τὸ πάθ@ ὀνομάζεται· κατὰ θάτερόν τε μέρος ἤτοι τὸ δεξιὸν ἢ τὸ ἀριςερὸν ει συμβάινει τοῦτο παράλυσις καλειται. *Gal. de Loc. Affect.* l. iii. c. 14.

have called πάρεσις, παράλυσις, is nothing more than a privation of sense and motion. It differs from an apoplexy, which is an abolition of sense of the whole body *with injury of the first principles of life*, and thus death happens; but a palsy is that disease in which one half of the body alone dies, or certain (*tendinous*) parts are obstructed, *without injury to the brain or spinal marrow*. This appears to be a translation of a part of a chapter in the *Artis Medicæ Principes*, which chapter is a Latin translation of Alexander, the meaning of which Dr. Kirkland seems not to have clearly understood. I think, from the passage in question, it may be inferred, that Alexander agreed with Aretæus and Galen in the opinion, that apoplexy is a general, and palsy a partial, abolition of sense and motion. The following will, perhaps, be considered as a literal and faithful translation of the passage in Alexander. The disease paresis, commonly called paralysis, is no other than a loss of sensation and motion in the parts affected. It differs from apoplexy, inasmuch as this is a want of sensation and motion of the *whole body*, with injury

of the governing energies, and death in some sort; but paresis is a death of *one part*, or of half the body, or of certain *nervous* parts, which have suffered obstruction without disease of the brain or spinal marrow. *

In the writings of modern nosologists we find a great variety of definitions of apoplexy. Sauvages denominates it a most profound sleep, with stertorous respiration, and Linnæus describes it in almost the same terms. According to Dr. Cullen, " apoplexy is a disease in which the whole of the external and internal senses, and the whole of the voluntary motions are in some degree abolished, while respiration and the action of the heart continue to be performed. By its being an affection of the whole of the power of sense and voluntary

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* Τὸ τῆς παρέσεως πάθος ὃ καὶ παράλυσιν ὀνομάζειν εἰώθασιν, οὐδεν ἄλλο, ἢ ἀναισθησία καὶ ἀκινησία των πεπονθότων τόπων ἐςι· διαφέρει δὲ τῆς ἀποπληξίας, ὅτι αὐτη μὲν του παντὸς σώματός ἐςιν ἀναισθησία, καὶ ἀκινησία μετὰ βλάβης των ἡγεμονικων ἐνεργειων, καὶ τρόπον τινὰ θάνατος· ἡ δὲ παρέσις τὸ ημίτεος σώματος ἢ ἑνός ἐςι μερους νέκρωσις, ἢ καὶ τινων μορίων νευρωδῶν ἐσχηκότων ἔμφραξιν, χωρὶς τὸ παθεῖν ἢ τὸν ἐγκέφαλον, ἢ τον νωτιαῖον. *Alex.* περι παρεσεως.

motion, he says we distinguish it from palsy; and by its being with the continuance of respiration and the action of the heart, it is distinguished from syncope." Dr. Young refers "apoplexy with lethargy and hydrocephalus, to a common genus, which he denominates carus, and defines it "suspension of the powers of sense and motion, more or less perfect, with an appearance of sleep; the motion of the heart remaining uninterrupted;" and he distinguishes apoplexy from the other species of this genus, by the character "supervening suddenly; with stertorous breathing." *

Mr. Good says, "apoplexy is mental and corporeal torpitude, with stertorous sleep."

Although stertor is generally included in the definition of apoplexy, some nosologists contend that the disease may exist without this symptom. Cullen says "the stertorous breathing is not always present, even in the most complete form, or in the most violent degree of the disease. Cullen's apoplexia is a genus including asphyxy and catalepsy:

* Med. Lit. p. 148.

he has hence been compelled to omit this symptom, or he must have excluded the two last diseases. Forestus, Portal, and others, are of opinion that there may be apoplexy without stertor: indeed they make the distinction between the *apoplexia levis* and *fortis* *, by its absence or presence. Yet Forestus, in distinguishing between apoplexy and syncope, reckons stertor among the pathognomonic symptoms necessarily present in apoplectic cases. †

Perhaps apoplexy may be thus defined:--- It is a disease in which the animal functions are suspended, while the vital and natural functions continue: respiration being generally laborious, and frequently attended with stertor.

The attack of apoplexy is sometimes sudden; sometimes we are warned of its approach by the following symptoms: a dull pain in the head, accompanied by a sense of weight or heaviness; vertigo; drowsiness; frequent fits of incubus; involuntary contractions of the muscles of the

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* Forest. lib. x. obs. 76.

† Forest. lib. x. obs. 73.

face; cramps or spasms in various parts of the body; inspirations deeper than natural; fulness and redness of the countenance and eyes; obscurity or irregularity of vision; bleeding from the nose; ringing in the ears; faltering in speech, or using one word for another; loss of memory; and diminished sensibility of body or mind, or of both.

Many of these precursors of apoplexy are mentioned both by ancient and modern medical writers. Hippocrates says, persons who are affected with head-ach and ringing in the ears without fever; with vertigo; hesitation in speech; and torpor in the hands; are likely to become apoplectic, or epileptic, or oblivious. * And again, an uncommon torpor and sense of stupidity indicate the accession of apoplexy. † Aretæus says, this disease generally comes on suddenly; sometimes gradually, beginning with heaviness, difficulty of motion, torpor, a sense of cold or of great heat, disturbed sleep,

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* Ἐ ἀποπλήκτους, ἢ ἐπιληπτικοὺς προσδέχου τούτους ἔσεσθαι ἢ καὶ ἐπιλησμονας. *Coacæ. præn.* p. 469.

† Νάρχαι καὶ ἀνασθησίαι γινόμέναι παρὰ τὸ ἔθος ἀποπληκτικῶν συμβησομένων σημεῖον. *Coacæ. præn.* p. 485.

and disturbed imaginations. * Cælius Aurelianus, and others, give a similar account of the symptoms threatening † apoplexy. Avicenna observes, that apoplexy is often preceded by a burning pain at the stomach, inflation, vertigo, scotomia, obscurity of sight, tremors throughout the whole body, gnashing of the teeth in sleep, a sense of general weight and heaviness, and often dark coloured thick urine. ‡ The symptoms indicating the approach of apoplexy, are described much in detail by Burserius. § The paroxysm is immediately preceded generally by vertigo; sometimes by a most violent, sudden, excruciating pain in the head.

In the fit, the patient falls to the ground, and lies as if in a deep sleep, from which he cannot be roused. ‖ Boerhaave says, this

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* De Causis et Signis Morb. Diut. lib. i. c. vii.

† Cæl. Aurel. De Morbis Acutis, p. 199.

‡ Avicenn. lib. iii. fen. ii. § Burser. p. 79.

‖ In the strong paroxysm, persons are said to lie entirely deprived of sensation and motion; but the power of moving is occasionally apparent, and we cannot be certain, that the power of feeling in these cases is wholly abolished. I have seen patients in this disease shrink on being cupped, and move their hands towards the

disease is the true image of the most profound sleep, and compares it to that of a person exhausted by exercise or labour, from which, he says, it can scarcely be distinguished. * Forestus describes the attack of apoplexy in very impressive language. †

In the perfect, or strong apoplexy, the respiration of the patient is generally much impeded; but although laborious, it is often, in the beginning of the paroxysm, slow and regular: in the middle, and to-

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head, as if feeling uneasiness there. Dr. Wilson Philip thinks, that in apoplexy, the power of the muscles of voluntary motion remains. He says, "I have repeatedly examined the state of these muscles in apoplexy, both in warm and cold-blooded animals, and found their excitability unimpaired. It is not their power, but the stimulus which excites them that is lost in apoplexy."

* Hic morbus est somni profundissimi vera imago. Si homo sanus a summo labore defatigatus dormiat, et juxta illum decumbet homo perfecte apoplecticus, vix possunt distingui. *Boerhaave, De Morb. Nerv.* p. 642.

† Concidit subito, et repente magnaque ruina in terram prolapsus est: ad nullas voces, ad nullas inclamationes, nec ad quasvis collisiones expergiscebatur, tam gravis torpor eum, utpote attonitum, tenebat: quem nullis stimulis discutere poterant adstantes.

Forest. lib. x. *Observ.* lxix.

wards the end, when the disease terminates fatally, it becomes frequent, weak, and irregular. Galen considers the disease to be violent in proportion to the degree in which the breathing is injured; and that respiration, he says, is the worst of all, which is intermittent and very laborious. Dr. Cheyne says, the respiration is at first slow and heaving; then irregular, and sometimes convulsive; and at the last, interrupted. He adds, "immediately before death the respiration is irregular, and is performed not oftener perhaps than three or four times in the minute."

The laborious breathing is very frequently accompanied by stertor; and some physicians, as mentioned above, contend, that this symptom is absolutely necessary to constitute apoplexy, whilst others maintain, that although an usual symptom, the disease may exist without it. Dr. Kirkland says, the snoring and sonorous respiration are pathognomic symptoms of the disease, and profound sleep, insensibility, &c. without them, do not characterise the * malady.

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* Commentary, p. 16.

Boerhave measures the strength of the disease by the degree of stertor; and Portal agrees with him in opinion on this subject; observing that respiration in apoplexy is greatly impeded, and the motions of the breast are very apparent. We hear a noise of snoring or stertor, he says, which is great in proportion as the apoplexy is * strong. In all the cases of strong apoplexy which I have seen, the respiration, in the beginning of the paroxysm, was laborious, slow, and stertorous; and in those which proved fatal, this symptom, as far as I can recollect, remained, even when the breathing had become weak and irregular.

In the strong apoplexy, a frothy saliva or foam is frequently excreted from the mouth, which is sometimes blown away from the lips with considerable force. This symptom has been noticed by almost all writers on apoplexy, and, as will hereafter be particularly pointed out, has by some been considered indicative of a violent disease.

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* Portal, p. 32.

The pulse, especially in the beginning of the apoplectic paroxysm, is generally described as being regular, slow, full, sometimes hard; but in a few hours, if no amendment appears, it is said to become irregular, frequent, and weak. Bellinus, however, says, "both the pulse and repiration are, in some cases of apoplexy, so weak, that the patient appears as if dead; and Zulianus remarks, that although the disease may be very strong, the pulse, from the beginning to the end, is sometimes very weak. According to Dr. Cheyne, the irritability of the heart survives the respiration: "sitting," he says, "with my finger over the artery of a person who died of apoplexy, I distinctly felt the pulse beat after the last expiration." As far as I have had an opportunity of observing, the pulse is at first regular, strong, full, and slow, beating from fifty-five to sixty-five times in a minute; but as the disease advances, it becomes weaker and more frequent; and in the end, irregular or intermitting. *

* Cheyne, p. 14.

The face and the whole body are sometimes cold, and bedewed with clammy sweat; but more frequently the temperature of the skin is higher than natural, and is accompanied with copious perspiration.

Fever is mentioned in the list of symptoms of this disease by Schacht and some other writers. Portal speaks of inflammatory apoplexy, and refers to the observations of Boerhave, Morgagni, Van Swieten, Lieutaud, and Tissot, on the subject; and Sir Gilbert Blane says, that blood drawn from persons in the apoplectic paroxysm is almost always covered with the inflammatory crust. Fever, however, is not generally mentioned in the history of apoplexy, and I believe seldom accompanies it.

The eyes, in this disease, are described as being prominent, bloodshot, sometimes half open, but more frequently quite closed; the cornea dull and glassy; and the pupils dilated. In the generality of cases, the pupil of the eye is indeed more or less dilated; but sometimes it is greatly and permanently contracted. In some instances, I have seen the pupil contracted

almost to a point, and a physician of eminence, of my acquaintance, has likewise observed this appearance of the eyes in apoplexy: yet although all writers on the subject mention the dilated pupils, I do not find any one (Aretæus among the antients*, and Dr. Cheyne among the moderns excepted) who has noticed the contracted pupil in these cases.

The teeth are often closely locked together; and deglutition is generally so much impeded, that fluids which have been forced into the mouth, return by the nostrils.

I believe the secretions, in this disease, are seldom much altered. Some ancient writers have indeed described the urine as being greenish or black, and deficient in quantity; but modern observation does not confirm these remarks.

When apoplexy terminates fatally, as the disease proceeds, the abolition of sense

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* The pupil of the eye, Aretæus says, may be either greatly dilated, which we call πλατυκορίην, or it may be much contracted; and that I denominate φθίσις or μυδρίασις. *Aret. de Sign. et Caus. Morb. Diut.* l. i. c. 7.

and voluntary motion seems to become more complete, the respiration and pulse more weak and irregular, cold clammy sweats affect the face and the whole body; the features shrink, and convulsions supervene, which terminate in death.

The duration of a fit of apoplexy is various: in some cases death is said to have immediately followed the apoplectic stroke. Dr. Kirkland speaks of apoplexy "in which there is an immediate extinction of the vital principle," and relates the case of a mantua-maker, "who, being at work, was talking cheerfully with some of her friends about her, when her hands dropped down upon her lap, and she was perfectly dead." Forestus, under the head Apoplexy, mentions two instances of immediate death; the one in which a person fell down in the street, and the other from a table at which he was sitting. It may be doubted whether these and other similar cases can be properly considered as cases of apoplexy: Forestus thinks that they cannot.

Sudden deaths are very commonly ascribed to apoplectic seizure, but they probably

depend upon some affection of the heart, or upon the rupture of some blood-vessel larger than those of the brain. Neither can cases of sudden extinction of the vital principle by the inhalation of carbonic acid, gas, &c., be, I think, properly called cases of apoplexy. Genuine apoplexy, I believe, seldom destroys life in less than one or two hours.

The paroxysm generally lasts from eight to twelve, twenty-four, or forty-eight hours; sometimes for a still longer period. Forestus relates the case of a woman seized with an apoplexy, which he calls *fortissima*, who lay in the fit for three days, and afterwards gradually recovered. When apoplexy does not prove fatal, it usually terminates in a greater or less degree of palsy; very frequently in the palsy of one side, which is called hemiplegia. Dr. Baillie, in his Morbid Anatomy, observes, that "when blood is effused into the substance of the brain, apoplexy is produced. When the patient is not cut off at once, but lives for some time after the attack, the hemiplegia, which is almost constantly an effect of this disease, is upon the opposite side of the

body from that of the brain, in which the effusion of blood has taken place. This would seem to show that the right side of the body derives its nervous influence from the left side of the brain, and the left side of the body its nervous influence from the right side of the brain. * Dr. Baillie, however, tells me that he has sometimes, although rarely, seen the effusion of blood on the same side with the paralysis. The strong apoplexy almost always ends in death. Dr. Kirkland says death has invariably happened in every case I have known, or heard of, in the space of fifty years." †

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* Baillie, p. 460. † Kirkland, p. 38.

CHAPTER II.

Dissections.

On the examination of the bodies of persons who have died of apoplexy, a great variety of morbid appearances have been observed, an account of which may, perhaps, be useful in the illustration of the causes and distinctions of the disease.

These morbid appearances have been most frequently seen within the cranium. The chief of them are blood, serum, pus, hydatids, tumours of different kinds, organic læsions, polypous concretions, ossification, and exostoses.

On examining the heads of apoplectic persons, blood is very often seen in various situations, effused between the membranes of the brain, on its surface, about its basis, among its convolutions, either mixed with serum, or in its natural state, and of its usual colour; sometimes it is dark, grumous, and concreted.

Serum, although not so frequently as blood, is also often found within the cranium

in these cases. It appears generally in its natural state, clear and insipid, sometimes of a saltish taste, not unfrequently of a yellowish or reddish colour; and occasionally in a gelatinous form, either transparent or opake, and of a brown or cineritious hue. These, together with pus, hydatids, tumours, &c. as found in various combinations and situations within the cranium after apoplexy, are very minutely described by Bonetus, Morgagni, Lieutaud, and others, from whom, without entering into the particulars of the cases, I shall make some extracts.

The Sepulchretum of Bonetus, revised and republished by Mangetus, with considerable additions, contains an account of many dissections of apoplectic persons, with numerous observations collected from the writings of Wepfer, Willis, Drelincurtius, &c. Bonetus gives descriptions of cases of blood found in the carotid arteries in a grumous state; — of blood under the dura mater, and about the basis of the brain; — of a very large quantity of black blood on the brain freely flowing out on opening the head; — of grumous blood filling a large

cavity in the brain from the rupture of a branch of the anterior carotid artery ; --- of blood in many instances found in the ventricles of the brain in a fluid or concreted state, --- and of one in particular, in which blood was seen effused between the meninges, about the basis, in the ventricles, and through the whole substance of the brain. He also describes several cases in which serum has been found in different parts of the brain ; in the convolutions, in the ventricles, and through its whole substance ; and he mentions one instance of a great quantity of water observed between the cranium and dura mater, in the falx and its reduplication, and in all the cavities ; this water being of a yellowish colour, somewhat saltish to the taste, and in quantity measuring five pints. He speaks of blood and serum mixed together within the cranium ; --- of serum in a gelatinous but limpid state in the brain ; --- of a thick and viscid humour obstructing the fourth ventricle, and of pituitous humour, occupying the beginning of the spinal marrow. He also describes various læsions of structure in the brain after apoplexy, such as rupture

of the carotid arteries, of the plexus choroides, &c.; --- steatomatous and other tumours;---polypous concretions and hydatids. An account is given of several morbid appearances, after apoplexy, observed in other parts of the body; in the heart, the lungs, the liver, &c. And one case is mentioned in which the lungs were discoloured, and filled with a frothy ichor; the brain, the cerebellum, and the medulla oblongata, being in all their parts firm, and of the proper colour, and no marks of disease of any kind appearing within the cranium. Bonetus denominates this, sudden death from apoplexy *, without injury in the brain, the lungs alone being diseased; but the propriety of calling this disease apoplexy may be reasonably doubted. He thus describes the case:—A person whilst on his knees at church was suddenly struck, and soon fell to the ground speechless and insensible; he was immediately carried home and put to bed; when visited by the physicians he was found to be without pulse, sense, or respiration. †

* Cerebro omnino salvo et incolumi, solo vitio in pulmonibus apparente.

† Boneti Sepulch. from p. 77. to 148.

Several years after the publication of the Sepulchretum, the celebrated Morgagni, a professor at Padua, gave to the world his valuable work entitled *De Sedibus et Causis Morborum.*

This work contains much original matter on a great variety of subjects. "I produce observations," he says, "which have not before been published, many from Valsalva, not a few from my friends, but the greater part from myself." In his second, third, fourth, and fifth epistles, Morgagni treats of the appearances found on dissection after apoplexy; first speaking of apoplexies in general, then of those arising from blood, from serum, and from other causes. He relates a case in which, after apoplexy, the brain was observed to be flaccid, the left ventricle containing a little serum, and the right two ounces or more of coagulated blood, the plexus choroides being lacerated, and the parietes of the ventricles corroded. He then mentions an instance in which a quantity of blood was found in the right ventricle, the corpus striatum and the plexus choroides being almost entirely corroded and consumed; and another, in which the

ventricles were filled with fluid blood, and much injured, as well as the plexus choroides. He speaks of an old man, who, long before death, had been seized with apoplexy, in consequence of which the right side had become paralytic, in whom, on examination, the inferior part of the left ventricle was found corroded, together with its plexus choroides, about which were polypous concretions of blood. A case is mentioned of blood extravasated beneath the dura mater, covering the whole right hemisphere of the brain, the sanguiferous vessels of the pia mater being unusually turgid, a large cavity in the brain filled with grumous blood, and many other marks of disease within the cranium being observed; also a case of extravasation of blood in the right hemisphere, with a great hollow in the middle of the substance of the left hemisphere, full of black and half concreted blood, the parietes of this hollow being lacerated, and an opening made through the body of the corpus striatum into the left ventricle. A dissection after apoplexy is described, in which, on examining the head, the dura mater was

found very closely adhering to the skull, the vessels of the pia mater being greatly distended, and the right ventricle containing as much black and concreted blood as would fill the shell of an hen's egg; together with fluid blood, or rather bloody serum in the other ventricles, some part of the plexus choroides containing vesicles full of water, of the size of large grapes. He relates a case of apoplexy followed by palsy of the left side, in which, on the head being examined by him and Valsalva, a quantity of blood, as Valsalva had predicted, was found in the right ventricle, black and concreted. He speaks of a youth fourteen years of age, subject to worms and bleeding from the nose, supposed to have died of apoplexy, in whose head, in the lateral and third ventricles, a small quantity of serum was found, and under the cerebellum, the substance of which was soft, two spoonsfull of black concreted blood. Morgagni likewise gives an account of several cases in which serum mixed with blood, or serum alone, has been seen within the cranium after apoplexy, varying in colour, consistence, and taste; sometimes pure and limpid,

sometimes coloured and gelatinous, in some cases tasteless, in others saltish, chiefly in the ventricles, especially in the lateral ventricles, but occasionally in other situations.

Some of these are not well marked cases of apoplexy, and in many of them the quantity of water was but small. Morgagni thinks that sometimes even a little water may be the cause of apoplexy; but he says that he is not of the number of those, who, when they find a little water within the skull of an apoplectic person, immediately conclude that it was the cause of the disorder.

Besides those above mentioned, we find interspersed through the numerous cases related by this author, accounts of a great variety of læsions of the parts within the cranium, particularly of the corpus striatum, the plexus choroides, the septum lucidum, the pineal gland, the parietes of the ventricles, and the medullary substance of the brain. He likewise, in his histories of dissections after apoplexy, describes ossifications, polypous concretions, hydatids, &c. within the cranium, and many morbid affections of various other parts—of the heart,

the lungs, the liver, the stomach, and intestines.

Lieutaud, from his own notes, and from the writings of Willis, Wepfer, and very many other authors, has also given an account of morbid appearances observed on dissection after apoplexy, in which he speaks of thickenings and ossifications of the membranes of the brain; --- of serum between the meninges, with hydatids attached to the plexus choroides, with a partial putrescence of the brain; — of hardness and inflammation of the brain, the ventricles containing much coagulated blood; --- of a redundance of water between the meninges, and in the ventricles, the corpus striatum, showing some marks of putrescence; --- of round vesicles filled with a white pituitous humour situated upon the corpus callosum; --- of a very large steatomatous tumour between the cerebrum and cerebellum; --- of thick viscid mucus, and a fœtid purulent matter in the brain. He decribes cases in which blood and serum, separate or together, have been seen after apoplexy between the meninges, on the surface of the brain, in its substance, and

in its ventricles. He cites three instances of blood found in the cerebellum, in one of which a part of the cerebellum was in a putrid state. He mentions a case which fell under his own observation, of turgid and varicose blood-vessels without any stagnation of blood, or of serum, which he considers as a case of apoplexy; but as he has not described the symptoms, and as the disease continued for a great many days before its fatal termination, the propriety of the appellation may be doubted.

M. Portal, in his chapter entitled "*Resultats de l'Ouverture des Corps*," remarks, respecting apoplectic persons, that their bodies preserve their heat for a long time after death; that this heat, in some cases, appears to be greater than during life; and that the limbs remain for a very long time flexible. He says that there is a fulness, more or less considerable, in the blood-vessels of the brain, of the cerebellum, of the medulla oblongata, and often of the spinal marrow, with or without an effusion of blood into the cavity of the cranium, and of the vertebral canal, between their membranes, or in their ventricles, or in

their substance; that there are effusions of serosity, of water, of albuminous and mucous matter, in greater or less quantity, and in different proportions, almost always in conjunction with congestion or effusion of blood; — that there are hydatids, encysted tumours, scirrhi, polypous concretions, fungosities, and false membranes; — that there are ossifications of veins, of sinuses, of membranes, and sometimes of arteries; — exostoses, splinters of bones, and malconformations of the cranium, diminishing in a greater or less degree its cavity. Frequently, he says, tumours and congestions have been found in the neck, in the breast, or in the abdomen; ossifications in the thoracic and ventral aorta, as well as in the arteries of the superior and inferior extremities, in the superior vena cava, in the right ventricle and the valves of the heart, with many other alterations in that *organ.

In a subsequent chapter, entitled "*Remarques sur les Resultats de l'Ouverture des Corps*," M. Portal enters into a minute detail respecting these, and several other

* Portal, p. 329.

morbid appearances founded on dissection after apoplexy. *

Dr. Cheyne, after having related what he had observed in his dissections after apoplexy, adds a summary of the most important phenomena in what he conceives to be the order of their appearance. "I mention first," he says, "the remains of an excited state of the minute arteries of the brain and its membranes, this probably being the most important, as it is the most unvarying appearance; then the extravasation of blood, probably the consequence of the excited state of the vessels; the turgescence of the venous system; the enlargement of the ventricles, partial or general; and, lastly, the serous effusion, which is generally found in various parts of the brain, and which would seem to imply previous absorption of the brain." †

Besides these systematic accounts of morbid appearances after apoplexy, many detached descriptions of dissections may be found in the *Journal de Medecine*, and

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* Portal, p. 331. † Cheyne, p. 24.

other periodical publications; but as they much resemble those which I have related, it does not appear necessary for me to extract them. The above mentioned are the principal and most common appearances, which have been observed within the cranium of persons who have died of apoplexy. There are, however, several cases on record, in which, on examination of the head after this disease, nothing morbid or uncommon has been found. Sir Gilbert Blane accounts for this by supposing that the inquiries made in such cases were not sufficiently minute. *

Mr. Carlisle says, "the particular affections, called apoplexy and palsy, have been illustrated by anatomical inspection, and it is well known, that the greatest number of cases have shown læsions of the brain or its vessels sufficient to explain the events; but it is also certain, that examples frequently occur, where no appearance of rupture or effusion in those parts could be found. That apoplexy or temporary palsy, says Mr. Carlisle, may arise from vascular

* It too often happens, that in dissection after apoplexy the head only is examined.

congestion within the skull, is to be inferred from analogous effects, following the known stoppage of the venous return of blood from the brain; and such congestion might even extend to the final suppression of all the vital functions, and leave no trace of physical derangement after death. Other causes are also capable of inducing fatal derangements of the sensorial organs; for excessive doses of opium or ardent spirit appear to extinguish life by their direct action upon the substance of the brain, independently of the disordered changes which they induce in the circulatory and respiratory organs."

It is much to be lamented, that in the accounts of the dissection of persons supposed to have died of apoplexy, the cases have been so imperfectly described. Bonetus, Lieutaud, and even Morgagni, have very generally contented themselves with giving names to the diseases which preceded their examinations, without any history of symptoms; and I think it very probable, that in many instances, these affections which they called apoplexies ought not to have been so denominated. A comparison of symptoms, or a consider-

ation of them, in connection with appearances on dissection, would afford considerable assistance to us in assigning causes, and thus lead to practical advantage.

With respect to the result of the examination of the bodies of persons who have died from hanging, drowning, the inhalation of mephitic gases, deleterious fumes, &c., I have not been able to obtain much information. M. Portal says, that where persons die from suffocation, or are poisoned by narcotics, there is a greater or less sanguineous fulness of the brain: he adds, however, that this is not always the case, the vessels of the brain sometimes not containing more blood than ordinary, and there being no other notable alteration, whether after mephitism, carus, apoplexy from gas, or narcotics. *

Dr. Goodwyn and Dr. Curry have described the appearances on the dissection of brute animals which had been drowned; but they do not admit that, in these cases, death is occasioned by apoplexy.

Dr. Goodwyn says, "if the body be immediately opened, it has these appearances:

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* Portal, p. 297.

the external surface of the brain is of a darker colour than usual; but the vessels are not turgid with blood, nor are there any marks of extravasation about them. The cavity of the lungs contains a considerable quantity of frothy fluid; and the pulmonary arteries and veins are filled with black blood throughout their whole extent. The right auricle and ventricle of the heart are still contracting and dilating; the left sinus venosus and auricle move feebly; but the left ventricle is at rest. The right auricle and ventricle are filled with black blood, and the left sinus venosus and left auricle also; but the left ventricle is only about half filled with the same coloured blood. The trunks and smaller branches of the arteries proceeding from the left ventricle, contain a quantity of this black blood also." *

Dr. Curry says, " on dissecting the body of a recently drowned animal, no particular fulness of the vessels within the skull, nor any disease of the brain or its membranes are, in general visible; and where such appearances do occur, they are rather the

* Goodwyn, p. 14.

effect of posture, or of some other accidental circumstances, than of the respiration being suspended. The lungs also are sound, and the branches of the wind-pipe generally contain more or less of a frothy matter, consisting chiefly of air, mixed with a small quantity of a liquid that is generally colourless, but sometimes of a reddish tinge. The right cavity of the heart, and the trunks of the large internal veins which open into it, and also the trunk and larger branches of the pulmonary artery, which carries the blood from this cavity through the lungs, are all distended with dark-coloured blood, approaching almost to blackness. The left cavity of the heart, on the contrary, is nearly, or entirely empty, as are, likewise, the large veins of the lungs (the pulmonary veins) which supply it with blood, and the trunk and principal branches of the aorta, or great artery, which conveys the blood from hence to the various parts of the body. The external blood-vessels are empty ; and the fleshy parts are as pale as if the animal had been bled to death. *

* Curry, p. 41.

CHAP. III.

Of the Causes of Apoplexy.

The causes of apoplexy may be considered as they predispose or render persons liable to the disease, and as they excite or actually produce it.

Among the *predisposing causes* of apoplexy, some authors mention hereditary conformation. — Forestus relates the cases of four persons of the same family, a father and his three sons, who died of this disease, which he observes was truly hereditary *; and Portal, in his account of *l'Apoplexie Plethorique* states, that he has seen many families in which this species was "comme hereditaire." Wepfer and many others are of the same opinion.

Advanced age is said to predispose to apoplexy.—The disease may happen at any time, but it seems most frequently to appear about the middle, or in the decline of life. Hippocrates says, apoplexies are

* Vere hic morbus hereditarius erat.

chiefly generated betwixt the fortieth and the sixtieth year * ; and the assertion so guarded, is I believe true; though it is certain that they sometimes occur before the first, and after the latter of these periods. Morgagni relates the cases of thirty apoplectic persons, of whom seventeen were above the age of sixty, and five were below forty; and out of eighteen cases described by Bonetus, five were those of persons above sixty, and six below forty. In both these authors, we find some instances of apoplexy occurring even below the age of thirty; but as these were occasioned, either by external violence, or by other complaints, they cannot be adduced in illustration of predisposition. Of six apoplectics mentioned by Forestus, three were below forty years of age. We find in the writings of some nosologists an "apoplexia infantum." Stoll and Portal mention this species, which however they consider as symptomatic of worms, or dentition, or occasioned by an improper admi-

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* Ἀπόπληκτοι δὲ μάλιϛα γίνονται, ἡλικίῃ τῇ ἀπὸ τεσσαράκοντα ἐτέων, ἄχρις ἑξήκοντα. *Aph. Sect.* vi. 57.

nistration of opiates. Portal says, I have seen children of a plethoric constitution, affected during dentition with a true coma ending in palsy of the arms or * legs. Apoplexy sometimes occurs at very advanced periods of life. Dr. Cheyne informs us "that he attended an old woman upwards of ninety, and in the last stage of dotage, who was carried off by † apoplexy." Bonetus relates the case of a lady of eighty of a plethoric habit, who was seized with the strong apoplexy, of which she died eighteen hours after the attack ‡; and Lieutaud quotes a case from Drelincurtius of a plethoric woman of the same age attacked with apoplexy, attended with stertor which proved fatal in a short time. §

Great heat or cold predispose to this disease. Dr. Cheyne says, "between the 12th of May, and the 9th of August, in the year 1808, I was called to nine cases of apoplexy;" and he observes that, "the summer of 1808 was the most sultry he

* Portal, p. 62.
† Cheyne, p. 151.
‡ Bonetus, Obs. xii.
§ Lieutaud, lib. iii. obs. 263.

had ever experienced." * He adds, " as far as I know, the only quality of the season upon which this disease depends, is extreme warmth." Cold, however, is generally thought still more strongly to predispose to apoplexy. This was evidently the opinion of the ancients. Hippocrates † mentions apoplexy among the disorders of cold and rainy seasons; and Aretæus says, this affection happens chiefly in winter, less frequently in spring, still less in autumn, and least of all in summer. ‡ Galen remarks, that cold with moisture, gives occasion to soporose affections. Cold, he says, diminishes animal energy; as is shown by the effects of cooling medicines, and cooling articles of diet; such as the lettuce, which, if taken in great quantity, produces somnolency. § He adds, stupor is produced by cold, as may be plainly observed in those

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* Cheyne, p. 147.

† Hippocrates, Aphor. Sect. iii. 16. 23.

‡ Ωρη, χειμών. ἔαρ, δεύτερον· ἔπειτα μετόπωρον· θέρος ἥκισα. *Aretæus de Sign. et Caus. Morb. diut.* lib. i. c. 7.

§ Καταφορικοὺς ἐργάζεται τοὺς ὕπνους.

Galen. de Loc. Aff. lib. iii. c. 6.

who travel in the cold of winter; and in the immoderate external application of refrigerants, by which a part will be rendered numb. * Indeed I have known, he says, the feet of some persons so affected by cold, as first to be deprived of sensation, and soon afterwards to become dead and putrid. † Forestus observes, that apoplexies are very common in cold and moist countries; at Florence, Lucca, and Bologna, which are cold from their situation; and in Germany and Britain, which are cold from the nature of the climate; they are most common in Holland, especially at Amsterdam. ‡ M. Boucher, in the *Journal de Medecine*, asserts that cold and moisture strongly predispose to apoplexy, and he thus accounts for the frequent occurrence of the disease in the city of Lisle. He thinks that cold quickly succeeding heat, more especially operates in giving occasion to this disease. To the frost, which in the month of November in the year 1767, suddenly succeeded mild weather, he says,

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* Ναρκώδες. † De Loc. Aff. lib. ii. c. 8.

‡ Forest. lib. x. Obs. lxx.

the apoplexies and palsies which were observed in the following month, ought to be attributed. He is of opinion, however, that apoplexies and diseases of that nature, most frequently occur when a thaw takes place after a very severe frost; and he gives an account of many cases of vertigo, tinnitus aurium, and soporose affections, which he had observed under such * circumstances. Baglivi asserts that apoplexy has sometimes prevailed epidemically in Italy. It is worthy of remark, he observes, that for the last two years, 1694 and 1695, a very great number of persons have been destroyed by apoplexy. This epidemic he ascribes to the unusual state of the weather. The summer of 1693 was so very hot that every thing was almost entirely burnt up and consumed, and the cold in the beginning of 1694 was so intense throughout Italy, that all parts were frozen up and covered with deep snow. The following summer was still hotter than the preceding, and for nearly five months there had been no rain;

* Journ. de Medecine, lib. xlviii. p. 335.

but towards the end of the year it fell in torrents, and continued for several months almost without intermission, in such quantity as had not before been known in the memory of man: during the uncommon weather of these years, the above-mentioned apoplexy raged. * This communication is made in a letter from Baglivi to Mangetus. †

Persons of a plethoric habit, especially those who have short thick necks, and who indulge in eating and drinking, and sleep, are predisposed to this disease. Galen, we are told, thought that apoplexy and epilepsy are sometimes occasioned by a fulness of blood; and Aretæus remarks, that those who are of a gross habit of body; of a lax or moist constitution; slothful, and gluttonous, are predisposed to it. ‡ Dr. Cullen thinks that "corpulency and obesity operate much in the production of apoplexy, by occasioning a more difficult transmission of the blood through the vessels of the lungs.

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* Sæviebat.

† Bonet. Anatom. Prælect. lib. i. sect. 2.

‡ Εξεις, οἱ παχέες κατὰ φύσιν, ὑγροι, αργόι ζωώδεες. *Aret. de Signis et Causis Morb. diut.* lib. i. c. 7.

It appears," he says, " that in fat persons, from the compression of the blood vessels in many parts of the body, the vessels of the lungs are thereby kept very full, so that upon the least increase of bodily motion which sends the blood faster into the lungs, a more frequent and laborious respiration becomes in such persons immediately necessary. This shows that in such persons the blood is not freely transmitted through the lungs, a circumstance which, as in other instances, must give a constant resistance to the return of blood from the vessels of the head, and therefore favour or occasion an accumulation of blood in them." * Forestus, speaking of a person disposed to apoplexy, observes, that he was devoted to gluttony; indolent; pituitous; plethoric; swallowing large draughts of heavy and strong fermented liquors. † In describing the case of a man who died suddenly of the strong apoplexy, he says, that he was of a gross habit of body, intemperate in

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* Cullen, p. 141.

† Copiose crassam cerevisiam ingurgitans.
Forestus, Lib. x. Obs. 69.

eating and drinking; and that his face was red, and covered with pimples, as is often seen in hard drinkers. * M. Portal says, from the earliest times it has been thought that those persons who have the greatest quantity of blood are most exposed to apoplexy; and daily observation confirms the opinion. Dr. Cheyne thinks that habits of life very strongly predispose to this disease. He says, "I am persuaded that there is so much more in the habits than either in the original form or diathesis, that I venture to affirm that in nineteen cases out of twenty of those who die of apoplexy, the disease might have been averted or postponed by temperance." † He even goes so far as to express his belief "that the daily use of wine or spirits, even in what is considered a moderate quantity, will lead a man of a certain age and constitution to apoplexy, as certainly as habitual intoxication." ‡ Although I do not agree with Dr. Cheyne in

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* Crassus, pituitosus, victu inordinato utens, bibax, cui facies rubicunda, pustulosa, adesset, ut egregiis potatoribus solet. *Forestus*, lib. x. Obs. lxxii.

† Cheyne, p. 146.

‡ Ibid. p. 149.

this opinion, I have no doubt that intemperance strongly predisposes to the disease. Apoplexy seldom occurs among the laborious poor, unless occasioned by drinking spirits to excess. I never saw a case of it, I think, in hospital practice. Sir G. Blane, however, at St. Thomas's hospital, and Dr. Young, at St. George's, have seen many apoplectic patients. Sir G. Blane says, that hemiplegia occurs as frequently in hospital as in private practice; and in this I agree with him; but I do not recollect a single instance of the occurrence of *apoplexy* at the London Hospital during an attendance there of above twenty years.

Some writers, among the predisposing causes of apoplexy, mention a leucophlegmatic, pituitous, or dropsical habit. M. Portal devotes several pages to the consideration of what he calls catarrhal apoplexy, which he observes is common in moist and cold countries; and which is the consequence of coryza, quinsey, croup, asthma, pulmonic complaints, and, in short, all catarrhal disorders, in moist seasons. He has often remarked that in wet winters, when catarrhal affections were very frequent, many per-

sons, especially old men, died more or less quickly, with all the symptoms of true apoplexy. *

The *exciting* or *occasional* causes of apoplexy mentioned by authors, are very numerous. Some account of them has been already given in the description of morbid appearances found within the cranium on dissection. They are chiefly blood; serum; tumours; hydatids; polypous concretions; ossifications; exostoses; and various læsions of the brain. These causes are said to act by producing pressure on the brain, which is supposed to be the most common immediate cause of the disease; and they may be divided into such as act quickly and powerfully, and those which act more gradually and feebly, in producing this pressure; the degree and the duration of the disease, being proportioned to the degree and duration of the pressure. In the strong *sudden* apoplexy, attended with stertorous breathing, the exciting cause is,

* Portal, p. 100.

I believe, almost always, an effusion of blood, because we can easily understand how by the rupture of a considerable vessel in the brain, an effusion sufficient to occasion a sudden and great pressure may take place, and because on examination after death we almost always actually find such effusion. Dr. Baillie informs me that he has seen a case of true apoplexy where the vessels of the membranes of the brain were very much distended with blood, but where no effusion was discovered. This person had also been a good deal affected with epilepsy; and I believe, says Dr. Baillie, a little serum had been effused between the tunica arachnoides and the pia mater; but I do not recollect this very distinctly.—In those cases in which the disease comes on gradually, and with symptoms warning us of its approach, I should, in the generality of cases, suspect the cause to be either blood poured out slowly from a small vessel, or serum gradually effused. In either case, if the effusion goes on, the full apoplexy may be produced; but it is difficult to conceive how serum should be effused so quickly as

to produce the sudden disease; and in fact, as far as I have been able to compare symptoms with appearances on dissection, the sudden apoplexy seems always more or less connected with an effusion of blood.

Effusions of blood, and also of serum, may then, with propriety, be considered as exciting causes of apoplexy; but tumours, hydatids, &c., which are of slow formation and growth, can only be admitted into the list of remote causes. They may give occasion to head-ache, vertigo, lethargy, stupidity, blindness, convulsions, &c., as we find by comparing the histories of cases in which they occur, with dissections; and they may, by their increase, in time, produce apoplexy, but not the sudden disease. I have, indeed, been informed of the occurrence of a case of sudden and true apoplexy, from an exostosis; but this exostosis was of a spiculated form, and probably produced the disease by wounding a blood-vessel,

Although tumours, hydatids, &c. have often been found on dissection after apoplexy, they have seldom, if ever, been seen after the strong disease, unless accompanied

with blood or serum. On a careful examination of the dissections of Bonetus, Morgagni and Lieutaud, I have been able to find only one instance of apoplexy in which organic læsion was observed in the brain unaccompanied with blood or serum. Lieutaud thus describes it: A man sixty years of age, for a long time subject to vertigo, was struck with apoplexy, from which, by the usual means, he recovered; the vertigo, however, continuing and increasing. In twenty-five days he seemed to be well, when the apoplexy occurring, carried him off. On examining the head, the brain was found faultless * excepting that the pineal gland was enlarged to the size of a walnut, was of a very compact dense substance, and appeared to be of a carcinomatous nature. † This, however, is not a case quite in point, for Lieutaud calls it vertigo ending in apoplexy.

A slight temporary apoplexy seems sometimes to be occasioned by pressure arising

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* Cerebrum inculpatum.

† Lieutaud, lib. iii. p. 188.

from a distension of the vessels of the brain, by an accumulation of blood in them, independently of effusion: indeed a case of this kind has fallen under my own observation. A gentleman whom I have had occasion frequently to visit, who is about sixty-five years of age, of a full plethoric habit, during violent fits of coughing, when much blood was determined to the head, has been repeatedly thrown to the ground, in a sort of apoplectic state, from which, however, he always soon recovered.

Although an effusion of serum may give occasion to apoplexy by pressure, I am persuaded that an effusion of blood is, in a very great proportion of cases, the exciting cause of the sudden strong disease. Dr. Kirkland is of a different opinion. He says, "there are abundance of instances which show that extravasated blood and serum do not cause apoplexies." Dr. Kirkland probably meant to say, that there are abundance of instances in which extravasated blood and serum have been found in the brain without preceding apoplexy, or that apoplexy is not always the consequence of effusion.

Effusions of blood are, I believe, very generally, either the consequence of great determinations of that fluid to the head, or of impediments to its free return from the head; whatever therefore may operate in either way may be reckoned among the more distantly exciting causes of the disease. Of these we have a great variety; such as violent passions of the mind, violent exercise of the body, fits of intemperance, excessive straining, long continued stooping, ligatures, tumours compressing blood vessels, rarefaction of the fluids by sudden and great heat, congestions by excessive cold; and the suppression of evacuations to which the body has been accustomed.

Dr. Abercrombie, speaking of the doctrine of increased determination of blood to the head, says, "I think it may be doubted whether this expression will bear examination, or whether it conveys any precise principle. The blood being propelled in every direction by an impulse primarily derived from the heart, it is not easy to conceive how, in the natural state of the parts, it should be propelled to the head with greater force, or in greater rela-

tive quantity, than to any other part of the body. The brain, indeed, says Dr. Abercrombie, from its extreme delicacy may be more likely than other organs to be affected by a general increase of the quantity of blood, or a general increase of its impetus, but I know no principle on which we can suppose, that in the natural state of the vessels, the blood can be sent with greater impetus, or greater quantity into the carotid, than into the subclavian, or any other great artery. To these considerations we must add the important fact, that the apoplectic attack often takes place with symptoms opposite to those that would accompany determination to the head, did such a state really exist, the face being in many cases pale, and the pulse feeble. Upon all these grounds, says Dr. Abercrombie, I think we must admit, that the doctrine of determination to the head is not supported by the principles of pathology, and does not accord with the phænomena of apoplexy." *

We have, however, the authority of seve-

* Abercrombie on Apoplexy, p. 19.

ral writers on apoplexy, both ancient and modern, in support of the opinion that violent passions of the mind, and other causes, by determining blood to the head, are capable of exciting the disease. Aretæus asserts that immoderate perturbations of mind *, consternation, fear, despondency ; in children, terror ; also sudden and great joy, and immoderate † laughter, have produced apoplexy. Forestus confirms the opinion of Aretæus. We have seen, he says, many, both men and women, affected with apoplexy in consequence of vehement anger, and sudden perturbation of mind. He adds, that sadness and fear, and excessive joy may induce it. ‡ He relates the case of a gentleman of a plethoric habit of body, and hereditarily disposed to the disease, who, on receiving information of the sudden death of an intimate friend, was instantly seized with a tremor of the left foot, and soon afterwards with apoplexy. § In Zulianus, we have a case related of apoplexy caused by sudden and

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* ψυχῆς ἀκρατέα πάθεα. Aretæus de Sign. et Caus. Diut. Morb. lib. i. cap. 7.

† Καὶ γέλως ἄσβεσος μέχρι θανατου. Ibid.

‡ Forestus, p. 509. § Ibid. p. 517.

excessive joy. M. Portal, in his account of the plethoric apoplexy, says, this superabundance of blood in the brain may also be the consequence of strong contentions of mind, of profound study, and of violent and prolonged chagrin. Hence, we are not surprised to find that the disease often happens to literary and scientific men; in short, to such as are devoted to painful mental * exertions, who, instead of taking the usual exercise of other persons, lead a sedentary life, so that the force and activity of the circulation of the blood necessary to health is diminished, and it is disposed to stagnation and congestion in the brain, and thus to the production of apoplexy. † M. Boucher, in the *Journal de Medecine*, observes that among the causes capable of interrupting the transmission of the nervous fluid through the organs of sensation and voluntary motion, we may class violent passions of the mind, anger, rage, excessive joy, &c. These passions accelerate the

* Several cases of this kind worthy of notice are mentioned by M. Portal. Vide Port. p. 152.

† Portal, p. 73, 74.

motion of the heart, and affect the lungs, and whatever hinders the passage through the lungs of the blood coming from the brain, causes it to flow back to the head, and thus apoplexy, or some other comatose disease is produced. * Dr. Cheyne relates an instance of sudden death by apoplexy, occasioned by anger. "A spare, sallow, old man," he says, "subject to vertigo and head-ache, with a polypus of the nose, had talked himself into a fit of passion. He found himself from sudden illness obliged to leave the parlour: when he reached his bed-room he complained of pain in his head and sickness, then retching came on, loss of muscular power, contracted pupils, paleness, slow pulse and insensibility: the next day he died." † Bonetus mentions the case of a lady who, in a sudden fit of anger, was seized with the strong apoplexy attended with much stertor. On examining the head, blood was found effused and concreted in each ventricle of the brain. ‡ I saw a case of apoplexy some years ago

* Journ. de Medecine, xlvii. p. 76.

† Cheyne, p. 4.

‡ Bonetus, Obs. xii. p. 87.

which had been caused by mental agitation. A gentleman of about forty-five years of age, in a violent paroxysm of anger, was seized with vertigo and pain in the head, which gradually increasing, in about two hours ended in apoplexy, with stertor, in which, however, sensation and motion were not completely abolished. The usual method of treatment was powerfully employed, but in two days the patient died. This instance, I think, may be adduced in support of my notion of the manner in which the occasional causes sometimes act in producing apoplexy. It is not unreasonable to suppose, that in this case the violent passion suddenly determined a quantity of blood to the head, and produced the rupture of a small vessel, and an effusion of blood sufficient to occasion pain and vertigo, and afterwards by its increase apoplexy; while, perhaps, the insensibility was not complete, because the quantity of blood effused was not large enough to produce a sufficient degree of pressure. The head, in this case, was not examined after death. A similar case occurred to my observation towards the latter end of the last year. A

gentleman, somewhat more than seventy years of age, of a full habit of body, and florid countenance, on getting into his carriage to go to his country house, was thrown into a violent passion by some circumstances which suddenly occurred. He soon afterwards complained of pain in his head, and by degrees he became sleepy, and in about a quarter of an hour wholly insensible. He was carried into the shop of an apothecary at Kentish Town, and was immediately largely bled. When I saw him, about an hour afterwards, I found him labouring under all the symptoms of the strong apoplexy. In about twenty-four hours he died.

Intemperance in eating and drinking not only pre-disposes to apoplexy, but when excessive sometimes excites it. M. Portal has a chapter entitled, "*De l'apoplexie qui survient pendant oû peu de tems apres le repas*," in which he adduces several instances of apoplexy from this cause. M. Portal thinks, that eating much at night is particularly prejudicial, for during sleep, he says, the patient is more disposed to the disease, on account of the greater deter-

mination of blood to the head at that time, than during the day. He remarks, that apoplexies were more common at Paris formerly than at present, because formerly it was the fashion to make supper, but now dinner, the principal meal. Instances of apoplexy occurring from intemperance in eating, may be found in Bonetus, Forestus, Morgagni, Lieutaud, and almost all authors who have written on the disease. In their description of cases, subito post prandium, or phrases of similar import very frequently occur. Lieutaud gives a case from Mangetus, of a man of sixty-four years of age, who was struck whilst at dinner, fell suddenly to the ground, with stertor, and soon died. I mention this case in particular, because, in it a quantity of water, filling the cavities of the brain and spinal marrow, was found, but no blood. This circumstance will be noticed hereafter. * Mead says, "most diseases of the head proceed from repletion." Dr. Fothergill observes, "that food distends the stomach, presses upon the aorta descendens, obstructs the free expansion of the lungs, and thus crowds the

* See Portal, p. 97. 125. 396.

arterial system of the head with more blood than ought to be there." Intemperance in drinking to intoxication, by determining too much blood to the head, may act as an exciting cause of apoplexy. Intoxication, indeed, when complete, has been considered as an apoplectic state, and Sauvages reckons among the species of the disease, the apoplexia temulenta, which he says so much resembles the sanguineous, as to have deceived incautious practitioners, to the great scandal of the art.* The apoplexy of intoxication is, however, in general only temporary, depending probably on a distension of the vessels without rupture; but cases have occurred of the strong apoplexy thus produced, in which, after death effusions of blood have been found in the brain. Lieutaud quotes from Haen an account of the dissection of a glutton, who in a fit of intoxication died of apoplexy, in whom the vessels of the pia mater were found in all parts aneurysmatic and varicose; the left anterior ventricle containing as much grumous blood as would fill a com-

* Sauvages, vol. i. p. 487. Curry, p. 88.

mon sized spoon, and the right ventricle containing about half the quantity of blood, which was somewhat more fluid. — The following account, transmitted to me by Mr. Martindale, apothecary to the London Hospital, tends to strengthen my opinion, that intoxication sometimes produces an apoplexy depending on a distension of the vessels without actual rupture. "David Torrington, on the afternoon of the 27th of June 1818, drank a quantity of pure rum, supposed about two pints; he shortly became insensible, and was found in that state under a hedge near the West India Docks. A surgeon passing by, bled him, and ordered him to be sent to the London Hospital. When admitted, he was in a state of total insensibility, he had stertorous breathing; frothing at the mouth; dilated pupils, which, however, contracted on holding a candle to the eyes, and a very full and hard pulse. A drachm and a half of sulphat of zinc was given, which operated well. At eleven at night, the same symptoms continuing, he was bled again largely, his head was shaved and a cold lotion applied to it. On the

following morning he was sensible when roused, but was heavy and drowsy. In the course of the day he was well purged, bled again, and kept on a low diet, and appeared to be recovering. On the 30th he complained of pain in the region of the stomach, and on the 1st of July he became furiously delirious; on the 2d he had roving slow delirium, copious perspiration, his strength failed him, he appeared sinking, and about midnight he died. On examination, the vessels of the posterior part of the brain only were found rather turgid; the quantity of fluid in the ventricles was natural, and there was no rupture of blood-vessels. The internal coat of the stomach was inflamed in patches, as also the internal and external coat of the intestines." In this case there was probably a distension of vessels from a too great quantity of blood determined to the head, which distension the depletion, by bleeding and purging, so far lessened, that the patient seemed recovering, when inflammation of the stomach and intestines supervened, and carried him off. — M. Portal admits that intoxication may produce apoplexy, but he thinks that

it is more frequently caused by a long continued abuse of intoxicating liquors than a temporary debauch. The abuse of intoxicating liquors, he says, gradually enervates the moral faculties, produces tremors of the limbs, stupidity, somnolency, and at length true apoplexy. * M. Portal, however, comprehends among the plethoric apoplexies, that from drunkenness (*par ivresse*) which is occasioned, as dissections have proved, by blood carried in too great abundance to the vessels of the brain, which, by excessively dilating them, compresses the central substance, and the origin of the nerves, so that rupture and effusion of blood take place. †

I am informed by Mr. Carlisle, that "a few years since a man was brought dead into the Westminster Hospital who had just drunk a quart of gin for a wager. The evidences of death being quite conclusive, he was immediately examined; and within the lateral ventricles of the brain was found a considerable quantity of a limpid fluid

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* Portal, p. 76. † Ibid. p. 75.

distinctly impregnated with gin, both to the sense of smell and taste, and even to the test of inflammability." The liquid, says Mr. Carlisle, "appeared to the senses of the examining students as strong as one third gin to two thirds water."

Violent straining, in lifting great weights or otherwise, has in several instances occasioned apoplexy. Morgagni says, that he knew a gentleman, nor was he the only one, who, being very full of blood, was seized with violent apoplexy on straining at the water-closet. *

Heat and cold not only predispose to apoplexy, but, when sudden and in extreme degree, may excite the disease. Exposure to the burning rays of the sun has, in many instances, produced a sudden fatal disease, which has been generally considered as apoplexy. Dr. Thomas observes, "that the coup de soleil, or stroke of the sun, which so frequently occurs in warm climates to those who are long exposed to its immediate influence, seems evidently to be an attack of apoplexy." † M. Portal

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* Morg. lib. i. sect. 12. † Thomas, p. 295.

gives, from Morgagni, an account of a man of seventy years of age, who, after exposure to the great heat of the sun, died of apoplexy; in the right ventricle of whose brain a quantity of concrete blood, equal in size to a hen's egg, was found; the plexus choroides being full of hydatids, some of which were very large.* — Sauvages, however, refers this affection to the genus carus. Carus ab insolatione, coup de soleil, is a disease, he says, which he has often seen in boys who had for a considerable time stood or slept exposed to the sun, from which they could not be roused, and which was always fatal in a short time.†

That extreme cold produces an almost irresistible disposition to sleep, and that this sleep, if undisturbed, will end in complete stupor and death, are facts perfectly well known. In Captain Cook's account of his first voyage round the world, he describes the dangerous situation in which Dr. Solander and Mr. Banks were placed, by an exposure to intense cold. Dr. Solander, he says, "who had more than once crossed the mountains which

* Portal, p. 81. † Sauvage, vol. i. p. 842.

divide Sweden from Norway, well knew that extreme cold, especially when joined with fatigue, produces a torpor and sleepiness that are almost irresistible; he therefore conjured the company to keep moving whatever pain it might cost them. 'Whoever sits down,' said he, 'will sleep, and whoever sleeps will wake no more.' Dr. Solander himself was the first who found the inclination, against which he had warned others, irresistible, and insisted upon being suffered to lie down. He soon fell into a profound sleep, from which, however, by the exertions of Mr. Banks, he was awakened. Several others of the party very narrowly escaped; and two of them slept, and perished from the cold." * M. Portal relates the case of a lady, who being in a bath of very cold water, and having ice repeatedly, while in the bath, applied to her head, was thrown into a profound sleep; her breathing became stertorous, she was deprived of sense and motion, and died.† The ex-

* See Hawkesworth's Account of Voyages, &c., vol. ii. p. 46.

† Portal, p. 235.

amination, he says, of the bodies of persons who have died from cold proves the presence of congestions of blood in the vessels and cavities of the body, and particularly in the vessels, and even the ventricles, of the brain. On opening the body of the person whose case is above described, a great quantity of blood was found in the ventricles and between the membranes of the brain: the substance of the brain, of the cerebellum, of the medulla oblongata, and of the other viscera, being in a sound state. Apoplexy from extreme cold, M. Portal says, is the effect of blood in too great a quantity carried to the brain, and retained there; the external veins of the body being contracted by the cold, cannot conduct it freely to the heart; and their correspondent arteries, not being able to empty themselves into the veins, become filled beyond measure; their blood penetrates the capillary extremities, (into which serum only ordinarily enters,) and flows into the brain and its membranes, or into the ventricles.*

* Portal, p. 235.

M. Portal's notions on this subject seem to want confirmation. Excessive cold undoubtedly produces, first drowsiness, and afterwards a profound sleep in which persons perish; but, we have not on record, I think, a sufficient number of cases with particular descriptions of symptoms and appearances on dissection, to enable us to say positively, that cold kills by producing apoplexy.

Over-distention and effusion giving occasion to apoplexy, may also, as Dr. Cullen has stated, be produced "by causes that operate by preventing the free return of the venous blood from the vessels of the head to the right ventricle of the heart; such as stooping down with the head, or other situations of the body, in which the head is long kept in a depending state, and in which the gravity of the blood increases the efflux of it by the arteries, and opposes the return of it by the veins; a tight ligature about the neck, which compresses the veins more strongly than the arteries," &c.

Many accounts of facts might be quoted in support of the opinion that tight liga-

tures about the neck, and other causes of obstruction of the veins carrying blood from the head, or interruption of the free transmission of blood through the lungs, may give occasion to apoplexy. Dr. Donald Monro states, that he has known soldiers carried off by apoplexy, in consequence of stricture of the veins of the neck, from their having been obliged to wear their cravats too tight. Winslow has made a similar observation in the Memoirs of the Academy of Sciences for the year 1741.

Dr. Fothergill mentions the case of a gentleman predisposed by his make, &c., to apoplexy, who was seized with a fit of that disease, as he was crossing the Thames in an open boat. "On being asked if he could recollect the position he was in when he lost himself, he replied he was looking at a ship, which had formerly belonged to his brother and himself, and kept his eye upon her, after he had gone by her, till he lost himself, and sunk down in the boat." "This," says Dr. Fothergill, "and some other occurrences, have induced me to think it very unsafe for persons of such a

make, to look backwards for any length of time without turning the whole body; and if we enquire of such persons, they generally acknowledge, that they find themselves become extremely giddy, and in hazard of falling down, when they keep in that posture only for a moment or two; and I believe that many persons have dropped down in apoplectic fits, merely from this unheeded cause. If we take a hollow flexible tube of leather, or any other yielding substance, six inches or more in length, holding one end in each hand, and endeavour, by turning each hand a contrary way, to twist the tube, we shall make but very little impression on its cavity, whilst our hands are at that distance, with one twist of our hands; but if we shorten the distance, and leave only one or two inches between each hand, the same turn of the hands, opposite ways, will lessen the diameter of the tube extremely, nay, almost wholly to bring the sides of the tube into contact, and prevent the passage of any fluid. In some respects, the same things happen to the jugular veins in very

short-necked people, and hence, therefore, first a giddiness, at length a total, though temporary, cessation of every faculty; or, in other words, a perfect apoplexy." *

Dr. Abercrombie admits of apoplexy from interrupted circulation; and "thinks that this principle will be found to accord with all the phenomena of simple apoplexy." The causes of this interrupted circulation, he observes, may be referred to the following heads:—"Derangement of the relation betwixt the arteries and veins of the brain in connection with a general state of plethora; causes which directly diminish the capacity of the venous system of the brain, or any part of it; diseases of the sinuses impeding the passage of the blood from the veins, or diminishing the area of the sinuses at particular parts; interruption of the circulation in the veins of the neck; and disease of the lungs and of the heart. Dr. Abercrombie adds, the circulation of the brain may be interrupted by diminution of the

* Fothergill's Works, vol. iii. p. 214.

impulse of blood entering the head, as in syncope, and disorders of extreme exhaustion."

For a particular explanation of the manner in which these causes act, and an ingenious illustration of Dr. Abercrombie's general doctrines, I have great pleasure in referring to his book.*

Some physiologists are of opinion that hanging produces death by inducing apoplexy. M. Portal says, persons who are strangled do not die of suffocation or want of respiration; they perish from apoplexy. In proof of this, he observes, that Morgagni, Lieutaud, and other great anatomists, have mentioned in such cases, a large quantity of blood found in the vessels of the brain, or in the cavities of that viscus, either without water, or mixed with water. He adds, water is sometimes found limpid and unmixed with blood. The examination of the bodies of persons who had been hanged, says M. Portal, which were formerly brought to us at the Jardin des

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* Abercrombie, p. 21—29.

Plantes for our lectures, furnished the same results. * Doctor Dejean, professor of medicine at Caen, convinced himself, by experiments made on living animals, that the result of strangulation was apoplexy; and that it was the effect of a congestion of blood in the brain. † Mr. Brodie informs me, that he found a large quantity of blood extravasated in the brain of a man who had been hanged; and that Dr. Hooper has in his possession a preparation of the brain of a person who died in a similar way, which exhibits a great deal of blood effused among the membranes. Some modern physiologists however do not agree in sentiment with M. Portal. Dr. Curry mentions an experiment, hereafter to be related, which appears conclusive on the subject.

It was formerly a common opinion, that drowning kills by inducing apoplexy; but Cullen, Hunter, Goodwyn, and others, maintain that death from drowning entirely depends upon the obstruction of respiration, which takes place under these

* Portal, p. 300. † Ibid. p. 302.

circumstances. Dr. Cullen, in his letter to Lord Cathcart, concerning the recovery of drowned persons, "considers it probable, that the death which ensues, or seems to ensue, in drowned persons, is owing to the stoppage of respiration, and to the ceasing, in consequence, of the circulation of the blood, whereby the body loses its heat, and with that the activity of the vital principle." Mr. Hunter says, "the loss of motion in drowning arises from the loss of respiration;" and he thought that this was the first cause of the cessation of the motion of the heart. Dr. Goodwyn agrees in opinion with Dr. Cullen and Mr. Hunter. Dr. Goodwyn made many experiments with a view to ascertain the effects of submersion upon living animals, from which he draws the following conclusions: — "That a small quantity of water commonly passes into the lungs in drowning; that the water enters into the lungs during the efforts to inspire, and mixing with the pulmonary mucus, occasions the frothy appearance mentioned by authors; that the whole of this fluid in the lungs is not sufficient to produce the changes which take place in drowning;

whence it follows," he says, "that the water produces all the changes which take place in drowning, indirectly by excluding the atmospheric air from the lungs, not directly by entering into the cavity of the lungs."

Dr. Goodwyn takes great pains to investigate the cause and manner of death from drowning, and is by no means disposed to consider the disease to be apoplexy, which is produced by submersion. Under these circumstances, death, he thinks, takes place, because the blood cannot receive oxygen from the air by respiration, without which the heart cannot be stimulated to action. "When the pulmonary blood," says Dr. Goodwyn, "is no longer fitted to excite the sinus venosus and auricle to contraction, they receive it into their cavity, and remain at rest. As soon as they cease to contract and propel the blood to the head, all the intellectual operations cease, and voluntary motions are suspended, and the external signs of life disappear." The disease, Dr. Goodwyn thinks, is in the blood, and consists in the presence of this black blood in the left side of the heart and arterial system, and

might, with more propriety, be named melanæma."* Under melanæma, as a genus, Dr. Goodwyn would place the diseases brought on by hanging and drowning; as, melanæma à suspensione, melanæma à submersione.

Dr. Curry thinks, that in hanging, as well as in drowning, the exclusion of air from the lungs is the immediate cause of death, "From the great accumulation of blood in the vessels of the head," says Dr. Curry, "many have been of opinion, that hanging kills chiefly by inducing apoplexy, but the following ingenious experiment made at Edinburgh many years ago by Dr. Monro, senior, clearly proves that the exclusion of air from the lungs is the immediate cause of death. A dog was suspended by the neck with a cord, an opening having been previously made in the wind-pipe below the place where the cord was applied, so as to admit air into the lungs. In this state he was allowed to hang for three quarters of an hour, during which time, both the circulation and

* Μελαν αιμα.

breathing went on. He was then taken down without appearing to have suffered much from the experiment. The cord was now shifted from above to below the opening made into the windpipe, so as to prevent the ingress of air into the lungs, and the animal being again suspended, he was completely dead in a few minutes." * +

We have hitherto spoken of apoplexy from pressure by blood, either accumulated or actually effused. — An effusion of serum in too great a quantity in the brain may also, it is said, give occasion to apoplexy from pressure. Of such an effusion there are many remote causes, and it is of practical consequence to remark, as will hereafter be explained, that several of the above-mentioned causes of an effusion of blood, may likewise occasion a morbid effusion of serum. Dr. Cullen says †, " that an increased afflux of blood into the arteries of the brain, and an increased action in these, may either occasion a rupture of their extremities, and thereby an effusion

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* Curry's Observations, p. 71. † Cullen, vol. iii. p. 164.

+ If the ligature were in reality tight, how was the brain supplied by the Carotids with the proper quantity of Arterial and returned by the Veins

of red blood, producing compression; or the same afflux and increased action may occasion an increased exhalation from their extremities, of a serous fluid, which, if not as quickly re-absorbed, may soon accumulate in such a quantity as to produce compression." He further observes *, that "besides these causes of apoplexy from afflux in the arteries, or resistance in the veins, an effusion of serum may happen from two other causes. The one is a relaxation of the exhalants, as in other cases of hydropic diathesis prevailing in the body; and it is not unusual for a general dropsy to end in apoplexy. The second is an over-proportion of watery parts in the mass of blood, which is therefore ready to run off by the exhalants, as in the case of an ischuria renalis, which when it proves incurable, very commonly terminates in apoplexy."

But in addition to the various causes supposed to act by pressure, authors have mentioned in the list of causes of apoplexy

* Cullen, vol. iii. p. 166.

several others, concerning which physiologists have differed in opinion, both as to their mode of acting, and the nature of the disease produced by them. The chief of these are opium, and other narcotics; certain vegetable poisons; alcohol, and other products of distillation; mephitic gases; and deleterious fumes or vapours, such as those from burning charcoal, or from quicksilver, lead, and other metallic substances. Dr. Cullen is willing to admit these noxious powers among the causes of apoplexy, and adds to them the power of cold, concussion, electricity, and of certain passions of the mind * &c.; but Sauvages thinks, that they produce carus and asphyxia, not the true apoplexy. Yet he quotes a case of what many would call apoplexy, from an over dose of

* Some writers are of opinion, that persons struck by lightning die apoplectic. Bonetus, from Benevitius, relates (p. 127.) the cases of a father and son who "uno et eodem momento a fulmine factos apoplecticos evasisse;" and also a case from Hildanus, in which the head of a person killed by lightning was greatly swelled, and became black, "unde graviter læsum fuisse cerebrum constat." Hildanus, however, speaking of the effects of lightning, says, "rarius tamen veram apoplexiam excitat."

laudanum. He speaks of carus à narcoticis, asphyxia à mephitide, à carbone, à fumis, à musto, &c. and he distinguishes carus from apoplexy by the absence of * stertor. The carus a narcoticis, he says, is occasioned by all opiates in too great a dose, when persons are not accustomed to them, either taken by the mouth or in the form of glyster, or, according to Dr. Bouillet, in the form of liniment applied to the chest; by the seeds or roots of hyoscyamus and stramonium, by the fumes from charcoal, &c. and by the vapour of fermenting must. †

M. Portal agrees in opinion with Sauvages on this subject. Apoplexy from mephitic gas and narcotic poisons, he says, does not so often happen as carus and asphyxia; but he admits, that the true apoplexy, with stertorous breathing, may, in some instances, have occurred to the mephitises. He observes, that this may take place, not only from opium internally taken, but even externally applied. ‡

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* Carotici non stertunt sed pacatissime rarissimeque respirant. Sauv. p. 837.

† Sauvages, p. 843. ‡ Portal, p. 294.

There are some cases on record, in which the true apoplexy appears to have been the consequence of opium taken in too great a quantity. Sauvages mentions the case of a boy of five years of age, who in half an hour after having swallowed a drachm and a half of liquid laudanum, became drowsy and stupid, the breathing being deep and stertorous, the pulse full, equal, and slow, and the sleep such as not to be * overcome. Dr. Marcet, in the first volume of the *Medico-chirurgical Transactions*, gives an account of a young man about eighteen years of age, who had taken no less than six ounces of laudanum, the whole of which had remained in his stomach, and had brought on symptoms which appeared to threaten immediate dissolution. "Notwithstanding the exhibition of strong emetics, which made him vomit about an ounce and a half of a fluid which had a strong smell of opium, the lethargy had gradually increased, and he had at last fallen into a *state of complete insensibility.*" Dr. Marcet

* Sauv. vol. i. p. 847.

says, "*his respiration was slow and sonorous, like the apoplectic breathing;*" and afterwards, "*his pupils were dilated, and his breathing apoplectic.*"* There is, in the same volume of the transactions of the Medico-Chirurgical Society, an account, by Dr. Babington, of a case of exposure to the vapour of burning charcoal, in which some of the characteristic symptoms of the true apoplexy were observed, viz. *insensibility, with a strong, full pulse, and stertorous breathing. At the corners of the mouth there was a copious discharge of frothy saliva.*†

With respect to the modus operandi of these noxious substances, we find, in writers on the subject, a variety of opinions. Dr. Cullen thinks that they act by directly destroying the mobility of the nervous power. "None of these poisons," he says, "seem to kill by acting first upon the organs of respiration, or upon the sanguiferous system, and I believe their immediate and direct action to be upon the nervous power, destroying its mobility, because the same

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* Med.-Chir. Trans. vol. i. p. 79. † Ibid. p. 77. 83.

poisons show their power in destroying the irritability of muscles, and of the nerves connected with them when both these are entirely separated from the rest of the body.* Dr. Goodwyn, however, is of opinion "that many of these noxious powers destroy life by obstructing respiration, and thus preventing the chemical changes which take place in the blood in ordinary, and which give it a stimulating quality, by which it is fitted to excite the left auricle and ventricle to contraction."† Dr. Goodwyn refers the diseases produced by these noxious powers to the genus melanæma abovementioned, as melanæma ab inspiratione aeris fixi, ab inspiratione aeris phlogisticati, &c. Dr. Curry says, "when carbonic acid gas is attempted to be drawn into the lungs in its pure state, it occasions an instantaneous contraction of the glottis, or passage into the wind-pipe, and the animal falls as suddenly as if struck by lightning." He adds, "it would appear, however, that the breathing of these vapours‡ is

* Cullen, vol. iii. p. 169. † Goodwyn, p. 84.

‡ Hydrogene, nitrogene, and carbonic acid gas.

attended with other effects besides that of merely excluding vital air from the * lungs." Dr. Curry likewise says, "as, upon examining the lungs of animals killed in this sudden way, (by carbonic acid gas,) no more carbonic acid gas is found in them than in those animals that were hanged or drowned, there is reason to believe that this gas destroys life by some peculiar action on the nervous system, altogether independently the blood."

Mr. Brodie, from a series of ingenious experiments, concludes that several of the narcotic poisons, such as alcohol, juice of the leaves of aconite, the woorara, essential oil of almonds, and the empyreumatic oil of tobacco, whether applied to wounded surfaces, or taken internally, occasion death by destroying the functions of the brain, without directly acting on the circulation; and he found that some of these poisons produce symptoms considerably resembling those of apoplexy. With respect to alcohol, he observes, "there is a striking

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* Curry, p. 73.

These conclusions have been questioned by Addison & Morgan of Guy's Hospital who have adduced some striking experiments in

analogy between the symptoms arising from spirits taken internally, and those produced by injuries of the brain."* It is a curious fact, ascertained by Mr. Brodie, that although the *empyreumatic oil* of tobacco and the other poisons above mentioned, act upon the brain, and not upon the heart, yet the *infusion* of tobacco, when injected into the intestines, and the *upas antiar*, when applied to a wound, have the power of rendering the heart insensible to the stimulus of the blood, and thus stopping the circulation.†"

The suppression of evacuations to which the body has been accustomed, especially of blood, is said to have frequently given occasion to apoplexy. M. Boucher, in the 47th volume of the *Journal de Medecine*, says, that apoplexy is often the consequence of the suppression of the hæmorrhoidal flux, or of the periodical discharge in females: in both cases of suppression, the blood, he remarks, is more easily accumulated in the interior of the head, finding less resistance

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* Phil. Trans. 1811. p. 206. † Ibid.

there than elsewhere; and the delicate vessels which terminate in the white substance of the brain are easily forced by this excess of blood. — M. Portal agrees in opinion with M. Boucher, and adduces an instance in which the cessation of hæmaturia was followed almost immediately by an intense somnolency with beginning stertor and privation of sense and motion, from which state the patient was restored by a topical evacuation of blood. — We find in various authors, accounts of apoplexy following the suppression of urine, the sudden stoppage of chronic diarrhœa, of sweating, of the discharge from old ulcers, &c. Illustrations of this by cases may be found in the works of Morgagni, Quarin, and Portal, in the *Journal de Medecine*, &c.

Apoplexy is not unfrequently symptomatic of, connected with, or caused by other diseases, particularly fever, hysteria, epilepsy, diseases of the liver and other abdominal viscera, dropsy, scurvy, small-pox and other exanthemata, worms, rheumatism and gout. — There is no disease more frequently connected with apoplexy than gout. M. Portal relates three cases of gouty

Apoplexy frequently attends diseased Kidneys. Vide Bright's reports.

apoplexy, in which, on dissection, the usual appearances after true apoplexy were found. In the first a great quantity of liquid blood was seen in the ventricles, and a clot of hard black blood in the cavity of the right hemisphere, which appeared to be the effect of an erosion of the cerebral substance; in the second water was observed in the ventricles of the brain, and a large clot of black concrete blood in the right hemisphere accompanied by erosion; and in the third, which was the case of the celebrated Malpighi, in the cavity of the right ventricle of the brain about two pounds of coagulated blood were found, the left ventricle contained about half an ounce of a reddish water, in which were several gravelly concretions, the blood-vessels were preternaturally distended, and the dura mater adhered very firmly to the cranium. Malpighi died suddenly of apoplexy in the year 1604, and his head was examined by Baglivi, who considered the effusion of blood as the cause of the disease and of his death. M. Portal says, other instances might be quoted from authors in addition to these, which confirm the fact that arthritic

apoplexies occur which are occasioned by effusions of blood between the membranes of the brain, in its ventricles, and in its substance with or without erosion. * In gouty or rheumatic translations to the head, however, the true apoplexy, with stertor, is not, I believe, so often produced as a comatose or lethargic state.—For almost innumerable examples of various diseases connected with, or causing apoplexy, reference may be made to Bonetus, Morgagni, Zulianus, Sydenham, Sauvages, Forestus, Portal, Boucher, Dumas, Cheyne, and many others. Some writers rank these combinations among the *species* of apoplexy; thus Sauvages mentions the *apoplexia febricosa*, *inflammatoria*, *epileptica*, *arthritica*, *metastatica*, *hysterica*, &c. How those combinations take place, or how these diseases influence each other, we do not know. "It would be vain," says Dr. Cheyne, "to enquire in what manner apoplexy is occasioned by the sympathy of the brain with distant parts; we must be content with the †fact."

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* Portal, p. 108, 110. † Cheyne, p. 108.

Physiologists, both ancient and modern, have very generally considered the *immediate*, or *proximate* cause of apoplexy to be an obstruction of the passage of the nervous fluid into the organs of sense and motion. This was the opinion of Galen and his disciples. Apoplexy and epilepsy, he says, seem to be generated by a quantity of pituitous humour collected in the ventricles of the brain, which obstructs the passage of the animal spirits from the ventricles: and again, apoplexy, by the suddenness of its attack, denotes a cold, or thick, or viscid humour entirely filling the principal cavities of the brain.* Paulus Ægineta, when speaking on this subject, expresses himself nearly in the same words; and Ætius from Archigenes, De Resolutione, says, this affection depends upon much thick and viscid humour obstructing the nerves of voluntary motion.† Dolæus says, that Hippocrates

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* Ἡ δὲ ἀποπληξία δια τὴν ἐξαίφνης γένεσιν, ἐνδείκνυται ψυχρὸν χυμον, ἢ παχὺν, ἢ γλίσχρον ἀθρόως πληροῦντα τὰς κυριωτέρας των κατα τὸν ἔγκέφαλον κοιλιων.

Galen, De Loc. Aff. lib. iii. c. xi.

† Ætius Tetrab. ii. Serm. ii. c. 27.

considers apoplexy as depending on congestion, and gives from him a passage to that effect. * Avicenna is of opinion that apoplexy arises from an obstruction of the sensitive and motive spirit in its passage from or to the brain, the former depending on a sanguineous, or phlegmatic humour effused suddenly into the ventricles of the brain. † Morgagni quotes the following passage from Galen, but without referring to the part of his works in which it is to be found: "By this means apoplexies are brought on, that is, by much blood rushing tumultuously into the origin of animation." ‡ Burserius thinks, that the proximate cause of apoplexy is an interruption of the connection between the cortex cerebri and its medulla, or between the medulla and the other parts which are employed in sense and voluntary motion, and that the causes of this interruption may be properly divided into such as fall

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* Dum autem Sanguis non movetur, fieri non potest, ut non etiam corpus quiescat et torpeat. *Dol.* p. 145.

† Avicenna, lib. iii. fen. i. tract. 5.

‡ Morg. lib. i. epist. iii. art. 27.

under the cognizance of our senses, and can be detected within the cranium, and those which are not cognizable by the senses, and which rest on thought or conjecture. * Dr. Cullen says "the proximate cause of this disease (apoplexy) may be in general whatever interrupts the motion of the nervous power from the brain to the muscles of voluntary motion, or in so far as sense is affected, whatever interrupts the motion of the nervous power from the sentient extremities of the nerves to the brain. Such an interruption of the motions of the nervous power may be occasioned either by some compression of the origin of the nerves, or by something destroying the mobility of the nervous power.† Apoplexy, says M. Boucher, consists in a defect in the transmission of the nervous fluid of the white part of the brain into the organs of sensation and voluntary motion, which may depend upon causes which act directly or indirectly. He enumerates many of these causes, such as effusion of serum, of blood,

* Burserius, de Apopl. p. 59.

† Cullen, vol. iii. p. 152.

&c. He is of opinion that apoplexy sometimes depends upon a diminution or defect of secretion of the nervous fluid in consequence of profuse hæmorrhages, and other causes of debility. Under such circumstances, blood, he thinks, is not carried to the brain in a quantity sufficient for the secretion of the animal spirits. M. Boucher supposes that a deficiency of this secretion sometimes depends upon a thickening of the blood into a solid mass not adapted to secretion, or upon a disordered state of the secretory organ itself, or of the parts connected with it. * Dolæus says that a deficiency of secretion of the nervous fluid may sometimes depend upon a bad state of the blood. † According to Burserius, some celebrated men have thought that a deficiency of determination of blood to the brain, or an interruption of its passage to the brain, are sometimes causes of apoplexy, and he refers to Boerhaave, Van Swieten, and Vogel on the subject. Apoplexy from a deficiency of blood has been denominated *apoplexia defectiva.*

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* Journal de Medecine, xlvii. p. 81—83.

† Dolæus, p. 146.

Selle, Zulianus, and some others suppose that apoplexy may immediately depend upon a spasm of the brain.

The opinion, however, that apoplexy is immediately caused by an obstruction of the passage of the nervous fluid into the organs of sense and motion has been the favourite hypothesis of physiologists, and seems, more satisfactorily than any other, to explain the manner in which the exciting causes act in producing the symptoms of the disease.

CHAP. IV.

Distinctions.

Apoplexy has been distinguished into various kinds, according to its degree or its cause. Hippocrates speaks of the strong and the weak, and Galen admits four distinctions of the disease, according to the degree in which respiration is affected.—Some writers divide apoplexy into the *fortissima*, in which a person falls suddenly to the ground as if struck by lightning and instantly dies; the *fortis*, in which sense and voluntary motion are suspended; and the *debilis*, in which the power of motion is wholly or partially lost, that of sense in some degree remaining: the last of these has been denominated parapoplexia.

Nosologists have described certain nerv-

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* Ἰσχυρὴν καὶ ασθενεα.

ous affections called carus, coma, lethargus, &c., which some consider as distinct diseases, others as inferior degrees of apoplexy. Dr. Cullen says, " Under the title apoplexy are comprehended those diseases which, as differing from it in degree only, cannot, with a view either to pathology or practice, be properly distinguished from it: such are the diseases sometimes treated of under the names of carus, cataphora, coma, and lethargus." * Sauvages, with the ancient physicians, is of a different opinion. There are some persons, he observes, who contend that the various soporose affections differ in degree only, and ought therefore to be reduced to one genus, of which the species may be carus, lethargus, cataphora, apoplexia, &c.; but those very persons, in admitting the different species of carus, lethargus, apoplexia, &c., plainly confess that they are so many genera, since a genus of disease is that which comprehends under it different species; and thus they offend against the rules of logic, and con-

* Cullen, iii. 149.

tradict themselves; for since the degree, more or less, cannot change the species, à fortiori, it cannot change the genus. * Dr. Young and Mr. Good do not consider these affections as inferior degrees of apoplexy, but characterise them by symptoms, and place them under carus, as a genus, which Dr. Young defines "a suspension of the powers of sense and motion, more or less perfect, with an appearance of sleep, the motions of the heart remaining uninterrupted;" † and Mr. Good, "muscular immobility, mental or corporeal torpidity, or both." ‡ Sauvages places all the diseases, commonly called soporose, under comata, as an order; and ranks lethargus, carus, apoplexia, and many others, as genera. Dr. Cullen also places apoplexy as a genus under the order comata, and enumerates the following species of this genus, distinguishing them by their causes: — the *sanguinea*, marked by signs of plethora, especially in the head; the *serosa*, chiefly

* Sauvages, Nosol. Method. i. 822.

† Young, Syst. of Pract. Nosol. p. 248.

‡ Good, Nosology, p. 365.

occurring in leucophlegmatic habits in the decline of life; the *hydrocephalica*, which, coming on gradually, affects infants and children, first with lassitude, slight fever, and pain in the head, and afterwards with a slow pulse, dilated pupil, and somnolency; the *atrabiliaria*, which takes place in persons of the melancholic temperament; the *traumatica*, arising from external mechanical injuries of the head; the *venenata*, occasioned by sedative powers internally taken, or externally applied; the *mentalis*, produced by passions of the mind; the *cataleptica*, in which the limbs remain in whatever situation they are placed by external power; and the *suffocata*, arising from an external suffocating cause. Dr. Cullen also enumerates many species of symptomatic apoplexy.

Dr. Cullen's divisions of apoplexy into species, so far as they depend upon evident causes leading to a corresponding mode of treatment, such as the *traumatica* and *venenata*, may, perhaps, be safely and properly admitted; but when distinctions are made upon a presumption only of the knowledge of causes, and yet lead to a

specific practice, as in the *sanguinea* and the *serosa* they should not, I think, be received without a very careful examination of the grounds on which they are made.

With regard to the *apoplexia hydrocephalica* of Dr. Cullen, commonly called *hydrocephalus internus*, or water in the head, I wish to observe, that it appears to be a complaint very different from the true apoplexy, both as to its nature and treatment; and ought to be considered as a distinct and separate disease.

In the writings of the ancients we do not find any accounts of distinctions of apoplexy at all resembling those of Dr. Cullen. They seem very generally to have thought that this disease depends upon the presence of a viscid pituita or humour in the brain, either becoming acrid, or being obstructed in its passage from the head. Hippocrates speaks of the humours which flow from the head which may be obstructed, or become acrid, &c.* The opinions of Galen and the other Greek physicians, do not on this

* Hippocrates, De Gland. p. 53.

subject materially differ from those of Hippocrates. Morgagni, however, observes, that some of the fathers of physic acknowledged an apoplexy from a sanguineous cause, though the greater part of them believed the contrary. Galen, he says, has taught us that an apoplexy may be formed from an abundance of blood within the cranium *: but I have not been able to find any direct observation in confirmation of this. Many eminent modern physicians have approved of the distinction of apoplexy into the *sanguineous* and the *serous;* and they enumerate certain circumstances and symptoms, which they think characterise these species. The *sanguineous* they say, is marked by plethora, especially in the head, a strong robust constitution, suddenness of the attack, a swelled, red or purple countenance, a full, strong pulse, laborious stertorous breathing, prominence and inflammation of the eyes, and an increased heat of body, the disease happening not unfrequently in the vigour of life,

* Morgagni, ep. iii. art. 37.

The *serous* apoplexy takes place, they say, more especially in advanced, or old age, in debilitated or leucophlegmatic habits, and makes its attack more gradually than the sanguineous. In this species the countenance is said to be pale; the pulse weak, and often irregular; the heat of the body seldom increased, sometimes less than natural; a frothy saliva or foam from the mouth, according to some writers, being more especially observable. With respect to the state of respiration in the serous apoplexy, authors are not agreed. Burserius asserting that it is more impeded and stertorous, and Tissot maintaining the contrary opinion.

Although the distinction of apoplexy into the sanguineous and the serous was approved by Morgagni, Boerhaave, Hoffman, Mead, Cullen, and many others, and has been very generally adopted, its propriety has been doubted by writers of great respectability. Dr. Heberden says, "books do indeed make a distinction between a pituitous and sanguineous apoplexy, in the latter only of which they recommend bleeding; but this difference is not easy to be

seen, and seems hardly ever looked for in practice." * M. Portal, in a memoir prefixed to his work on apoplexy, speaking of this distinction, remarks, such was the doctrine of the most celebrated physicians who have preceded us, and it is still the doctrine of the most distinguished physicians of the present day. It had been adopted by M. Portal in his practice, and taught in his lectures, when a circumstance occurred which seems to have made a very material change in his opinions on the subject. He had occasion to examine the body of a person who had died after having experienced all the symptoms of serous apoplexy, when, on opening the head, he found the vessels of the dura and pia mater full of blood, and also those which insinuate themselves among the circumvolutions of the brain dilated and swelled with blood, the plexus choroides gorged with that fluid, and a great quantity effused in the basis of the cranium, the ventricles of the brain being quite dry; not containing even a drop of water. In another instance, after the symp-

* Medical Trans. i. 473.

toms supposed to indicate serous apoplexy, he observed blood in the cavity of the cranium, under the hemispheres of the brain, and cerebellum, and in the vertebral canal; the ventricles containing but a small quantity of serum, not more than that which is ordinarily found. He adduces a third case in which the symptoms were such as are considered characteristic of serous apoplexy, in which, he says, no doubt blood collected in the vessels of the brain had produced a compression upon that organ, and upon the origin of the nerves, &c. M. Portal, however, is not quite correct in his deduction from this case, for the patient did not die, and the cause of the disease therefore could not be ascertained: he seems to have had no ground for his conclusion, but that of the patient having recovered after large and repeated bleedings. But if paleness of countenance, foaming at the mouth, a concentrated and small pulse, joined to the other symptoms of apoplexy, are not certain signs of the presence of water in the cranium, or in the brain; neither, says M. Portal, are redness of countenance, and fullness of pulse certain

signs of an excess of blood in these parts. In many apoplectics, who had a red countenance, with prominent eyes, a full pulse, and no foam from the mouth, he says, water has been found effused between the brain and the cranium, in the ventricles, or in both situations; but he produces no authority for this assertion. He mentions two cases, indeed, which fell under his own observation, in one of which, after the symptoms of sanguineous apoplexy, the ventricles of the brain were seen full of a reddish serosity, the plexus choroides being loaded with hydatids of a great size; and in the other, when he had concluded from appearances that the apoplexy had been produced by a stagnation of blood in the brain, he was convinced of the contrary by opening the body and finding that the ventricles were full of a yellowish humour, the plexus choroides being covered with hydatids, without any blood either stagnant in the vessels of the brain, or effused in the cavities of that organ, or in those of the cranium *; but it

* Portal, p. 12.

may be remarked, with respect to the first of these cases, that M. Portal had no opportunity of knowing its history, and seems to have concluded that the disease was sanguineous apoplexy, merely because the face was swelled, and of a blackish colour, as if covered with ecchymosis; and with respect to the second, that he has not described the symptoms, nor asserted positively that blood was not found within the cranium on examination after death. But admitting that M. Portal had fully established both his positions, it would not follow that the distinction of apoplexy into the sanguineous and serous is without foundation in nature. M. Portal's observations, on the contrary, rather tend to prove the correctness of the distinction by showing that sometimes *blood* and sometimes *serum* are found in the brain after death by apoplexy. — The important conclusion to be drawn from the examinations of M. Portal and others is, that in these cases it is extremely difficult to make the distinction during life. Cases seldom occur so strongly marked by circumstances and symptoms as they are described by authors in enumerating the

characteristics of the two apoplexies, and even in those most distinctly marked, erroneous conclusions as to the cause have been very frequently made; blood having been often found where the dissector expected to see serum, and in some instances, as we are informed, water having appeared to be the cause, when the disease had been supposed to depend upon the presence of blood. M. Portal's practical conclusions from his observations are correct and important: hence it clearly appears, he says, that the signs by which physicians believe that they can distinguish serous from sanguineous apoplexy, such as paleness of the countenance, weakness, smallness and slowness of the pulse, are not to be depended upon (illusoires), and have led, in the treatment of this malady, to a most destructive practice. * M. Portal observes, that it is an error to believe that the apoplexy to which old men are so much subject, is not sanguineous. He says, the examination of the bodies of very old persons have proved

* Portal, p. 14.

the contrary, and he quotes the cases of Daubenton and Le Roy, members of the Institute, both of whom at an advanced age died of this kind of apoplexy.* A very great number of cases might be adduced from authors to prove that after what has been called *serous* apoplexy, *blood* has been found in the brain. Zulianus describes an apoplexy marked by a pale countenance, and a pulse so weak as scarcely to be felt, which, on examination after death was found to be *apoplexia vere sanguinea;* and another, in which, after all the symptoms of serous apoplexy, much blood was discovered in the brain without any effusion of serum, or even the smallest moisture in the ventricles.† Burserius puts us on our guard against believing that the apoplexy of old age, marked by a pale countenance, is not sanguineous, for under such circumstances it often happens that blood has been found effused in the brain.‡

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* Portal, p. 23.

† Zulianus, De Apopl.

‡ Caveto autem ne ex sola facie pallida, aut in senili ætate credas non esse sanguineam, non raro enim in senibus apoplexia cum facie pallida sanguis intra cerebrum, effusus inventus est. Burserius, De Apopl. p. 82.

Some writers are of opinion that in those cases in which serum has been found in the brain after apoplexy, it is to be considered rather as the effect than the cause of the disease. Stoll says, "In sectionibus hominum apoplexia mortuorum, sæpe dubites an serum effusum causa vel effectus apoplexiæ fuerit." * Sauvages observes, that when water has been found in the brain, it does not follow that apoplexy has been occasioned by it. † M. Portal seems inclined to adopt the opinion of Stoll. He remarks, that as water is sometimes to be seen in apoplectic subjects, who, before or during the attack, had laboured under all the symptoms of sanguineous plethora, it may be reasonably doubted, whether or not the water collected in the head was the effect of the apoplexy, or its cause. Dr. Abercrombie maintains, that "the distinction betwixt the symptoms of sanguineous and serous apoplexy, has no foundation in ex-

* Stoll, Prælect. p. 367.

† Ex eo quod in cadavere sinus cerebri aqua turgidi reperiantur non sequitur, apoplexiam ab illo sero fuisse inductam. Sauvages, Nosol. p. 848.

perience or observation." He objects to the term serous apoplexy entirely, and thinks it extremely doubtful whether there really exists such a disease. * "If by serous apoplexy," says Dr. Abercrombie, "we mean to express simply an apoplectic disease, in which, on dissection, we find serous effusion, we express a fact, and the name is harmless. But if we mean a disease in which serous effusion takes place immediately, so as to be the direct cause of the apoplexy, we express not a fact, but a doctrine, and a doctrine which is extremely doubtful." On this subject Dr. Abercrombie makes some observations which are highly worthy of attention. "In other parts of the body," he says, "serous effusion is seldom or never a primary disease. In the abdomen we trace it to peritonæal inflammation, or organic disease obstructing the venous circulation. In the thorax we trace it to pneumonic inflammation, or to other diseases of the lungs and of the heart. In the brain it is in many cases distinctly traced to inflammatory action, and it is

* Abercrombie, p. 32.

probable that there also it may arise from obstructed circulation. In neither the thorax nor the abdomen do we meet with it as a primary disease, and it is not probable that it should occur as a primary disease in the brain. In other parts of the body serous effusion takes place slowly, and does not accumulate at once in such quantity as to induce urgent symptoms. It is therefore not probable that it should accumulate in the brain with such rapidity as to produce the symptoms of an apoplectic attack. The quantity of effused fluid bears no proportion to the degree of the apoplectic symptoms. We often find it in small quantity when the apoplectic symptoms have been strongly marked and long continued. We find it in large quantity when the symptoms have been much slighter. We find it in very considerable quantity when there have been no apoplectic symptoms at all. Finally, we observe all the symptoms strongly marked, which lead us to expect serous effusion, and yet we find none. Upon every principle of sound reasoning, these considerations should make us hesitate very much concerning the doctrine

of serous apoplexy, and I think entitle us to consider serous effusion in these affections as one of the terminations of simple apoplexy. This affection, we have seen, may be fatal without effusion, and without any morbid appearance, and the cases which terminate in this manner cannot be distinguished in practice from those which terminate by effusion."

On the whole, if we admit the distinction of apoplexy into the sanguineous and serous, I think we must also admit that the serous apoplexy very seldom occurs; and I am of opinion, that even in very old persons of leucophlegmatic habits, pale countenance, small pulse, and other marks of serous apoplexy, *if the disease come on suddenly*, it ought to be considered as probably arising from an effusion of blood within the cranium.

The above-mentioned are the most important distinctions which authors have made relative to apoplexy; but, besides these, we find in Burserius, Zulianus, Sydenham, Hoffmann, Tissot, &c. a description of an apoplexy which they denominate the spasmodic, convulsive, or nervous apo-

plexy. Burserius and Zulianus have described this disease very minutely; and Tissot relates two cases of its occurrence under his own observation; but I am inclined to think that these ought to be classed among the symptomatic affections.

CHAP. V.

Diagnosis and Prognosis.

On the diagnosis of apoplexy I have only a very few observations to make. The strong disease is clearly marked by the symptoms which have been already described in its definition and history. Some persons however may possibly confound epilepsy with apoplexy, although these diseases very materially differ both in their nature and in their symptoms. In epilepsy, a person generally falls to the ground suddenly, as in apoplexy; but in the former disease we observe great agitation, with convulsion and spasmodic affection of the whole system, especially of the muscles of the face; whereas in the latter, the patient lies as if in a profound sleep, with stertorous breathing. The paroxysm of epilepsy is soon over; that of apoplexy generally lasts for some hours. Other symptoms by which these diseases may be distinguished will

hereafter be described in my account of epilepsy.

Sauvages says of apoplexy, it is distinguished from epilepsy by a relaxation of all the limbs. *

Apoplexy differs from syncope and asphyxia by the state of the pulse and respiration, which in it are generally stronger and fuller than natural; while in them they are much diminished or wholly abolished.

Intoxication has been sometimes mistaken for true apoplexy. Intoxication arising from great excess in drinking spirituous liquors, may, indeed, be considered as a species of apoplexy; but it differs from the strong apoplexy, I believe, by its being a disease of distension, and not of rupture. The treatment for the true apoplexy would not, however, be improper in this affection, and therefore a mistake respecting the cause would not be hurtful to the patient; but as it might be prejudicial to the practitioner, the distinction is important. In these cases careful enquiry should be made into all cir-

* Per artuum omnium laxitatem distinguitur ab epilepsia. Sauvages, vol. i. p. 845.

cumstances preceding the soporose affection, and where no information can thus be obtained, the smell of the breath will sometimes ascertain its nature. Sauvages says, on this subject, unless this species of the disease be pointed out by the information of by-standers, or the rejection of wine by vomiting, or by the vinous odour of the breath, it may be taken for the sanguineous, to the great scandal of the art. *

Carus, *lethargus*, &c. may, I think, be properly considered as inferior degrees of apoplexy. Sauvages says, apoplexy differs from cataphora, carus, &c. by the degree of stertor; and from lethargy, typhomania, &c. by the intensity of the sleep. †

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* "Nisi per adstantium relatum, vel per vinum vomitione rejectum, aut odorem vinosum anhelitus species morbi patet, illa pro sanguinea reputetur magno artis scandalo." Sauvages, vol. i. p. 847.

† Ratione stertoris apoplexia discrepat à cataphora, caro, &c. ratione profundissimi somni differt à lethargo, typhomania, &c. Sauvages, ibid.

The *prognosis* in apoplexy must, in a very great proportion of cases, be unfavourable. Hippocrates says, it is impossible to cure the strong apoplexy; and not easy to cure the weak. * This opinion of Hippocrates has been very generally adopted. In the first and second degree of apoplexy, Burserius says, there is some hope of recovery; in the third, means may be used; but in the fourth he despairs of † success. Dr. Kirkland, speaking of the vehement apoplexy, says, "death has invariably happened in every case I have known or heard of for fifty years." ‡

Dr. Mossman says, "I shall never be able satisfactorily to prove it; but I am strongly inclined to believe, that in all cases of convalescent apoplexy, there is no material rupture, but merely a turgescency of the vascular system. I ground this belief

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* Λύειν αποπληξίην ἰσχυρὴν μεν ἀδύνατον ἀσθενέα δὲ οὐ ῥηΐδιον. Hipp. sect. ii. aphor. 42.

† In primo et secundo gradu spes aliqua salutis effulget, in tertio experiri quid ars posset, in quarto curatio ne tentari quidem debet, nisi certa prædicta pernicie. Burser. p. 97.

‡ Kirkland, p. 38.

upon a conviction, that a sudden affusion of any large quantity of fluid upon the brain is incompatible with animal life." *

Opinions like these are calculated to do mischief by discouraging exertion, and I am persuaded that they are incorrect. That the strong apoplexy, in a very great proportion of instances, proves fatal, must be admitted; but that it always terminates in death, may be justly denied. I have myself seen more than one instance of recovery from the strong disease. M. Portal says, that he has often observed apoplexies formidable by the intensity of the assoupissement, and by the stertor of the respiration, followed by complete palsy of the limbs, hemiplegia or parapoplexia, which have been cured almost spontaneously in a longer or shorter period of time. †

I am informed by Dr. Baillie, Mr. Astley Cooper, Mr. Wilson, and other professional friends, that in many cases where persons had recovered from apoplexy, evident marks of effusion of blood have a long time

* Med. and Phys. Journ. vol. vii. p. 207.

† Portal, p. 404.

afterwards been found in the brain. Mr. Cooper has favoured me with a communication on this subject, in which he says, " the dissections which I have made of cases of apoplexy, and extravasations of blood upon the brain from accident, have led me to the belief that the effused blood never becomes absorbed, but that the brain gradually acquires the power of bearing its pressure, and that thus the symptoms which are produced at the first moments of general extravasation gradually diminish.

I will give you instances of these extravasations. My friend and pupil, Mr. Saunders the oculist, had repeated slight apoplectic attacks for many months before his death, of which he apparently recovered; but at length he died from a sudden and large extravasation of blood into one of the ventricles of his brain. Upon examination of his head, besides the great extravasation above mentioned, several streaks of coagulated blood were found in the pons varolii, and in the cerebellum, the colour of which was so different from the recent extravasations, as clearly to indicate that they had been long effused.

The other example is that of a gentleman who fell from his horse, struck his forehead violently, and was taken up comatose. He recovered from these symptoms, and appeared to be well, excepting that he had a slight defect in vision. Three months afterwards, from improvident conduct, he brought on symptoms of inflammation of the brain, of which he died; and upon examination of his head a large coagulum, which I have preserved, was found deeply embedded in the anterior lobe of the cerebrum, opposite to the part at which he had received the blow, and which had the colour of blood long retained in an aneurismal sac."

Complete apoplexy is certainly a disease in the highest degree dangerous, but it ought in no case to be abandoned as entirely hopeless. Our prognosis ought to be formed from a careful consideration of the nature and degree of the disease as indicated by circumstances and symptoms. Selle says, in proportion as the apoplexy is more perfect, it is more dangerous.*—Where

* Quo apoplexia est perfectior, eo est perniciosior, p. 28.

the attack of apoplexy is sudden, we may consider the danger to be great, for in such cases we have reason to suppose that the disease depends upon a rupture of a blood-vessel in the head.

The danger in apoplexy has, by many physicians, both ancient and modern, been estimated by a consideration of the degree in which respiration is affected.

Hippocrates says, in the strong apoplexy vehement respiration with an unequal intermitting pulse, argues immediate danger. Galen infers the magnitude of the affection of the brain from the magnitude of the affection of the respiration. That breathing, he says, which is intermittent and difficult, is the worst of all. He thinks that persons in apoplexy often die in consequence of the violence of the degree in which respiration is impeded. * Dolæus says, we consider those persons to be affected with the most oppressive and powerful apoplexy, in whom respiration is altogether interrupted, or can

* Galen, De Locis Affect. lib. iii. c. 14. p. 446—449.

scarcely be perceived.* Sauvages remarks, that in proportion as respiration is more sublime, and the pulse more depressed and unequal, death is to be considered near. †

Stertorous breathing has been very generally considered as one of the most dangerous symptoms of apoplexy. Dolæus observes, that, in the true apoplexy, in which there is an abolition of the animal functions attended with stertor, there is no hope of recovery; yet he afterwards says, that the stertorean and Stentorean respiration is not always fatal; and he relates the case of a person who recovered after having laboured under difficult and stertorous breathing for a whole day.‡ Hippocrates thought that stertor was not always fatal in apoplexy. §

Baglivi mentions foaming at the mouth

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* Cum autem spiritus omnino intromittitur, aut cum inspirare vix ac ne vix quidem percipi potest, illos magno morbo et gravi fortique apoplexia correptos dicimus.
Dolæus, p. 144.

† Quo respiratio magis sublimis et pulsus magis depressus minus æqualis eo mors proximior.
Sauv. vol. i. p. 846.

‡ Dolæus, p. 149. § Hipp. Aphor. sect. vi. 51.

as a very unfavourable appearance in apoplexy, and refers to Hippocrates in confirmation of his opinion. Hippocrates says, those who are in a state of suffocation or extreme weakness and relaxation, but not dead, do not recover if they foam at the mouth. * Forestus remarks, that on being called to attend a person in apoplexy, when he saw foaming at the mouth he immediately pronounced the disease to be a most vehement and fatal apoplexy, and in a very short time his prognosis was verified. He considers this as one of the worst symptoms of the † disease. Rhazes was of opinion that the disease was always mortal when foam appeared about the mouth. Montanus commenting upon this sentiment of Rhazes, enters into a long discussion, and makes some distinctions on the subject, referring to the opinions of Galen. ‡ Burserius says, in general,

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* Τῶν ἀπαγχομένων καὶ καταλυομένων μηδέπω δὲ τεθνηκότων, οὐκ ἀναφέρουσιν ὅισιν ἂν ἀφρὸς ἢ περὶ τὸ στόμα.

Hipp. Aphor. sect. ii. 43.

† Forestus, p. 510.

‡ Ibid. 516, 517.

snoring, stertor, and foaming at the mouth, are the worst signs. *

When the pulse, after having been slow, strong, and full, becomes quick, weak, and intermitting, especially in conjunction with other unfavourable signs, we may conclude that the disease will soon terminate fatally.

Among the dangerous signs in apoplexy, many authors mention a dilated state of the pupil of the eye; but the contracted pupil, which I consider to be a still more dangerous appearance, has been scarcely noticed. I am of opinion that this ought to be reckoned among the very worst symptoms of the disease. I never knew a person recover from apoplexy when the pupil was greatly contracted. My opinion on this subject is confirmed by that of Sir Gilbert Blane and Dr. Temple.

Cold and profuse sweats are very unfavourable symptoms in apoplexy. Hippocrates thinks, that sweat coming on after difficulty of breathing is a fatal sign, and

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* Generatim pessimum signum exhibent rhonchi, stertor, orisque spuma. Burs. p. 97.

coldness and torpor dangerous. * Etmuller adopts this opinion, and considers this sweating as indicative of a failure of the vital powers, and not a natural perspiration. † When we have reason, from the sudden accession of the disease, and other circumstances, to think that a *considerable* vessel in the brain is ruptured, we may almost despair of the patient's recovery.

The signs in apoplexy which have been generally considered as favourable, are, a moderate degree of the disease; a warm, gentle, general perspiration; excretions of blood from various parts of the body, particularly from the nose, or from the hæmorrhoidal vessels; and a free state of the bowels. Hippocrates says, that the accession of piles is useful to apoplectic ‡ persons. Schacht observes, that the accession of piles, the menses, ptyalism, and copious warm perspiration, is favourable in apo-

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* Εν τοῖσιν ἀποπληκτικοῖσιν ἐπὶ τῇ δυσφορίῃ τῶ πνεύματος ἱδρῶς ἐπιγενόμενος, θανασιμον, ψύξιες δὲ καὶ ναρκωσιες, πονηρόν. Coac. Pren. p. 485.

† Etmuller, p. 907.

‡ Ἀποπληκτικοῖσιν αἱμορροίδες ἐπιγενόμεναι χρήσιμον. Coac. Pren. p. 485.

plexy.* Dolæus says, that apoplexy is often cured by salivation, and describes the case of an apoplectic woman who was thus relieved, but who died on the ceasing of the salivation. † Goavarts, in his Dis. Med., remarks, that nature sometimes spontaneously relieves apoplexy by large hæmorrhage from the nose, by ptyalism, by warm and copious perspiration, and a free flow of the urinary or alvine evacuation. ‡

Whether the accession of fever is to be considered salutary or not in apoplexy seems doubtful. Hippocrates, however, speaks positively in the affirmative, and M. Portal says, that observation has convinced him of the truth of the assertion. Hippocrates, speaking of apoplectic persons, says, if in these, fever comes on, a solution of the disease takes place. §

M. Portal thinks, that convulsions in this

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* Prodest sæpe, si apoplexiæ hæmorrhoides, menses, ptyalismus, sudor copiosus crassus calidus superveniant. Schacht, De Apoplexia, p. 92.

† Dolæus, p. 149.

‡ Goav. Dis. Med. 159.

§ Ἐν αὐτοῖσι δὲ πάλιν τούτοισιν ἢν πυρετὸς ἐπιγένηται, λύσις. Coacæ Pren. p. 485.

complaint are not always mortal; on the contrary, he says, sometimes they announce a diminution of the cause of the evil.* On the contrary, Dr. Cheyne observes, "the greatest danger is to be apprehended when the patient is seized with convulsions." The same writer says, "a very unfavourable prognostic is also drawn from the patient putting his hand to his head. Certainly I have not known a patient recover who, in the beginning of the attack, complained of sudden pain in his head." † M. Portal says, in general, the apoplexy, the cause of which is immediately in the brain, is the most intense, and almost always mortal.‡

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* On a dit précédemment qu'il avait été prouvé par des experiènces sur des animaux vivans, que lorsque on ne comprimait que légèrement le cerveau, les convulsions des membres avaient lieu, et que lorsqu'on augmentait cette compression, l'assoupissement le plus profund avec sterteur dans la respiration, survenait, et que si on diminuait cette compression, a moins qu'elle n'eût été extrême les convulsions avaient encore lieu; ce qui ne laisse aucun doute que l'apoplexie et les convulsions ne soient souvent produites par la même cause, qui est plus intense dans l'apoplexie que dans les convulsions.

† Cheyne, p. 13, 14.

‡ Portal, p. 405.

He remarks, that if the disease last in this state for more than one day, it is generally incurable. --- If the strong apoplexy has continued for even half that time, I believe it almost always terminates in death. If the patient does not show symptoms of amendment soon after the employment of the most powerful means, a fatal termination of the disease may be expected.

If the pulse sink and intermit, if coldness of the extremities with cold clammy sweats come on, and the power of respiration greatly diminish, we may predict that dissolution is inevitable, and fast approaching.

CHAP. VI.

Treatment of Apoplexy.

Under this head I shall point out, first, the means to be employed when symptoms appear threatening an apoplectic attack; secondly, the mode of proceeding in the paroxysm of the disease; and lastly, the remedies to be used on recovery from the fit, with a view of preventing its return.

When fullness and redness of the countenance and eyes, drowsiness, vertigo, and the other symptoms formerly described, are observed, means must be immediately employed to prevent, if possible, an apoplectic paroxysm. These symptoms are generally produced by a too great fullness of blood in the head, and with a view to lessen this fullness, blood-letting, purging, and revellents have been recommended. Under these circumstances, the greatest reliance has been placed on bleeding. The quantity of blood to be taken should be

regulated by careful observation of the age, constitution, and strength of the patient, and the apparent urgency of the case. In a plethoric habit, and strong constitution, especially if the warning symptoms be urgent, blood should immediately be taken away, both generally and topically. In some cases of this kind, the opening of the temporal arteries or jugular veins has been thought advisable. In old age, or considerably advanced life and feeble constitution, caution ought to be observed in the evacuation of blood, but even under these circumstances, if symptoms were urgent, I should not hesitate to recommend cupping, either on the neck or the temples. I know that in several instances this practice has been very useful. In one case in particular, to which I was called, the good effects of the abstraction of a large quantity of blood by cupping-glasses applied to the neck, were immediate and very great. The patient was about seventy years of age, of a spare habit, and debilitated constitution. He was affected with vertigo, and pain in the head, confusion of mind, faultering in speech, and strabismus in a very great de-

gree. As the blood flowed, all the symptoms gradually abated, and in a few hours entirely disappeared, and he completely recovered. The gradual return of correct vision in this case was very striking. Several similar instances of the probable prevention of impending apoplexy by topical bleeding might be quoted from authors. Spontaneous hæmorrhages particularly from the nose and the hæmorrhoidal vessels, seem, in many cases, to have prevented an apoplectic attack; therefore, where evacuations, especially of blood, to which the body may have been accustomed, have ceased, they ought, if possible, to be restored. M. Portal mentions the case of a lady subject to a bleeding from the nose, who, on the stopping of the hæmorrhage, was affected with confusion in the head, sometimes deafness, and indistinctness of vision; and after three or four months with a true apoplexy, from which she was restored by bleeding. *

Although, with a view of preventing the accession of apoplexy, we chiefly rely on

* Portal, p. 61.

bleeding, other means ought not to be neglected, such as low diet, and whatever tends to promote tranquillity both of body and mind. Great advantage has often been derived, under these circumstances, from the administration of cathartics of speedy operation, and stimulating glysters. Some recommend fomentations, or rubefacients of a powerful kind, such as sinapisms, to the legs and feet.

In the actual paroxysm of apoplexy, the patient should, if possible, be immediately carried into a spacious apartment, into which cool air may be freely admitted. He should be placed in a posture which the least favours determination of blood to the head; all ligatures, especially those about the neck, should be speedily removed, and the legs and feet should be placed in warm water or rubbed with stimulating applications. These means may be employed in *all* cases of apoplexy; but before we proceed to take strong measures we ought carefully to consider the probable nature and causes of the disease.

I shall first speak of the treatment of the strong apoplexy, that in which we have

reason to suppose the disease to depend on pressure from an effusion of blood in consequence of the rupture of a vessel; and I shall afterwards point out the plan of proceeding when we apprehend the disease to depend upon other causes, or when it appears in its milder forms.

Some physicians, implicitly confiding in the opinion of Hippocrates, that it is impossible to cure the strong apoplexy, have employed only trifling and inefficient means, fearing, as they allege, that unsuccessful attempts might bring disgrace on themselves and on the profession. Forestus says, in the strong apoplexy no remedium generosum ought to be tried; no venesection, no pills; but in order to please the bystanders, the remedia leviora, such as frictions and clysters, may be used. He describes a case to which he and another physician were called, in which, after frictions and the administration of some opening medicines, and a clyster. the patient was abandoned to his fate, no farther attempts to relieve him having been made, although he remained alive for three days. He mentions another case of strong apo-

plexy, attended with foam at the mouth, and anhelitus ad jugulum ascendens, in which the patient was pronounced to be in the agony of death, ita ut illico, says Forestus, curationem sacerdotibus commiserimus. In this disease, which he calls fortissima, no remedies were tried, except frictions and ligatures round the arms and thighs. A stimulating clyster which had been prepared was not injected, lest powerful remedies should fall into * discredit. The dogma of Hippocrates above-mentioned has had a most mischievous influence, both on ancient and modern practice. It is not, however, consistent with the 51st aphorism of his 6th section, in which he says, persons who are seized with sudden pain in the head, who become speechless and stertorous, die in seven days, *unless fever supervene*; thus admitting the possibility of recovery from the strong disease. Forestus quotes the opinion of Galen, that the strong apoplexy admits of no * cure.

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* Ne optima remedia diffamarentur.
Forestus, Obs. vol. i. p. 512.

† Forestus, speaking of Galen, says, "Et ideo quidam

The generality of practitioners, however, both ancient and modern, have acted upon the supposition that the strong apoplexy may possibly be cured, and have recommended a trial of the most powerful means.

Of these, an immediate and free evacuation of blood has at all times been considered as the most important. The most esteemed Greek physicians advised speedy and copious bleeding in this disease. Aretæus in particular, is a strenuous advocate for the practice. A strong disease, he observes, requires a powerful remedy; such is the evacuation of blood, unless we take more than is proper. He says it is difficult to determine the quantity; for if we take too much we destroy the patient; if less than the case requires, we do not reap the full advantage of a powerful remedy, for the cause will still remain. He is of opinion, however, that it is better to err by taking too little than too much; for if too little blood be extracted, and any advantage shall have

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dixit quod nulla ratione curatur ne ab Æsculapio quidem; imo inter pauculas horulas hominem in Elysios campos aut in horrida Tartari mittit. Obs. v. i. p. 507.

appeared, a vein may again be * opened. Galen, Ætius, Cælius Aurelianus, and Paulus Ægineta recommend the evacuation of blood in apoplexy; and Celsus thinks that any other treatment scarcely ever restores health. He says, if, after bleeding, sense and motion do not return, there is no hope. He remarks, however, that in the strong disease blood-letting either kills or cures.†

The Arabian physicians adopted the practice of the ancients as far as relates to the employment of blood-letting in the strong apoplexy, and by far the greater number of modern physicians have, in this respect, followed their example. In support of this practice we might adduce the opinions of almost all who have written on the disease; we might quote from the works of Forestus, Sydenham, Wepfer, Boerhaave, Van Swieten, Morgagni, Baglivi, Sauvages, Tissot, Mead, Friend, Pitcairn, Hoffman, Cullen, Gre-

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* Aret. De Cur. Mort. Acut. l. i. c. 4.

† Si omnia membra vehementer resoluta sunt, sanguinis detractio vel occidit, vel liberat.

Celsus, l. iii. c. 27.

gory, Portal, Cheyne, and many other eminent modern writers. Dr. Cheyne says, "I am desirous of removing every objection which can be opposed to blood-letting, which I am convinced is not only the most effectual remedy in apoplexy, but is much more effectual than all the others in use." There are some modern authors, however, though the number is small, who oppose this practice. In the list of those who have doubts on this subject, the respectable names of Fothergill and Heberden appear. Dr. Fothergill says, "Bleeding in apoplexies is one of those operations, which, on several accounts, requires the most dispassionate consideration. In no disease, perhaps, is the judgment of the prescriber of more consequence to the patient. — If it is successful — if the patient recovers upon it, it is a fortunate event for both. If bleeding is performed when it ought not, either death ensues, or an incurable *hemiplegia." In apoplectics who are fat, short-necked, and inactive; who live freely; who neglect

* Fothergill, vol. iii. p. 208.

due care in respect to evacuations; and who are plethoric, with a full and tense pulse, and a general sense of suffocation, bleeding is most commonly performed; and yet from the consequences attending it in general, there seems reason to suspect that bleeding, in this case, is performed much oftener than is proper or conducive to the patient's recovery. If a person fall down in a fit of any kind, the surgeon is immediately sent for; he, perhaps, upon feeling the patient's pulse, finds it as above described, and general practice not only authorises, but custom, become a law, generally directs the operation. The pulse, in such a situation, is often an insufficient guide: it may be that struggle which arises from an exertion of the vires vitæ to restore health. I believe it happens in most cases where there has been a temporary or even momentary cessation of the animal powers; and it is, perhaps, in this situation that bleeding is performed, and often very liberally." * He admits, however, that "it

* Fothergill's Works, vol. iii. p. 209.

is possible that, by lessening the quantity of blood, the resistance to the heart is lessened, and what nature was attempting in vain, is acquired by this means, and the patient's recovery much facilitated. — It is possible, likewise, that, by a copious bleeding, the animal strength may be so much reduced, and the effort begun so powerfully checked by the operation and the effects of the disease itself, that the patient expires soon afterwards, or survives a few days and suffers a hemiplegia; none of which might probably have happened had bleeding been omitted. It becomes the operator, therefore, most carefully to attend to every circumstance of his patient's situation before he opens a vein, which may, perhaps, be decisive of his patient's fate." * In cases of apoplexy after a plentiful meal, or sudden gusts of passion in particular constitutions, exposure to sudden heat, or sudden alterations of the weather from cold to great heat, or from moderate to extreme cold, or the suppression of some usual evacuation,

* Fothergill's Works, vol. iii. p. 210.

it will be necessary to consider the habit and other circumstances before we bleed." "It seldom happens," says Dr. Fothergill, "that a physician arrives before this operation is performed, let the disease have originated from what cause it may; and though very few would probably recover if this operation had been omitted, yet, comparing what has happened to those who have been blooded, and the few I have seen who have not, I am of opinion that bleeding in apoplexy is, for the most part, injurious, and that we should probably render the most effectual aid by endeavouring, in all cases, to procure a plentiful discharge from the stomach and bowels; as, by these revulsions, the head is, perhaps, much more effectually relieved from plenitude, and that without weakening or interrupting any other effort of nature to relieve herself than by venesection." Dr. Heberden's interdiction of bleeding in apoplexy is much less absolute than that of Dr. Fothergill. Dr. Heberden is of opinion that blood-letting has often been prejudicial; but although he forbids the practice in some cases, in

others he strongly recommends it. Where persons are in the prime of life, plethoric, and accustomed to high living, immediate blood-letting, he thinks, is necessary; but he disapproves of large, repeated, indiscriminate abstractions of blood, which experience proves to have been often* prejudicial. Dr. Kirkland says, "it may be observed that a loss of blood, to whatever extent carried, affords not any relief in the vehement apoplexy; and yet much dependence has always been had upon bleeding indiscriminately in every disease which has been

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* Sanguinis missio vulgo æstimatur esse præsentissimum attonitorum auxilium; et profecto ubi æger florente sit ætate, et sanguine abundet, et lautioribus epulis assuetus fuerit, vena sine mora est incidenda. Veruntamen largæ et repetitæ sanguinis detractiones omnibus apoplecticis et paralyticis, nullo delectu habito, utiliter aut tuto adhiberi certe non possunt. Etenim juniores, et robusti, non tam obnoxii sunt his morbis, quam pueri infirmi, et effœti senes, in quibus vires nutriendæ sunt, et excitandæ, potius quam minuendæ; dum multa sanguinis profusio, quemadmodum in submersis fieri dicitur, omnes naturæ conatus reprimit, et tenues vitæ reliquias penitus extinguit. Quod si consulamus experientiam, hæc, quantum possum judicare, testatur copiosas sanguinis missiones sæpe nocuisse, easque in non paucis ægrotis tutius fuisse prætermissas. Heberden, p. 300.

called apoplexy." Yet he allows the propriety of bleeding in the apoplexy occasioned by compression of the brain, which he calls coma. "Bleeding," he says, "it is agreed, takes off distension by emptying the vessels, thins the blood, somewhat, perhaps, cools it, and of course must be useful where blood abounds, especially where its motion, from vigour, is too rapid, or sluggish in consequence of plethora, and should, under such circumstances, first take place." * Dr. John Brown considers apoplexy as a disease of indirect debility, and therefore does not admit the evacuation of blood into his list of means for its cure.

Dr. Darwin says, "if apoplexy arises from the pressure of blood extravasated on the brain, one moderate venesection may be of service to prevent the farther effusion of blood, but copious venesection must be injurious by weakening the patient: where the pulse is weak, bleeding must be injurious." †

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* Kirkland, p. 70.

† Darwin's Zoonomia, v. ii. p. 402.

In forming a judgment on this very important subject, we ought, I think, to be guided principally by reasoning on allowed facts. Now it is universally admitted that, on dissection, blood is almost always found effused within the cranium of those who have died of the strong apoplexy; and as we know that pressure on the brain occasions an abolition of sense and voluntary motion, it is reasonable to conclude, that in such cases the disease is produced by pressure on the brain from blood. It is likewise admitted, that on examination after apoplexy, the vessels of the brain are very often seen distended and gorged with blood; so that it is probable that a general as well as partial pressure is made on that organ. Dr. Cheyne observes, that "When we examine the brain of a plethoric man who has been carried off by a fit of apoplexy, we find that every vessel within the head has been in a state of excitement; the venous system is still tense with blood; some of the arteries had yielded to their own inordinate action; and the brain is torn up by the blood which they had driven out of the course of the

circulation." * Under such circumstances, what practice can be more rational than that of abstracting blood speedily and freely? How can we more effectually diminish the pressure on the brain, from blood circulating or effused, than by diminishing the quantity of that fluid in the head? We cannot, it is true, thus remove blood actually extravasated; but we may prevent farther effusion, and lessen general compression. In the complete apoplexy the pulse is generally full and strong, and blood drawn exhibits the inflammatory crust; circumstances which may be adduced in favour of the practice in question. Spontaneous hæmorrhage has probably often prevented the accession of apoplexy, and, in a few instances, appears to have removed the disease. Blood-letting, in the strong apoplexy, has been almost universally recommended by physicians in all ages, and those who object to it rather discourage its indiscriminate use or excessive employment than forbid the practice. If it be said that vene-

* Cheyne, p. 55.

section is generally prescribed, and in a very great proportion of instances, without success, I would remark, that the observation rather tends to establish the dangerous nature of the disease than the impropriety of the practice in question. The strong apoplexy almost always proves fatal, in whatever way treated; yet there are on record several cases of recovery from it after blood-letting, but none that I know of in which venesection was neglected. Celsus was of opinion that a cure was scarcely ever effected by any other mode of treatment. *

In the strong apoplexy, blood, I think, should be evacuated speedily and freely, generally and topically. Almost all practitioners speak with great confidence on this subject, and some recommend a very bold practice. Dr. Cheyne says, "two pounds of blood ought to be removed as soon as possible after the attack, and if the first bleeding has not been of service, and the disease is unequivocally established, the

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* Aliud curationis genus vix unquam sanitatem restituit. Celsus, p. 17.

chief question to be decided is the additional quantity of blood to be drawn. It ought to be known, that from six to eight pounds of blood have been taken from a person by no means robust, before the disease, which ended favourably, began to yield. The first and second blood-letting ought to be large, and a third ought to follow the second as soon as it is ascertained that this has been ineffectual in stopping the disease." Quotations innumerable from authors might be made in recommendation of a free evacuation of blood in this disease.

Where, in apoplexy, we can discern a paralytic affection on one side, we are advised by Aretæus to take blood from the sound side, as the blood is thus more likely to flow freely. This opinion is adopted by Valsalva, and Morgagni, who assign other reasons also in favour of this * practice. Baglivi, on the contrary, contends, that blood in these cases should be drawn from the paralytic arm, being of opinion, that the defective circulation of the fluids in the

* Vide Morgagni, lib. i. ep. 3. art. 17.

part affected, cannot be relieved more speedily than by opening a vein in that part. The celebrated Malpighi, who was seized with apoplexy, accompanied by a palsy of the whole right side, was bled, Baglivi says, in the left arm. He adds, had it not been contrary to the sentiments of the physicians who consulted with me, I would have ordered the blood to have been drawn from the paralytic arm. Dr. Cullen agrees in opinion with Valsalva and Morgagni on this subject.

Great stress has been likewise very generally laid, both by ancient and modern physicians, on topical blood-letting in the strong apoplexy. Aretæus says, if the disease goes on to a considerable length, and the cause is in the head, much blood must be taken by cupping the occipitium. More may be thus taken than by venesection, with less danger of diminishing the strength: he recommends likewise dry cupping between the * shoulders. Morgagni advises deep scarifications and cupping of the occiput.

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* De Cur. Morb. Acut. lib. i. c. 4.

The extraction of blood, by cupping on the neck or temples, is very generally recommended. Forestus relates a case of recovery from apoplexy by cupping and glysters, in which a surgeon, utpote gloriosus, had refused to call in a physician, and had neglected to bleed. Galen says, when the blood is hot and full of vapour, and ascends to the head, and the vessels are loaded, the remedy found by physicians to be the most useful is the division of an artery. * He recommends the section of the temporal arteries, as well as of others of the head. Modern physicians also lay great stress on the abstraction of blood from the temporal arteries or jugular veins. M. Portal strongly recommends the latter plan, stating that the vessels of the brain may be sooner emptied in this than in any other way. He, and several others, Burserius, Morgagni, Valsalva, Friend, Heister, &c. direct, that in opening a jugular vein no ligature should be employed, as the smallest pressure on the part may do harm by in-

* Ἀρτηριοτομια.

terrupting the circulation of the blood in the external veins of the neck.

The employment of leeches has been recommended by Burserius; but their operation is too slow for the urgency of these cases. Burserius thinks them principally useful when applied to the anus, where apoplexy seems connected with a suppression of the catamenia or hæmorrhoids.

Forestus, however, relates a case from Valescus of a cure of apoplexy by the application of leeches to the whole body. *

M. Portal was in the habit of bleeding from the foot, as is customary in France, in apoplexy; but admits, that in the intense disease recourse should be had to bleeding from the neck in preference. Burserius recommends bleeding from the foot, in either the flow or retention of the hæmorrhoidal or menstrual flux in apoplexy.

M. Portal mentions another mode of bleeding which was proposed to the Aca-

* Eas quasi per totum corpus apposuit et detracta sanguinis copia, apoplecticus curatus fuit.

For. lib. x. Obs. 76.

demy of Sciences by M. Dejean, professor of medicine at Caen. It was that of opening the superior longitudinal sinus after having raised the bone which covers it. This physician, he says, proposed that mode of blood-letting, stating that he had employed it with the greatest success on dogs which had been strangled. M. Portal, and M. Tenon, however, who were appointed commissioners to examine M. Dejean's memoir on this subject, were of opinion, that bleeding from the jugular vein was to be preferred, as it would probably have produced the same effect more speedily. Besides, says M. Portal, we have no ascertained method of stopping hæmorrhage from the opening of sinuses. *

Bleeding in or near the part, says Mr. J. Hunter, "will answer better than taking blood from the general habit; for certainly less may be removed in this way, so as to have equal effect upon the part inflamed, and yet affect the constitution less. We find relief by bleeding in the temporal

* Portal, p. 423.

artery, or jugular vein, for complaints in the brain." *

Dr. Cullen recommends blood-letting, both general and topical, in the strong apoplexy. He says, "in all cases of a full habit, and where the disease has been preceded by marks of a plethoric state, blood-letting is to be immediately employed, and very largely. In my opinion, it will be most effectual when the blood is taken from the jugular vein; but, if that cannot be properly done, it may be taken from the arm. The opening of the temporal artery, when a large branch can be opened, so as suddenly to pour out a considerable quantity of blood, may also be an effectual remedy; but, in execution, it is more uncertain, and may be inconvenient. It may be in some measure supplied by cupping and scarifying on the temples or hind-head. This, indeed, should seldom be omitted; and these scarifications are always preferable to the application of leeches." †

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* Hunter on the Blood, 4to ed. p. 358.

† Cullen, vol. iii. p. 182.

Mr. Hunter says, "the only difference between an apoplexy and hemiplegia is in degree; for they both arise from extravasations of blood." In these cases he thinks "we ought to bleed very largely, especially from the temporal artery, till the patient begin to show signs of recovery, and to continue it till he might begin to become faintish." *

In determining the quantity of blood to be taken away in apoplexy, we are to be guided by the age, strength, constitution, and habits of life of the patient; yet if the disease occur, as it sometimes does, in its strong form, in old persons of debilitated constitution, blood-letting, I think, ought even then to be employed. Morgagni advises us not to be too much influenced by these circumstances, and relates the case of a lady eighty years of age who had an attack of the apoplexia levis, threatening the strong apoplexy, whose life was repeatedly preserved by bleeding. I have lately had the pleasure of seeing the beneficial

* Hunter on the Blood, 4to. ed. p. 213, 214.

effects of blood-letting in the case of a lady seventy-four years of age, who was seized with apoplexy. Some years ago she experienced a slight paralytic attack, and has since been often affected with vertigo, faultering in speech, and confusion of mind. When I saw her, she was wholly deprived of sense and voluntary motion, her respiration was laborious, and in some degree stertorous. A medical gentleman who had been called in immediately after the accession of the paroxysm, had taken from the arm a very considerable quantity of blood. As the pulse was not materially weakened by this depletion, I ventured to recommend farther bleeding by opening the temporal artery. I desired that mustard cataplasms might be applied to the soles of the feet; that stimulating injections should be frequently administered; and that if the power of swallowing were restored, cathartics should be taken by the mouth. On my return, two hours after these directions had been given, I was informed that blood had been drawn from the temporal artery; that cupping glasses had been applied to the temples; and that very soon after the evacuation of blood

by these means, the patient showed signs of returning sensation. I found her in a state of considerable improvement; in a few hours she was able to swallow; and she continued to amend so rapidly, that at the end of forty-eight hours she was restored to a degree of health nearly equal to that which she had enjoyed before the attack.

Burserius says, that we ought not to be deterred from venesection by irregularity or intermission of the pulse, unless other signs of a deficiency of vital power* appear. In defence of the propriety of a free evacuation of blood, even in old persons, he quotes, from Lancisi, the case of a very aged man who was freed from impending apoplexy by the loss of an immense quantity of blood spontaneously from the nose.*

Dr. Cheyne goes so far as to say: "I believe it is a good rule to have every patient in apoplexy, who is not plainly dying, blooded." †

I wish to remark that foreign practi-

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* Burserius, p. 101.
† Ibid. p. 100, 101.
‡ Cheyne, p. 64 .

tioners, even those who recommend bleeding in apoplexy most strongly, proceed with much greater caution in this practice, than the physicians of this country. Burserius, in the treatment of the sanguineous apoplexy, speaks of the abstraction of twelve ounces of blood as a large bleeding: and M. Portal says, in general, the blood-letting ought to be abundant, "de deux bonnes palettes, ou de huit onces au moins," if the pulse be not too weak.*

General opinion and observation, then, as well as reasoning, appear to be very much in favour of free and repeated evacuations of blood, both general and topical, in the strong apoplexy; and I am persuaded that greater advantage may be reasonably expected from this than from any other practice; yet I am very much inclined to think that it may be, and actually sometimes has been, carried too far. I have seen several cases, and heard of many others, in which very large quantities of blood have been drawn without the smallest perceptible advantage, and

* Portal, p. 420.

with an evident and considerable diminution of the strength of the patient. Celsus thought that if bleeding in apoplexy be not useful, it is highly prejudicial, and I confess, notwithstanding the positive opinions and directions of some modern physicians on this subject, I would not venture to persist in the abstraction of blood, if, after free and repeated bleedings, there was no apparent advantage ; and à fortiori, if symptoms of debility should supervene. Under such circumstances, I would have recourse to other remedies hereafter to be recommended, rather than run the risk of too much weakening the vital powers of the patient by farther depletion.

In the treatment of apoplexy, some writers employ stimulating remedies externally, such as volatile alkali, camphorated liniment with tincture of cantharides, &c. in order to excite the patient to sense and motion ; but Burserius thinks that in the strong apoplexy, those things which agitate the humours, or excite much motion, such as errhines, sternutatories, and acrid volatile remedies, should not be used without the greatest caution. If any thing be

applied to the nose, he says, let it be vinegar, or the oil or volatile salt of amber, or spiritus melissæ, with which the tongue and the mouth and the torpid limbs may be anointed.* Dr. Cullen says, " it has been usual with practitioners, together with the remedies already mentioned, to employ stimulants of various kinds; but I am disposed to think them generally hurtful; and they must be so, wherever the fulness of the vessels, and the impetus of the blood in these is to be diminished. Upon this principle it is therefore agreed, that stimulants are absolutely improper in what is supposed to be a sanguine apoplexy; but they are commonly supposed to be proper in the serous. If, however, we be right in alleging that this also depends upon a plethoric state of the blood-vessels of the brain, stimulants must be equally improper in the one case as in the other." † — Such

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* Si quid naribus admoveri liceat, esto id acetum vini, vel oleum succini, vel ejus sal volatile, vel spiritus melissæ, quibus et lingua, et os, et torpentia membra perfricari potuerunt.

Burserius, De Ap. chap. iv. p. 110.

† Cullen, p. 187.

applications, I think, should not be made till after blood-letting.

In diseases supposed to have their origin in the brain, the ancients seem to have placed great dependence on applications made to the head. Galen, speaking of the practice of Archigenes in cases of loss of memory, or of intellect, says, he applied his remedies to the head; and what experienced physician, he asks, would attempt the cure of apoplexy, epilepsy, episthotonus, emprosthotonus, tetanus, or hemiplegia in any other way. He mentions some very violent remedies, — *vehementer calefacentia et exsiccantia*, which the ancients were in the habit of applying to the head; such as sinapisms, and hot water. He speaks of the practice of sprinkling the head with nitre, on the removal of a sinapism, and afterwards applying hot water; a remedy, than which, he says, none more violent can be found in * medicine. Galen does not, however, expressly say

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* ὃ βοήθημα βιαιότερον ἁδὲν ἂν ἑυροις ἄλλο τῶν κατ' ἰατρικην. Gal. De Loc. Aff. lib. iii. c. 5.

that such applications were made in apoplexy. — It is very much the custom at present in these cases, to direct that the head should be shaved, and that blisters should be applied to it, and to the nape of the neck. Dr. Cullen recommends this practice. "Another remedy," he says, "to be immediately employed is blistering; and I judge that this is more effectual when applied to the head, or near to it, than when it is applied to the lower extremities. This remedy I do not consider as a stimulant, or capable of making any considerable revulsion. But, applied to the head, I suppose it useful in taking off the hemorrhagic disposition so often prevailing there." * Dr. Cheyne, on the contrary, does not approve of blisters to the head, but seems to give the preference to cold applications: he says, "I never distinctly saw a patient in apoplexy relieved by blistering; and I have repeatedly ordered blisters, which took effect soon after the second or third bleeding. Were I to order

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* Cullen, p. 186.

a blister in apoplexy, I should recommend it to be applied to the nape of the neck: this application is often of signal service in relieving the headach which attends febrile diseases. Blistering the scalp prevents the use of cold applications, such as sponging the head with cold water and vinegar, or with a solution of muriate of ammonia, or with iced water, — applications of a less equivocal kind than blisters." *

Revellents, such as pediluvium, frictions, sinapisms, and blisters *to the extremities*, are very generally employed in apoplexy. M. Portal thinks large blisters necessary to excite irritation, and determine a flow of serous or other humours to parts more or less distant from the brain, and thus diminish congestion. We ordinarily apply blisters to the legs, he says, in preference to any other part, and if we increase the number of them, we put two others to the thighs, or one to one arm, and another to the thigh or leg of the opposite side. M. Portal likewise approves of the application of

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* Cheyne, p. 80, 81.

sinapisms, separately or conjointly with blisters. * They are recommended by Aretæus and others of the ancients, and very generally prescribed by modern physicians. Among the most powerful revellents, stimulating and purging clysters may be reckoned. Forestus is a warm advocate for their administration; and it appears that he has sometimes employed them with great success. In one case of apoplexia fortissima, he says, a clyster was injected, which having occasioned five evacuations, the patient in a few hours was roused from the fit. This apoplexy ended in palsy. † In another case, the same remedy was employed with similar success. He describes the patient as being apparently almost at the point of death, and says, but after the injection of a clyster, which twice operated largely, he began to speak. ‡ A

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* Portal, p. 426.

† Mox clyster injectus est, ex eo quinquies cum alvum deposuisset, egregie paucis horis excitatus a paroxysmo, apoplexia illa desiit in paralysin.

For. lib. x. obs. 69.

‡ Sed ab injecto clystere cum bis alvum egregie deposuisset, cœpit loqui. For. p. 518.

palsy in this case supervened, but the patient recovered both from the apoplexy and palsy. It is remarkable that in these two cases, Forestus does not say whether the patient had been bled or not. Selle makes distinctions in his recommendation of clysters.* Some physicians recommend clysters of the infusion or smoke of tobacco; but M. Portal is of opinion that they are infinitely less efficacious than other stimulating injections. Burserius thinks them dangerous, and says that we cannot too strongly reprobate them in apoplexy.† M. Portal in some cases recommends clysters of asafœtida in preference to the stimulating injections usually administered. Clysters seem to possess a considerable revellent power, and as they are scarcely in any case capable of doing mischief, I think they ought always to be tried in apoplexy.

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* Si sola sensibilitas et plethora adsunt, tantum emolliens (enema), sordibus vero in primis viis biliosis præsentibus laxans, atque in redundantia humorum mucosorum irritans esse debet.

Selle, Med. Clin. vol. ii. p. 38.

† Ab ejusmodi remedii usu, cane pejus et angue cavendum est in apoplexia. Burser. vol. iii. p. 106.

Purgatives should be given by the mouth also if possible; but in the strong disease it often happens that the teeth are nearly closed, and the power of swallowing is so much impaired, that it is extremely difficult to introduce any thing into the stomach. Under such circumstances medicines in a fluid form may sometimes be administered by means of a syringe, and a female catheter, taking care to manage these instruments so as to avoid the danger of any part of the fluid getting into the trachea. Aretæus observes, that the æsophagus is sometimes affected in such a manner, that neither food nor medicine can be given without danger of strangulation. He says, if we attempt to give liquid food by the mouth, it will fall into the trachea; he therefore, in these cases, recommends an instrument, (a sort of long spoon,) for the purpose of avoiding such mischief. * Dr. Cullen recommends the exhibition

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* Χρὴ ὧν μελίκρητον ἢ χυλὸν ἐγχέαντα μυσιλῇ μακρῇ ὑπεραίροντα ὑπὲρ τῆς ἀρτηρίης ἐς τον σόμαχον ἐγχέειν τόδε γὰρ ̓τι ἐς κατάποσιν ὑπουργέει.

Aret. de Cur. Acut. Morb. lib. i. c. 4.

of *drastic* cathartics by the mouth; whilst others give the preference to *eccoprotics*. Dr. Cheyne says "an active purge is to be given to the patient as soon as he can be made to swallow; calomel, I believe, is the most suitable medicine, more particularly in the varieties of apoplexy connected with disorder of the abdominal viscera. This medicine sometimes produces the nausea from which so much benefit is expected. To secure a speedy operation, it ought to be followed by a dose of some of those cathartics, which operate chiefly on the upper part of the alimentary canal, as rhubarb, jalap, or scammony; or a draught of the infusion of senna, in half an hour after the calomel has been swallowed, may be administered, to secure and quicken the operation."* Sir Gilbert Blane thinks that the purgative of the greatest activity, in the smallest bulk which can be given, is a combination of calomel and extract of jalap, in equal parts, and therefore most proper in these cases.

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* Cheyne, p. 77, 78.

Some of the ancients advise the exhibition of emetics in apoplexy. Aretæus, speaking of purging, says, if nausea should supervene, do not discourage it. He seems to think that the agitation in straining may tend to rouse the patient from the paroxysm, and the vomiting of pituita remove the cause of the disease. *

P. Ægineta, after bleeding, purging by clysters, anointing the whole body with oil, and the exhibition of opoponax, sagapenum, galbanum, and castor, recommends the attempt to force open the mouth by the fingers, and to introduce a feather dipt in oil, in order to eject any thing that may stick in it. † Forestus considers this as a recommendation of an emetic; and Ætius, from Galen, mentions it as a practice adopted with a view to excite vomiting. ‡

Modern practitioners have much differed in opinion respecting the propriety of giving emetics in the strong apoplexy. Syden-

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* Καὶ ὁ τῶν φλεγμάτιων ἔμετος την αιτίην της νοσου ἄγει.
Aret. De Cur. Morb. Acut. lib. i. c. 4.

† P. Æg. lib. iii.

‡ Æt. Tetr. ii. Serm. 2. c. 27.

ham, Fothergill, Pitcairne, Kirkland, Selle, and some others, recommend the practice; whilst Forestus, Cullen, and the generality of the physicians of the present day forbid it. Sydenham says, "after blood-letting from the arm, and the jugular veins, let an emetic be immediately given."* Pitcairne agrees with Sydenham in opinion, and advises that the emetic be strong, and in a large dose.† Fothergill, speaking particularly of apoplexy, arising from a full undigested meal, says, "we are to remove the obvious cause as speedily as possible, that is, to endeavour by all the means we can, to remove the load by emetics and purgatives, and to excite as plentiful a flow of blood to the lower extremities as we can by stimulants, sinapisms especially. Liberal doses of white vitriol, from a scruple to half a drachm, for a dose: emetic tartar dissolved in water, and got down by spoonfuls, furnish us with the means of promoting the alvine discharges with effect. We need not be under much restraint in the use of these

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* Sydenham, p. 597.

† Vehemens et dosi non mediocri.
Pitcairne, El. Med. lib. ii. c. 2.

medicines, till thorough evacuations are procured. The stimulus exerted on the stomach, and the room provided for a freer circulation, are almost alike beneficial, and, without diminishing the patient's strength, make way for his recovery." * Kirkland observes, " there is reason to believe that the common nervous apoplexy mostly originates in the stomach, or some part of the abdominal viscera ;" and adds, " when there is no plethora, more dependence is to be had upon vomiting and purging than upon bleeding ; and seemingly the effects of vomits are not to be dreaded in this instance." † Selle says, if we are certain of the presence of sordes in the stomach, an emetic should be ‡ given. Selle, however, recommends emetics in that apoplexy only which he calls *gastrica.* A writer in the Medical and Physical Journal, under the signature Pyrrho, seems to be an advocate for emetics in apoplexy,

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* Med. Observ. and Inq. vol. vi. p. 84.

† Kirkland, p. 49.

‡ Si certi sumus, sordes primario tantum in ventriculo contineri, emeticum exhibitur. Selle, Med. Clin. p. 40.

or at least doubts whether they are hurtful. After giving the names of several eminent men who favour the practice, he says, "In turning from authority to the dictates of reason, in this matter, I would ask, is it certain that from the action of a vomit upon the system, there is an increased impetus or determination of blood to the brain? Or supposing that there is an increased determination of blood, does it follow, necessarily, that a rupture of vessels, or effusion, would take place? It seems to me, in reflecting upon the effect of an emetic upon the system, that the first circumstance that assails the attention, is a great diminution or enfeebled action of the vascular system in general; this is observable during the nausea preceding the act of vomiting; in this state there is great pallor of body, faint sweats, the pulse is feeble and unsteady, and the respiration is affected; and there are evident marks of lessened action in the heart and arteries. It will not, therefore, be asserted by the enemies of emetics, that in nausea the blood is sent to the brain, either with greater force or in greater quantity; on the contrary, it is reasonable to

suppose, that in this state there is a smaller quantity of blood, and less forcibly sent to the brain." * He adds, " it is well known that emetics are frequently and repeatedly employed in diseased states of the lungs, and where a discharge of blood has previously and repeatedly taken place, and that in such case the appearance of hæmorrhage is retarded rather than promoted by their use. And there have also been cases of persons labouring under frequent and alarming hæmoptysis, who have been sent to sea for their health, and who have never passed a day for months without strong efforts to vomit, and yet without any recurrence of hæmorrhage." † Forestus, on the other hand, thinks, that vomiting in apoplexy or palsy is dangerous, as it may excite strangulation. Dr. Catherwood, who published an inaugural disputation on apoplexy, and some years afterwards a work entitled " A new Method of curing Apoplexy," considers emetics as highly prejudicial. Dr. Cullen says, " vomiting has

* Med. and Phys. Journal, vol. vii. p. 330.

† Ibid. p. 331.

been recommended by some practitioners and writers; but, apprehending that this might impel the blood with too much violence into the vessels of the head, I have never employed it." * Dr. Cheyne is of opinion that " in a confirmed apoplexy, even the mildest means of inducing vomiting cannot be employed without † danger." Portal, in opposition to the sentiments of the generality of French physicians, thinks that emetics cannot be safely given in the disease; and he adduces many facts, and much reasoning, against the practice, even in those cases in which Fothergill most strongly recommends it, viz. in the apoplexy *apres les repas*. Portal believes vomiting to be dangerous, by determining a great flow of blood to the brain, and thus augmenting the immediate cause of the disease. ‡ Burserius disapproves of the exhibition of emetics in the sanguineous apoplexy, which, he says, are not indicated and are hurtful; and he quotes a case from

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* Cullen, vol. iii. p. 186. † Cheyne, p. 68.

‡ Portal, p. 43.

Morgagni, in which an emetic given to a person labouring under hemiplegia produced a fatal apoplexy. * Burserius and Quarin, even in the apoplexy from intemperance in eating, forbid the administration of emetics, remarking that the vomiting may depend on compression of the brain.

The safety and propriety of giving emetics in apoplexy was some years ago the subject of a long and somewhat acrimonious discussion between Dr. Langslow and Mr. Crowfoot, two respectable practitioners in the county of Suffolk. The controversy originated in a difference of opinion respecting the exact nature and the proper treatment of a case of apoplexy under their care. Mr. Crowfoot having considered the disease to be connected with a disordered state of the stomach, had proposed an emetic, to the administration of which Dr. Langslow objected, on the sup-

* Exulent ab apoplexia sanguinea præsertim exquisita, omnia emetica, utpote non indicata et noxia atque a sanioribus clinicis et præ primis a Morgagnio ipso explosa. Burs. vol. iii. p. 108.

position that the affection depended upon compression of the brain. Dr. Langslow does not approve of emetics in apoplexy, because he considers the disease as *always* arising from compression of the brain; and in this case, he says, "it must be produced either by extravasation, exudation or effusion; and as the act of vomiting tends to force the blood more violently into the head, or impede its return from thence, it would of course rather increase than diminish the *cause* of the disease." "The nausea and sickness at stomach in this case," Dr. Langslow considered "as symptomatic, or an effect of the compression, and not as a cause, or arising from any foulness in the stomach." He, therefore, thought "that vomiting could not possibly do good, but, on the contrary, might do great injury, by forcing more blood or serous fluid from the vessels of the head, and thereby increasing the compression of the brain." — Mr. Crowfoot thinks apoplexy may exist without extravasation, exudation, or effusion, and insists upon it, that in the particular case in question, no such mischief existed in the brain. He is of opinion, that in some cases emetics may

Correct. Nausea & vomiting are often present when compression is known to exist.

be useful, and ought to be given; and he adduces an instance of apoplexy cured by vomits. Mr. Crowfoot seems not only to have adopted the opinions and doctrines of Fothergill and Kirkland, but to have gone so far as to maintain, at least so Dr. Langslow says, that pressure on the brain is not the general cause of apoplexy, but that it exists in, or originates from, the stomach, and that therefore vomits are the best and most judicious remedies in such cases.—This dispute gave rise to several dissertations on the nature and treatment of apoplexy, which are published in the sixth and seventh volumes of the Medical and Physical Journal. Two papers on the subject, signed Pyrrho, are particularly worthy of attention.—Sir Gilbert Blane is persuaded "that nothing is more certain than that a full meal may bring on apoplexy, whether from compression of the descending aorta, or from sympathetic action; and this is, perhaps, he says, the only case in which the administration of an emetic is justifiable. He thinks that if the stupor or sopor from overeating were carefully watched, the fit or stroke might be prevented, and that the

utility of emetics in such circumstances would be among the first suggestions of reason. Sir Gilbert once knew this practice employed by an extra-professional person, apparently to the saving of life."

If I were to give an opinion on this very important question, I would say, that I think our practice in this respect ought to be guided by the particular circumstances of each case. In the strong apoplexy, there may be danger of determining too much blood to the head by the act of vomiting; I therefore would not venture to prescribe an emetic till the safer remedies had been unsuccessfully employed. Although we do not precisely know how the brain is affected during the act of vomiting, and although we are informed by Dr. Bryan Robertson and others, that emetics may be safely given in hæmoptysis and other hæmorrhages, I think that vomiting should not be excited, in the strong apoplexy, till depletion had been tried in vain; but if after free and repeated evacuations of blood, both general and topical, and the administration of clysters and other revellents abovementioned, no signs of amendment

should be perceptible, I would endeavour to excite the action of the vis medicatrix naturæ, by the exhibition of an emetic of speedy operation, such as the white or blue vitriols. In favour of the practice I am now venturing, under certain circumstances, to recommend, I would observe, that some instances might be given of restoration, from even the strong apoplexy, on the exhibition of an emetic; and I myself have witnessed one case of recovery from the disease in a somewhat milder form, by this remedy, when bleeding, &c. had been prescribed without any good effect. When soon after eating, the strong apoplexy has supervened and spontaneous vomiting comes on, as not unfrequently happens, I should have more than usual hope of success from this practice, notwithstanding what Burserius and Quarin say; yet I must confess that on two occasions in cases of this kind, I lately prescribed an emetic without the smallest apparent advantage. The prospect of success from this remedy, in the strong apoplexy, is certainly not flattering; yet, after unsuccessful depletion, I would rather try it than leave the patient

to sink under the pressure of the disease, on the supposition that the case was hopeless. I think with Celsus, that it is better to give a remedy of doubtful effect, than none. *

With respect to the internal use of volatile stimulating and nervine medicines in apoplexy, physicians have differed in opinion. The ancients seem to have very generally employed them. Aretæus speaks highly of castor, both externally applied in ointments, and internally given. The dose, he says, should be the same as in lethargy, namely, half a drachm, in three spoonfuls of syrup †, or sweetened wine. Ætius gives a recommendation from Galen, of castor, as well as opopanax, sagapenum, and galbanum, in these cases. Forestus was in the habit of employing nutmeg, oxymel of squills, castor, and mithridate. Sydenham, in the paroxysm of apoplexy, after an emetic, recommends cordials, such as the compound

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* Melius anceps remedium quam nullum.

† Καςόριον πιπίσκειν δραχμῆς ὁλκῆς ἥμισυ, ξὺν μελικρήτῳ [something mixed with honey, probably water, or wine,] κυαθοις τρισὶ. Aret. De Cur. Morb. Acut. l. i. c. 2.

Nausea does all the good that vomiting usually does, and none of the harm.

spirit of lavender. He says, however, we must take care that the cordials be not too hot, or, as is customary, too frequently *given. The French physicians have very generally employed cordials, and especially spirituous preparations, in apoplexy. A medicine prepared for many years, by the Dominican friars at Rouen, has been much celebrated on the Continent, under the title Elixir antapoplectique, and great cures it is said have been effected by it. A medical practitioner of much respectability informs me that, in some cases of apoplexy, he has witnessed very beneficial effects from the internal use of brandy. Dr. Catherwood says that, in apoplexy, he has no confidence in venesection, strong cathartics, clysters, cupping, scarifying, and blisters. He trusts wholly to arteriotomy, cordials, and motion, such as carriage in a sedan chair. He states the case of a person whom he had cured of the strong apoplexy by these means, and asserts positively that if he were not afraid

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* Cavendum est, ne cardiaca plus justo calida, ac nimis frequenter (ut mos est) exhibeantur.

Sydenham, p. 577.

of tiring his readers, he could easily adduce a hundred instances of similar * success. Perhaps cordials and stimulants may be sometimes useful in the milder forms of apoplexy, and an experienced and judicious physician of my acquaintance recommends them as safe and proper after depletion, when there is great depression of spirits; but in the strong disease I certainly would not try them, unless the strength of the patient were very much exhausted, and even in such cases I should expect but little if any advantage from them. I agree in opinion on this subject with Dr. Cullen, who says, " it has been usual with practitioners, together with the remedies already mentioned, to employ stimulants of various kinds, but I am disposed to think them generally hurtful; and they must be so,

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* Vir annorum viginti apoplexia correptus fuit, robusto satis et valido corpore, qui humi tanquam mortuus, magno rhoncho edito concidit. Eadem autem ratione illum ad pristinam valetudinem restitui. *Centum hujus generis exempla facile proferre possem*, ni lectores fatigare vereor; quibus non dubito, quin ad rationis nostræ morbum hunc, olim nimis fatalem, tractandi, summam utilitatem confirmandam, hæc supra memorata sufficiant.

wherever the fulness of the vessels, and the impetus of the blood in them is to be diminished. Upon this principle it is therefore agreed, that stimulants are absolutely improper in what is supposed to be a sanguine apoplexy.* Mr. Hunter speaks in strong terms against the employment of cordials, stimulants, electricity, &c. "in apoplexy and hemiplegia, upon a supposition that it is nervous debility," &c.; he says, "the poor body is also tortured, because it cannot act, the brain not being in a condition to influence the voluntary muscles; we might with the same propriety stimulate the fingers, when their muscles were torn to pieces. I must own, I never saw one of them which had not an extravasation of blood in the brain when opened, excepting one who died of a gouty affection in the brain, with symptoms similar to apoplexy."†

What has hitherto been said respecting the treatment of apoplexy, more especially relates to that, which, from its supposed

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* Cullen, vol. iii. p. 187, 188.

† Hunter on the Blood, &c. 4to. edit. p. 213.

cause, has been denominated sanguineous. I am now to speak of the treatment of *serous* apoplexy.

Some physicians, as has been already remarked, will not allow the distinction of apoplexy into the sanguineous and serous; but this, seems to be of very little consequence, for it is universally admitted that, in different cases, apoplexy is attended with different symptoms and circumstances; and, in a practical point of view, it does not signify whether we attach to these symptoms and circumstances particular names or not. When apoplexy, however, occurs in old age, in leucophlegmatic temperaments, debilitated habits, and is attended with a pale countenance, a feeble pulse, &c. and comes on gradually, it is very generally denominated serous apoplexy, and is supposed by many to depend on an effusion of serum in the brain, and to require a mode of treatment very different from that above directed.

I am of opinion that in these cases, when symptoms warning us of the approach of the disease appear, we ought to proceed as already directed, on the accession of san-

guineous apoplexy, *but with caution;* and even in the fit, we may safely and advantageously employ many of the means recommended, such as pediluvium, frictions, sinapisms, blisters, cathartics, and acrid clysters. Indeed blisters and other stimulating external applications seem to be better suited to this than to the other form of the disease. In the employment of these means we can scarcely err, and they are almost always prescribed; but with respect to the use of some other remedies, particularly blood-letting, physicians have much differed in opinion. In those cases in which there appears to be a determination of blood to the head, and increased arterial action, blood-letting may, perhaps, be properly prescribed, although we may believe that the symptoms depend on an effusion of serum. Our practice ought rather to be guided, I think, by the age and strength of the patient, than by conjectures respecting the immediate exciting cause of the disease; especially as such conjectures have often been found erroneous.

In the *paroxysm* of this species of apoplexy, though marked by debility, and a

feeble pulse, the generality of practitioners recommend bleeding in a greater or less degree. Both Morgagni and Forestus, as before observed, mention cases of apoplexy in which, even in very old persons, blood-letting was practised by them with success. M. Portal, who is very unwilling to admit of the distinction of apoplexy into sanguineous and serous, thinks bleeding admissible in cases *dites sereusés*. I have bled, he says, in the foot, and in the jugular veins, persons supposed to be affected with serous apoplexy with so much advantage that they were by this assistance alone recalled from the gates of death.*

Dr. Cheyne is a great advocate for bleeding in all apoplexies. He thinks the cases of sanguineous are to those of serous apoplexy in the proportion of fifty to one, and thence founds a general argument in favour of bleeding. He says, " were the patient beyond a doubt labouring under serous apoplexy, I do not think his chance of recovery would be lessened by venesection : indeed,

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* Portal, p. 7.

from every analogy, I should think myself justified in recommending this measure, before having recourse to blisters, or the means usually resorted to in this very fatal species of apoplexy." * Sauvages doubts of the propriety of phlebotomy in serous apoplexy, but recommends cupping. † Several other authorities might be quoted in favour of blood-letting in serous apoplexy.

On the other hand, many respectable writers may be referred to, who entirely disapprove of blood-letting under these circumstances. In addition to the names of Fothergill, Heberden, and Darwin, those of Selle, Burserius, and Lieutaud may be mentioned. ‡ Burserius, though a friend to the practice of bleeding in apoplexy, introduces into his recommendation of it, cautionary phrases, such as, si vires non deficiant, nisi signa virium vitalium defectus,

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* Cheyne, p. 59.

† Sauvages, vol. i. p. 848.

‡ Selle says, "generatim non quævis apoplexia requirit missiones sanguinis, e contrario hæc nocere possint ubi vires deficerint, facies est pallida, pulsus parvus atque abundantia humorum aquosorum atque mucosorum adest."

&c. by which we may conclude, that under circumstances of debility he would not direct venesection in apoplexy. Lieutaud, speaking of serous apoplexy, says, we ought to abstain from venesection, which is as hurtful in this species of apoplexy as it is useful in the other. *

The ancients seem to have made no distinction in the treatment of apoplexy, from its supposed cause, but to have regulated their practice by a consideration of the degree of strength or weakness both of the patient and of the disease. Thus Aretæus, when he says, if it do not seem proper to open a vein, the patient being affected with cold in a great degree, and torpor and defect of sensation, in direct terms admits the impropriety of bleeding in some apoplexies. †

With respect to the propriety of taking away blood in a fit of what is called serous

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* A venæ sectione nimirum abstinere præstat; quæ tanta est nociva in hacce apoplexiæ specie, quanto proficua in altero. Lieutaud, Syn. Med. vol. i. p. 150.

† Ην δὲ μὴ δοκέῃ τάμνειν φλέβα ψύξιος πολλῆς καὶ νάρκης καὶ ἀναισθήσιος ἀμφισχούσης τὸν ἄνθρωπον.

Aret. De Cur. Morb. Acut. lib. i. c. iv.

apoplexy, I can give no opinion from observation of its effects, as I have never seen a case exactly answering to the description of this form of the disease; I think, however, that in coming to a determination respecting depletion, we ought to be influenced chiefly by a consideration of the probable power of the patient to bear the practice. In this view, the distinction of apoplexy by the ancients into the strong and the weak, seems very rational and useful. Perhaps, generally speaking, under these circumstances, it will be prudent rather to trust to a topical than to a general evacuation of blood; and I can hardly conceive of a case of complete apoplexy in which I should be afraid to take away some blood by cupping, by the application of leeches, or opening a vessel in the neighbourhood of the head with the lancet; but undoubtedly we ought always, in calculating the degree of depletion, to look, as abovementioned, to the power of the patient to bear it.

The advocates for the employment of emetics in apoplexy, more particularly recommend them in the serous. Sauvages

says, in the cure of this species, we are to begin with emetics in powerful doses, and afterwards to give acrid cathartics. He recommends likewise clysters of emetic wine, and also of tobacco-smoke. By some foreign practitioners emetics have been considered as almost specific remedies in apoplexy. Wepfer describes a case from Grubelius, in the treatment of which, that physician having administered an emetic without effect, expressed the utmost surprise, observing, that, from Van Helmont and others, it would appear that the infallible secret of curing apoplexy consists in giving vomits. *

When the power of deglutition remains, especially under circumstances of great debility, cordials, and stimulating medicines have been very generally prescribed in serous apoplexy, even by those who disapprove of the indiscriminate employment of them as recommended by Sydenham. Thus it has been customary for physicians to

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* Satis constat secretum curandæ apoplexiæ certissimum in vomitoriis consistere.

Wepfer, De Apopl. p. 437.

order decoctions or infusions of horse-radish, mustard-seed, and lavender, cathartic tinctures, volatile alkali in the form of spiritus ammoniæ compositus, cornu cervi, and some metallic preparations, particularly those of iron, and mercury. Sauvages says, volatile salts, and cephalic cordial elixirs may be prescribed*; and Burserius recommends the use of warm acrid volatiles, both internally and externally †; but Dr. Cullen not only absolutely forbids them in the sanguineous apoplexy, but disapproves of them in in the serous. "It is agreed," he says, "that stimulants are absolutely improper in what is supposed to be a sanguine apoplexy; but they are commonly supposed to be proper in the serous. If, however, we be right in alleging that this also commonly depends upon a plethoric state of the blood-vessels of the brain, stimulants must be equally improper in the one case

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* Salia volatilia, elixiria cephalica cardiaca prescribantur.

† Volatilia calida acria tam interius quam exterius adhibita, uti sales volatiles alkalini, spiritus salis ammoniaci, fuliginis, &c.

as in the other. It may be argued from the almost universal employment of stimulants, and sometimes with seeming advantage, that they may not be so hurtful as my notions of the causes of apoplexy lead me to suppose. But this argument is, in several respects, fallacious; and particularly in this, — that in a disease which, under every management, often proceeds so quickly to a fatal termination, the effects of remedies are not to be easily ascertained." *

The treatment of apoplexy arising from mephitic vapours, narcotic poisons, and the like, must be regulated by a consideration of the specific nature of each case. Dr. Cullen is of opinion that all these causes act by directly destroying the mobility of the nervous power, and not by giving occasion to compression of the brain; but with respect to some of those mentioned in his list, particularly opium and alcohol, I am inclined to think that Dr. Cullen is mistaken. In several cases opium and alcohol

* Cullen, vol. iii. p. 187, 188.

seem to have produced the symptoms of apoplexy from compression. I have already * described two of these cases, and to them many more might be added. In the particular management of such cases we must be influenced by observation of the exact state of the patient, which will very much depend on the length of time during which the exciting cause may have been operating. Where medical aid is obtained before the power of deglutition is lost, an emetic of powerful and speedy action should be instantly given, such as the white or blue vitriol, or tartrate of antimony, in large doses, and the patient should be kept in constant motion. If the power of swallowing does not remain, emetics may be conveyed into the stomach by a female catheter and syringe, or by the flexible tube and funnel as recommended by Dr. Curry. This experienced physician very judiciously advises that where opium has been taken in too large a quantity, " instead of white vitriol, we should give

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* Medico-Chirurg. Transactions, vol. i. p. 77. 83.

a table spoonful of antimonial wine, four or five of ipecacuanha wine, two or three grains of emetic tartar dissolved in half a gill of water, or thirty or forty grains of ipecacuanha in powder; because, though they should fail to produce vomiting, they will serve to counteract the stupifying and noxious effect of the opium, by making it operate by sweating." * "It is well known to medical men," says Dr. Curry, "that when either emetic tartar, antimonial wine, ipecacuanha wine, or ipecacuanha in powder, is given, joined with opium, each counteracts the effect which the other would have had if administered alone; the opium generally preventing the emetic tartar, &c. from exciting vomiting, and the latter in their turn, entirely suspending the stupifying power of the opium; the consequence generally is, that they operate upon the skin and occasion a very copious sweating." † In these cases especially, if the abolition of sense and motion be complete, I think we ought to administer acrid ca-

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* Curry, p. 98. † Id. ibid. note.

thartic clysters, and to take away blood topically, as directed in sanguineous apoplexy, though not with so much freedom. In the case of apoplexy from opium, successfully treated by Dr. Marcet, white and blue vitriol were freely given, and afterwards lemon-juice, asafœtida and camphor; acrid clysters were administered, and the patient was kept in constant motion about his room. The free use of acids, particularly the citric, under these circumstances, is recommended by Selle and others.

This plan of treatment is also proper when the disease is caused by other vegetable narcotics, or alcohol. Dr. Curry, speaking of insensibility from intoxication, says, " if the countenance be swollen, and of a dark red or purple hue, and these appearances do not go off upon keeping the body for a short time in an erect posture, it will be proper to take some blood from the jugular veins, or apply cupping glasses to the neck. When the pulse and breathing continue, and the body is hotter than natural, cloths dipt in cold water, and applied to the head, neck, stomach, and breast, have often been found serviceable in

restoring intoxicated persons to their senses; and these applications will frequently render bleeding unnecessary." * "If the hands and feet have become cold, they should be put into warm water, or wrapped in flannels well wrung out of the same, to be changed for others as they cool. And, if necessary, bottles of hot water, or heated bricks, covered with flannel, may afterwards be applied to the feet," &c. † In the case of apoplexy from intoxication, communicated by Mr. Martindale, as above related, we see that very good effects were produced by vomiting, bleeding, and purging.

Among the causes of apoplexy, which, according to Dr. Cullen, act by destroying the mobility of the nervous power, he mentions mephitic gases, and deleterious fumes from charcoal, quicksilver, lead, and other metallic substances, to which he adds the power of cold, concussion, and electricity.

Mephitic gases sometimes seem to produce the true apoplexy with determination

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* Curry, p. 77. † Ibid. p. 79.

of blood to the head, when general or topical blood-letting may be advantageously employed; sometimes, as in the case where a full inspiration of carbonic acid gas is made, they kill by occasioning asphyxia, the breathing and pulse being instantaneously stopped. Mr. Good is of opinion, that mephitic gases produce apoplexy in certain states of constitution, and asphyxia in others; and that bleeding, which is so highly useful in the first, will be tried in vain in the last, for the blood will not flow. In the one, he thinks we must avoid the stimulus of Galvanism, which in the other is our best remedy. M. Portal says, that persons under the influence of mephitic vapours are sometimes affected with stertorous breathing, and true apoplexy; and in such cases, especially if the pulse be full, and the respiration be stertorous, blood-letting is indispensable. In asphyxia, carus, &c. from mephitic gases and narcotics, experience has taught us, says M. Portal, that it is proper to expose patients to a free air, and to sprinkle them with cold water, first on the face, and afterwards on the whole body, and to administer

stimulating clysters. Burserius, in these cases, recommends the same remedies, and, in addition, cordials, stimulants, and volatiles, with frictions, and the extraction of blood from the jugular veins. Dr. Curry, speaking on this subject, says, that "when the accident is recent, and the body retains its heat, the application of cold water to the head, neck, breast, and other parts, has been found of great service in promoting recovery. For this purpose, the body should be stripped naked, and laid in the open air, upon a door or boards placed in a slanting position, so that the head and shoulders may be considerably elevated. The cold water is then to be dashed smartly and repeatedly upon different parts, and especially upon those mentioned above, until the temperature of the body be reduced to the natural standard, or until signs of life appear." * It is a well-known fact, that dogs which have been rendered insensible by breathing the gas of the Grotto del Cane in Italy, may be soon restored by

* Curry, p. 63, 64.

being exposed to cold air, or plunged into cold water. — In these cases, other remedies have also been recommended, and employed with good effect. In the case of apoplexy from the vapours of burning charcoal, successfully treated by Dr. Babington, that gentleman, after ordering the patient to be carried into a pure and cool air, and taking away some blood, directed that Galvanic shocks should be passed through the chest, that the face and body should be sprinkled with cold water, and that oxygen gas should be inhaled. In addition to these remedies, volatile spirit was rubbed on the temples and chest, bottles filled with hot water were applied to the feet, and clysters were repeatedly administered. Nearly a pound of blood was lost by the accidental slipping of the ligature from the arm, which had been used in the bleeding. Under this mode of treatment the patient soon recovered.

The suspended animation from drowning, hanging, excessive cold, and electricity, or lightning, is not attended with the symptoms of true apoplexy, according to my definition of the disease; I think, there-

fore, that it is not necessary for me here to point out the plan to be adopted in such cases. For information on this subject, I can, with great satisfaction, refer the reader to Dr. Curry's treatise on apparent death from drowning, suffocation, &c.; and to M. Portal's publication, on the same subject.

When apoplexy arises from suppressed evacuations, the cure must be attempted by endeavouring to restore those evacuations, the suppression of which may have produced the disease. If a suppression of the hæmorrhoidal discharge, or if the menses have given occasion to apoplexy, we are advised to bleed in the foot, to give emollient clysters, and to apply leeches to the neighbourhood of the anus. M. Portal describes a case of somnolency approaching to apoplexy, arising from a cessation of a discharge of blood from the urethra, in which the greatest advantage was derived from a restoration of the discharge, by the application of leeches to the perinæum. * In

* Portal, p. 249.

apoplexy from a suppression of the lochia, repeated bleeding in the foot, blisters to the legs, and gently opening medicines, are strongly recommended, and have been very happily tried by respectable physicians. M. Portal describes his successful treatment of a case of apoplexy, arising from the suppression of an habitual purging and vomiting, by venesection, blisters to the legs, and emollient clysters. The same author mentions an instance in which apoplexy, from a suppression of urine, was cured by bleeding, mild aperients, emollient clysters, and the mineral waters of Bourbonne. Many similar instances might be quoted from authors.

With respect to the apoplexy caused by, or connected with, other disorders, commonly called symptomatic apoplexy, I wish to observe, that the removal of the symptomatic disease is to be attempted by the means best calculated to remove the primary disease.

In the *apoplexia metastatica* of Sauvages and others, which supervenes on the retrocession of gout, rheumatism, cutaneous affections, &c. our object should be to

+ Diaphoretics seem to do good by equalizing the circulation.

bring back the transferred complaint to its original situation. There is no disorder which more frequently produces apoplexy by metastasis than gout. As to the treatment of this affection, authors differ; but that generally, and, I think, judiciously recommended, is topical blood-letting, especially by cupping; blisters, and sinapisms to the legs and feet; and revellent clysters. In these cases some practitioners recommend aromatics and cordial volatiles; but I doubt of the propriety of this. M. Portal tells us that he succeeded in restoring gout to the extremities, which had receded to the head, in what he denominates *une apoplexie foudroyante*, by repeated bleedings in the feet, and the application of sinapisms to the extremities. In a case of apoplexy from retrocedent gout in a lady eighty-two years of age, M. Portal, after trying some other means without advantage, bled her in the foot, and she was restored to perfect health. From this instance, M. Portal observes, we see the great necessity of having recourse to blood-letting. In confirmation of this practice in

arthritic apoplexy, he quotes the authority of Sydenham. *

Apoplexy has in some instances been occasioned by the repulsion of cutaneous eruptions, and cured by a restoration of them. Instances might be adduced of apoplexy from the receding of small-pox, measles, and erysipelas. In these cases, bleeding has been recommended by some; but others are afraid to prescribe it, and give the preference to the internal use of volatiles and cordials, and the application of sinapisms and blisters. — M. Portal relates the case of a banker at Paris, who had for a long time been almost covered with a tettery eruption, which had been repeatedly mitigated by blisters and other depuratory remedies. He was persuaded to try an external application, which caused the cutaneous affection to disappear, and he was soon afterwards seized with the strong apoplexy. M. Portal was at first afraid to bleed this patient, and ordered for him cordials, sudorifics, blisters, and

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* Portal, p. 111.

sinapisms, with the view of restoring the cutaneous humour. As this plan did not succeed, and as the pulse was hard and full, and the sleep profound, M. Portal bled him in the foot, and with evident advantage. He advised a second bleeding, and some hours afterwards, on the breaking out of a copious perspiration, the patient was cured, excepting that a slight numbness in one of his arms remained.*

After recovery from a fit of apoplexy, with a view to prevent its return, those remedies should be recommended which have been already at large described as proper to prevent the accession of the disease when symptoms threatening its approach have made their appearance. Blood-letting, general or topical, according to the age, constitution, strength, and habits of life of the patient, should be occasionally ordered, together with mild cathartics internally taken, or administered in the form of clyster. A constant attention to the state of the bowels is of the utmost importance.

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* Portal, p. 265.

Discharges from the neighbourhood of the head by blisters, issues, or setons, are, I believe, often highly beneficial. The strictest temperance and moderation, both with respect to eating and drinking should be observed. This is absolutely necessary, especially in those cases in which persons are disposed to make blood quickly, or in too great a quantity. Moderate exercise in the open air, when the weather will permit, will probably be found useful; but violent exercise is likely to be prejudicial. The mind should be kept as much as possible in a state of tranquillity, as all violent passions are dangerous. A sedentary, and especially a studious life, watchfulness, or indulgence in too much sleep, are likely to prove very injurious under the circumstances to which we refer. All the causes of the disease which have been at large described, should most carefully be avoided.

This plan is recommended not only to those who may have recovered from a fit of apoplexy, but likewise to persons predisposed to the disease, though they may not have experienced its attack. Apoplexy,

as we all know, is a most dangerous disorder, in its strong form almost always, as above-mentioned, proving fatal; but we have every reason to believe that by attention to the employment of proper remedies, it may be, and often has been prevented. The prophylactic treatment, therefore, cannot be too strenuously urged, or too diligently employed.

A physician of my acquaintance, of great judgment and experience, informs me that he has in many instances, he believes, warded off a repetition of apoplectic and hemiplegic attacks by a similar prophylactic plan. "Laborious digestion, and repletion, particularly of the blood-vessels, being," he says, "the ordinary causes of relapse, great temperance, and a free state of the bowels are highly necessary." He adds, "we ought not, in these cases, to wait for the enemy, but to be beforehand with him by cupping, and a short course of purging every spring and autumn, whether threatenings of the disease appear or not. I have in view several," he observes, "who, by these injunctions, have for twenty years escaped a repetition of fits, and one, who,

lulled into security by long exemption, indolently omitted these periodical evacuations, and was overtaken by a sudden and fatal stroke."

M. Portal considers this part of our subject very minutely, and recommends a preventive mode of treatment in many particulars resembling that which we have described. With respect to the means, says M. Portal, to be employed for the purpose of guarding from apoplexy those who are threatened with it, or to prevent a return of it, when its attack has been experienced, the plan must be varied according to the causes which may produce the disease, and the strength, age, sex, &c. of the patient. If, in a strong constitution, the neck be short, the head large, the pulse too full, in a word, if we see a strongly marked plethora, we must endeavour, by all the known means, to diminish it, first by artificial evacuations, if the danger appear imminent, otherwise by regimen chiefly. Bleeding is in general, M. Portal observes, the most powerful preventive remedy, and it should be repeated again and again, taking care, however, not to exhaust the pa-

tient. He recommends a seton in the neck, or the double caustic along the cervical spine, according to the method of M. Pott. Discharges by caustic may, if necessary, be established in the arms, the thigh, the leg, &c.; blisters are, however, to be preferred, or employed in addition, if we wish to produce an internal irritation by the volatile part of the cantharides which they contain, and which being absorbed into the mass of humours, stimulate the sensible parts, increase the motion of irritable parts, and much contribute to the reduction of superabundant flesh. The internal remedies prescribed to produce the same effect are such as the cruciferous plants, antiscorbutics, extract of polygala, serpentaria, arum, elecampane, digitalis, &c. Patients under these circumstances, M. Portal says, should from time to time be purged, and in the intervals of purging they should drink the thermal waters, if possible, at the fountain-head, such as those of Bareges, Aix-la-Chapelle, Bagnols, &c. M. Portal also recommends an early attention to hereditary predisposition, to scrophulous taint, mal-conformation of the head and the

bones in general, and to steatomatous congestions which we may discover in the neck, armpit, or internal parts. When soporose diseases appear to be connected with spasmodic, hysterical, melancholic, convulsive, or epileptic affections, with pain or strong passions of the mind, with acrimonious humours, with diminished or suppressed evacuations, with catarrhal, arthritic, or rheumatic attacks, the treatment must be suited to the particular nature of the case, and its connection with such affection; for an account of which, as well as of certain means which he says have been employed by modern physicians, with a view of restoring to the nerves their sensibility, and to the muscles their irritability, I must refer to M. Portal's book.

With respect to regimen for those threatened with apoplexy, or who have experienced an attack of it, M. Portal recommends low diet, aliments which are not too succulent, and such as are easily masticated, and of easy digestion; mild aperients, weak broths, with roots and herbs; fish; fruit, such as apples, grapes, &c. and light wines mixed with water. He does not

allow farinaceous diet, or milk. He recommends laxative clysters when there is a tendency to constipation; pediluvium, and moderate exercise; but forbids indulgence in sleep. In these cases, he says, persons should lie upon hard beds, and with the head elevated. For other remarks, and some distinctions which he makes on the subject of regimen, I must also refer to his work.*

The above-mentioned means for preventing apoplexy, or guarding against its return, do not apply, as indeed is evident, to persons of debilitated, leucophlegmatic, dropsical habits. The treatment proper in such cases will be given under the head *palsy*.

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* Portal, p. 438.

CHAP. VII.

Of Lethargy, Coma, Carus, Cataphora, &c.

These soporose affections, as I have already stated, are very differently considered by different writers; some viewing them as various degrees * of apoplexy, others as entirely distinct diseases. Much confusion has arisen among nosologists, as to the classification of them. Sauvages and Cullen place them under comata, as an order, and Dr. Young and Mr. Good under carus, as a genus; whilst Dr. Cheyne considers them "under the general term, lethargy, cataphora being a more inveterate form of lethargy, and carus the extreme species of it."

Many of the Greek physicians have described lethargy, which they say consists in an irresistible desire to sleep; and they almost all consider carus, coma, &c. as higher degrees of lethargy. From lethargy they say persons may be roused, though

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* Mead says, Lethargia et carus sunt levioris apoplexiæ species. Mead. Mon. et Precept. Med. c. ii.

with difficulty, but not from carus and coma. Ætius, from Posidonius, says, " carus differs from lethargy in this, that the lethargic answer when spoken to ; but those affected with carus lie in a profound sleep, and when stimulated, though they have sensation, they neither speak nor open their eyes." * Many similar accounts may be found in the writings of other ancient authors. — Celsus, speaking of lethargy, says, that in it there is an unconquerable necessity of sleeping. † And Forestus, in his account of lethargy, adopts the description of Celsus, to which he makes some additions. ‡

Modern authors seem very generally to have considered lethargy, coma, &c. as symptomatic diseases, or as imperfect apo-

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* Ætius, Tetrab. ii. serm. ii. c. 3—5.

† In hoc marcor, et inexpugnabilis pene dormiendi necessitas ; ληθαργον Græci nominant. Cels. lib. iii. c. 20.

‡ He says, " vix respondent quocunque modo interpellantur, oscitant crebro et hianti ore, aliquandiu persistant tanquam claudere id obliti. Cum violenter ab assidentibus excitantur, rursus in somnum deferuntur et dum ad mictionem urgentur, porrectâ ipsis matulâ, sese in manibus habere obliviscuntur. For. lib. x. obs. 8.

plexies, and very little has been written by them expressly on this subject. Dr. Cheyne, indeed, has published some cases of lethargy, with observations upon the comatose diseases, in which he considers very much in detail the distinctions which have been made relative to them; he himself, in a great measure, adopting those of the Greek physicians.

With respect to the *treatment* of lethargy and other soporose affections, we must look for information principally to the ancients. Many of the Greeks have enlarged on the method of cure of these disorders, but none so much as Aretæus. The following is an abstract of his practice. The lethargic, he says, should be placed in a strong and splendid light *, and attempts should be made to rouse them by speaking to them, and powerfully stimulating the feet and limbs; or, if the sleep be more †profound, by calling to them in a loud voice with expressions of anger, exciting terror by those whom they have been accustomed to fear,

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* Εν 'φωτὶ καὶ πρὸς αυγὴν.

† Ἢν βαθὺν κῶμα ἴσχῃ.

or by the communication of any very interesting intelligence. If the lethargy be the consequence of some other disease, as phrenitis, the opening of a vein is not admissible, nor is much blood to be taken in any way; but when the disease is idiopathic, and the patient is plethoric, Aretæus recommends venesection. He afterwards says, in certain cases blood may be taken from the back part of the head, by cupping. He also advises the administration of clysters, not only with a view to cleanse the bowels, but also to derive from the head; and that to them castor should be added, as the lower intestine is cold. The diet should be moderate in quantity, and attenuating; consisting of broths rather than of vegetables. He recommends diuretics and carminatives, of which he mentions a great variety, observing that flatulence often occurs in lethargy. In cases where there is trembling of the hands and of the head, he prescribes castor, of which half a drachm may be taken for several days in three spoonfuls of sweet wine; or if the patient be not able to drink, it may be used externally with three spoonfuls of

oil, in which rue has been boiled, or a double quantity of it may be injected into the lower intestines for several days in succession. He has in these cases a high opinion of castor mixed with other medicines in various forms. Several topical applications are recommended by him in lethargy, particularly affusions on the head, cupping under the circumstances above mentioned, sternutatories, ointments with castor and oil of anise, &c. stimulating liniments to the knees and feet, and the application of nettles to the legs, and rubefacients and warm fomentations to the head. When the whole body is cold, especially the extremities, liniments of castor, oil of anise, &c. should be applied to the head, spine, and all parts of the body. If after the exhibition of these and other remedies, the stupor be still very great, he advises the application of a poultice of the wild cucumber, triturated with vinegar, with the addition of an equal quantity of mustard. This, he says, is a powerful cataplasm, soon exciting redness, and a discharge; and, he adds, if there be danger of its producing pustules or ulceration, it

should be frequently removed. If sensation shall have returned, and there be weight in the head, with noise and tinnitus aurium, we must endeavour, he says, to promote the excretion of pituita from the mouth; and for this purpose mastich should be chewed so as to cause a spitting, and afterwards the staphis agria and the Cnidian berry, or fruit of the spurge flax, but above all mustard, which most powerfully evacuates pituita, and which, if swallowed, will act advantageously, by dissolving what is in the stomach, gently operating upon the bowels, and dispelling wind, as he had witnessed in a particular case; and experience, he observes, is a good teacher. * After the disease, bathing, exercise, and frictions will be found useful. The practice of Aretæus in lethargy, comprises almost every thing mentioned by the other Greek physicians. — Galen advises cupping, sinapisms to the head, sternutatories, and the vapours of vinegar in which thyme and other herbs have been boiled.

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* Αγαθὴ δὲ διδασκαλος ἡ πειρη.

He agrees in opinion with Aretæus as to the usefulness of castor in this disease. *

Alexander Trallianus, above all things, recommends bleeding, when the strength of the patient will bear it. He thinks that vinegar with oil of roses † may be usefully applied to strengthen the head. He recommends sternutatories, such as pepper, euphorbium, &c. stimulating liniments to the head, and frictions to the legs. The bowels are to be kept open with scammony; and warm bathing, or the affusion of warm water on the head, he says, will be found useful. Alexander thinks castor very efficacious in lethargy, applied in liniments, as a sternutatory, or internally taken either alone or with oxymel. He observes that he has known many persons labouring under the disease who escaped death by this remedy alone. ‡

Paulus Ægineta also recommends bleeding, cupping to the occipitium, acrid clysters, liniments and sinapisms to the head, sternu-

* Meth. Med. lib. xiii. ch. 21.

† Ὀξυῤῥόδινον.

‡ Alex. Trall. lib. i. ch. 13.

tatories, &c. and castor*, with other remedies advised by Aretæus. The treatment of lethargy given by Ætius, from Archigenes and Posidonius, very much resembles that of Aretæus. † Celsus, with the view of rousing persons afflicted with lethargy, advises sternutatories, such as pepper, euphorbium, castor, vinegar, &c. and also the fumes of burning galbanum, or cornu cervi, to the nostrils, and affusion with cold water, which, suddenly applied, powerfully excites. ‡ In order to cure the disease, the head, he says, should be shaved, and then fomented with water in which laurel or rue had been boiled, and afterwards castor should be applied, or rue triturated with vinegar, or the berries of laurel or ivy with roses and vinegar. He thinks mustard useful, either applied to the nostrils, or to the forehead, or the whole head.

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* Paul. Ægin. lib. iii. c. 9.

† Æt. Tetrab. ii. Serm. ii. c. 3. 5.

‡ Excitat autem validissime repente aqua frigida superinfusa. Cels. lib. iii. chap. 20.

The practice of Forestus and his cotemporaries, in lethargy, does not very materially differ from that of the ancient physicians. He recommends bleeding, frictions, opening medicines, and sialogogues, errhines, clysters and sinapisms.

With respect to the treatment of lethargy, carus, &c. I find very little that is interesting in modern writers. Dr. Cheyne says, "if the reader expects satisfactory information relative to the cure of lethargy, I fear he will not be gratified." In these cases he was in the habit of prescribing blood-letting, cathartics, and blisters, and the strictest attention to regimen; diuretics, mercury, and tonics he tried without advantage. Topical bleedings he found in some cases useful; and analogy, he says, would lead to the trial of issues and setons. "Every thing which greatly stimulates the brain ought to be avoided, such as the daily or frequent use of ardent spirits, strong wines, and tobacco. When lethargy has been induced by great excitement of the mind, change of scene, travelling by easy stages, the amusements of a watering-

place, and a course of mineral waters, which relax the bowels, are well worth a trial." *

A physician of eminence informs me that he has seen many of these disorders probably occasioned by the stomach being lined with mucus, or slime; under which circumstances he recommends emetics.

Modern authors, I believe, do not give any additional information of importance on this subject; nor does my own experience furnish me with any practical remarks worthy of communication, as I have seen but very few instances of idiopathic lethargy.

Soporose affections occasionally occur, which seem to partake of the nature of lethargy, carus, or coma, but which in some respects materially differ from them. I had some years ago an opportunity of seeing a case of this kind, and as the circumstances of it are curious, and, I believe, extraordinary, I shall shortly describe it. A lady about twenty years of age, who had usually enjoyed very good health, was one morning found in a state of profound but quiet

* Cheyne, p. 211, 212.

sleep, from which she could not be awakened, although the preceding evening she had gone to bed apparently quite well. Various means had been tried with a view of exciting her from this state, but in vain. Under these circumstances, I recommended cupping on the neck; and after she had lost a few ounces of blood in this way, she opened her eyes, perfectly recovered, and remained through the day quite free from all symptoms of disorder. The next morning, and for several successive mornings, she was found in a similar state, from which she was recovered by the same remedy, no stimulating external applications producing any good effect. As she was considerably weakened by repeated depletions, it was determined that on the next recurrence of the paroxysm the case should be left to the efforts of nature, as long as was consistent with safety: the experiment was tried, and at the end of about thirty hours she spontaneously awoke, apparently refreshed, and wholly unconscious of her protracted sleep. On the future returns of these paroxysms, which were frequent, the same plan was adopted, and she awoke after intervals of

thirty-six, forty-eight, and, on one occasion, sixty-three hours, without seeming to have suffered from want of food or otherwise. In the early part of the disease, various means were employed, without the smallest advantage, except that while under the influence of mercury, which produced a very severe salivation that lasted for more than a month, she was free from the complaint. For a considerable length of time these paroxysms recurred; but at length they gradually left her, and soon afterwards she became deranged in mind, in which state I believe she still remains.

Among the species of apoplexy of Dr. Cullen, we find the *apoplexia cataleptica*, commonly called catalepsy. Some physicians doubt of the existence of this affection, whilst others admit it to be an idiopathic, but uncommon disease. Dr. Gregory, in his lectures, says "it is a disease which very seldom occurs; but I once saw a fatal case of it in which there could be no suspicion of deceit." Catalepsy has been described by Galen and some others of the ancients, and by several modern physicians, particularly by Sauvages, who places

it as a genus under the order comata, and enumerates several species of it. Catalepsy, which is said to begin with torpor and headach, consists in a suspension of all sense and motion, excepting that of the heart and lungs; the limbs being flexible, and remaining fixed in whatever position they are placed. Sauvages says the disease occurs in paroxysms, in which the body and limbs, retain their fixed posture, whether the patient be sitting or standing. In a perfect catalepsy, he observes, if the hand be raised and extended it will not fall, and if the muscles be in any particular state of action at the accession of the disease, they will continue in that state; so that if the muscles of the face, for instance, be disposed as in laughter, or in weeping, such expression will remain, the whole body resembling an image of wax, which receives and retains all impressions. Sauvages remarks, that, sometimes sooner, sometimes later, the patient awakes as from sleep, wholly unconscious of what has happened. The duration of the paroxysm varies from a few minutes to several hours.

Forestus shortly, but very forcibly de-

scribes this affection in the following terms: "Quum catalepsia quis corripitur, confestim instar marmoreæ statuæ gelatur, nec mutat constrictus presentem corporis habitum, sed subito tanquam afflatus sidere, aut (quod est in fabulis) Meduseos vultus conspexerit attonitus rigidusque *consistit."

Galen considers catalepsy and catoche as similar affections, and Ætius has adopted this opinion; but the particular symptom considered by the moderns as characterising the disease they do not mention.

The treatment of catalepsy much resembles that of lethargy, already described. Ætius, who thinks that the disorder sometimes arises from a fulness in the head, recommends in such cases that a vein should be opened, and that as much blood should be taken away as the patient can bear to lose; and he relates the case of a young man who recovered from the disease by a large effusion of blood from the nose. Ætius likewise advises fomentation of the head with warm oil; that the bowels should

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* Forest. lib. x. obs. 41. † Καταληψις, κατοχη.

be kept open; that clysters should be administered; and that wine and certain decoctions should be given.

Hoffman, in catalepsy, prescribes bloodletting, purging, and nervines, particularly musk and asafœtida; in cases supposed to be connected with worms, anthelminthics. As the disease often depends upon the state of the mind, passion, he says, must not be excited.

Forestus, among the remedies for this complaint, mentions cupping on the neck and shoulders, fomentations and unctions to the head, frictions, opening medicines, and especially clysters.

Sauvages describes another nervous affection, — ecstacy, which nearly resembles catalepsy. Ecstacy, however, he says differs from catalepsy in this respect, that although in the former complaint the limbs preserve the situation in which they happen to be on the accession of the paroxysm, they do not, as in the latter, retain any position in which they may be subsequently placed.

Although Sauvages has given a minute account of these two diseases, particularly the

former, he does not, either from his own experience or that of others, advise any mode of treatment. Hoffman, Gregory, Forestus, Sauvages, and others, speak very confidently of the existence of catalepsy; yet they all admit that it is a disease of very rare occurrence. Sauvages and Forestus mention several instances in which the symptoms have been feigned; and I think that even those which they relate as cases of true catalepsy, are accompanied by some suspicious circumstances.

CHAP. VIII.

Of Apoplexia Hydrocephalica, or Hydrocephalus Internus.

Among the species of apoplexy enumerated by Dr. Cullen, we find the apoplexia hydrocephalica, which, he says, "arises gradually in children, and affects them with lassitude, feverishness, and pain in the head; afterwards with slowness of pulse, dilatation of the pupil of the eyes, and somnolency."

This disease, commonly called hydrocephalus, or water in the brain, by Drs. Carmichael Smith, Yeats, and Coindet, denominated hydrencephalus, has been classed by Sauvages, Linnæus, and Sagar among the local dropsies, and divided into the internal and external: the water in the former being situated in the ventricles of the brain, in the latter in the integuments of the head; while Dr. Quin and others, adopting Dr. Cullen's arrangement, refer it to the genus apoplexy. Hydrocephalus has also been

distinguished into the acute and chronic, according to the duration of the disease; and into the idiopathic and symptomatic, or the primary and secondary complaint. The disease which I propose to investigate at present is the *internal acute hydrocephalus*. Dr. Cheyne is of opinion that this was not known as a distinct disease before the year 1768, when Dr. Whytt gave an account of it; but Dr. Gregory, in his Lectures, says that a description of it was published by a surgeon of Glasgow in the year 1753; and M. Petit, in the Memoirs of the Academy of Sciences for the year 1718, has detailed many of its most important symptoms.

The hydrocephalus *exterior* was undoubtedly known to the ancients: all the principal Greek writers mention it, and Galen has enumerated four species of it, according to the situation of the water, which, in the first, he says, lies between the brain and the meninx (dura mater); in the second between the meninx and the bone; in the third between the bone and the pericranium; and in the fourth between

the bone and the skin: the first of these he pronounces to be incurable.

Galen, however, and his followers, in their account of hydrocephalus, do not mention any of the symptoms which characterise the *internal* disease; but Hippocrates, in speaking of the complaints which arise from the head*, describes one, to which he gives no name, though he assigns its immediate cause, the symptoms of which a good deal resemble those of the hydrocephalus *interior*. He says, when water is formed in the encephalon, there is occasionally an acute pain, limited to the sinciput and the temples; sometimes rigor and fever; pain in the eyes and obscurity of sight; with a disturbance of the pupil, so that a person seems to see objects double; on standing up, he is seized with vertigo; he cannot bear the air or the light; he is affected with tinnitus aurium, and confusion in hearing; he vomits saliva, or pituita, sometimes also his food; and the skin of the head grows thin and becomes contracted.†

Dr. Whytt notices this passage in Hip-

* Νοῦσοι αἱ ἀπὸ τῆς κεφαλῆς γινόμεναι.

† Ἢν ὕδωρ ἐπὶ τῳ ἐγκεφάλῳ γένηται ὀδύνη ὀξείη ἴσχει διὰ

pocrates, but says that ἐπι more properly means *upon* than *in* or *within*. I wish, however, to remark that Hippocrates sometimes employs that preposition to signify *in*; as, for example, ἐπι τὰς μήτρας, in uterum. * Dr. Whytt thinks that Hippocrates is here speaking of water between the dura mater and the brain, because he proposes to trepan, ϖρος τον εγκεφαλον, which would be useless if the water were within the brain. Perhaps it may be reasonably doubted whether water between the dura mater and the brain would produce all the symptoms which are enumerated by Hippocrates; and it is a curious circumstance, that neither Galen, Aretæus, Ætius, nor Celsus have mentioned them in their account of the

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τῦ βρέγματος καὶ των κροτάφων ἄλλοτε ἄλλη, καὶ ῥίγος καὶ ϖυρετὸς ἄλλοτε καὶ ἄλλοτε, καὶ τὰς χώρας των ὀφθαλμῶν ἀλγέει καὶ ἀμβλυώσσει καὶ ἡ κόρη σχίζεται, καὶ δοκέει ἐκ τοῦ ἑνὸς δύο ὁρᾶν, καὶ ἢν ἀναςῇ, σκοτοδινίη μῖν λαμβάνει, καὶ τὸν ἄνεμον ὀυκ ἀνέχεται, ὀυδὲ τὸν ἥλιον, καὶ τὰ ὦτα τέτριγε, καὶ τω ψόφω ἄχθεται ἀκούων. καὶ ἐμέει σίελα καὶ λάπην ἐνίοτε δὲ καὶ τὰ σιτία. καὶ τὸ δέρμα λεπτύνεται τῆς κεφαλης, καὶ ἥδεται ψαυόμενος.

Hipp. De Morbis. lib. ii. Morb. à Cap. orient.

* De Naturâ Pueri, p. 19.

external disease. — The whole of this, however, must be considered as a question rather of curiosity than of use; since neither Hippocrates, nor any of the other Greek or Roman writers, give us any practical information farther than what seems to appertain to the treatment of the hydrocephalus exterior.

The acute internal hydrocephalus has been minutely described by several modern physicians, particularly by Drs. Whytt, Fothergill, Cheyne, Carmichael Smith, Yeats, and Coindet; yet "the subject is so far from being exhausted," says Dr. Cheyne, "that the disease is universally admitted, both in pathology and practice, to be still involved in great obscurity."

This species of hydrocephalus in its confirmed state, has been very generally considered as a disease of the utmost danger. It may, however, perhaps be prevented, or, in its incipient state, be cured, by the timely employment of proper means: it is therefore of the utmost consequence that we should be acquainted with the symptoms which denote its accession, or the danger of its accession. — Dr. Yeats, in a late

publication, has taken great pains in stating these symptoms, and in endeavouring to impress the necessity of a watchful attention to them, and the fatal consequence of neglecting them.

Dr. Yeats thinks that the internal causes which indirectly give rise to water in the brain are seated in the digestive organs, the functions of which, he says, become deranged with various symptoms; and of this derangement the hepatic powers, from their great importance, largely partake: he would therefore be early upon the alert, and keep in view the consequences of a diseased state of the digestive organs upon the brain before any pain was complained of * there.

Before I enter on the consideration of the symptoms which indicate the presence of water in the brain, I shall briefly mention those which, in the opinion of Dr. Yeats, often lead to this important and dangerous complaint. Among the symptoms which

* It may be doubted, however, whether the affection of the brain be the consequence or the cause of the derangement of the functions of the stomach, liver, and intestines.

occur "in the very first commencement, before any alarm is taken, and before any person can possibly imagine, but from experience, that they will often terminate in water in the brain," Dr. Yeats mentions those which follow:— Occasional languor, as if from fatigue; a diminution of the usual degree of healthy appearance of the countenance in a transient paleness, and occasional collapse of the features; a dark coloured line under each eye, with a dulness of that organ; harshness, and increased heat of the skin; capricious appetite; occasional thirst; tardy state of the bowels; whiteness, and sometimes dryness of the tongue, without any morbid change in the pulse; urine at times higher coloured than it ought to be; costiveness; the stools being more than commonly consistent and firm, and, if attentively examined, showing that a diseased action has begun to take place in those glands which pour their secretions into the intestinal canal, the evacuations being much lighter than they ought to be, or sometimes tinged with a dark colour of a greenish cast, and accompanied with some quantity of slimy matter;

noise and confusion in the head, but without pain; the scalp, however, feeling sore on being rubbed or touched. "During this state," says Dr. Yeats, "upon examination, a puffiness will be felt, and also a fulness observable, over the centre of the stomach, extending towards the navel; uneasiness is complained of there from pressure, but like all the other symptoms at this time, they are not permanent; and the only symptom which observes any permanency, is the torpid state of the bowels. Although the degree of it varies in different patients, the costiveness is, nevertheless, always more or less present; the sleep is frequently disturbed by restlessness, indicated by repeated movements about the bed. The child is said to be only not well, and this is supposed to arise from some improper food that has been taken. It is evident we cannot, à priori, positively determine what exact state of disease this deviation from general health will ultimately produce; but full well I know, that this irregular excitement, this vacillating state, in the way above described, very frequently leads to the next chain of more manifest

morbid actions, which terminate in water in the brain. We should be, under such circumstances, most carefully * watchful." The puffiness and fulness about the region of the stomach, Dr. Yeats is disposed to refer to a distension of the duodenum, an intestine which he thinks is of very great importance in the chylo-poietic functions. He particularly points out the dangerous consequences of a continued or frequently-recurring deviation from the healthy state of this " viscus succenturiatus."

The symptoms which Dr. Yeats has mentioned as occurring before any alarm is taken, and which, in his opinion, often lead to hydrocephalus, are, it must be confessed, equivocal; they may have no connection with that disease, or they may be precursors of some other complaint of a very different nature; but whatever they lead to, they require careful consideration, and he has very properly called our attention to them.

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* Yeats, p. 34, 35.

The symptoms which indicate the actual presence of water in the brain, enumerated by writers on the subject, are so many and various, that it is very difficult to give a history of them which may be clear, and yet sufficiently comprehensive. Dr. Whytt's description of hydrocephalus is very methodical and accurate; and though, in some respects, deficient, it has been very generally admired, by subsequent writers on the subject.

Dr. Whytt divides the symptoms of dropsy in the ventricles of the brain into three stages. "In the first stage, four, five, or six weeks, and in some cases, much longer before their death, he says, children begin to lose their appetite and spirit, they look pale, and fall away in flesh, they have always a quick pulse, and some degree of fever." "In some cases," he says, "I have seen a hydrocephalus attended with a considerable degree of fever, which had frequent remissions, but without any order or regularity; in other cases, the paroxysms came on pretty regularly in the evening, and then the disease was taken for a slow

nervous fever, or for one occasioned by worms." * Among the symptoms of the first stage, Dr. Whytt mentions whiteness of tongue; sometimes a remarkable cleanness of the tongue, which towards the end of the disease acquires an aphthous redness; thirst; vomiting; pain in the crown of the head, or in the forehead above the eyes; costiveness; sometimes looseness; when bound, not easily moved by purgatives; sometimes griping; an inclination to lie in bed, though more disposed often to watching than to sleep; inability to bear the light; picking of the nose, and grinding of the teeth, as in the case of worms. Dr. Whytt says, "I never had but two patients who had not vomiting during either the first or second stage;" and he remarks, that "in general the vomiting once or twice a day, or once in two or three days, the head-ach and the aversion to light, are the symptoms which, in the first stage of this kind of hydrocephalus,

* Whytt's Works, p. 729.

characterise it most." Dr. Whytt dates "the beginning of the second stage from the time the pulse, from being quick, but regular, becomes slow and irregular. This sometimes happens about three weeks, often a fortnight, or less, before the death of the patient. In this stage, the pulse is commonly not only slower than it was before, but often more so than in health." Dr. Whytt never saw "a patient with water in the ventricles of the brain, whose pulse did not come down to its natural state, or very near it, except one." "When the pulse is nearly as slow, or slower than natural, it is always irregular or unequal, both as to the strength, and the interval of the strokes. When it grows quicker, the irregularity lessens; and when it becomes very quick, it is then most equal and regular. Farther, it deserves notice, that, although in the second stage the pulse becomes much slower than it was before, the heat of the skin continues much the same, and sometimes seems rather to increase. I have insisted the longer on the state of the pulse in this period," Dr. Whytt says, "as from

thence we can learn the surest diagnostic. During the second stage, most of the symptoms mentioned in the first continue. The sick are then unable to sit up, though generally they sleep little, till towards the end of this period, when they begin to grow drowsy. They moan heavily, yet cannot tell what ails them. Their eyes are often turned towards the nose, or they squint outwards, and sometimes complain of seeing objects double. Some, towards the end of this stage, grow delirious, and cry out in a wild manner, as if they were very much frightened: about this time also, or later, they frequently void either real worms, or some substance like worms in a dissolved state; yet this discharge gives no relief to the patient, and only helps to deceive the less experienced practitioner, with regard to the nature of the disease." The urine in this, as well as in the other stages, varies in appearance; the breath has now, but especially in the last stage, a sickish and peculiarly offensive smell. "When the pulse," says Dr. Whytt, "which for some time was nearly as slow, or slower than in a healthful state, rises again to a feverish quickness,

and becomes regular, the third and last stage may be said to begin." In the third stage, the patient becomes drowsy and comatose; frequently one eyelid loses its motion, and afterwards the other becomes also paralytic. About this time, or rather sooner, the pupil of one or both eyes ceases to contract, and remains dilated in the greatest light. In some, this happens five, six, or seven days, in others, only two or three days, before they die. In this stage, Dr. Whytt remarks, that "the patients are sometimes observed to be constantly raising one of their hands to their head, and are generally troubled with convulsions of the muscles of the arms, legs, or face, as well as with a subsultus tendinum. One of the cheeks will twice or thrice a day grow hot and red, while the other, with the lips, remains pale and cold. These flushings generally appear two, three or four days before death." "A day or two before death, the patient either swallows with difficulty, or not at all. Lastly, the respiration grows more frequent and laborious; and in some, there is a considerable pause after every expiration."

After his history of dropsy of the brain, Dr. Whytt gives an ingenious *ratio symptomatum* in which he particularly notices the affection of the pulse, the inclination to vomit, the aversion to light, the slow irregular pulse in the second stage, the quick pulse in the third stage, the dilatation of the pupil of the eye, and the slow respiration towards the end of the disease. *

Dr. Fothergill says, that he agrees with Dr. Whytt in opinion, "respecting the seat of the disease, most of its symptoms, and its fatality." The first symptoms remarked by Dr. Fothergill in hydrocephalus, are a "pain in some part or other below the head, most commonly about the nape of the neck, and shoulders, often in the legs, sometimes, but more rarely, in the arms. The head and stomach," he observes, "are always more or less affected from the beginning; but in some cases the pulse at first is not quickened." As the disease proceeds, the patient complains "of an acute deep-seated pain in the head, extending across the fore-

* Whytt's Works, p. 741.

head from temple to temple, and he is generally very sick, exclaiming alternately, 'Oh, my head! Oh, I am sick!' breathing irregularly, and sighing much when awake." Among the symptoms of hydrocephalus, Dr. Fothergill mentions "short disturbed sleep; startings; irregular pulse; watchfulness; dilatation of the pupils of the eye, with paralysis of the eyelids; aversion to light; an inability to bear any but the horizontal posture, one or both hands being commonly about the head; great heat of the head and body, with profuse sweats; suspirious respiration; and involuntary discharge of the fæces and urine." "A trembling pulse, beyond the possibility of counting it, failure of the strength, and sometimes a spasm, he says, finish the * catastrophe." Dr. Fothergill remarks, that in all the cases he had seen, there was costiveness; and when stools were with difficulty procured, they were of a dark greenish colour, with an oiliness or glossy bile, and for the most part singularly offensive. He does not

* Fothergill's Works, vol. ii. p. 69.

agree with Dr. Whytt as to the duration of the disease, having seen children carried off by it in fourteen days, and having seldom been able to trace the commencement of it above three weeks.

Dr. Quin, in his dissertation De Hydrocephalo interno, has given a history of the disease, much resembling that of Whytt; but although he pays the greatest respect to Whytt's authority, he states, that in some instances, in the beginning there has been no increased frequency of pulse, and he mentions one case in which the pulse was at first slow and unequal, afterwards quick, and in the end, again slow and irregular; in which there was no aversion to light, nor dilatation of the pupil of the eyes, unless on the last day of the disease, nor vomiting at any time, nor pain in the head. In another case, all the symptoms so completely intermitted, that the Peruvian bark was administered with some advantage. Other examples of anomalous circumstances, Quin says, might be adduced: hence he calls it, a Protei-form disease.

Dr. Cheyne pronounces Whytt's account of Hydrocephalus to be a full and accurate history of the disease; but he says, "the student will be disappointed, if he expect, as Dr. Whytt has taught, that the stages will follow each other in a regular and measured progress. A child has sometimes appeared in health on the very night in which he was seized with the convulsions which in a few days destroyed him. I have observed the pulse become slow, without any other change in the disease, for some days; and although there is, for the most part, a period, sometimes at the very beginning of the disease, during which the pulse is slow, yet it often lasts for so short a time, that unless the child is very attentively observed, it will escape notice. Every attentive observer must have found the pulse slow and quick, and then again slow, constantly varying towards the end of the disorder."* Cheyne has attempted, he says, "to arrange under distinct classes the various forms which the disease assumes,

* Cheyne, p. 23, 24.

and he is convinced that his classification is not artificial nor arbitrary, but that it has a foundation in the nature of the disease." For an account of Dr. Cheyne's classification, and other interesting particulars on this part of our subject, I must refer to his essay. With respect to the duration of the disease, Cheyne rather inclines to the opinion of Fothergill than that of Whytt. "From the date," he says, "of the first symptom, Dr. Whytt supposes the disease to extend to four, five, or six weeks. Dr. Fothergill has found that it is almost always ended in three weeks. Like every disease of the brain, the duration is uncertain; in some cases, in the second, and also in the third variety of the attack, it appears to run its course in a few days; and I have known it, in the first variety, from the great length of the first stage, last many weeks; but the result of my observation, even in this variety, has been in favour of the more limited period of Dr. Fothergill."*

Dr. Carmichael Smyth approves of

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* Cheyne, p. 26, 27.

Whytt's division of the disease into three stages, chiefly distinguished from each other by the alteration that takes place in the pulse, which, from being at first quick, becomes slow, and from slow becomes quick again; but remarks, that excepting "this change in the pulse, there is no decided change in any of the other symptoms, to mark the different periods of disease; the length or duration of those periods, even their relative duration, is extremely uncertain, and differs widely in different instances. Dr. Whytt's estimate of the duration of the disease, from beginning to end, including all the periods, does not coincide so exactly with my experience as that of Dr. Fothergill, but persuaded as I am of Dr. Whytt's accuracy, the difference between us may, with probability, I think, be ascribed to his not having distinguished between the primary and secondary disease; and when we consider, with attention, his own narrative, we can hardly entertain a doubt that this was the case." * "Upon

* Smyth, p. 26, 27.

the whole," says Dr. Smyth, " judging from my own experience, as well as from that of others, I think the average duration of the original disease from first to last, may fairly be taken at three or four weeks; sometimes it may extend to five, perhaps even to six; but I have seen none of longer continuance where the skull did not give * way." " Upon the whole, I may venture to affirm," says Dr. Smyth, " without danger of contradiction, that there is no example of an original or primary hydrencephalus, excepting when the sutures of the skull had opened and given way, continuing so long before the fatal termination." † Dr. Smyth makes many ingenious comments on Whytt's history of hydrocephalus, and mentions certain parts of it which do not agree with his own experience, or which appear to him to be equivocal, and points out some symptoms which have escaped Dr. Whytt's notice; but he allows that his description has great merit, and that it has much improved our professional knowledge on this

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* Smyth, p. 29. † Ibid. p. 28.

particular subject. Smyth particularly remarks on Whytt's account of the affection of the pupil of the eye, and the strabismus, which he thinks occurs sooner than Whytt mentions. He adds, " besides the morbid sensibility to light, I have observed in some instances a morbid sensibility to sound, where the patient suffered greatly from the slightest noise. Two other circumstances, omitted by Dr. Whytt, but which highly deserve our attention, are the effects of posture and of motion. Children with water in the brain, cannot bear an erect posture; for when put in that position, even for a short time, they become either faint or sick, and from any attempt at motion they scream and cry out, evidently from suffering pain. This is one great reason for their always choosing to lie in bed, especially as by that means they also avoid the * light." For other important observations of Dr. Smyth, I refer to his treatise.

Dr. Yeats enumerates the following symptoms, as those that chiefly characterise the

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* Smyth, p. 35.

confirmed state of this disease. Intense heat of the skin, distressing and violent febrile accession, pain in the head more acute and frequent, loud screaming, great dilatation of the pupils of the eyes, squinting, knitting of the brows with an expression of countenance indicative of great distress; moaning and sighing; sickness and vomiting; obstinate costiveness; extremely offensive stools; tongue foul, sometimes brown and dry; much thirst; no appetite; urine irregularly secreted; irregular pulse; dewy moisture on the upper lip and round the nose; wasting of the flesh; pallid sunk countenance; hollowness of the temples; blueness of the lips; the eyelids half open and motionless; the eyes filmy; the circulation extremely hurried; convulsions; palsy, partially or generally. Death, Dr. Yeats says, most commonly, in one convulsive struggle, closes the scene. *

With respect to the duration of the disease, Dr. Yeats takes a much more extended view than any other writer on the subject,

* Yeats, p. 70.

conceiving that its foundation is laid, and even its existence sometimes established, long before it is suspected; and hence he insists on the necessity of attention to the first signs of deviation from the healthy state of the digestive organs.

Dr. Coindet, of Geneva, in a memoir which he has lately published on this disease, which he calls Hydrencephalus, considers it as occurring in two forms, the acute and the chronic; the first a febrile disease, the second unaccompanied with fever. Of this malady, he says, there are two different species, or rather varieties; the one, in its commencement, slow and obscure, the other more rapid and decided in its progress. The first is connected with the acute symptomatic hydrencephalus, the second more essentially with the idiopathic.

Dr. Coindet approves of Whytt's division of the disease into three periods or stages, and his description of the symptoms of these stages very much resembles that of Whytt. In his history of the first variety of hydrencephalus, he lays great stress on the peculiar kind of cry of children affected

by it, and on certain appearances in the urine. The urine he says, furnishes us with two appearances which are characteristic of the complaint; on the second of which he lays particular stress, even if it should have occurred only once, and while the nature of the malady was doubtful. The first of these appearances is a white, farinaceous, cretaceous deposit; the second is micaceous. He has seen these united, or changing from the one to the other. A more particular account of these appearances in the urine may be seen in Dr. Coindet's memoir.* The second variety of hydrencephalus, which Dr. Coindet considers as more essentially idiopathic, begins, he says, with symptoms resembling those of an inflamed state of the brain, or with convulsions; so that it is difficult in its commencement to distinguish it from an inflammatory fever. The violence of the pain in the head, the brilliancy of the eyes, the balls of which are red, the heat of the skin, and the hardness and frequency of

* P. 34.

the pulse, would lead us, he says, to believe that an inflammatory or febrile state precedes the nervous state of the brain, or the rengorgement, contrary to what happens in the first variety; but soon we are directed to the diagnosis by the exacerbations of the irregular fever which supervene several times in the course of the day, the state of the pulse, the appearance of the tongue, the peculiar vomiting, the micaceous deposit in the urine, the sensibility to light, the plaintive hydrencephalic cry, and the rapid progress of the disease, unlike that of any other fever. In the advance of this complaint, Dr. Coindet says, there is no apparent difference between its different species. This variety of hydrencephalus, he adds, is more regular than any other in its progress; its first period is shorter, and the division adopted by Whytt is more particularly applicable to it.* Dr. Coindet proceeds to give an account of certain variations of symptoms and circumstances, of which I shall only mention one: it is this, that in

* Coindet, p. 21, 22.

some cases, especially of the idiopathic disease there is a wonderful resistance to the action of strong emetics; insomuch that, notwithstanding continual nausea, vomiting cannot be produced by double or triple doses of tartar emetic. On this Dr. Coindet relies as an almost certain diagnostic in many cases, doubtful in their* beginning. For an account of the other variations of symptoms, I must refer to his memoir.†

Coindet agrees with Fothergill rather than with Whytt with respect to the duration of hydrencephalus; and he thinks that the latter has erred by not distinguishing the idiopathic from the symptomatic disease. The idiopathic hydrencephalus, he says, terminates in death, sometimes in the space of eight or nine days, but most frequently in the third week: in the rare cases of a cure, the danger ceases at a later period.

On the dissection of those who have died of hydrocephalus internus, various morbid appearances have been observed. Fulness

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* Coindet, p. 28. † Ibid. p. 25.

in the blood-vessels of the head, and, according to some writers, marks of increased arterial action, and even of considerable inflammation in the brain and its membranes; derangement of the chylopoietic viscera; tubercles, probably scrofulous, in the brain, on the surface of the liver, or in the lungs; enlargements of the pineal gland, or of the thalami nervorum opticorum; sometimes a gelatinous effusion in the brain, or betwixt the tunica arachnoidea and pia mater; but the most common appearance is, that of water within the cranium, either betwixt the membranes, upon the surface of the brain, or in the ventricles. In almost all cases of hydrocephalus internus, water has been found in greater or less quantity in these cavities; chiefly, however, in the lateral ventricles. Abercrombie mentions some cases in which all the ventricles were found distended, with a clear serous fluid. Whytt generally discovered, on dissection, a clear thin fluid in the anterior ventricles, immediately below the corpus callosum, often also in the third and fourth ventricles; but he never met with water between the dura mater and the brain, be-

tween the hemispheres, or considerably above the corpus callosum. Cheyne says, "upon dissection, we generally find within the cranium, the veins, particularly those of the membranes, on the surface of the brain, and lining of the ventricles, gorged with dark-coloured blood; sometimes considerable adhesion between and thickening of the membranes, and minute florid vessels upon the pia mater. The ventricles we find to contain from two to six ounces of limpid serum; also, fluid, in a small quantity, under the tunica arachnoides, both above and at the base of the brain. The substance of the brain is generally soft and blanched, fimbriated and particularly soft where it forms the ventricles. The substance of the fornix is often like a soft curd. In the abdomen, I have found the intestines inflamed and constricted from spasm, and the surface of the liver of a bright red colour, abounding in minute vessels, and sometimes extensively adhering to the peritoneum."* This accurate

* Cheyne, p. 30.

observer has often seen, in these cases, the effects of increased arterial action and of inflammation. "In one instance," he says, "on dissection, there occurred unusual difficulty in separating the skull-cap from the dura mater. This arose from an indissoluble adhesion, at the upper part of the lamboidal suture, of a part of the membrane to the bone. The adhesion was circular, and about an inch in diameter. It was evidently the effect of inflammation; but whether of a recent date is, I think, very doubtful. The dura mater did not at any other part exhibit any great mark of disease. The longitudinal sinus was but scantily filled with blood. On lifting the dura mater, there appeared on the brain the most incontestible remains of arterial action. All over the surface the red blood-vessels were very abundant; and, in the spaces between them, there were suffusions of vermilion-coloured extravasation, in pretty extensive masses. Under the tunica aracnoidea there was a considerable quantity of serous effusion extending over all the surface of the brain, but lodged

chiefly in the interstices, between the convolutions."*

Dr. Abercrombie and some other writers consider the serous effusion giving occasion to the symptoms of hydrocephalus internus, as a consequence of chronic inflammation of the brain. This effusion, Abercrombie says, "may take place either in the ventricles or on the surface. When it is in the ventricles, it generally is found in all of them, owing to their free communication with each other. On the surface it is generally between the pia mater and the arachnoid membrane, elevating the latter, so as, from its extreme tenuity, to impart to the effusion a gelatinous appearance; it may also occur between the arachnoid membrane and the dura mater, and this is probably the source of the fluid which is often found in the base of the cranium, after the brain is removed. There is reason to suppose, that, in some cases, it is also formed between the dura mater and the bone, and that this may be the source of the fluid, which often escapes in con-

* Cheyne, p. 198.

siderable quantity while the cranium is opened."* Smyth, on the contrary, asserts that marks of inflammation never appear after the true disease. "There is one thing," he says, "of which I am confident and am certain, that every anatomist, conversant in the dissection or examination of morbid bodies, will agree with me; that neither the brain itself, nor its membranes, in any case of genuine hydrencephalus that ever yet has been examined, showed any appearance of inflammation, or of the usual effects of this having taken place. This remark I feel myself called upon to make, as several very eminent men have entertained an opinion, that the collection of fluid in the brain is always the consequence or effect of phrenitic inflammation. But the authority of no name, however respectable, can be put in the balance against the authority of facts and experience."†

The quantity of water in the ventricles of the brain after hydrocephalus internus is very different in different cases. It varies,

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* Abercrombie, p. 8. † Smyth, p. 59.

we are told, from one or two to eight or ten ounces. In some cases persons have died with the usual symptoms of hydrocephalus, and on examination the ventricles have been found in their natural state, containing only a moisture on the surface of the cavities. Quin and others, mention such cases, but they very seldom occur.

With respect to the nature of the fluid effused in this disease, we find in authors a variety of opinions; some thinking that it resembles the serum of the blood, others maintaining that it materially differs from it. Dr. Carmichael Smyth says, "the fluid contained in the ventricles resembles the purest water, being perfectly transparent and colourless, neither coagulating by heat, nor from the admixture of mineral acids. When exposed for some time to the heat of boiling water, it evaporates to dryness, leaving hardly any residuum." * On examining the head of a boy who died of hydrocephalus, Dr. Watson found in the

* Smyth, p. 57.

cavities four ounces of fluid which had neither colour nor smell, and which, on exposing it to the flame of a candle in a spoon did not coagulate, but went off in the form of vapour without any residuum. Dr. Coindet says, I have never found this serosity coagulable, although I have often tried it by the mineral acids, and particularly by heat, which entirely causes it to evaporate, only leaving a thin whitish pellicle. This, he informs us, was the opinion of Bellini, Boerhaave, De Haen, Malpighi, and Haller; but the latter quotes Pechlin, Lapeyronie, Broussett and others, in favour of the notion that this water is coagulable. Dr. Baillie says, "The water is of a purer colour, and more limpid than what is found in dropsy of the thorax or abdomen. It appears, however, to be generally of the same nature with the water that is accumulated in both of those large cavities. In some trials which I have made, it partly coagulated upon the application of the common acids exactly like the water in hydrothorax and ascites, or like the serum of the blood. But there is much variety in the quantity of the coagulable matter. In some in-

stances the water in hydrocephalus contains a very small proportion of coagulable matter, and in others it is almost entirely free from it. This variety may probably depend upon some difference in the action of the small blood-vessels which pour the fluid out." For a very minute and accurate examination of this fluid, see Dr. Marcet's ingenious chemical analysis of various dropsical fluids, published in the Medico-Chirurgical Transactions.

Respecting the *nature* of hydrocephalus, physicians have much differed in opinion. Sauvages, Whytt, Monro, Fothergill, Smyth, and various others consider it as a species of dropsy; Cullen and Quin think that it belongs to the genus apoplexy, while Cheyne, Rush, Yeats, Abercrombie, and Coindet, believe that it consists in an inflammatory affection of the brain, and that the water is rather the consequence than the cause of the disease.

Whytt says hydrocephalus is a dropsy of the brain; and the immediate cause of it, and of every kind of dropsy, is the same,

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* Vol. ii. p. 340.

viz. such a state of the parts as makes the exhalant arteries throw out a greater quantity of fluid than the absorbent veins can take up.

Smyth says, "upon the whole, we feel ourselves justified in concluding that the hydrencephalus is a dropsical effusion, and occasioned by the same causes that are known to induce it in other parts of the body." *

Cullen considers hydrocephalus as a species of apoplexy depending on pressure on the brain from water.

Quin says that it "owes its origin to a morbid accumulation of the blood in the vessels of the brain, sometimes proceeding to a degree of inflammation, and generally, but not always, producing an extravasation of watery fluid before death."†

Cheyne, on the contrary, asserts that "it requires but a very limited knowledge of pathology to render it obvious that this disease is not a dropsy, as supposed by Dr. Fothergill, produced by a ruptured lymphatic; or by any original weakness or

* Smyth, p. 60. † Cheyne, p. 58.

laxity of the brain, whereby the small exhalant arteries will throw out the lymph faster than the absorbent vessels can imbibe it; or by a too thin and watery state of the blood; suppositions of Dr. Whytt." * "It is obvious, that before the dropsical effusion takes place, the condition of the part, as it exists in health, must be altered; and this antecedent condition of the part is the disease." † He says, "in this disease there is produced a venous congestion in addition to, and probably arising from, the increased arterial action; that the effusion of serous fluid arises from this venous congestion; that this effusion has a tendency to counteract the baneful effects of the increased action, and to retard the fatal termination of the disease; of course, that the effusion into the ventricles is not the cause of the violent symptoms; and that the increased arterial action, though perhaps varied, does not cease when the congestion and effusion have taken place." ‡ The great pain, pyrexia, convulsions, and suffused eye, cannot be derived from a small

* Cheyne, p. 57. † Ibid. ‡ Ibid. p. 66.

quantity of a mild fluid in the * ventricles. He adds, " hydrocephalus appears to me to consist of a diseased action of a peculiar kind. What this is we can as little explain, as we can the nature of the scrophulous, or syphilitic action." †

Dr. Yeats agrees pretty much in opinion with Dr. Cheyne. He thinks that some of the early symptoms considered by authors as denoting water in the ventricles, are caused by the commencing vascular excitement of the brain previous to the effusion; and he mentions, among the remote causes of the disease, " motion of any kind which would increase vascular action in the brain. He says, from the feel and condition of the pulse, and from the increased febrile accessions and pain, an inflammatory tension has evidently taken place in the circulating system." It is a known and curious fact, that the fluid in health found in the ventricles of the brain, does not contain coagulable matter by the test of acids; but that, when an accumulation of fluid takes place

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* Cheyne, p. 64. † Ibid. p. 83.

there from hydrencephalus, a coagulable precipitation is produced by the application of such tests. It is evident, then, that this morbid effusion is caused by an action of the vessels, different from that which produced the healthy deposition of fluid, which is not coagulable, and which, therefore, not only increases the quantity, but alters the qualities of the effused fluid. The watery effusions which take place after scarlet fever, are produced in an analogous way to the effusion in hydrencephalus. There is no doubt of the great morbid activity of the extreme vessels in this disease, and the dropsical effusions are the * consequence." Dr. Yeats thinks, that the internal causes which indirectly give rise to water in the brain, are seated in the digestive organs, the functions of which becoming deranged, an impression is made on the brain, an irritation is transmitted to it, and its vascular activity is excited to greater violence. †

Dr. Abercrombie is of opinion, that the

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* Yeats, p. 108. † Ibid. p. 29.

serous effusion in hydrocephalus, is one of the terminations of chronic inflammation of the brain. In cases of hydrocephalus, he says, the coma, and other symptoms, are not to be considered as the direct effect of the effusion, but of that morbid condition of the brain of which the effusion is the consequence.

Dr. Rush considers the disease as, in its first stage, inflammatory, and calls it phrenicula, from its being a diminished state of phrenitis; "no more occurs," he says, "in this disease than takes place when hydrothorax follows inflammation of the lungs, or when serous effusions follow an inflammation of the joints."

Dr. Coindet observes, that the direct causes which more particularly tend to produce idiopathic hydrocephalus, are the general causes of active inflammation, such as cold, &c.; but, above all, those which act more directly on the brain. *

In the review of Dr. Coindet's memoir in the Quarterly Journal of Foreign Medicine and Surgery, we find the following very

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* Coindet, p. 80.

judicious observations respecting the nature of this complaint. "When the disease called hydrocephalus, or hydrencephalus, first excited the particular attention of pathologists, it was considered simply as a dropsical effusion into the ventricles of the brain. The more urgent symptoms were believed to be the immediate effect of the presence of the fluid, and the treatment was directed chiefly or entirely to promote its absorption. In the natural progress of observation, circumstances soon occurred which tended to shake this hypothesis. Cases, with all the usual symptoms of hydrocephalus, were met with which were fatal, but in which, on dissection, no effusion was found; and on the other hand, examples were not wanting in which extensive effusion occurred in the brain, without any of the symptoms of hydrocephalus. These cases might, at first, be considered as singular and inexplicable exceptions to a general rule; but they at last accumulated to so great a number, as led to a more correct and philosophical doctrine of this dangerous affection of the brain. We have now every reason to believe, that the primary

disease, in acute hydrocephalus, is an inflammatory action affecting certain parts of the brain, particularly the more deep-seated parts; that the serous effusion is an effect of this action; and that all the usual symptoms may exist, and even go on to a fatal termination, without this effusion having taken place." *

The *remote causes* of hydrocephalus enumerated by authors are various. Those who consider the disease as a species of dropsy, refer it to the general causes of dropsy. Dr. C. Smyth says, "as it appears, then, that the dropsy of the brain agrees in all the principal circumstances with the general character of the class, we are warranted in concluding that it has a similar origin, or must arise from the same causes, which we have already proved to be, either an obstruction to the return of the blood through the veins, or weakness, general or local. The first is probably the cause in those instances of hydrencephalus, accompanied with a diseased organic structure of

* Quarterly Journal of Foreign Medicine, p. 118.

some portions of the brain adjoining the lateral ventricles; but as examples of this are not frequent, we must look upon the other cause, viz. weakness, general or local, or both, as the usual source of the disease." * Dr. Whytt mentions, as the causes of hydrocephalus, original laxity, or weakness of the brain, injuries done to the skull in the time of birth, tumours within the brain, a too thin, or watery state of the blood, a diminution or suppression of urine, and tedious chronic diseases. Dr. Fothergill seems to consider the causes of hydrocephalus to be those of dropsy in general, and is of opinion, that the rupture of a lymphatic in the brain may give occasion to the effusion, rather than weakened absorption, as the disease happens commonly to healthy lively active children. He has been told that jumping from a considerable height upon a hard floor, a fall, or some pretty smart exercise, has been thought to have given rise to this complaint.

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* Smyth, p. 65.

The authors who think that hydrocephalus is an inflammatory affection, assign as its remote causes, those of inflammation in general. Amongst others, Dr. Yeats mentions insolation and mechanical violences, and quotes the opinion of Dr. Wall, that falls, blows, and concussions often give occasion to it. Yeats says, "although I have never yet traced a case of hydrencephalus to external violence, yet I feel no difficulty whatsoever in yielding my belief to the opinion, that such accidents to the head may ultimately produce water in the brain; more especially, if they occur at a time when the digestive organs are more easily excited to diseased action; or in persons who have a constitutional predisposition to morbid action in these organs."* Dr. Rush is of opinion that the causes of the complaint which act directly on the brain are falls and bruises on the head, certain positions of the body, and childish plays, which bring on congestion or inflammation, and afterwards an effusion of water

* Yeats, p. 25.

in the brain; but Dr. Cheyne says, "with extensive opportunities of seeing hydrocephalus, I have not met one instance of its having been directly, and I believe only one where it was indirectly, occasioned by external violence." * Dr. Cheyne adds, however, "I do not mean to affirm that injuries of the head never give rise to hydrocephalus; all I contend for is, that when they do, it is only intermediately, by inducing an asthenic state, or by calling into play what from a good and fortunate management had hitherto been latent; I mean a scrophulous condition of the system, which I have repeatedly seen to follow a severe accident, and which wonderfully favours the establishment of hydrocephalus." †

The causes which *predispose* to hydrocephalus are hereditary conformation, infancy or childhood, and scrophulous or other morbid taint. Dr. Smyth thinks that hydrencephalus makes its appearnce, and may be considered secondary to, or symp-

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* Cheyne, p. 72. † Ibid, p. 74.

tomatic of, the intestinal remitting fever of children, and the scarlet fever or scarlatina anginosa.* Dr. Cheyne says, "Hydrocephalus is the disease of every stage of life, perhaps with the exception of old age. It is, however, more particularly the disease of childhood; and in the middle years, between weaning and puberty, I have met most frequent examples of it. It chiefly falls upon the children of families having a strumous taint. Sometimes it attaches itself to particular families. I have attended two families, in one of which four children, in the other three, died of this disease; and I have heard of an unfortunate father who lost eleven children from hydrocephalus."† Dr. Fothergill observes, "I have seldom met with the hydrocephalus in subjects younger than three years; most frequently it has happened, in my practice, from five to ten, two or three from ten to thirteen, and two between seventeen and nineteen years of age.‡ Drs. Huck, Coindet, and

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* Smyth, p. 10. † Cheyne, p. 30.
‡ Fothergill, vol. ii. p. 64.

others mention instances of the occurrence of the disease in adults.

The establishment of the *diagnosis* of hydrocephalus in its commencement, or at an early period of the disease, is of the utmost consequence; for after it has made a certain progress, it is in the highest degree dangerous, almost always proving fatal. Unfortunately it is extremely difficult to ascertain its existence, until it has obtained a strength which we are unable to subdue. In the history of the disease, I have collected from various authors the symptoms and circumstances supposed to indicate the probability of its accession, as well as those from which its actual existence is inferred, and to a careful consideration of this history, I must refer for the early diagnosis. Dr. Yeats and others, as above-mentioned, consider the origin of this disease as connected with an unhealthy state of the digestive organs, and particularly with derangement of the stomach and bowels; and perhaps these, if accompanied with vomiting and feverishness, may be reckoned among the very first symptoms that should excite our apprehensions, especially

if they occur in constitutions hereditarily or otherwise predisposed to the complaint. Feverishness with vomiting and diseased appearance in the evacuations from the bowels are mentioned by almost all writers among the earliest symptoms of this affection. Dr. Whytt thinks that feverishness is always in a greater or less degree present. Dr. Cheyne says, " that the disease, in its first stage, is evidently attended with a considerably increased arterial action." Quin, Rush, Yeats, and Abercrombie, are also of this opinion. But fever, with symptoms indicating derangements of the digestive organs, still are equivocal, and sometimes occur in worms, dentition, &c. when there is no reason to suspect hydrocephalus. " During the first stage," says Dr. Whytt, " it is very difficult to distinguish this dropsy of the brain from a slow irregular fever, occasioned by worms, by some other disorder in the bowels, or by some other cause. When with a slow and irregular pulse we meet with thirst and a feverish heat, watching, a strabismus or double sight, a delirium and screaming, succeeding the symptoms mentioned in the first stage, we may strongly

suspect water in the ventricles of the brain. But this is still more evident, when, soon after, the patient grows comatose, the pupil dilates and loses its motion, the pulse becomes quick, the cheeks are flushed, the tendons start, and convulsions * follow." Dr. Fothergill agrees pretty much in opinion with Dr. Whytt, but observes, " that pain in the limbs, incessant head-ach and sickness seem to be the most certain intimations of the danger. This happens, he adds, in other diseases of children, but neither so uniformly nor so lastingly."

In forming the diagnosis, Dr. Coindet, in addition to other distinguishing symptoms, lays considerable stress on what he calls the hydrencephalic moan or cry. Respiration, he says, becomes frequent, and is interrupted by a cry or plaintive sigh, which I call hydrencephalic because it does not occur in any other disease, and powerfully aids the diagnosis. The appearances in the urine, and the insensibility of the stomach to the action of emetics above-

* Dr. Whytt, p. 737.

mentioned, Dr. Coindet thinks characteristic of the disease.* Dr. Whytt observes that "the urine in this, as well as in the other stages varies; it has often a large sediment, sometimes none at all, but most commonly it deposits one of a light consistence, and a white colour. In several I have observed the urine have a large perfuraceous sediment till within a few days of their death, when it had no † separation." "It is generally easy," Dr. Cheyne observes, "even in the more early periods, to distinguish hydrocephalus from fever. We must particularly attend to the train of symptoms. The gradual commencement; the more irregular remission; the dyspeptic symptoms; the nature of the excretions; in particular the glairy, dark, and unnatural stools; the aversion to light: and the whole expression of the disease differing much from that of fever. The peculiar nature of the pains attending hydrocephalus, the acute pains of the body, the peculiar pain of the head. The pain, when fixed, is

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* Coindet, Memoir, p. 34. † Whytt, p. 732.

oftener dull than acute, but so overpowering that it does not admit of the head being raised from the pillow. It is sometimes a very acute pain. It is not increased by every throb of the artery, like the phlegmonic pain. Generally, it is deep-seated, like the pain attending some of the visceral inflammations; but it differs in this, that it is not increased or rendered more frequent by any muscular exertions."* On the subject of diagnosis, Dr. Smyth speaks at great length, and with much confidence. He says, "if I mistake not, it will evidently appear that the symptoms of this disease, when carefully attended to, and accurately examined, are equally sufficient to distinguish it as those of any other internal disorder. Although the symptoms of hydrencephalus have only one origin, viz. the collection of a watery fluid in the ventricles of the brain, yet this cause, simple as it is, produces two distinct and opposite effects; and consequently the disease is accompanied by symptoms of a kind and

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* Cheyne, p. 33.

character not only different, but directly opposite to each other. For, whilst the weight and pressure of a watery fluid in the centre of the brain, causes symptoms of compression, or of a compressed brain, the distension of the delicate membranes lining its ventricles, produces symptoms of high irritation; and though in the course of the disease, sometimes the one set of symptoms and sometimes the other predominate or take the ascendency, — from first to last that strange admixture of opposite symptoms is perfectly evident."* He then proceeds to enumerate the symptoms of each kind, which he illustrates by examples of those opposite occurring at the same time, and in the course of the same disease. After this enumeration and illustration of symptoms, Dr. Smyth says, "I can declare with truth, that I never met with a case that gave me the smallest doubt, nor do I suppose that any one who attends to the true character of the hydrencephalus, can ever be in danger of confounding it with any

* Smyth, p. 42.

other disorder."* Dr. Smyth's observations chiefly relate to the diagnosis of the disease at an early period; at any subsequent one a knowledge of it, however useful for the credit of the physician, can, he observes, be of little advantage to the unhappy patient.†

These opinions from a person of Dr. Smyth's knowledge and experience, are highly worthy of attention; but I am afraid that the generality of physicians will not entertain such sanguine expectations as he does, respecting the power of distinguishing this disease in its early periods.

Dr. Abercrombie speaks very doubtfully on the subject. He says, " we have no certain mark which we can rely upon as indicating the presence of effusion in the brain. Slowness of the pulse followed by frequency, coma, squinting, double vision, dilated pupil, and paralytic symptoms, we have seen, may exist without any effusion."

Although it must be admitted that these symptoms have, in some cases, occurred

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* Smyth, p. 49. ‡ Smyth, p. 50.

independently of water in the brain, and therefore cannot be considered as *demonstrative*, yet I think that they ought to be regarded as strongly *indicative* of its presence. From what I have read, and seen, I am of opinion that when, in addition to fever with vomiting and other symptoms of deranged stomach and bowels, we observe marks of uneasiness or pain in the head, drowsiness, morbid sensibility to light, a disposition to the horizontal posture, the face being turned from the light, and the hands placed round the head, there is strong reason to believe that water is actually effused in the brain. When the pulse, from being frequent and regular, becomes slow and irregular, when violent pain in the head, with screaming, or a comatose state supervene, when the pupil of the eye becomes either preternaturally dilated, or contracted, with strabismus, the disease is still more manifest; but when the pulse, from having been slow, has become again very frequent, when the fever is very high, with flushings, in the face, and inflamed eyes, when delirium in a great degree, or perfect stupor, with other

symptoms mentioned towards the end of Dr. Whytt's description, are present, I think there can be no doubt either of the nature or degree of the complaint.

The *prognosis* in hydrocephalus must always be unfavourable, unless we should be fortunate enough to detect its presence at an early period. It seldom happens that the disorder is cured, if it have made such a progress as to enable us to say with certainty that it actually exists. Dr. Whytt says, "I freely own that I have never been so lucky as to cure one patient who had those symptoms which with certainty denote this disease; and I suspect that those who imagine they have been more successful have mistaken another distemper for this."* The accounts of Gregory and Fothergill are also very discouraging; but Smyth, Cheyne, and Yeats, speak on the subject with less despondency, and Percival and Dobson hold out considerable hopes of a cure, under the influence of a

* Whytt, p. 745.

particular mode of treatment hereafter to be mentioned. Dr. Dobson states, that in three instances he has cured hydrocephalus. Dr. Percival relates two cases of recovery from it, and Dr. Watson one.* Dr. Stanger has favoured me with an account of a very strongly marked hydrocephalus lately under his care, from which the patient perfectly recovered; and several other cases might be adduced in which the disease has been successfully treated.

I have seen a few instances of recovery from what appeared to me to be water in the brain; but the difficulty of ascertaining the existence of this complaint, unless in its advanced state, is such, as to lead me to doubt on the subject. Dr. Whytt observes, "I remember, several years ago, that an able and experienced physician being called to a child of a year old in a fever, attended with convulsions, and a coma, was of opinion that the disorder proceeded from water in the head; on

* Med. Observations, vol. iv. p. 321.; vol. v. p. 174.; vol. vi. p. 220.

which account, besides blisters, which had been applied before, he ordered a purge of jalap and calomel, which had a very good effect; for in two or three days, the coma and convulsions ceased, and the patient soon recovered, which I am persuaded could not have been the case had he laboured under a dropsy of the brain." *

The prognosis in supposed hydrocephalus should always be very much guarded. Instances have occurred, as above-mentioned, in which the symptoms considered characteristic of the complaint have been present, and after death, on examination of the head, not the smallest appearance of water could be found. Dr. Yeats informs me that a case some years ago occurred to his observation, in which all the symptoms usually thought pathognomic of hydrocephalus were present, and yet on examination, the brain was found preternaturally dry, no moisture whatever being observable in the ventricles. On the

* Whytt, p. 745.

other hand, it sometimes happens that water in considerable quantity has been seen in them without any of the symptoms of hydrocephalus having appeared. A too positive prognosis, either as to the absence or presence of water in the brain, may prove extremely unfavourable to professional reputation.

In making this prognosis, the greatest attention should be paid to the duration and degree of the disease. When the symptoms of the second stage have made their appearance our chance of success is very small; but when those characteristic of the third stage have fully supervened, our hope will rest on very slender foundations; indeed I much doubt whether, under these circumstances, a single instance can be adduced of recovery from this formidable disease.

With regard to the *treatment* of internal acute hydrocephalus, we derive but very little information from those writers who first particularly described it. What Dr. Whytt says on this part of the subject is very brief. He merely observes "that if

this disease could be known early, and before any considerable quantity of water has been collected, it might probably be sometimes cured by purgatives, diuretics, bleeding, friction, exercise, and diet." *

Dr. Fothergill, in introducing the account of hydrocephalus internus, says, I must own to you that it is not in my power to suggest any probable means of curing the disease of which I treat; it has baffled all my attempts, both when confided in alone, and in consultation with the ablest of the faculty."

With a view to the prevention or the cure of hydrocephalus, the indications seem to be to remove irritation and irregular action of the chylo-poietic viscera; to lessen vascular excitement; to alleviate symptoms which are particularly oppressive; and to support the strength of the patient.

These indications are principally to be fulfilled by purging, blood-letting, blisters,

* Whytt, p. 744.

setons and issues, revellents, refrigerants externally applied, and certain medicines internally taken, which are supposed to produce a specific effect, particularly mercury; and, by corroborants and sedatives, especially bark and opium.

Almost all practitioners are of opinion that in the commencement of this disease, the organs of digestion are morbidly affected, and that irritation in the stomach and bowels is present; and under these circumstances aperients of greater or less power, to which some add emetics, have been very generally employed. "When called," says Dr. Fothergill, "to a patient in the earlier stages of this distemper, I proceeded in the same manner as if the disease was supposed to arise from worms, or from some cause of irritation capable of being removed. Three or four grains of calomel, or more, according to the age and habit of the patient, with rhubarb and the pulvis e scammonio compositus, are given to empty the bowels. If the stomach appears to be loaded, a quarter or half a quarter of a grain of emetic tartar may be joined with

it, and the stomach washed with any suitable liquor. * — In the very beginning of the affection, and while its nature is doubtful, Dr. Quin recommends an emetic, and a powerful cathartic; and in some cases, where the presence of worms may be suspected, he prescribes calomel as a remedy calculated for either disease. In this he follows the opinion and example of Dr. Fothergill, who was partial to that medicine, and who, in addition to it, advises that other anthelminthics in broth, in the form of clyster, with small doses of anodynes, occasionally should be administered.—" In perhaps every instance," says Dr. Cheyne, " upon the first appearance of symptoms of hydrocephalus, it will be safe to use some strongly cathartic medicines, and it will be proper to repeat this as circumstances require. But should we ascertain that the alimentary canal is torpid, and imperfectly performing its functions, admitting an accumulation of fæculent matter, or that

* Fothergill's Works, vol. ii. p. 72.

the secretions flowing into it are vitiated or diminished in quantity, which we discover by the peculiarity in the appearance, or pungent fætor of the stools, we must, by steadily pursuing the purgative plan, endeavour to effect a change; for while this is produced in the appearance of the stools, by the stimulating quality of our medicines, we are effecting a most important change in the hepatic system, alimentary canal, and all the parts, including every organ essential to life, which is connected with * them." Dr. Cheyne has a very high opinion of the use of purgatives in this disease, especially in its early state, and under such circumstances he recommends the exhibition of the largest dose which can with safety be prescribed. — Rush strongly recommends purgatives in the first stage of the disorder. He says, " I have constantly observed all the patients whose cases have been related, to be relieved by plentiful and repeated evacuations of the bowels." † — Smyth

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* Cheyne, p. 93.

† Rush, Medical Enquiries, p. 225.

thinks, that by means of gamboge, or resin of scammony, with calomel, or some similar medicines, the patient's bowels should be evacuated once a day, or, at furthest, once every other day. — Yeats is a great friend to the practice of paying early and giving constant attention to the state of the bowels in these cases. "A combination of evacuants will occur," he says, "to every practitioner, with the proper intervals of their exhibition, according to the age of the patient, and the degree of obstinacy in the constipation." He commonly gave the compound extract of colocynth with calomel, or the latter with aloes, rhubarb, or scammony twice or thrice, or even four times, every twenty-four hours.* Dr. Yeats thinks it necessary always to join other purgative ingredients with calomel. The intestines, he remarks, are generally torpid after the operation of a dose of calomel, and will continue so under its use, until it accumulates in the bowels, and even then, he says, it frequently does not

* Yeats, p. 40.

act; hence the necessity for joining with it other purgatives. He is "inclined to believe that a fatal practice has been sometimes adopted from an inattention to this circumstance; and that in cases which have been treated as water in the brain, patients have died from the want of the bowels being cleared by proper purgatives." * In illustration of his opinion, he mentions ten cases of hydrencephalus which proved fatal, though mercury was used in large quantities externally and internally; and three or four grains of calomel were taken every eight hours, without producing any purgative effect." "I have scarcely a doubt," says Dr. Yeats, "that the treatment of hydrencephalus in this way, without the combination of purgatives with the calomel, for the reasons already mentioned, would almost uniformly prove fatal." †

Dr. Coindet recommends purgatives in hydrencephalus, especially in its commencement. They correct, he says, the state of the digestive system, by changing

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* Yeats p. 49. † Ibid. p. 54.

the nature of the evacuations, which are always very bad; but we ought not to employ them in excess, for in cases of great prostration of strength they are hurtful. Dr. Coindet observes, that there is no disdisease, except colica Pictonum, in which it is so difficult to procure evacuations as in this, especially in its latter stages. The purgatives given with the greatest success in these cases, are jalap and calomel, either alone or in combination. He asserts that he has frequently seen children of five, six, or seven years of age, who appeared to be threatened with hydrencephalus, cured by calomel and rhubarb, or calcined magnesia, alone or together, given in purgative doses, and repeated every two or three days. He also recommends emetics, as well as purgatives, in the beginning of hydrocephalus. He says he has often employed white vitriol, which he thinks peculiarly suited to the complaint, as it is not likely to produce diarrhœa. Tartar emetic appears in like manner, to Dr. Coindet, to be useful as a preventive of hydrencephalus, from derangements in the functions of the viscera

of the lower belly. He has seen, he observes, several of these, which appeared likely to terminate in hydrencephalus cured by this remedy. *

By these means we are advised to attempt to remove irritation, and to correct the morbid state of the digestive organs in the beginning of the disease.

In cases of increased vascular action, which, in the opinion of many intelligent observers, frequently occurs in the early period of this complaint, blood-letting, refrigerants, revellents, and topical applications, as well as aperients, are recommended. Among these remedies, blood-letting is, by some, considered to be the most efficacious in diminishing vascular action in these, as well as in other cases. Almost all those who have lately written on hydrocephalus, recommend blood-letting in the beginning; but as this is a disease chiefly occurring at a very early period of life, the preference, I think, ought to be given to topical bleeding.

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* Coindet, p. 197—199.

Dr. Quin is of opinion, that an evacuation of blood from the temples, by cupping or leeches, is more likely to prove useful than general bleeding. When a large abstraction of blood is desirable, and the strength of the patient will bear it, he says, blood may be taken with advantage by opening a jugular vein.

Dr. Cheyne admits of general bleeding, but seems rather inclined to trust to a topical evacuation of blood. He says, "in most cases local bleeding by leeches or cupping, or general blood-letting, according to the strength of the pulse and state of the patient, must be had recourse to." He adds, however, "I am convinced that blood-letting, unless in very robust constitutions, or in the second variety of the attack, is not to be repeated without great danger." *

Dr. Yeats directs "bleeding, both topically and generally, in the same patient," but he "does not bleed from the jugular vein in cases where it is possible to use the lancet, having found general bleeding from the

* Cheyne, p. 98.

arm, and the application of leeches, answer his purpose very well."

Dr. Coindet is of opinion, that the nature of the inflammation in hydrocephalus differs entirely from that of phlegmonous inflammation, and remarks, that whatever theoretical notions we may form on the subject, practice demonstrates that the disease does not yield to evacuations of blood. He admits, that, in some particular cases, they have a tendency to diminish or moderate the complaint, but not to conquer it, as in phrenitis or enteritis. He enters at considerable length into distinctions on this subject; and though he sometimes allows of bleeding in the beginning of the disorder, he says, when that period is once passed, it rarely effects a cure; it sometimes relieves, but most commonly it proves prejudicial. However, in cases of falls, or blows on the head, evacuations of blood, he thinks, are of great use, as also the application of leeches to the temples or behind the ears, or on the part injured. In the hydrocephalus after scarlet fever, especially if ushered in by strong convulsions, the eva-

cuation of blood, he says, appears to be indispensable. Dr. Coindet has sometimes, though seldom, ordered an opening of the temporal artery; but having witnessed a remarkable and immediate relief obtained by that practice, in the cure of a man of thirty-two years of age, who was seized with idiopathic hydrocephalus, and in a girl of eight years old, he regrets that he had not employed it in other cases. *

Dr. Rush, who considers hydrocephalus as a milder phrenitis, places great dependence on blood-letting, as a remedy, the good effects of which he illustrates by his practice in many instances. In some of them Dr. Rush prescribed a repetition of blood-letting; but, except in the cases of two adults, the quantity taken at once was very small. The blood, he remarks, was in several instances sizy. †

Dr. Smyth, in his method of cure of hydrocephalus, seems to lay no stress on blood-letting. Respecting it, he only says, " the

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* Coindet, p. 188—190.

† Rush, Med. Enquiries and Observ. p. 217.

head-ach I have known to be mitigated by leeches applied to the temples." *

With a view to lessen vascular action in this disease, and to relieve particularly oppressive symptoms, in addition to blood-letting, revellents, and refrigerants, either externally applied or internally taken, have been very generally prescribed. Cullen, Quin, and many others, think that blisters should be applied to the head, and the discharge promoted for a considerable time, and Rush is a strenuous advocate for this practice. "Blisters," he says, "have been uniformly recommended by all practical writers upon this disease. I have applied them to the head, neck, and temples, and, generally, with obvious relief to the pain in the head. They should be omitted in no stage of the disorder; for even in the inflammatory stage, the discharge they occasion from the vessels of the head greatly overbalances their stimulating effects upon the whole system." † Dr. Abercrombie, however, is of opinion that the effect of blistering is

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* Smyth, p. 79. † Rush, p. 226.

ambiguous. When it is employed, he observes, it should be, perhaps, on the back of the head or neck. In that situation it is probably more likely to be useful than on the crown, while it does not interfere with a more powerful remedy, — the effectual application of cold." * A part of the treatment of hydrocephalus, which Dr. Smyth considers as of the first importance, "is the application of caustic to the bregma, or rather, to what was the bregma, the juncture of the sagittal and lambdoid sutures." "This part of the head," he prefers "to every other from the frequent communications at this place between the internal and external blood-vessels and nerves." Dr. Smyth says, "the caustic has the advantage of a blister, being more certain in its effect, and more powerful in its operation. "The first can only act on the living fibre, the second acts equally on the dead. The first only raises the epidermis or scarf skin, the other destroys the skin itself; the first is a trifling stimulus, and

* Abercrombie, p. 61.

transitory in its operation, the other a powerful one, and whose effect is necessarily continued for a considerable time during the sloughing off of the eschar; and, by proper means, a discharge and irritation may be kept up as long as is required." *

Dr. Coindet does not approve of the employment of caustics, on account of the tender age and irritability of children, their liability to convulsions, and the pain produced by this treatment. He gives the preference to blisters, which he thinks ought to be considered as powerful auxiliary remedies. † With respect to setons, he observes, that on trial he has not found them of use; but he strongly recommends them in the prophylactic ‡ treatment. — Some modern practitioners place great confidence in the external application of refrigerants in these cases. Dr. Rush says "linen cloths wetted with cold vinegar or water and applied to the forehead, contribute very much to relieve the pain in the head. In a particular case, a solution of

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* Smyth, p. 75. † Coindet, p. 193.

‡ Coindet, p. 195.

ice in the vinegar appeared to afford the most obvious relief of this distressing symptom." * — Dr. Abercrombie speaks very favourably of the application of cold to the head in hydrocephalus, and points out what appears to him to be the best mode of making it. He says, " in applying cold to the head in the most effectual manner, it should be done by a stream of cold water directed against the crown of the head, and continued for a considerable time, until the full effect of it be produced. Applied in this manner, it is a remedy of great power; it even requires in many cases to be used with discretion. Under its operation I have seen a very strong man thrown, in a very few minutes, into a state approaching to asphyxia, who, immediately before, was in the highest state of maniacal delirium, with morbid increase of strength, defeating every attempt of four or five strong men to restrain him." † Dr. Abercrombie relates a case of coma in which this practice was followed with the most beneficial ef-

* Rush, p. 227. † Abercrombie, p. 61.

fects. "A strong plethoric girl, aged about five years, after being for one day feverish, oppressed, and restless, fell rather suddenly into a state of perfect coma, without convulsion, or any other symptom. She had lain in this state about an hour when I saw her; she lay stretched out on her back, motionless, and completely insensible, her face much flushed, and turgid. She was raised into a sitting posture, and a basin being held under the chin, a stream of cold water was directed against the crown of the head. In a few minutes, or rather seconds, she was completely recovered, and the next day was in her usual health. The same remedy I am in the habit of using with the best effect, in the convulsive diseases of children." * Dr. Coindet, informs us that he has frequently made cold applications to the head in these cases, by means of water, ether, and ice, without any evident advantage.†

In addition to these means, certain medicines have been recommended, which are

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* Abercrombie, p. 61. † Coindet, p. 205.

supposed to possess a specific effect in the cure of hydrocephalus: these are antimonials, certain nervines, digitalis, and some narcotics, but above all, mercury. Dr. Coindet recommends tartar emetic in the beginning of this complaint, which should be given, he thinks, in much stronger doses than in other febrile disorders. He says a very large quantity of the medicine is necessary in these cases to produce its usual effect, and on this circumstance as has been before observed, he places considerable stress in forming the diagnosis. In the advanced state of the disease, he asserts, that he has often seen enormous doses of excellent tartar emetic taken in the space of a few hours without exciting much nausea. Dr. Coindet thinks very highly of tartar emetic as a prophylactic in symptomatic hydrocephalus, given in alterative doses.*

Dr. Cheyne, in his second publication on hydrocephalus, relates a case in which James's powder was given with the hap-

* Coindet, p. 197.

piest effects. "A respectable clergyman, who resides within a few miles of Dublin, had been so unfortunate as to lose three or four of his children of water in the brain. He observed that the physicians endeavoured to bring on a perspiration, but always without effect; and he determined, should the complaint seize any other of his children, to take the management of the case into his own hands. The opportunity was soon afforded by the illness of one of his daughters, and the remedy he used was James's powder. This medicine had a great effect upon the child, who, though she had all the symptoms which attended the attack of the disease in the fatal cases, recovered. He gave the child a large dose of James's powder at bed-time, this was repeated every night, and, on alternate nights, as much rhubarb was added as was sufficient to move her bowels. This remedy, it is alleged, has been successful in a number of cases of hydrocephalus which have occurred since." * Dr. Cheyne, however, says,

* Cheyne, p. 27.

" In several cases of hydrocephalus, I have known James's powder given both as this gentleman recommended, and also in much larger quantities, and in a quicker succession of doses, without relief. But making every allowance for the misconceptions of the ignorant, James's powder has been a valuable auxiliary.*

Some modern physicians, in the treatment of hydrocephalus recommend diuretics, particularly digitalis. Dr. Yeats, however, lays no stress upon them, unless we can reduce the vascular excitement in the brain. He says, " I have seen death take place with much flow of urine." He adds, however, " diuretics are nevertheless useful, from counter-irritation, by increasing the secretion of the other glands. The digitalis requires consideration on account of the other peculiar effects of this valuable and extraordinary medicine." † Coindet, speaking of digitalis, says, I have given it frequently without any advantage, except in a few cases, and especially in those

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* Cheyne, p. 28. † Yeats, p. 81.

which occur after scarlatina, in which it appears to act almost as a specific.* Cheyne observes, "in the cure of hydrocephalus, digitalis appears a medicine of great promise, and when it comes to be more generally used, and the manner of administering it better understood, it seems highly probable that our hopes will be realised."†

The medicine which has of late years been most celebrated for its specific virtue, and on which modern physicians have most relied for the cure of hydrocephalus, is mercury, externally applied, or internally taken; although the early writers on the disease have placed no dependence upon its efficacy. Whytt does not even mention it in his list of remedies; and Fothergill and Quin seem to have employed it merely as a purgative or anthelmintic. I believe Dr. Dobson of Liverpool, and Dr. Percival of Manchester, first prescribed this medicine boldly in hydrocephalus, and brought it into repute. Dr. Dobson was called in the year 1775 to visit a child between three

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* Coindet, p. 220. † Cheyne, p. 103.

and four years of age, the son of a Mr. C. of Liverpool, who laboured under the characteristic symptoms of hydrocephalus, of which disease three children of the family had died. An emetic, some calomel powders, and a purgative had been administered without affording any relief. Conceiving that it was in vain to pursue the usual line of practice, it occurred to Dr. Dobson "that mercurials, so far urged as to enter the course of circulation and affect the salivary glands, might possibly reach the system of absorbents in the ventricles of the brain, and thus remove the extravasated fluid;" he therefore commenced a mercurial course, which was urged on with caution and expedition. In forty-eight hours the breath began to be offensive, the gums were reddish and swelled, and the symptoms of the disease, so far as could be distinguished, were somewhat abated. In forty-eight hours more a ptyalism came on, and the disease was evidently declining. Between the 15th and the 22d (of February) the patient took twenty grains of calomel, and one drachm of the strongest mercurial ointment was rubbed in well

upon the legs and thighs. The dose of calomel was one grain, mixed with a little sugar, and repeated at such intervals as the circumstances of the case pointed out. After the 22d no more mercurials were administered; a moderate ptyalism continued for five or six days; then gradually ceased, and the disease was entirely removed. The bark was then given, as the best tonic remedy after the mercurial course, and as the best preservative against a *relapse." Dr. Dobson asserts that three indubitable instances of hydrocephalus internus have occurred in which this method of cure has succeeded.

In the year 1777, Dr. Percival tried Dr. Dobson's plan in a case in which, although a cure was not effected, considerable relief was obtained; and he gives the following account of the successful employment of it in another instance. " One of my own children, a girl of three years and three months old, has lately been a severe sufferer under this alarming malady. As soon as the characteristic symptoms of the disease

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* Medical Communications, vol. vi. p. 223.

clearly manifested themselves, I laid aside all other remedies, convinced by repeated observation of their insufficiency, and trusted solely, though with much solicitude, to the internal and external use of mercury. In forty-eight hours signs of amendment appeared, and her recovery was perfected in six days. During this space of time, thirteen grains of calomel were administered, and seven scruples of unguentum hydrargyri fortius carefully rubbed into her legs.—Other instances of the successful treatment of hydrocephalus, by the employment of mercury, are related in the Medical Commentaries, by Mr. Mackie, of * Huntingdon, Dr. Alexander Eason, of Manchester†, and Dr. Thomas Aery, of Whitehaven; and in the Memoirs of the Medical Society of London, by Mr. Gapper, of Ewell ‡; and many similar cases may be found in the various medical journals. ‖ In the case above-mentioned, communicated to me by Dr. Stanger,

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* Med. Com. vol. vii. p. 290.

† Ibid. vol. viii. p. 325.

‡ Ibid. p. 332.

‖ Mem. Med. Soc. vol. vi. p. 50.

of his successful treatment of a very strongly marked hydrocephalus, mercury was very freely employed, and I believe Dr. Stanger attributes the cure principally to its influence.

Dr. Rush is an advocate for the employment of mercury in hydrocephalus, but has not so much reliance on it as many other practitioners.* Out of all the cases in which he gave it, he succeeded in only two. "Perhaps," he says, "my repeated failures in the use of this remedy were occasioned by my giving it before the inflammatory action of the system was sufficiently subdued by previous evacuations."†

Dr. Cheyne recommends a mercurial course, and assures us that "he has witnessed its efficacy in several cases, of which he has no voucher." He is of opinion that when the existence of the disease becomes probable, there ought to be no other delay in commencing the mercurial course than that occasioned by our endeavour to subdue the disorder in the bowels.† He thinks mercury more efficacious when given in combination with antimony.

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* Rush, p. 227. † Cheyne, p. 99.

Dr. Smyth is of opinion that mercury might "prove more useful if combined with other medicines by which its effects might be determined to the kidnies, where its operation at least would be attended with no risk or inconvenience;" and he refers to some cases in which he succeeded in curing the disease, or in alleviating some of its symptoms by combining mercury with the fresh squill. Dr. Smyth's form and manner of using this combination was the following:—"Ten grains of crude quicksilver were rubbed down with twenty or thirty grains of cordial confection, or manna, to which afterwards, five grains of the fresh squill was added, and the whole made up with any syrup to the consistence of a soft bolus or electuary, to be divided into such small parts or portions as was necessary for its being administered along with a little gruel, panada, or the like: and where it could not be conveniently administered in a solid form, I have given it in a mixture, suspending the mercury by means of some mucilage; but I prefer giving it in the first way, where it can be done. The dose above-mentioned, that is, ten grains

of mercury, with five grains of the fresh squill, was given every six or eight hours, where the child's stomach could bear it. The efficacy of this medicine I have occasionally endeavoured to promote, by giving other diuretics at the same time; but the stomach will seldom admit of this practice." *

Dr. Yeats, on this subject, says, "together with the judiciously repeated application of bleeding and blistering, as already stated, a diligent use, both internally and externally, must be made of mercury; which, when the constitution is influenced by it, powerfully assists with the other means used in altering that morbid excitement, constituting the disease." † Dr. Yeats, however, mentions ten cases under the care of Dr. Taunton, in which mercury failed, although used in large quantities both externally and internally. This failure Dr. Yeats seems to think might possibly be attributed to the want of other purgatives in combination with the mercury. ‡

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* Smyth, p. 73. & 74. † Yeats, p. 78.
‡ Yeats, p. 49.

Dr. Coindet does not seem to place much faith in mercury as a remedy in hydrencephalus. He admits, however, that it may be given with advantage both externally to excite salivation, and internally to act by opening the bowels, but he contends that it has no specific effect in the cure of the disease. He thinks, that calomel, given as a purgative, is to be preferred to any other form of this medicine. *

Dr. Abercrombie, speaking of the remedies in hydrocephalus, says, "I have little reliance on mercury. In some cases a sudden and smart salivation has appeared to be useful; but I suspect it is rather on the principle of a drain, or counter-irritation than by any specific operation, as mercury. In many cases, especially during the first or most active stage, the indiscriminate employment of mercury, I apprehend, may be injurious." †

Dr. Clarke is an advocate for the employment of mercury in hydrocephalus; but as it is the property of this medicine, when

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* Coindet, p. 213. † Abercrombie, p. 61.

applied to the human body, to excite salivation, and to produce soreness of the mouth, he says, the dread of these effects has deterred many practitioners from employing it in a large quantity in children, lest the remedy should prove worse than the disease. He thinks, however, that children generally bear mercury very well; and he remarks, that "he has, under various circumstances, prescribed this remedy in very large quantities, and in a great number of cases, and he never produced salivation, except in three instances, in any child under three years of age." With respect to the mode of administering this medicine, Dr. Clarke says, "at any age above one year, half a drachm of the unguentum hydrargyri fortius, with five or more grains of camphor, may be rubbed in every six hours, on any broad surface of the body; this may, in two days, be increased to two scruples, or one drachm. The back is the best surface from its breadth; next to that the thighs, especially the inside of them, as it is well known that a great number of absorbent vessels are situated there." Dr. Clarke thinks it useful every twenty-four

hours to wash off the dried ointment, and to rub the part again when cleansed. To children of a year old, and upwards, a grain of calomel may be given every six, four, or even three hours, unless diarrhœa should supervene." *

I have myself witnessed the good effects of mercury used both externally and internally, in several cases of what I supposed to be water in the brain; of these, two were marked by the symptoms of confirmed hydrocephalus.

On the whole, the general opinion appears to be in favour of the use of mercury in hydrocephalus. Indeed, Dr. Abercrombie seems only to deny its specific influence, and to object to the indiscriminate employment of it. The instances of recovery from this dangerous complaint under the management of Dobson, Percival, and many others, as well as those which have fallen under my own observation, may, I think be fairly adduced in support of the practice in question; and I believe few physicians of

* Dr. Clarke's Comment. on Diseases of Children, p. 182, 183.

the present day would think themselves justified in omitting to employ mercury in attempting the cure of this complaint.

To rely wholly on this medicine as a specific would, I think, be in the highest degree imprudent, but after the means recommended to remove irritation and increased vascular action, it would, in my opinion be equally imprudent, to say the least, entirely to reject this powerful remedy.

A variety of antispasmodics and corroborants have been recommended and employed in hydrocephalus, particularly zinc, ether, volatile alkali, valerian, opium, bark, and wine; but I do not find in authors any observations of importance concerning their effects in this disease.

Drs. Cheyne, Smyth, and almost all other physicians, are of opinion, that in these cases the strength of the patient should be supported by nutritious diet, especially in a liquid form, such as broth, sago, &c.; and under circumstances of great debility, wine is recommended.

With respect to the hydrocephalus described by some of the ancients, particu-

larly by Galen, and by Sauvages and other modern nosologists, under the title of hydrocephalus *exterior*, I have very little to communicate, as the consideration of it rather belongs to surgery than to medicine. In this disorder the water is situated externally in respect to the cranium, and sometimes occasions a prodigious enlargement of the head. Its cure has been attempted by cathartics, diuretics, blisters, and corroborant medicines; but I believe, very seldom, if ever, with success. Galen recommends, in some cases, a surgical operation, with a view to evacuate the water, and we have a few modern instances on record in which it has succeeded. Dr. Vose, of Liverpool, relates a case in the Transactions of the Medico-chirurgical Society, in which the external hydrocephalus was cured by puncture, and Coindet gives a similar one from Rossi, a celebrated surgeon of Turin. In the latter case six pints of water were taken away in the space of twenty days, and the patient recovered.

The patient whose case Dr. Vose describes, was, "an infant of seven weeks old, whose head was enlarged by the accu-

mulated fluid to between two and three times its natural size. This," he says, "was thought a favourable case for the experiment of gradually discharging the water from the head by puncture. The operation was accordingly performed the next day by means of a couching needle of the size and shape formerly in use. Three ounces and five drachms of limpid fluid were discharged, and the opening was closed with adhesive plaster, a roller being at the same time applied round the head. After the discharge of this small quantity of water, the head lost its tension and globular form, and became so flaccid as to allow the water to gravitate backwards while the child was laid upon its mother's knee, giving to the loose integuments the form of a pendulous bag." The water, however, again accumulated, and the head became as tense as before, in a very few days. The operation was repeated, when five ounces of fluid were evacuated; and again in about eight weeks, when eight ounces of fluid were discharged. In ten days afterwards, the head was punctured for the last time, when twelve ounces of fluid were drawn in a con-

tinued stream. No derangement of health followed the fourth operation, and the child gradually improved in health, size, and vigour. For a more particular account of this case, I refer to the second part of the ninth volume of the Medico-chirurgical Transactions.

With these observations on hydrocephalus, I finish the consideration of *apoplexy* and the diseases connected with it.

In the second part of this work I propose to communicate the opinions of ancient and modern authors on the nature and treatment of *palsy* and *epilepsy*, together with the best information I can collect respecting the actual practice of the present day in those important diseases.

END OF THE FIRST VOLUME.



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