

A report on the cerebral affections of infancy : with a few comments and practical remarks.

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Copeman, Edward, 1809-1880.
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Publication/Creation

Norwich : Fletcher, 1873.

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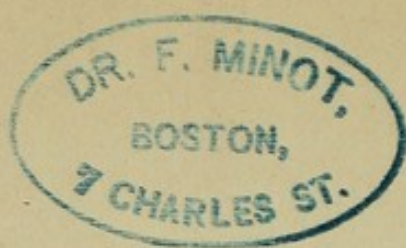






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A REPORT
ON THE
CEREBRAL AFFECTIONS OF INFANCY

WITH A FEW

Comments and Practical Remarks.

BY

EDWARD COPEMAN, M.D.,

Senior Physician to the Norfolk and Norwich Hospital;

Fellow of the Royal College of Physicians, London;

Fellow of the Royal College of Surgeons of England;

Vice-President of the Obstetrical Society of London, etc.

NORWICH: FLETCHER AND SON.

LONDON: HAMILTON, ADAMS, AND CO.

1873.

2019

To J. G. JOHNSON, ESQ., F.R.C.S.

Dear Mr. Johnson,

More than twenty years ago I had the privilege of dedicating to you a work founded on the recorded midwifery practice of a mutual friend and very eminent member of our profession; I could scarcely have hoped after this long interval of time to have the satisfaction of associating your name with another work on a subject which, during your long and useful professional life, you have regarded with extreme interest, and prosecuted with equal success.

Accept it as an additional testimony of regard,
from

Your sincere friend,

E. COPEMAN, M.D.

Norwich,

May 5th, 1873.

THE HISTORY OF THE

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PREFACE.

The object of the following report is to offer as complete a description as possible of the phenomena and treatment of a class of diseases which cannot fail to enlist the sympathies of all who have to deal with them in practice. I have myself profited by the study required for compiling it, and would fain believe that others who may be induced to read it carefully, will not retire from the task without having derived an amount of information in this very interesting department of medicine, which will repay them for the little time and trouble occupied by its perusal. Should this be so, the labour required for its production will not have been in vain.

Norwich,

May 5th, 1873.

PREFACE

The object of this little book is to present
to the student a summary of the principles
and methods of the science which is called
Statistics. It is not intended to be a treatise
on the subject, but rather a guide to the
study of the subject. I have not, of course,
attempted to cover the whole of the subject,
but have only dealt with the most important
principles and methods. It is hoped that
this book will be of some use to the student
who is studying the subject for the first
time, and who is desirous of obtaining a
general knowledge of the subject. It is
not intended to be a substitute for a
text-book, but rather a companion to it.

London,

1891.

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REPORT

ON THE

CEREBRAL AFFECTIONS OF INFANCY.

In the early part of the 18th Century—
Harris, 1715. 1715—a work entitled *De Morbis Acutis Infantum* was published by Walter Harris, M.D., a learned physician, in great repute at the Court of William and Mary, and whose writings bespeak a highly religious and exemplary character. He was acquainted with the great Sydenham, by whose advice it was, he informs us, that he made public his method of treating infantile disorders.

His descriptions of disease are by no means clear, nor does he treat much of symptoms; his principal object is to direct the attention of practitioners to a more successful method of treatment than had hitherto prevailed. Dr. Harris' plan is confessedly sufficiently simple; and if as universally applicable as he believed it to be, it would save the physician an immensity of difficulty in diagnosis, and remove almost all doubt about the choice of remedies. He says, "Quemadmodum temperies puerorum humid-

issima est, haudquaquam vereor pronunciare, morbos illorum universos ejusdem generis esse, ab unâ eâdemque causâ produci; quodque prout partes corporis diversæ, sint superiores, sint inferiores, hæc vel illâ aegritudine affici soleant; prout nempè ventriculus, intestina, pulmones, caput, et nervi, maxime augentur, aut male se habent, idem reverà morbus quamplurima nomina sortiatur."

Thus, according to his theory, all the diseases of children arise from one and the same cause, this being the natural humidity, or fluids of the body, degenerating into an acid.

"Porro symptomata infantum singula acido, ut parenti legitimo, ortum suum debent."

From these simple premises, he deduces an equally simple indication of treatment; namely, to neutralize the predominating acid by testaceous powders in large doses, and purge them off at intervals. The powders are to be given two or three times a day in some aromatic water; and every two or three days, an aperient of rhubarb alone, or mixed with cream of tartar, to remove the contents of the bowels. Several cases are narrated in which the effect of this treatment was remarkably beneficial in various acute diseases of infancy; and this comprises nearly the whole of what is to be learned from his book upon the subject of infantile diseases.

In convulsions, Harris recommends bleeding under certain circumstances; but only in the intervals between the convulsive fits, and not during the fit;

the child being then so much exhausted by the convulsion as not to be able to bear loss of blood. On the subject of bleeding in general, he makes the following sage remarks :—

“Quod ad *venæsectionem Puerorum* attinet, quamvis *materiæ febrilis in Pulmones metathesis insignior, et tusses convulsivæ*, eam in minimis Infantibus quandoque exigant, tamen apertè constat, eam non esse medicinam illorum naturæ consentaneam, neque magis huic tenerrimæ, quàm decrepitæ ætati propriè accommodam. Et proindè minimè necessarium duco ejus auxilium requirere in quibuscunque Infantum affectibus, nisi in tussibus convulsivis, aut ubi Febrem subito exortum Tussis importuna concomitari solet ; nisi et in contusionibus gravioribus, quæ nonnunquam contingunt ; nisi denique nonnunquam in convulsionum intervallis.”

Rhubarb he extols as without exception the best purgative for children ; and considers aloes injurious to them.

Æthiops mineral he looks upon as the best mercurial, “quia qualicunque quantitate, et quotiescunque exhibita *salivationem* non solet excitare, quæ tenerrimis naturis neque convenire potest, neque inexpectata citra horrorem astantium unquam conspicitur.” His formula is as follows :

Rp. Hydrarg : pur : *part* : ij

Flor : Sulph : vel Sulph : vivi *part* : j—

Agitentur in Mortario vitrio, aut alio, donec omnes globuli mercuriales penitus evanescant, et massa

redigata in pulv: fuscum tenuissimum, qui paululum conservatus maximè nigrescit—and he sums up his remarks upon the treatment of acute diseases of children in the following words:

“Persuasissimus sum, vel in provectâ jam ætate, post diuturnam experientiam, simpliciores medicandi methodos, á technis elegantibus doctorum quorundam alienas, et ventriculo plerumque gratiores esse, et sanitati restituendæ magis conducere, et benedictione divinâ frequentius comitatas succedere solere, quàm farraginem medicamentorum pomposam, quantumlibet multiplex Autoritas, recens aut antiqua, contrâ hanc sententiam, et contrâ simplex verum, vi insigni militet, aut obstrepere possit.”

The method of prescribing at the period at which Dr. Harris practised and before his time, was so contrary to the simple plan he advised, and consisted of such an incongruous mixture of multifarious ingredients, that it was scarcely probable he lived to see old prejudices surmounted and his advice generally followed; indeed for many years after his time the art of prescribing continued complicated and indefinite, and it was left for the present generation to separate the good from the bad, to choose the former, and discard the latter; for although physicians of the present day employ a more extensive range of medicinal agents than Dr. Harris advised, yet they approach much nearer to the simplicity of his method, particularly with reference to patients of tender years.

IN 1767 an account of the diseases most
Armstrong, incident to children, was published by
1767. Dr. George Armstrong.

It does not appear that the diseases of children were much studied or understood, in this country, before the publication of Dr. Armstrong's work, for he speaks of hydrocephalus almost as a novelty, and the possibility of its cure but just ascertained. In his remarks on the diseases of children in general, he ably refutes the opinion, at that time very prevalent, and even now by no means universally discarded, that because infants have not the means of expressing their feelings or describing their complaints by words, there is nothing to be done for them when ill, owing to the difficulty the physician has to encounter in endeavouring to ascertain the nature of their diseases. It would be out of date now to enlarge upon this subject; the prejudice against the medical treatment of children's diseases is confined almost to old women; and but few of the present race of educated medical practitioners will not acknowledge that, to say nothing of the interest necessarily connected with the having it in our power to contribute to the relief of the most helpless and interesting part of creation, there is but little, if any, more difficulty in distinguishing and treating the diseases of infancy than those of adult age. Indeed in many respects there is less; in infancy there is no guile, there are no evil habits to counteract; in infancy, disease runs a more *natural* course, is less biassed by the counteracting powers of

moral and physical intemperance ; in infancy there is more certainty in the action of medicines, less disappointment in their effects ; so that if the administration of them be properly understood, their beneficial influence may be more safely relied upon. It is true, indeed, that ignorance renders the treatment of infantile diseases not only difficult but extremely hazardous ; but knowledge is power, to the effectual relief of many little sufferers.

Dr. Armstrong considers *inward fits* the most common complaint incident to infants, and as this affection belongs at least to *functional* cerebral disorders, it will not be out of place to quote his description of it. “The child appears as if asleep, only the eyelids are not quite closed ; and if you observe them narrowly, you shall see the eyes frequently twinkle, with the white of them turned up. There is a kind of tremulous motion in the muscles of the face and lips, which produces something like a simper or a smile, and sometimes almost the appearance of a laugh. As the disorder increases, the infant’s breath seems now and then to stop for a little ; the nose becomes pinched, there is a pale circle about the eyes and mouth, which sometimes changes to livid, and comes and goes by turns ; the child starts, especially if you go to stir it, though never so gently, or if you make any noise near it—thus disturbed, it sighs, or breaks wind, which gives relief for a little, but presently it relapses into the dozing. Sometimes it struggles hard before it can break wind, and seems as

if falling into convulsions ; but a violent burst of wind from the stomach, or vomiting, or a loud fit of crying, sets all to rights again. If neglected, these fits either degenerate into an almost constant drowsiness, or else they terminate in vomitings, sour, curdled, or green stools, the watery gripes, and convulsions." For the prevention and cure of the complaint, he particularly insists upon the child never being laid down to sleep, after it has been suckled or fed, till it breaks wind upwards or downwards two or three times ; and gives a gentle puke if this cannot be procured by more easy means ;—upon preserving the child from cold, keeping it as dry as possible, rubbing the limbs and belly frequently and for a good while together, with a warm hand before the fire—and he adds, in case the above directions are observed, if the child has been born at the full time, of healthy parents, is not remarkably weakly, nor subject to rashes, and is suckled by a healthy nurse, careful of her diet ; we need not be much afraid either of the thrush, green stools, watery gripes, or even of convulsions, except the idiopathic, till the time of teething.

With regard to other cerebral disorders, Dr. Armstrong considers convulsions in most instances a symptom and not a disease, often closing the scene in adults as well as in infants.

Idiopathic convulsions, those in which the brain is primarily affected, are of more rare occurrence, although much harder to manage ; they may be thus distinguished : “ When a child is seized with convul-

sions, without having any complaint in the bowels, or symptoms of teething, especially if they happen before the teeth shoot into the gums, and if the child has had no rash, nor the discharge behind the ears dried up, we may reasonably suppose them to be *idiopathic*." He mentions hydrocephalus internus as a cause of idiopathic convulsions, which happens more frequently than is generally imagined. Of this disease he appears to have possessed but very imperfect notions, and believed it quite incurable until he became acquainted with a case published by Dr. Dobson, in which recovery was effected by means of calomel carried to Ptyalism. This case, another communicated by Hunter, and a third which occurred in his own practice, he has inserted in order to exemplify the mode of treatment by calomel, and represent the curability of hydrocephalus.

Whytt,
1768. In 1768 appeared some "Observations on the Dropsy of the Brain," by Robert Whytt, M.D., Professor of Medicine in the University of Edinburgh. This was perhaps the first Essay published in this country professedly on hydrocephalus, and marks an important era in the history of this serious disease.

Dr. Whytt describes *Hydrocephalus* as either external or internal—The former has its seat in the cellular substance, between the skin and the pericranium, or between this membrane and the skull. In the latter, the water is sometimes collected between

the *cranium* and *dura mater*, or between this last and the *pia mater*; but most commonly in the ventricles of the brain, immediately below the *corpus callosum*; and this is not only the most frequent and fatal species of hydrocephalus but also that with which medical writers seem to have been least acquainted. The youngest infants are not so subject to this kind (internal) as children of two years and upwards; “of about twenty patients whom I have seen die of this distemper, one only was under half a year old, the rest between two and sixteen.”

Whytt divides the disease into three stages; the *first* comes on four, five, or six weeks, and sometimes even longer, before death; is always attended with some degree of fever, sometimes much, sometimes little; and is more particularly characterized by vomiting once or twice a day, or once in two or three days, headache and aversion to light; the bowels being commonly costive, though sometimes they have returns of a looseness. The *second* stage is dated from the time the pulse, from being quiet but regular, becomes slow and irregular. This sometimes happens about three weeks, often a fortnight or less, before the death of the patient. The diminished frequency and irregularity of the pulse, *the heat of the skin continuing much the same*, are the chief diagnostic marks of the second stage. When the pulse rises again to a feverish quickness, and becomes regular, the *third* stage may be said to begin; and this change in the pulse is observed five, six, or seven days before

death. In this stage, the patient, who before was little disposed to sleep, becomes then drowsy, and comatose; one eyelid, and afterwards the other, become paralytic; the pupils are inactive; the patients are sometimes observed to be constantly raising one of their hands to their heads, and are generally troubled with convulsions of the muscles of the arms, legs, or face, as well as with a *subsultus tendinum*. Those who have been costive before, often become loose in the third stage, and complain of gripes.

In ten cases in which Dr. Whytt examined the head after death, he found a clear thin fluid, generally from two to five ounces, in the ventricles of the brain; but never met with water between the dura mater and the brain, between the hemispheres, or immediately above the corpus callosum. The fluid did not coagulate by heat.

In the treatment of hydrocephalus, Dr. Whytt employed repeated purges of rhubarb and jalap, with calomel and blisters; but he frankly confesses, that he had never had the luck to cure a patient who had those symptoms which with certainty denote this disease.

Fothergill, 1768. In the Fourth volume of "Medical Observations and Enquiries by a Society of Physicians in London," there are three papers on hydrocephalus, one by Dr. Fothergill, read August 8th, 1768, and two by Dr. Wm. Watson, the respective dates being August, 1768, and April, 1770.

From the observations of Dr. Fothergill it would seem that he had, at the time he wrote, only an obscure notion of the disease, and could with difficulty distinguish it from symptoms supposed to proceed from worms; and as to treatment, he observes, "I must own that it is not in my power to suggest any probable means of curing the disease; it has baffled all my attempts, both when confided in alone, and in consultation with the ablest of the faculty." He describes the disease as seldom occurring in subjects younger than three years; most frequently from five to ten; two or three cases happened from ten to thirteen, and two between seventeen and nineteen years of age, the last four were girls; the former mostly boys; and none of them peculiarly unhealthy before they were attacked with the disease. Most of them had gone through the small pox, some the measles likewise; but without any reason to suspect that these had left any foundation for this terrible complaint.

Dr. Fothergill differs from Dr. Whytt with respect to the insidious nature of an attack of hydrocephalus, and says, on the contrary, he has seen children, who, from all appearance, were well, healthy and active, seized with this distemper, and carried off in about fourteen days.

The following is his description of the disease. "In most cases, a pain in some part or other below the head was the first thing complained of; most commonly about the nape of the neck and shoulders,

often in the legs, sometimes in the arms, but more rarely. This pain was not always alike acute, nor always fixed to one place; sometimes it seemed not to affect any of the limbs. In these cases, the head and stomach seemed to be more disordered; and indeed were always disordered more or less from what I could learn. When the pain was in the limbs, the sickness or headache was less; when the head became the seat of complaint, pain in the limbs was seldom or ever mentioned: some had very violent sicknesses, and violent headaches alternately. From being perfectly well and sportive, some were seized with these pains in the limbs, or with sickness, or headache slightly, in a few hours, commonly after dinner. Some have been observed to droop a few days before they complained of any part being much indisposed. In this manner they continued three, four, or five days, more or less, as the children were healthy and vigorous, when the distemper begins to show itself in an alarming manner. They then commonly complain of a most acute pain in the head, deep seated, and extending across the forehead from temple to temple. They are generally very sick between whiles, crying out in the most affecting manner, *Oh, my head! Oh, I am sick!* alternately, and with short intervals: dozing a little in these intervals, breathing irregularly, and sighing much while awake. Sometimes they only seem to breathe in sighs for some minutes together. The pulse, from being regular as in health, as the disease creeps on, becomes

irregular; slower, for the most part, at first than it ought to be; it grows still slower as the pain increases, gradually likewise irregular both in force and frequency. The limbs, for the most part, are temperate in respect to heat, after the first access, which is often attended with feverish heats, especially towards evening and forepart of the night, and till within a day or two of their dissolution; the pulse then becomes extremely quick, the breathing deep, irregular, and laborious, the heat excessive and more general. The head is always hot from the first, and the *præcordia* likewise. Almost every symptom that is known to attend an irritating cause existing in the brain, appears in its turn; first, pain in the limbs, sickness, and headache. Short disturbed sleeps, startings, irregular pulse, watchfulness, and the pupils of the eyes much dilated. They are unwilling to be disturbed for any purpose, are averse to light, take things greedily, and cannot bear any position but that of lying horizontally. They attend less to objects; when asleep, great part of the whites of the eyes are seen, and are undisturbed by anything but moving them. Their urine comes away insensibly, and their stools likewise. They often scream out most piercingly, but complain of nothing. One or both hands are most commonly about their heads. At length the eyelids become paralytic, the *iris* immoveable: it gives them no apparent uneasiness if one raises the eyelids with the finger two or three days before they die. The heat of the head and trunk becomes exces-

sive ; a great heat and sweat spreads over the whole body, respiration is altogether suspirious, the pulse trembling and quick beyond the possibility of counting, and the patient goes off gradually as the strength fails ; sometimes a spasm finishes the catastrophe. Another circumstance likewise is familiar, if not peculiar to this disease : I recollect not one instance in which the patient was not costive, and in which likewise it was not without singular difficulty that stools were procured. The stools are most commonly of a very dark greenish colour, with an oiliness or a glassy bile, rather than the slime which accompanies worms. They are, for the most part, singularly offensive.”

The treatment advised by Dr. Fothergill is the same as that for worms ; consisting of purgatives of calomel, rhubarb and scammony, antimonial emetics if the stomach appear to be loaded, anthelmintics, and anodynes.

Watson,
1768-70. In Dr. Watson's paper, attention is directed in the first instance to three cases of hydrocephalus—they were all girls ; the first 6, the second 9, and the third 14 years of age ; and they all terminated fatally. The following are his concluding observations :—“ The dropsy of the brain is a most dangerous disease. Not only the three cases above-mentioned, but several others that have fallen under my notice, have all been fatal : nor has better success attended other physicians, both here and

elsewhere. Early in the disease, the symptoms are such as render it difficult to the physician to distinguish it from those disorders which owe their rise to worms or foul bowels. In the advanced state of it indeed, the diagnostics are more certain; if, therefore after a fever of an anomalous kind, attended with remarkable impatience of light and great restlessness, in which the stomach is affected with sick fits, and the head with unremitting pains, together with a sensation of tightness or fulness in the upper part of it, the patient becomes comatose, with considerably dilated pupils, and convulsive motions of the cheeks, eyes, and eyelids; if to these are added a frequent rolling of the head from side to side, little doubt remains of the disease being dropsy of the brain."

The principal feature in Dr. Watson's second paper, which he terms an appendix to the first, is a case which terminated successfully, it being the only instance he had seen of recovery from dropsy of the brain, when, from the attendant symptoms, little doubt remained of the disease being completely formed. The following is the case:—"An healthy boy, aged six years, received, in November, on the top of his head, a smart blow from a stone thrown at him by one of his companions: of this he complained a good deal at the time; but as the wound was slight, it was almost forgotten. In about a fortnight, he made frequent complaints of a pain in the head. As his breath was now unusually offensive, and his belly somewhat enlarged, this disorder was supposed to be

owing to worms. In a few days the headache increased; he had a considerable degree of fever, was exceedingly restless, and lost his speech. The second day from the loss of his speech I first saw him; I was informed that the fever, within these few days, was much increased; his pulse was quick, and his flesh hot; his cheeks flushed considerably, and he sweated much about the head, face, and neck; he was in a lethargic stupor, scarce sensible of anything that was said to him, and parted with his urine and stools involuntarily; the pupils of both eyes were in the greatest degree of dilatation, and they did not contract when exposed to light, an indication of the loss of sight; the right arm was, in a considerable degree, enfeebled; but with the left arm and hand he was, when roused, constantly rubbing his forehead, as he rolled his head on the pillow from side to side. Though his sleeps were short, whenever he awoke, he shrieked for a considerable time. Besides frequent returns of general convulsions, the muscles of his face, eyes, and eyelids were particularly convulsed; and so at times was his right enfeebled arm. Without much hope of affording relief, I ordered a blister to the head, some medicines to abate the fever, and to keep his bowels gently soluble, with proper liquids and nourishment. For four or five days from this time, every symptom increased to such a degree, that death was hourly expected. The patient was reduced to the greatest degree of debility; in the course of a few days more, however, the symptoms were milder;

he every second day took an opening medicine; and as his feverish heat abated, he was allowed weak broth, and aliment more nutritious than that before directed, with a small proportion of wine. In about a fortnight from my first seeing him, his pupils contracted at times, and he gave indications of his being able at such times to distinguish objects. The convulsions, flushings, great restlessness, cryings out upon waking, and other symptoms, continued, though in a less degree, for near a month longer; by which time his sight was quite restored, and his right arm had recovered its strength; in about a fortnight more his speech returned, after having lost it two months; by slow degrees he recovered his strength, and he is now perfectly well."

The above is certainly a remarkable case of recovery from severe cerebral disease; and exemplifies the remedial power which nature occasionally exercises even in desperate cases, when she is not interrupted, but only gently assisted, by the interference of art. It teaches us the double lesson, never to despair, and, not to do mischief by overmuch activity.

Lieutaud, 1770. About the period that Armstrong wrote on diseases of children, Lieutaud's Synopsis appeared, a work which displays considerable practical knowledge on the part of its author. Amongst the diseases of children, he treats of epilepsy, convulsions, and hydrocephalus, remarking that it is often difficult to distinguish between the two

former. *Epilepsy* he mentions as a species of convulsion recurring periodically within the first seven years from birth, depending seemingly upon some permanent cause; whilst *simple convulsion* arises from a temporary cause, and has reference to all ages. He enumerates as the forerunners of epilepsy, nocturnal fears, watchings, yawnings, green urine, &c., and as the actual symptoms, tremor of the arms, convulsion and rigidity; irregular movements of the eyes, with loss of sensibility; these seldom attack children seven years of age; but if the disease has existed before that age, it generally continues until puberty. The causes of convulsions and epilepsy he states to be dentition, worms, and other intestinal disorders. Children delicately brought up, and whose bowels are costive, are most prone to epilepsy: those suffering from eruptions are but little so, unless the eruptive disease be repelled. The younger the child and the more frequent the paroxysms, the more dangerous the disease. Considering these diseases most frequently to arise from *saburræ* in the *primæ viæ*, he numbers emetics amongst the best remedies, given in the intervals between the fits; purgatives also, given in the intervals. He also refers to bleeding as sometimes successful during the paroxysm, but remarks that it should be very seldom employed in young children. Anthelmintics and absorbents are useful; and with respect to these he says, although they have the power of confining the bowels, in infancy they sometimes produce a contrary effect; which he

accounts for by the supposition that a neutral salt is formed by the union of the absorbents with acid substances in the first passages. In order to remove or alleviate the fit itself, spir. succini vel cornu cervi may be given; but external remedies appear more efficacious, such as snuffing up various substances into the nostrils, purgative enemata, cupping glasses, and liniments rubbed upon the spine. Blisters, caustics, and setons, are very useful during the intermissions. If vitiated milk be the cause of the affection, all medical remedies will be useless unless the food be changed.

Lieutaud describes *hydrocephalus* as a *colluvies serosa*, sometimes enormously increasing the size of the head. It is chiefly a disease of infancy, but neither is middle nor advanced age entirely exempt.

Hydrocephalus may arise from contusions of the head, from difficult parturition or otherwise; from dentition, worms, convulsions, &c. The fluid may be situated under the scalp, or between the cranium and dura mater, and the disease admits of cure; or it is contained in the convolutions of the brain, floating around this viscus, or filling all its recesses; and this is considered incurable. Children labouring under this disease are feeble and languishing, somnolent and heavy; the face is pallid, the teeth appear slowly, the eyes are prominent and the pupils dilated; the mouth and eyelids are affected with spasmodic movements, and there is grinding of the teeth. Some go blind, others have spina bifida. At last these symp-

toms are succeeded by coma. The *post mortem* appearances are, wide sutures, and large fontanelles; the bones often so little connected with the dura mater and pericranium that they can easily be pulled out, the membranes thickened, and the falces callous. Sometimes the brain appears moist and flaccid; at other times dense and firm, and, owing to the circumambient fluid, contracted to the size of an apple. In other cases, the ventricles are so dilated with fluid, that the surrounding cerebral substance is scarcely six lines in thickness, and the medulla oblongata so compressed as to be almost obliterated; so great sometimes is the extenuation of the brain from the pressure of the fluid, that it seems to be altogether deficient. The medulla spinalis does not escape, the fluid being effused as far as the sacrum, where a watery tumor sometimes makes its appearance. The plexus choroides is sometimes contracted to a small round body and full of hydatids.

Hydrocephalus, like other dropsies, is to be treated with evacuants, aperients, and tonics. Rhubarb, jalap, and mercury, as purgatives. Resolvents and discutients are to be employed, though he has little confidence in them; but he advises blisters, cauteries, and setons, when preceded by suitable internal remedies.

In the Fifth volume of Medical Commentaries, published in 1777, Dr. Percival has given a case of hydrocephalus in which he thought great good had resulted from the free use of

Percival,
1777.

mercurial frictions; by causing absorption of the fluid in the brain, which had produced a manifest tumor at the bregma. His patient, however, died; and in a letter published in the same volume by Dr. Simmons, the latter physician expresses great doubt as to the fluid having been removed by the action of the mercury; and attributes it rather to the several blisters that were applied to the head, and to the application of linen dipped in brandy to the seat of the swelling.

Quin,
1779. In 1779, Dr. Quin published a thesis on internal hydrocephalus, in which he takes a different view of the nature of the disease to that which had before prevailed. The new doctrine propounded by Dr. Quin was to the effect, that the causes of acute hydrocephalus are of a very different nature from those of simple dropsies, and are much more closely allied to the causes of acute diseases; and that in fact it always owes its origin to a morbid accumulation of blood in the vessels of the brain, sometimes proceeding to a degree of inflammation; and generally, but not always, producing an extravasation before death.

Underwood,
1784. A few years afterwards, Dr. Michael Underwood published his famous treatise on diseases of children. The first edition appeared, I believe, in 1784, the fifth in 1805, and the tenth in 1846, edited by Dr. Henry Davies.

Other editions have appeared, under the superintendence of Drs. Marshall Hall and Merriman; and that published by Dr. H. Davies brings up the subjects contained in the treatise to a level with the improvements of the day. No greater proof of merit in the original work can possibly be accorded; for, from its first appearance to the present time it has been considered, with the editorial additions and improvements it has at various periods undergone, to be a standard authority on the diseases of infants and children in this country.

Dr. Underwood was physician to the British Lying-in Hospital; and from his eminent position in London, enjoyed ample opportunities of witnessing the diseases of children also amongst the highest classes of society. His opportunities for observation were turned to good account by the industrious workings of a powerful mind, and a benevolent desire to promote diffusion of knowledge upon a subject of great interest, but which before his time had not been either widely or successfully investigated. In the preface to his fifth edition, he says: "Prompted by a laudable ambition of being useful in his generation, and leaving behind him something beneficial to posterity in the only way he could attempt it, he is persuaded the benefit will not terminate here; but that others will be excited to perfect this long neglected, but most important branch of the profession." How well the anticipations of the author were founded, and how completely they have been fulfilled, is most amply attested, both

by the future career of his own book, and by the industry and talent brought to bear upon the same department of medicine both at home and abroad.

Inward fits, a disease much insisted upon by Armstrong, is scarcely noticed by Underwood; indeed, he says he knows no complaint that deserves the name, and considers the symptoms to be merely the effect of a little wind upon the stomach; or when accompanied with spasm, to be chronical croup, which he always succeeded in removing by the administration of different antispasmodics.

Whether or not it be right to acknowledge *inward fits* as a distinct disease, the term does refer to symptoms which it is exceedingly important to observe. It is of great importance for them to be recognized by the mother or nurse; and as the appellation has been familiar to nurses and old women for ages, and they are extremely tenacious of what is handed down to them by their predecessors, it is better to give the term a definite meaning, than to abolish it altogether. I was once much struck with an observation, by a nursemaid of no very great experience, about an infant a few days old, who to all appearance was perfectly well and healthy. She remarked to the monthly nurse that she had *once or twice* noticed an appearance about the eyes which she thought would turn out to be fits or water in the head. I watched the child very carefully in consequence, but could never during my visits, nor could the nurse either, detect the slightest appearance of

disordered health. After a while, however, the baby suffered from wind and acidities, which were soon removed by suitable remedies; afterwards a mild thrush appeared, but again the child regained its health. It was vaccinated at two months, and passed well through the disease. Soon after this, I lost sight of the infant; it was removed to the sea coast; whilst there, was attacked with diarrhœa, a disease then very prevalent, and died, I was told, with symptoms of water in the head. How valuable is the knowledge of any tendency to head affection in the treatment of diarrhœa or any other disease in infancy; and consequently how important for nurses to understand and be able to communicate to the physician any symptom, however slight and temporary, that may be calculated to arouse his vigilance or influence his treatment. The above narrative proves that those who are in constant charge of an infant may occasionally notice a suspicious circumstance which does not present itself to the view of the medical attendant, and from this I deduce an argument in favour of encouraging amongst nurses and mothers a knowledge of the symptoms of *inward fits*, instead of banishing it from the catalogue of diseases; not for the sake of enabling them to treat them therapeutically, but that they may be competent to give due warning of the necessity for proper medical advice.

Of the cerebral diseases of children, hydrocephalus is the principal one described by Dr. Underwood, whose acquaintance with this disease, both as to its

nature and treatment, was superior to that of his predecessors. For his account of it I refer the reader to the last edition, by Dr. H. Davies (1846) and merely remark, *en passant*, that in the treatment of the disease, he appears to advocate with too much freedom, abstraction of blood.

Rush,
1798. At the close of the last century, an "Inquiry into the Cause and Cure of the Internal Dropsy of the Brain," by Dr. Rush, was published at Philadelphia; and forms one of the papers in the second volume of his "Medical Inquiries and Observations."

Having been unsuccessful in all but two cases of internal dropsy of the brain which came under his care, he was led to entertain doubts of the common theory of this disease, and to suspect that the effusion of water was only the effect of inflammatory disease of the brain. In accordance with this view of the nature of the disease, he resolved to alter his mode of treatment. The first remedy indicated by it was bloodletting, and he gives seven cases, which all terminated successfully after free bloodletting, assisted by purgatives and topical applications. He remarks that "where bloodletting has failed of curing this disease, I am disposed to ascribe it to its being used less copiously than the disease required," and, "since I have adopted depleting remedies, I have declined giving mercury altogether, except when combined with some purging medicine," because of the uncer-

tainty of its operation, its frequent inefficacy when it excites a salivation, and, above all, its disposition to produce gangrene in the tender jaws of children.

NINETEENTH CENTURY.

Capuron,
1813. In 1813, a treatise on the diseases of children was published in Paris, by Capuron, which deserves to be specially noticed; and I purpose to review his statements and opinions concerning diseases of the nervous system, in order to exemplify the state of knowledge at that period prevailing in France.

Convulsions. All infants are not equally subject to them, their liability being in proportion to their sensitiveness and weakness. Predisposition to them is shewn by paleness, tenuity of fibre, softness of the cellular tissue, and debility, either natural or acquired. Convulsions are idiopathic or sympathetic; the former depending upon causes acting immediately upon the brain, and occurring only in children endowed with extreme sensibility. The latter may also, if prolonged, become idiopathic, by producing a kind of nervous ataxia, which becomes habitual, and is renewed by the slightest impressions.

The exciting causes of sympathetic convulsions act only in a mediate or secondary manner upon the brain; they are, retention of the meconium, morbid

accumulations in the stomach and bowels, acidities or flatulence in the primæ viæ, worms; the milk of an illtempered or unhealthy nurse, difficult dentition, and anything that suddenly irritates or excites, as anger, surprise, the sight of hideous objects, fear, and sometimes imitation. Also the approach of various exanthemata, as smallpox, measles, &c., the sudden suppression of these and other eruptions, the drying up of natural or artificial discharges, and poisonous substances accidentally swallowed.

Convulsions seldom occur without premonitory symptoms; the eye is restless, wild, fixed or twinkling; disturbed sleep; children start out of their sleep, cry out, and shed tears in the middle of the night. They appear drowsy during the day; their countenances change colour and expression frequently; they grind their teeth during sleep; the hand is carried involuntarily to the nose; the risus sardonicus is on their lips; the body moves by jerks. The limbs are more or less contracted, and the thumb is grasped in the palm of the hand.

During the attack the voluntary muscles are convulsed with scarcely any derangement of the muscles subservient to nutrition or organic life, without fever or disturbance of the intellect.

On being called to a child in convulsions the essential point is to ascertain the cause of the disease; but this is not always to be accomplished even with the greatest attention. The children themselves can

furnish no account; and the parents are often too much frightened to give information.

Idiopathic convulsions are the most obstinate, and to treat them, regard must be had to the constitution of the patient. If he be robust and sanguine, with a disproportionately large head, red countenance, prominent and sparkling eyes, and becomes drowsy after a fit, there is accumulation of blood in the head compressing the origin of the nerves; and there is fear of the convulsions terminating in apoplexy and death, unless prevented by general and local bleeding, pediluvia, purgatives, and diuretics. If the convulsions continue after such evacuations, antispasmodics and opium must be employed. When debility is the cause, good nourishment, animal and vegetable jellies, tonics, quinine, gentian and rhubarb, decoction of valerian, tincture of opium or camphor, &c. should be had recourse to; and benefit may also be derived from the use of the cold bath and frictions.

The treatment of *sympathetic* convulsions, although apparently more easy, requires however more tact and sagacity. It must be varied according to the cause which produces the disease. When this is dentition, the best treatment consists in putting the child into a warm bath several times a day; or if this be inconvenient, using foot baths or fomentations. General bleeding, or leeches behind the ears, blisters there or on the arms, and purgatives, are beneficial. When plethora, or congestion of the brain is subdued by these means, and the convulsions still continue,

we must endeavour to subdue them with opiates, although these require great caution, and should never be used whilst heat or any other febrile symptoms remain, unless they be purely nervous.

When convulsions are occasioned by disordered bowels, indicated by defective appetite, nausea, diarrhoea, or constipation, yellow skin, pale or livid countenance, enlargement of the belly and foul tongue, emetics and cathartics are the proper remedies. When produced by flatulence or colic, they are relieved by carminatives, and antispasmodics, as a few drops of æther and laudanum. Those caused by acidity, yield to absorbents, magnesia, camphor and musk. Warm baths, pediluvia, and lavements, calm, as if by enchantment, those which precede the eruption of some exanthem, or which supervene upon the impression of cold. Those which proceed from badly treated cutaneous diseases, require diaphoretics and remedies which determine to the skin. Convulsions produced by fright, imitation, or disgust, should be combated by moral treatment and antispasmodics. The child must be encouraged, and never left alone in the dark; kept from the sight of all disagreeable objects; and if necessary, removed to another locality for change of scene and air. Æther and flowers of zinc, have also been much recommended.

A different mode of treatment is required for convulsions caused by worms or poisons. Anthelmintics are proper in the former case; in the latter, we first excite vomiting to remove the poisonous substance

before it passes into the bowels, and afterwards allay irritation.

Epilepsy. This is, according to Capuron, the most frequent, the most frightful, and the most obstinate of maladies. Before the age of seven, both sexes are equally obnoxious to it; but from that time till puberty, more females than males are attacked by it. It is divided into idiopathic and sympathetic. In the former the cause is either seated in the brain, or acts immediately upon that organ; in the latter, it is affected only by sympathy. Idiopathic epilepsy may depend upon some natural or acquired malformation of the cranium; it is said to be sometimes occasioned by improperly applied pressure on the infant's head after birth for the purpose of restoring it to a proper shape. Strong emotions, as anger or fear; thunder, the explosion of firearms, a disgusting object, severe reprimand or threat, unkind treatment, &c., are also enumerated as causes of epilepsy in irritable and sensitive children.

The causes of sympathetic epilepsy are, bad nourishment, milk of bad quality from intemperance on the part of the nurse; in fact, irritation of any kind produced in the stomach or bowels by acrid substances, meconium, or worms; disease of the liver or spleen; suppressed eruptions, difficult dentition, or approaching puberty.

Sometimes epilepsy is preceded by many premonitory symptoms; the body and limbs move by jerks, the child sucks interruptedly; its features change, its

eyes are wild, wandering, weeping; eyelids swollen; countenance confused; sleep disturbed. Those who are old enough, complain of vertigo, noise in the ears, headache, and particularly of icy coldness in the feet and hands; they see sparks or flashes of fire; cramps in the limbs; pulse more frequent, voice more shrill, all the functions more feeble; and the child appears sorrowful, restless, melancholy, and indifferent. Others are attacked suddenly and without warning.

Infants at the breast are more frequently attacked, but recover each time more quickly. Some have only a single attack, others many. Some recover from the disease about the seventh year of age or after the teeth have made their appearance; and others die of it.

There is a great analogy between epilepsy and convulsions; but in the former, the paroxysm terminates in a state of stupor or drowsiness, which disorders the senses and intellectual faculties; and this is not the case in convulsions.

Idiopathic epilepsy is often hereditary, and very difficult to treat, because it depends upon causes which can neither be recognised nor removed. Sympathetic epilepsy is the more formidable, the more violent and frequent the attacks. It may be suddenly fatal; or may become permanent, causing disorganization of the brain, and making the child imbecile, deaf, dumb, or paralytic. A purulent discharge from the nose, ears or eyes, has been known to cure the disease.

The post mortem appearances are, certain vices of formation in the skull; the bones sometimes thicker,

sometimes thinner than natural, and sometimes carious. Membranes of the brain thickened, vessels congested, choroid plexus varicose or loaded with hydatids; the lateral ventricles filled with lymph, pus, fetid sanies, or serum; tumors, abscesses, or ulcers in the substance of the brain.

The treatment must vary according to the cause, and no time should be lost; for delay in such cases allows the number of fits to increase, and the disease to become inveterate or habitual.

When the disease is idiopathic, and the child plethoric and robust, the treatment should consist of bleeding and purging, spare diet and exercise, blisters, setons or issues; to diminish the mass of fluids. Afterwards antispasmodics are to be employed, and even opium, the exciting effects of which are not to be feared when blood has been abstracted. If the disease arises from weakness or inanition, we must first support the strength by nourishing and digestible food, quinine, steel, &c., and afterwards employ such means as are suited to combat the epileptic paroxysms. When there is extreme mobility and sensitiveness, we must endeavour to strengthen the system by exercise duly proportioned to the strength, exposure to the air, cold baths, and antispasmodics.

Sympathetic epilepsy must be treated according to the circumstances which produce it. Evacuants for disordered digestive organs. Anthelmintics for worms; warm baths for suppressed eruptions; leeches and blisters behind the ears when the fits are produced

by difficult dentition ; sudorifics when they succeed to the repression of cutaneous eruptions.

OF THE ATAXIC OR NERVOUS FEVER OF INFANTS.

This name is applied to a kind of fever common amongst children ; it appears to be seated in the brain, and manifests great disorder of the nervous system. It attacks children of all ages, from the infant at the breast to the child of ten or twelve years or more.

Professor Pinel has named it “cerebral” fever.

Generally, previously to the attack, children have appeared to be in perfect health ; fat, plump, and well nourished ; their condition indicative of plethora, and vigour ; with heads of disproportionate size, not depending, as in hydrocephalus, upon the presence of fluid in the cranium, but rather upon an excess of vital energy. Most of them possess extraordinary mobility and sensitiveness.

The exciting causes of the disease are vicissitudes of temperature, errors in diet, exanthematous diseases, and various moral impressions.

Symptoms. At the onset, the countenance is sometimes pale and dejected, sometimes red and animated ; the eyes are sparkling and wild, and cannot bear the light. There are commonly severe pains in the forehead, vertex, occiput or temples ; the hand is often carried to the head, as if by a kind of automatic movement ; the child moans ; sometimes complains of pain in the stomach, and vomits all it

takes; the back, neck, abdomen, and limbs, are very often affected with flying pains, alternating with those of the head. As the disease advances, the child becomes restless, cries, and sighs; dislikes both light and noise; grinds its teeth and picks its nose; pulse irregular, sometimes very slow, and directly after so quick as scarcely to be counted; the surface is alternately very hot and very cold. There are intervals during which the patient feels better, but there is always a paroxysm at night. The functions of animal life undergo great changes; the pulse gets slower and more feeble; there is strabismus and the eyelids are unequally opened; sometimes one is quite closed and paralysed; one cheek is pale whilst the other is flushed; the patient falls into a state of stupor, insensibility, drowsiness, lethargy; one side of the body is often convulsed, whilst the other is paralysed. The disease is never of long duration. The patients generally die in the first or second week, and rarely go on to the third unless they are about to recover.

Morbid Anatomy. Substance of the brain sometimes infiltrated with blood or serum; or these fluids are found extravasated into the ventricles. One case shewed traces of inflammation of the membranes, and purulent matter on some of the convolutions, besides a collection of serum in the ventricles; the lung and pleura of the right side presented also unequivocal signs of inflammation; when the disease has not been rapidly fatal, it is not unusual to find the vessels of the head simply engorged. The

ventricles do not then contain a single drop of fluid ; proving that these effusions are the effect or consequence, not the cause of the fever. One conclusion to be deduced from the examination after death, is that this disease is not essentially meningitis (as some authors have believed) because the latter disease is not in all cases discovered, and is but a complication of the principal affection.

The disease is very dangerous, and Dr. Odier says two-thirds of the children attacked by it perish.

Treatment. The indications are, to prevent effusion, and to cause absorption of the fluid when effusion has taken place. General or local bleeding is the best means of fulfilling the former indication, especially at the commencement. We should apply leeches round the neck, open the jugular vein or temporal artery, and not hesitate to diminish the vital forces. We should afterwards endeavour to effect a salutary derivation by cupping glasses to the nucha, blisters on the head and neck, sinapisms to the feet, purgative enemias, frictions to the trunk and limbs, warm pediluvia, hip baths, &c. Mercury has been employed, internally and externally, with benefit, and emetics are sometimes useful. Tonics, as quina and wine ; antispasmodics, as musk, opium, æther, ammonia, have also been recommended ; but they seem to be useful only in the latter period of the disease, for the purpose of supporting or increasing the vital powers, or quieting nervous agitation.

ENCEPHALOCELE.

This disease consists of a tumor in the situation of one of the sutures or fontanelles; of variable size, not hard, and offering but slight resistance. The skin covering it is not altered in colour, and it is not painful. By these characters, and by deficiency of bony matter, hernia of the brain is easily distinguished from elongation of the head arising from difficult parturition, and from suppuration caused by contusion or inflammation of the scalp. In the latter, there is pain, and redness of the integuments. There are but few instances upon record, of children recovering from hernia of the brain. After death, we discover the tumor to consist of a portion of the brain covered only by the membranes and integuments. Its base is surrounded by the bones of the cranium, which are more or less separated, and incompletely ossified.

Although the prognosis is so unfavourable, we ought nevertheless to attempt a cure. Ledran and Camper recommend first reducing the tumor by slight pressure, and afterwards supporting it with bandages dipped in spirit. Some practitioners recommend the application of a card, or piece of leather, or a plate of lead, over the opening in the cranium until ossification be completed.

CONGENITAL HYDROCEPHALUS.

Capuron has placed this amongst congenital diseases, from its being so frequently present at birth.

The causes of the disease are very obscure. According to Underwood, six children in one family were affected with the disease, of which they died at between one and two years of age.

Armstrong also relates having examined several children in the same family who had died from it from which it appears to depend upon hereditary predisposition or transmission. But hydrocephalus may also occur accidentally, as an effect of increased exhalation or diminished absorption of the serous fluid destined to lubricate the brain. Other causes are, injury to the head in its passage through the pelvis; blows or falls upon the head; and metastasis or retrocession of measles, small pox, or other cutaneous diseases.

Symptoms. At first the child has dull pain in the fore part of the head, and vertigo; he falls into a state of stupor or insensibility; his intellectual faculties are altered; the pupils are dilated, and by degrees become inactive; the pulse is disturbed, and the stomach sympathises. Afterwards appear, swelling and flushing of the cheeks, puffiness of the eyelids, prominence of the forehead, depression of the nose, projection of the eyes, difficult articulation, and impeded motion. Sometimes one or both eyes are only partially opened, and the tears flow involuntarily. At a more advanced period, sight and hearing are lost, and memory gone; sometimes the patient becomes epileptic or paralytic; finally, drowsiness, lethargy, delirium, or convulsions, terminate the scene. If the effusion takes place slowly, the symptoms are more

obscure and death is preceded simply by a state of stupor.

Hydrocephalus is sometimes rapid, sometimes slow or chronic in its progress ; so that, occasionally, there is difficulty in distinguishing it from other diseases, such as internal acute hydrocephalus or ataxic fever, &c. When the disease is congenital it is impossible to mistake it. The size of the fontanelles, the separation of the sutures, and fluctuation, sufficiently distinguish it.

Camper has observed that hydrocephalic children, in whom the sutures were separated, seldom lived beyond the third or fourth year. Some persons affected with hydrocephalus have lived till youth or even beyond ; some have lived till the age of forty-five years. But such individuals generally lead but a miserable life and are almost all fatuous. Tulpius has given the history of one who retained the use of his intellectual faculties, notwithstanding complete disorganization of the brain !

P. M. appearances. When the head is opened, the fluid is sometimes found between the membranes, sometimes between the arachnoid and brain, but never between the dura mater and the cranium. When the dropsy is partial, the serum accumulates in one or both ventricles. From one or two to twenty pints of fluid have been found in the cranium. If the effusion has taken place quickly, the bones of the cranium are separated, and the fontanelles enlarged ; but if slowly, the bones sometimes present no trace of

sutures. Before birth, the disease may make such rapid progress that the serum produces disorganization of the brain, bursts the membranes and scalp, destroys even the bones, and bursts into the amnion. Nothing remains of the cranium but the base, and the hydrocephalus is converted into acephalus.

Treatment. In this disease, but little is to be expected from the action of medicines. Mercury appears to have occasionally been successful. When hydrocephalus has succeeded the cure of an ulcer, or the suppression of an eruption, blisters, issues, or even the actual cautery are to be employed.

Lecat proposed paracentesis, or puncturing the cephalic tumor, but it was rejected as a rash proceeding by Camper. The operation could not restore the brain to a healthy state, when that organ had been partially or entirely destroyed. It has also been recommended to apply a circular bandage round the head, to oppose by gentle pressure the separation of the bones of the cranium; but this method has always proved either injurious or insufficient.

Carmichael Smyth,
1814.

Carmichael Smyth speaks very confidently as to the non-inflammatory nature of hydrocephalus; remarking that neither the brain itself, nor its membranes, in any case of genuine hydrocephalus that ever yet has been examined, shewed any appearance of inflammation, or of the usual effects of this having taken place. He considers, on the other hand, that dropsy

of the brain agrees in all the principal circumstances with the general character of the class, that it has a similar origin, or must arise from the same causes; which are, either an obstruction to the return of the blood through the veins, or weakness, general or local.

In 1813, a treatise on the “Remittent Fever
Coley,
1813. of Infants, with remarks on Hydrocephalus Internus” was published by Mr. J. M. Coley. His object is to point out the distinction between these two diseases, in order more effectually to treat the remittent fever. He considers the proximate cause of this latter disease to be a torpor or defective action of some part, or of the whole, of the chylopoietic system; and observes that when this disease is perfectly understood by the practitioner, and the remedies are prescribed with judgment, and administered with diligence, the recovery of the patient is almost certain. On the contrary, if it should be mistaken for another complaint, or the means of cure be improper, or the attendants negligent in performing their duties, it will in many instances have a fatal termination. With a view of preventing these mistakes, and pointing out the characteristic symptoms, he has been at some pains to describe the diagnosis between this fever and hydrocephalus internus. His remarks upon this subject are as follow: “The symptoms denoting *hydrocephalus internus* cannot be confounded with remittent fever,

until effusion has taken place to such an extent as to compress the brain and impair its functions. In its previous stage a manifest difference must have been observable, from the acuteness of the pain in the head, from the intolerance of light, from the agitation or tossing of the head, and from the absence of sleep; to which must be added the *healthy* state of the bowels. It might also be suspected that this disease is commencing, when the above symptoms have been observed to succeed much irritation about the gums during the formation and evolution of the deciduous teeth; as it is not uncommon for it to arise from the inflammation of the membrane lining the alveolar processes, or of the capsules of the teeth, being translated by the operation of sympathy, or some other cause, to the membranes of the brain.

“When effusion has commenced, the symptoms are such as proceed from compression of the brain from other causes; as squinting, interrupted or stertorous breathing, paralysis generally on one side of the body, insensibility to external stimuli. At length the pupils are dilated and invisible, the pulse intermits, the eyelids are half closed, the evacuations are involuntary, and in this stage of the disease, those from the bowels are often of a greenish or other unhealthy appearance. The countenance is pale, the muscles of the face are generally distorted, and convulsions often arise, and continue from the time the apoplectic symptoms commence till death closes the scene. In this complaint the muttering expressions are incoherent,

the screamings are acute and loud; and, as was before observed, the patient cannot be roused to attend to anything, being like one in a profound sleep. While the sense of pain continues, the hands are constantly carried towards the head.

“In the delirium or stupor of *remittent fever*, the attention of the patient may be excited for a few moments by strong external impressions, as by talking loudly to him, or by sudden agitations of his body; and there is never any tossing of his head from one side to the other; but on the contrary the child is disposed to be still, and to remain in one posture, unless roused by the officiousness and anxiety of his friends or attendants. The face is flushed, and the eyelids are closed; or if wide open, they have a foolish, disagreeable kind of stare; which is particularly conspicuous in those cases where the patients possess a perfect knowledge of everything that is going forward, but are unable to articulate. The respiration is quick, but *not interrupted*, and the pulse *never intermits* excepting in cases of extreme debility. There is no squinting, the pupils are sometimes contracted, and sometimes dilated, according to the degree of stupor; and when temporary paralysis happens, it is in those parts which are *subservient to the power of volition*. The hands are seldom carried up towards the head; and when they are, we may perceive that the intention is that of picking the skin about the face, and not that of expressing pain in the head. When convulsions happen it is impossible

during their continuance to distinguish the two diseases; but after they have ceased, if they have proceeded from remittent fever, the faculties of the patient will be restored.

“The tongue in both diseases is furred when the bowels are affected.

“In addition to what has been stated, it may be remarked that in every case of hydrocephalus internus that has come under my care, I have observed, before any attack of the disease, a peculiar dulness about the eyes, with some dilation of the pupils; which have appeared to dispose the children to keep the head in a prone position, or to incline it to one side.”

Mr. Coley considers worms (*lumbrici*) a consequence, rather than a cause of infantile remittent fever; and, in accordance with his view of the proximate cause of this disease, his treatment consists of mercurial purgatives, followed by smaller and more frequently repeated doses of oxide or muriate of mercury, until the healthy action of the liver has been perfectly restored. This treatment he represents to have been almost universally successful in his hands.

Dr. Clarke,
1815. In 1815, exactly a century after the publication of Harris' “*De Morbis Acutis*,” &c.,

Dr. John Clarke published his “*Commentaries on some of the most Important Diseases of Children*.” He begins by commenting on the great mortality of children under ten years of age; and in a table taken

from the annual register, it appears that in 40 years the whole number of burials amounts to 836,285; "of this number 281,408 died before they had attained the age of two years; and that of the surviving 554,877, 113,393 died before they reached the age of ten years. Assuming that in early life the births and burials are equal, then it follows, that of all the children born within the district comprehended in the bills of mortality, nearly a fourth die under two years; and of the survivors, about a fifth in the succeeding eight years, that is, under ten years of age." This great mortality is accounted for partially by the variableness or severity of climate, exposure to cold, to bad air, to improper clothing, to the prevalence of contagious disorders, and to a defect in legislative enactments and restrictions; but it is also referable to the fact of there being "many disorders which, if not peculiar to children, are very much modified by the circumstances of infancy and childhood, and which will often prove dangerous, and even sometimes fatal, notwithstanding the best care and attention." Moreover some diseases are exclusively confined to the early periods of life; and from want of skill and experience, (such diseases being either not understood, or improperly treated) many lives are lost which might have been preserved to their parents and the community. He adds, "important as the attention to the diseases of children confessedly is, no part of medicine (to use no stronger expression) has been so little cultivated." Dr. John Clarke accounts for this want of knowledge

on so interesting a subject, by the institution of a prohibitory bye law of the college of physicians; by which the fellows are compelled to exclude themselves from practising midwifery, and therefore from acquiring much knowledge of the diseases of infants and children; and he remarks, indignantly, "It seems to be a law calculated for the perpetuation of ignorance, by preventing men of the best education, and the highest attainments in learning, from adding to the stock of medical knowledge on subjects most dear and important to society."

Dr. Clarke takes notice of convulsions only as a secondary affection. "Convulsions," he says, "as far as his experience enables him to judge, are never an idiopathic disease, but may generally be traced to some pre-existing cause; or the cause, as in the case of infectious eruptive diseases, such as smallpox, scarlet fever, and measles, will develop itself in the course of a day or two, if the exposure to infection was previously unknown." P. 84.

He has a separate chapter on "A peculiar species of Convulsion in Infants," which owing to the advanced state of knowledge at the present day is better explained by more recent authors. His description of the symptoms are accurate; but not so, probably, his explanation of the cause; which he considers to be, the brain being at the time organically affected, either directly or indirectly; the pathology being, determination of blood to the head and consequent pressure on the brain.

The 6th chapter treats of phrenitis, a disease which the author appears to have very carefully observed, and of which he treats in a very able manner. I think that large quotations from his work are admissible and appropriate in any comprehensive report of the cerebral diseases of infancy; and shall make no apology for giving a somewhat full account of his views on so important a subject. First, his description of the disease: "Inflammation of the brain does not always commence in the same way. In some cases the symptoms are very slight at first, and are scarcely observed—the child, by almost imperceptible degrees, becomes less lively;—it shews often more disposition to be sedentary and quiet, than to amuse itself or be amused—it gapes without any accountable cause, and as much in the early part of the day as towards the evening. It frowns often, knitting the eyebrows strongly, but not constantly. It starts and is disturbed in sleep, and dreams unpleasantly. But these, although symptoms of a formidable disease approaching, are unfortunately, yet generally, disregarded by parents and friends till the accession of violent fever, or a sudden convulsion, excites alarm. The earliest indications of the existence of this disease ought by no means to be neglected, and it is far better that a child should be treated as if the disease actually existed, when perhaps the symptoms may be equivocal, than neglected till they have become very decided, and when remedies are generally applied too late.

“In other cases the early symptoms of the disease are violent. The child is suddenly seized with great heat, thirst, frequency of pulse, but regular at the same time. The pulse is generally hard, full and strong; and blood drawn from a large vein always has a firm or buffy coat. Whiteness of the tongue, great flushing of cheeks, and disturbance of sleep, likewise take place. If no other symptoms occur at the time, or if occurring, they are not attended to, the disease is often mistaken for simple fever, and treated as such; and the error is not detected till a dilated pupil, squinting, or convulsion, demonstrate the effusion of water. ‘Cum mala per longas invaluere moras.’

“The symptoms of general febrile affection are common to this and several other diseases; but there are some characteristic symptoms of this, which a moderate degree of attention may detect. The irritability of the organs of sense in a very early stage of the disease, is greatly increased. The slightest sound will produce starting, both when the child is asleep and awake. Dropping anything on the floor, the falling of a poker, or of a chair, excites a great alarm and starting, such as would not happen in any other circumstances. The sense of feeling becomes very irritable, so that if a child is lying at rest, the slightest touch upon any part of the skin will rouse it with great agitation. In the early stage of inflammation of the brain, vision becomes painfully sensible; the child cannot by any means endure a strong light

without betraying evident marks of distress, such as turning the head away from it, closing the eyelids, wrinkling the forehead, and contracting the eyebrows. It is very common to observe this symptom in the earliest stages of this disorder, before any alteration is discoverable in the eye itself. The impatience then of light, arising from the increased irritability of the retina, becomes a marked diagnostic symptom of inflammation of the brain, at a very early stage of the disease. The iris, in consequence of this, will be found to contract violently, even in a very moderate light, to such a degree, that it would in some cases be almost impossible to introduce a fine needle through the pupil without incurring the danger of wounding some of the fibres of the iris. The conjunctiva becomes highly vascular in this disease; and in the second stage, when the eyelids are constantly open, this circumstance produces an appearance very distressing to the bystanders. The quantity of urine secreted is diminished, and gives out a strong smell. Costiveness does not necessarily attend the early periods of this disease. The sensible perspiration is generally altogether interrupted, so that the skin feels intensely hot and dry. The symptoms above enumerated, prove to demonstration the increased irritability of the brain and nervous system through the whole body, not only as affecting the organs of sense, but also the general circulation. They continue with little or no interruption or abatement, sometimes for several days; occasionally some slight

remissions of the febrile symptoms, &c., take place, but they never altogether subside—the pulse constantly remaining very frequent, and the heat and thirst undergoing little or no diminution. In the first stages of the disorder, if, before the attack, dentition had been going on with considerable salivation, the secretion of saliva considerably diminishes, or ceases altogether. After a few days, (if in the mean time the occurrence of convulsions should not give a new character to the disease) all the symptoms undergo a very material alteration. The child loses its increased irritability, and becomes weary and indisposed to any exertion; it frequently yawns and becomes sleepy, so that it is almost impossible to keep it awake by any means. When asleep it is difficultly roused, and would lie, if it were not disturbed, constantly asleep, scarcely awaking to take food.

“The heat remains above the natural standard, but not always in the same degree: the exacerbations, on the contrary, are occasional. The face is not so uniformly red as in the first stage; but the flushing of the cheeks is sometimes very strongly marked, so that they seem as if they had been painted. The thirst is not so considerable as it was in the early part of the disease, although the mouth remains equally dry and parched. The nostrils rarely secrete any mucus in the whole course of the disease. The senses become more dull, the hearing is less acute, till by degrees the child is perfectly insensible to all

except very violent sounds, and at length entire deafness ensues; the sense of feeling in like manner loses its excessive irritability, and the sleep will not be disturbed even if the child be roughly handled; the pulse gradually loses its frequency, beating, however, seldom less than 110 or 120 in a minute. As the disease proceeds, the pulse becomes less equable and is sometimes interrupted—neither is the frequency of it at all times alike, but it will be found most frequent when the cheeks are most flushed. The state of the pupil now begins to be altered—as the retina becomes less sensible, the iris is more expanded; but, in the first instance, it often has a vibratory motion, consisting of alternate contractions and relaxations quickly repeated, especially upon sudden changes in the intensity of light falling upon the eye. Afterwards, the expanded state of the pupil becomes more permanent, till at length the iris will not contract in the smallest degree when the strongest light is brought close to the eye; and the child then becomes altogether blind. Whilst these changes are going on in the vision the muscles which direct the eye are also affected. Those which turn the eyes outwards are weakest, therefore lose their power in the greatest degree, and one or both of the eyes are turned towards the nose, and squinting is the consequence.

“After the child has remained in that state of insensibility and coma for some time, it is either attacked by a fit of screaming, or by convulsions. In

some instances, before the access of universal convulsions, partial spasmodic affections occur—the child rolls its head about, or one or both arms are found in a tremulous state resembling chorea. Sometimes both the upper and lower extremity of one side are attacked in this manner, the other side remaining free from twitching. In some cases the disease does not pursue the regular course already described, but in twenty-four or forty-eight hours after the first attack, a fit of screaming or of convulsion comes on. After the occurrence of these symptoms, but especially the screaming, whatsoever may have been the previous state of the child with regard to irritability of the system, and particularly of the organs of sense, the irritability becomes perceptibly diminished, and a state of coma, stupor, and torpor succeed; and, in progression, all those symptoms which belong to the second stage of the complaint. An attack of screaming (as if the child were cut or torn) lasts very often for an hour or more, without any intermission, after which it commonly falls asleep, or at least remains quiet for a long time, and then another similar attack of screaming takes place, succeeded by farther marks of diminished sensibility. The pulse, frequent during the paroxysm of screaming so that it cannot be counted, accompanied with flushing of one or both cheeks, becomes more slow, and often very irregular after the termination of it. At length, the fits of screaming cease, and convulsions come on with longer or shorter intervals, till the child dies, or until

a chronic state of the disease takes place, or till the effect of remedies employed removes the cause producing them. After this time, if the ossification of the head was not complete before, the edges of the separate bones of the skull will be observed to recede from each other—the fontanelles will become gradually larger, and in some few cases, the membrane of ossification will be raised above the general surface, so as to give the effect of a section of an oval tumor lying under the skin; but it clearly arises from the internal part of the skull, as the skin is distinctly moveable upon it; and when the child dies, or recovers, the tumor always retires.

“A paroxysm of convulsion not unfrequently happens at the very commencement of inflammation of the brain, from which the child recovers; and afterwards, symptoms of the first stage of the disease betray themselves. Screaming, as far as the author’s experience has gone, never occurs till after the symptoms of the first stage have decidedly been established; and after a fit of screaming, the symptoms of the first stage invariably decline, and are succeeded by symptoms of the second stage. Symptoms of the second stage occur more early in those cases where the sutures and fontanelles are closed, than where the ossification is incomplete. When the patient is cut off in the first stage of the disease, it is always by convulsions, and this often happens.” (p. 116 *et sequent.*)

The *post mortem* appearances he describes as

follows: "When children have died in the first stage of the disease, the vessels of the dura and pia mater were found tinged with blood, and the plexus choroides is generally highly vascular. The substance of the brain has not appeared to be decidedly altered, and there have not been any clear evidences of inflammation either of the substance of the cerebrum or cerebellum. The parts lying on the basis of the skull generally exhibit strong marks of inflammation. The writer has seen the optic nerves entirely embedded in a sheath of coagulating lymph, extending backwards to the thalami nervorum opti-corum, and to the medulla oblongata, from which it has been easy to detach considerable portions of laminated coagulating lymph.

"In the ventricles there has generally been rather a larger proportion of water than is found in a healthy state. When the head has been inspected after symptoms of the second stage of the disease have appeared, especially when the pupil of the eye had been dilated, and when there have been fits of screaming superadded to the appearances above described, there will always be found a considerable quantity of water effused between the tunica arachnoides and the pia mater, or in the ventricles, or in both these situations.

"It does not appear that the violence of the symptoms of the disease has always been commensurate with the derangement of structure found on inspecting the head after death; since, in some cases, where

the symptoms have been very severe, the appearances of disease have been slight, and, on the contrary, the alteration of structure has been great, when the preceding disease has not been attended by very violent symptoms. This may depend on the brain and nerves being in some individuals capable of bearing very different degrees of injury, or being endowed with very different degrees of irritability. The appearances observable on inspecting the heads of such as have died in the second stage of the disease, coincide with the symptoms during life, and are such as would be attended with the usual effects of pressure. The screaming fits probably take place with the first effusion of water between the membranes, or in the ventricles of the brain." (p. 133 *et sequent.*)

The predisposing causes he mentions are, First: Original structure, consisting in a greater capaciousness of the bloodvessels, together with laxity of their coats; a circumstance likely to happen in scrofulous subjects. It is certain that the children of scrofulous parents, (all other things being equal,) are most liable to the disease. Second: The practice of keeping the heads of young children unnaturally warm, by which circumstance an increased flow of blood is invited to the head. Third: Dentition.

The occasional causes (independently of local violence) are the same as act upon other internal parts, but especially sudden changes of temperature, from heat to cold, acting with more certainty on

those children who are predisposed to the disease. Also dentition, and indigestible food in the stomach, exciting local plethora of the head. The sudden healing of ulcers, or cutaneous eruptions about the head, or the stopping of discharges behind the ears; or the cure of the simple or infectious ophthalmy in children, without attending at the same time to a diminution of nourishment; to keeping the bowels in a very open state; to applying a seton or making an issue at the back of the neck, or blistering the lower extremities. The external application of cold to the body is also an occasional cause.

Dr. Clarke argues warmly against the too constant belief that Phrenitis in children is an incurable disease; no doubt it is a very formidable disease, but as recoveries do sometimes take place, both in the first and second stages of the complaint, "the prognostic should not be too gloomy, lest all exertion on the part of the bystanders should be checked, and the child left to die unassisted." He remarks that recent cases are more susceptible of cure than those of longer standing; and the first stage much more so than the second. When symptoms of the second stage have taken place without screaming, the danger appears to be less, and the chance of relief by the use of remedies greater. (p. 146.)

In the treatment of this disease, Dr. Clarke depends principally on bloodletting, the blood being drawn quickly from a large orifice. In very young children, he recommends cupping or leeching, particularly

the former. "Leeches often are difficultly procured and expensive—they often, moreover, will not fasten; and when they do, the quantity of blood taken away by them is very uncertain. Sometimes the orifices will scarcely bleed at all; at other times the bleeding can scarcely be restrained. From a child of seven or eight months old, two ounces and a half of blood may be taken, and one and a half or two more in sixteen hours afterwards. Three ounces may be taken from a child of a year old, and two and a half or three afterwards, if the symptoms do not yield: at this age, two more may be taken in twelve hours after the second bleeding, if it should be necessary and the patient has not been too much weakened already. Cupping may be performed on the scalp, or behind the ears, or the nape of the neck, or high up on the spine, or between the shoulders." (p. 153.)

When a child has attained the age of a year, and at any succeeding period of its life, unless in fat subjects, the external jugular veins may often be sufficiently large and superficial to admit of blood-letting from them; and a decided preference is to be given to taking away blood from the external jugular vein, to taking it from the veins of the arm. The remaining points of treatment recommended by the Author, are glysters composed of infusion of senna and salts, or made by dissolving soft soap in water. The stomach and intestines should be emptied by giving a large dose of calomel, and in two hours afterwards a purgative, consisting of a solution of

sulphate of magnesia or some other saline purgative, in infusion of senna with manna—the dose should be repeated every two or three hours, until plentiful evacuations have been procured. “Care should be taken to procure afterwards two or three watery evacuations from the intestines every day. In the intermediate time between the exhibition of purgatives, ipecacuanha or antimony, exhibited every four hours in such doses as to diffuse the circulation over the whole body, and especially to produce a state of perspiration, will be found eminently useful.” He advises the erect posture to be observed as much as possible through this disease. He considers blisters applied to the scalp itself perfectly useless or injurious, because the external and internal parts of the head derive their blood from the same general trunk, and there is a free anastomosis between the branches of the two carotid arteries, by which they reciprocally feed each other through the bones of the skull—a blister cannot therefore act in this situation by revulsion, that is, by exciting an inflammation in a part of the body unconnected, especially by blood-vessels, with the part diseased. If blisters be used, he recommends them to be applied to more distant parts, for instance to the outside of the legs. Besides these remedies already referred to, there is another from which great benefit may be derived, viz.—the application of cold to the head.

Occasional tepid bathing, and spare diet are also insisted upon; but when the second stage has arrived,

and it may be presumed that water has been effused, the anti-inflammatory treatment must be discontinued; and the means to be employed are to be directed to the absorption of the water already thrown out, and the prevention of farther effusion. "Mercury appears to be the only medicine which has been successful in the cure of acute hydrocephalus, and with this view it may be used both externally and internally in very considerable quantities." He particularly advocates its external application, and says, "At any age above one year, half a dram of Ung: Hydr: forte, with five or more grains of camphor, may be rubbed in every six hours, on any broad surface of the body." This may be continued until some evidence of its favourable operation has appeared, unless contraindicated by profuse salivation or diarrhoea, when it must be used in smaller quantities at greater intervals, or discontinued altogether.

Shearman,
1825.

Dr. W. Shearman wrote an essay on the nature, causes, and treatment of Water in the Brain; published in 1825. He considers Hydrocephalus an accidental effect, rather than a specific disease. "Those," he says, "who maintain a contrary doctrine, are necessitated to assign the final event (effusion) as the only diagnostic; and, accordingly, when this event has not occurred, they term the disease one *resembling* hydrocephalus; and oftentimes when they have assured themselves of the existing disease being properly and specifically hydro-

cephalus acutus, dissection has demonstrated the brain to have been perfectly free from any affection whatever."

He considers that inflammation of the brain is not an essential character of hydrocephalus, but that a predisposition to the disease is occasioned by undue irritability of the brain, or increased circulation through its vessels, of which the increased exhalation is the natural consequence. This opinion he confirms by a reference to the nature of the fluid effused. This consists of "merely aqueous fluid, not coagulable, nor containing either albumen or fibrine. The character of the fluid, therefore, distinguishes it from the product of inflammation, as the effusion resulting from this latter affection always contains coagulable matter."

Dr. Shearman strongly objects, in the treatment of the disease, to general bloodletting, because this evacuation produces immediate weakness and consequent increase of irritability; but states that this objection does not apply with so much force to local abstraction of blood by means of leeches, when there exist evident signs of increased determination to the brain.

Billard, 1828. In the year 1828, a valuable addition was made to the literature of Infantile Diseases by M. Billard's admirable treatise; which, for minuteness of description and profundity of research, has no parallel in this country. It is devoted entirely

to the consideration of the diseases of new-born and nursing infants, and I shall quote largely his opinions and descriptions of such of the diseases as may be termed *cerebral*.

M. Billard's work has gone through several editions; and as I have not the original, I make use of the translation of the third French edition, by Dr. James Stewart, published in 1839.

In his chapter on the diseases of the cerebro-spinal apparatus, he commences by saying, "If there be one point in the pathology of new-born children which can demonstrate the utility of considering together the science of organization, and the clinical observation of diseases, it is the history of the diseases of the encephalon;" and previously to entering upon the nature of the diseases, he takes a rapid view of the development of the spinal marrow and brain.

"About the third or fourth week, there is perceived in the cavities of the head and spine a greyish fluid; from the fourth to the fifth week, the medulla oblongata is distinctly seen, bending forward at the place of the union of the head with the spine; at this time, the spinal marrow is formed of two white threads, which gradually inclining backward, form a kind of longitudinal groove, so that at seven weeks the medulla spinalis appears cleft in its whole extent; the rudiments of the cerebellum are then for the first time to be seen, and the cervical swelling coinciding with the appearance of the superior extremities. At the beginning of the third month, the medulla spinalis

is still open at its upper half, and exhibits nothing more in the remainder of its extent than a longitudinal raphé, which is the mark of reunion of the two primitive cords; the tubercula quadrigemina are large, the thalami nervorum opticorum perfect, and the enlargement of the medulla very evident; at the twelfth week, the spinal marrow extends only half way down the sacrum, the tubercula quadrigemina are united, and the medullary eminences are easily distinguished, together with the corpora striata. There exists an internal canal produced by the turning over of the borders of the medulla, which communicates with the fourth ventricle. This canal is obliterated by the formation of the cineritious substance, which is secreted in the interior, so that at the sixth month, it is no longer found in well-formed embryos. At the fifth month, the corpora pyramidalia, pons varolii, and corpora striata, are very large, and the human embryo exhibits a caudal prolongation; it quickly diminishes as the development and elongation of the vertebral column rapidly takes place, whilst the medulla spinalis continues fixed in its place. At the eighth month, the spinal cord extends only to the fourth lumbar vertebra; it terminates in small nervous filaments, constituting the cauda equina. Finally, at birth, the medulla spinalis and medulla oblongata, which is an appendage to it, exhibit their constituent parts very distinctly formed. In fact, the corpora striata are observed forming a well-marked lateral projection,

the cords of which penetrate into the thalami optici from the crura cerebri; and the pons varolii is found composed of fibres from the lateral parts of the cerebellum, and of those coming from the opposite hemisphere, and which are disposed in layers alternating with fibres directed obliquely from the corpora pyramidalia to the thalami nervorum opticorum. While the medulla spinalis is undergoing these different evolutions, the cerebrum and cerebellum gradually acquire their proper form and organization. The cerebellum, which at first consists only of two laminæ turned towards each other, is produced by the enlargement of these two laminæ, which arise and are united above the fourth ventricle, and by degrees are arranged in branches and twigs, which are seen in the substance of this organ. From the corpora pyramidalia arise the thalami nervorum opticorum and the corpora striata, which terminate on the outside by a lamina, which is observed to be reflected from before backward, and from without inward, to form the cerebral hemispheres.

“These membranous hemispheres are so short at the second month, that they scarcely cover the corpora striata; but in proportion as they increase in size they successively cover the thalami nervorum opticorum, the tubercula quadrigemina, and lastly the cerebellum. It is their inflection on themselves which gives rise to the lateral ventricles. From this short view of the formation of the medulla spinalis and encephalon, we see that the cerebral mass is

produced by the spinal marrow, of which, as Reil has observed, it is an efflorescence." (p. 452 *et sequent.*)

In a child just born, the medulla spinalis is white, its cineritious centre is not altogether of the same colour as in the adult, but is more of a rosy hue, and softer. It is easy to unrol the two lateral cords of which it is formed. Its consistence is sufficiently firm to allow of its being cut smoothly. The brain of a new-born child only resembles that of an adult in its general form; it differs entirely in its consistence and aspect. Its consistence is like that of paste, and will allow of being cut tolerably smooth; but it soon softens when in contact with air, its colour is white, and there exists as yet no well-marked line of demarcation between the cineritious and medullary substance; so that in cutting the hemisphere horizontally, the centrum ovale does not appear as in adults. Yet the seat of the cortical substance may be discovered by the presence of a line less coloured than the central substance, and which winds over the superficies of the brain throughout its circumvolutions. The white substance of the brain is generally very much injected, or has a large number of vessels passing through it. As the child advances in age, the various constituent parts of the brain assume an aspect, form, and anatomical organization which they are to have during the remainder of life.

From the ninth month to one year, the grey substance acquires a degree of vital energy, which doubtless results from the modification occurring in

its texture ; it first appears of a rose colour, then red, brown, and lastly, of a reddish grey. It is to be observed that the parts of the cerebral mass which are the nearest to the medulla oblongata are also more advanced in their organization than those more remote—a natural consequence of the mode of organization of the cerebro-spinal apparatus, the development of which passes progressively from the medulla spinalis towards the encephalon. It appears, therefore, that from birth to the age of one year, the brain of a child is in a true state of transition ; and that this organ, scarcely perceptible in the beginning, reaches its proper organization about the ninth or twelfth month. Is it not owing to this modification occurring in the brain of a child, that the frequency of cerebral affections at this age is to be ascribed ? It happens also that at this period the teeth first make their appearance, and it has long been believed that convulsions and other cerebral diseases are to be attributed to this cause. This opinion, found in the writings of Hippocrates, doubtless derives its principal support from the respect and authority which the name of the father of medicine usually inspires. But it is evident that the true cause of the frequency of cerebral affections in infants at the period of dentition, is in the brain. Dentition can be only one of the accidental causes of cerebral diseases ; the predisposing cause exists in the organic modifications supervening in the encephalon, and it is to this part that we ought to direct our treatment. Not only

has the brain undergone during the first year, the organic modifications just pointed out, but the exercise of its functions has also increased; it has gradually acquired its control over the other organs, and it has become fit to receive from them the sympathetic indications with which it was before unaffected; it is the centre and regulator of the sensations, and this influence is felt even in disease; we frequently see, during the first periods of life, great alterations in the organs, unaccompanied by any febrile reaction, any general symptom, or any morbid sympathy; but at the age of which we are now speaking, every thing assumes a new aspect; fever, which is scarcely ever seen in new-born children, here makes its appearance on the slightest cause; hence the restlessness, cries, spasms, nervous mobility, so common, so easily excited, and at the same time so transient, in children who have passed the period of infancy. These considerations will prove to us the difficulty of studying the diseases of early infancy; the cause is evidently in the organic imperfection of the encephalon, which cannot reveal to us the signs and external symptoms of these diseases.

The cranium is, at first, entirely membranous; its ossification commences early about the foramen magnum, the different bones composing it exhibit in the centre a primitive point of ossification, extending by radiation towards the circumference of the bone, the borders and angles of which are still separated at the period of birth, by cartilaginous or membranous

intervals, which permit the different parts of the cranial cavity to move over each other with great facility. The membranes of the spinal marrow and brain are formed very early, and present their peculiar disposition and form, so that at birth they possess all their vital and organic properties; their diseases, therefore, are similar to those of the meninges in adults, giving rise to nearly the same symptoms.

The brain and spinal marrow are, during life, in a state of continual movement, elevation and depression.

He then considers the congenital malformations of the cerebro-spinal apparatus in their relation to the symptoms of the diseases of infants, and commences with those of the spine, but they do not belong to our subject. I therefore pass on to the congenital malformations of the brain and cranium, which are of frequent occurrence. *Acephalia*, which consists in the absence of the brain and even of the medulla oblongata, is seen only when the head, face, and upper part of the neck are wanting at the same time; in such a case, life cannot be established, and the fœtus which had only existed by its communication with the circulatory apparatus of its mother, dies as soon as this communication is broken off. The respiratory and circulatory apparatus are at the same time wanting, or are incomplete.

Anencephalia consists in the absence of one part of the brain, with or without the absence of the cranial cavity. It is so common to meet with a deformity of the cranium, with a deformed brain,

that the most celebrated anatomists have established it as a general law that when the containing part is deformed or wanting, all the contained parts are at the same time but little developed, or are badly formed. But several contradictory facts have already disturbed this principle, and I could myself give a very remarkable instance.

Anencephalia presents different degrees. It exists from a species of atrophy of the cerebral hemispheres, which is seen in idiots, to the complete absence of the cerebral mass. I have seen it in several degrees. Thus, I once saw a child where the forehead and summit of the head were considerably flattened. From this disposition of parts, M. Baron made a diagnosis of the existence of anencephalia; and upon a *post mortem* examination, we found only the cerebellum, thalami nervorum opticorum, the third and fourth ventricles; the fornix was separated at its middle. The posterior part of the hemispheres was sufficiently developed, but they were deficient anteriorly, leaving exposed the anterior part of the lateral ventricles. This child lived forty days, cried, respired, and sucked without difficulty. I have also seen a child who came into the world with the cranium very irregularly developed; there was no doubt of this being a case of anencephalia. It died in three days, and instead of finding the brain regularly formed, there was only a sac formed of the meninges, on the surface of which the vessels appeared as usual; this sac contained a bright yellow fluid, liquid and inodor-

ous, like serum. When it had flowed out, the cerebellum could be seen at the bottom of the cranium, covered by the tentorium, the rudiments of the falx cerebri, the medulla oblongata, the thalami nervorum opticorum, and the corpora striata; on the outside of these floated some pulpous fragments, which appeared to be the rudiments of the cerebral hemispheres. The pia mater, which formed the internal tunic of this cerebral cyst, was covered here and there with a great number of pulpous and cerebriform flakes which it was said had been secreted by it. In this case, notwithstanding the integrity of the bones of the cranium and the considerable number of vessels of this organ, the brain only existed in a very imperfect state, and exhibited the deformity peculiar to anencephalia. Anencephalia had not in this instance been caused by any exterior mechanical influence, nor by default of development of the vascular system; and everything leads to the belief that a dropsical or some other disease of the brain had suspended its development, or had caused its disorganization, at a period more or less remote from its formation. But what is more important for us to note is, the entire absence of all symptoms which would enable us to recognise the existence of this disorganization, and the continuance of life for so long a time, with the absence of so great a portion of this important organ.

The most usual degree of anencephalia is that where the cranium and the brain are both wanting,

the upper part of the cranium being open ; the ossa frontis are wanting, or are much mutilated, and there is scarcely a trace of the ossa parietalia. A shapeless cerebral mass, covered by red and bloody membranes, is situated at the base of the cranium, which is usually found nearer the shoulders than in a natural state ; the projection of the orbital arches and of the eyes, the face which presents some analogy to that of the head of certain of the lower animals, to which the vulgar will sometimes compare these children, such are the ordinary traits of an anencephalous infant, in whom is often found nothing more than the medulla oblongata, and sometimes the cerebellum, and the remains of the thalami nervorum opticorum and corpora striata. Most anencephalous children, even though born before the full time, and being otherwise well constituted, have for the most part lived one day, and even for a longer time, and have thereby proved that it is sufficient for the medulla oblongata and medulla spinalis, whence arise the nerves essential to organic life, to be in a certain state of integrity, to preserve life during the fœtal evolution and for some time after birth.

Congenital hydrocephalus is in all probability the result of inflammation of the meninges during intra-uterine life, or of some malformation difficult to ascertain, bearing some resemblance to a nutritive hypertrophy of the encephalon. This idea is favoured by the development of the cerebral mass and the bones of the cranium in hydrocephalic fœtuses.

These bones acquire a breadth and thickness, not only resulting from inflammation of the meninges, (this circumstance alone cannot explain the phenomenon,) but evidently showing an increase of nutrition, which may be regarded as one of the causes of hydrocephalus. It is worthy of remark that, after birth, children, where the brain and cranium are very much developed, are also very much exposed to hydrocephalus. The vital activity, or the power of nutrition developed with more energy than in a natural state, ought doubtless to be taken into consideration, as one of the possible causes of congenital hydrocephalus.

There are, however, different varieties of hydrocephalus: that where the cranial cavity takes no part in the dropsy of the brain, the substance of which is found to be more or less destroyed, and this was the case in the instance of anencephalia which has just been mentioned; that where hydrocephalus supervenes at a more advanced stage of fœtal formation, and the cranium and brain are destroyed or deformed; and lastly, the most common form of the disease, that where there is with it a considerable development of the bones of the cranium; this last variety appears to me evidently owing to a kind of cerebral and cranial hypertrophy not observed in other cases. This nutritive hypertrophy, by increasing the power of formation in the encephalic mass, will augment the activity of the secretion from its membranes; hence the abundance of fluid at the same time that the organ augments in volume.

Congenital hydrocephalus consists in a very abundant effusion of serosity in the distended ventricles of the brain, the size of which is increased one-third and a half, and the substance of which, more or less firm at the circumference, is always so where it is in contact with the fluid. The latter does not always remain enclosed in the ventricles; it is sometimes found effused in the arachnoid cavity; hence the distinction, which is very slight, between hydrocephalus internus and externus. This disease often coexists with hydrorachis; children then have one or more tumors along the vertebral column, and an enlarged head. It is very difficult to tell which of these two diseases exists primarily; perhaps they are both simultaneously developed under the influence of the same cause. Well-marked inflammation of the meninges does not always accompany congenital hydrocephalus. Like hydrorachis, it is observed to arise and produce its peculiar symptoms when an external cause, like the introduction of air from an opening, in spina-bifida, causes an irritation of these membranes, which is generally rapid in its progress. Hydrocephalus may exist in an infant at birth without giving rise to any morbid symptoms. It is in some even accompanied with a very remarkable degree of intellectual activity, and this is an additional proof of the truth of the assertion just made relative to the causes of this anomaly. Indeed, if we follow for a greater or less time the causes and progress of this disease, we shall see that it at first

consists of an increase of organic energy, which gives to the brain and cranium a size and form which in its study affords so much pleasure to physiologists, because it is the presage of a high intellect—a presage which appears to be well founded, as the child soon astonishes by its instinct, the justness of its judgment, or brilliancy of its wit. But if the cause of such organic and functional energy continues to act, it reduces both the organ and its functions to a state of destruction and annihilation, soon to be succeeded by death itself.

Hydrocephalus may remain stationary, and continue to an advanced period of life. It would seem, from the observations of Camper, that children in whom the bones of the cranium are not separated, live a much longer time than those in whom there exist large fontanelles and a considerable separation of the sutures of the bones. It often coexists with a congenital malformation of the vertebral column, or of the limbs; rendering the individuals who are affected with it either idiots, if the cerebral substance be much changed; or remarkable for their genius, if it continues in a slight degree, and if the cerebral activity does not exceed the limits, to us unknown, beyond which intellect is perverted. It is useless to describe the form of the cranium, and the expression which the accumulation of water in the ventricles imparts to the physiognomy; the *facies* of those affected with hydrocephalus is well known.

I believe that it is difficult to establish a proper

treatment in this disease. How, indeed, can the nutritive activity be suspended in the affected organ, and cause the absorption of the effused fluid? Yet authors have advised various means for effecting this, among which is friction with mercurial ointment: it was for the first time employed by Armstrong; and Lefebvre de Villebrune has recorded, in his translation of Underwood, several cases by Armstrong and Hunter, where the efficacy of this method is made very evident. But it is to be remarked that the subjects of these cases were of an advanced age, and that their symptoms were more properly those of acute or chronic meningitis, than of a simple effusion of serosity in the cerebral ventricles. I think, therefore, that it is useless to attempt any therapeutic means when hydrocephalus causes no special symptoms; but we ought to confine ourselves to the directions of hygiene, the object of which will be to remove everything that would increase cerebral excitement. If meningitis should supervene, we must have recourse to the measures advised for this disease.

The bones of the cranium present, in infants at birth, either malformations, or solutions of continuity. The former are the result of an arrest of development. I have collected three cases of remarkable ossification of the cranium; the osseous fibres, instead of passing from the centre to the circumference of the bone, were interrupted and disposed in small isolated masses, between which was found a cartilaginous

substance. When these bones were felt through the integuments, they appeared as if fractured or ground. In another instance, I found in a new-born child a considerable depression at the anterior inferior part of the right parietal bone, which appeared to have been produced by some mechanical compressive cause applied to the cranium during the process of ossification. The bones of the cranium are subject to fractures in different parts, when the head has undergone much difficulty in passing through the straits of the pelvis, or when we have been compelled to terminate the labour by the use of forceps. These fractures are almost always accompanied with cerebral congestion or apoplexy; this complication ought to engage the attention of the practitioner more than the fracture.

The bones of the cranium sometimes leave between them large spaces, either because they are not sufficiently developed by reason of the great size of the brain, as is observed in hydrocephalus, or because the development has been arrested. The fontanelles are, in consequence of this, very much spread, allowing a greater or less quantity of the brain to project, forming a real hernia. This disease is a very serious one; it almost always coexists with hydrocephalus, the progress of which soon causes the death of the child. The nature of this hernia is easily ascertained, particularly from its situation, for it always occupies a point corresponding with one of the fontanelles, and principally to the superior and

anterior one. We must be careful neither to compress nor pierce this tumor; it ought to be loosely covered, that the friction of the clothes or of external bodies may not produce excoriation and inflammation.

There is another species of hernia, which is much more rare; I have met with but one instance of it, and am not aware of anything similar in the works of authors.

Case. M. M., aged one day, entered the infirmary on the 22nd of June; she was of medium strength, the integuments were very red; she had no other symptom than diarrhœa; the cry was strong, and the respiration free. She had on the lateral part of the left side of the face, before the ear, a tumor half an inch in diameter, very round, more projecting inferiorly than superiorly, where it was confounded with the skin of the cranium, whilst inferiorly it presented a circumscribed prominent border. The integuments covering it were healthy, and of a vermillion colour, like the rest of the face. It was painful and slightly soft to the touch; the forehead, very much depressed above, formed a considerable prominence in front; the eyelids were sunk in the orbits, and their approximation prevented the globe of the eye from being distinguished; an oblong vermillion cicatrix, with slightly prominent edges, and apparently but recently consolidated, existed at the left lateral part of the cranium. On the 20th of July the child died. On opening the body, there was

found an acute inflammation of the digestive tube; the respiratory apparatus was healthy. The left hemisphere of the brain was about one-third less than the right. Neither the longitudinal sinus nor the falx of the brain were found upon the median line of the cranium, but they were directed obliquely from the centre of the forehead to the lateral left part of the occipital fossa; all the left portion of the hemisphere, which is usually lodged in the middle fossa of the base of the cranium, was thrown backward in a species of sac, formed of the tunica arachnoides, the dura mater and the skin. This portion of the brain formed the tumor of which I have spoken; it issued from the cranial cavity by a tolerably large opening, which resulted from the absence of the squamous portion of the temporal bone. This portion consisted of nothing but an edge of not more than two lines in extent, and which was curled below like the shell of a snail; the angle of the parietal bone existed, and formed the upper part of the opening. The meninges and the cerebral substance were very much injected. This hernia was evidently the result of compression which the cranium and brain had experienced during intra-uterine life; the defect in the development of the squamous portion of the temporal bone was doubtless caused by the compression which the corresponding part of the brain had exercised on it.

DISEASES OF THE CEREBRO-SPINAL APPARATUS,
DEVELOPED AFTER BIRTH.

Congestions. Passive congestions of the cerebro-spinal apparatus are very common in infants at birth. This arises from the abundance of vessels, the slowness of the circulation, and the influence of respiration on the spinal and cerebral circulation. The length of the labour, the necessary tractions in certain manœuvres, the difficulty with which respiration is established, the changes which the circulation undergoes, explain how this apparatus is so often the seat of sanguineous congestions, varying from simple injection of the meninges to true apoplexy. By the general term apoplexy in new-born children, is meant several degrees of cerebral congestion; and for the most part, children dying in an apoplectic state do not, on a *post mortem* examination, exhibit the effusion of blood, or the circumscribed cerebral hæmorrhage which constitutes the disease described under the same name in adults. Let us, therefore, consider the various lesions which belong to this disease.

Injection of the meninges, of the medulla, and of the brain, is so common in infants at birth, that it has appeared to me more proper to consider it as a natural rather than as a pathological state. It is found in most dead bodies; and I have often seen it without its having giving rise, during life, to any

appreciable symptom. If the injection is continued too long, it will soon produce an exudation on the surface of the meninges; and the blood which is the product of this exhalation, is ordinarily coagulated in a greater or less quantity, compressing the brain and spinal marrow, and causing the state of stupor to follow which is characteristic of apoplexy. This hæmorrhage, exterior to the cerebral mass, is almost always met with in infants who have died of apoplexy. This is what M. Serres calls meningeal apoplexy, and which he attributes to the rupture of some one of the vascular branches which wind over the surface of the brain.

Injection of the cerebral pulp is equally common; it exists under the form of a spotted redness, sometimes colouring deeply the substance of the brain; it usually exists on the lateral parts of the corpora striata and thalami nervorum opticorum. It is in this part that the cerebral vessels exist in the greatest abundance, and which is more generally affected with hæmorrhage and inflammation at every period of life. Lastly, it is possible, but it is very rare, to find cerebral hæmorrhage very circumscribed; I have met with but one case of it. This child died on the third day after birth, with symptoms of apoplexy. On a *post mortem* examination, there was found a sanguineous effusion in the left hemisphere, on the lateral parts of the corpora striata. There was no apparent cyst; the cerebral substance was a little softened in points which surrounded the effusion, the extent of

which was one inch in length by half an inch in breadth. A fact observed by M. Bérard, junr., proves that cerebral hæmorrhage may occur during intra-uterine life; so that apoplexy ought to be mentioned among the number of diseases by which an infant may perish before birth, and bring on labour before the time. The fœtus in which M. Bérard has observed this remarkable alteration, was aged eight and a half months; the clot, about the size of a nut, was lodged in the substance of the brain. *Société Anatomique*, 1828.

Non-inflammatory softening, is a lesion peculiar to the encephalon of new-born children, and is the result of congestion of this organ. This is a species of softening either general or local, which, far from presenting the characters of inflammation, on the contrary presents all the signs indicating decomposition, and we might almost say putrefaction, of this organ. The softening of which I speak sometimes exists only in one lobe, at other times in both; very often the whole of the cerebral mass is so destroyed that nothing more is found on opening the cranium than a soft flocculent black mass, mixed with a great number of clots of blood and pulpy flakes. It is a remarkable fact that the meninges are not involved in this disorganization, and that notwithstanding this destruction of the encephalon, children will still live some days, not possessing simply a mere breath of life, but actually respiring, crying, and sucking; this occurs when the disorganization is arrested at the

medulla oblongata, which remains unaffected, and which, with the medulla spinalis, controls the phenomena of life, even preserving it for some time. I have often found this softening in new-born children that died immediately after birth, leading to the belief that it had its existence during the sojourn of the child within the womb. When the medulla oblongata and medulla spinalis are thus softened, the child exhibits much less vital activity; the limbs are completely flaccid and immoveable; the cry is altogether annihilated; the pulsations of the heart scarcely perceptible; the limbs are cold, and deglutition almost impossible. The child soon sinks under this state of feebleness, and the *post mortem* examination reveals the disorganization of the entire nervous centre, and thus explains the symptoms and death of the child. This softening is more frequent on the lateral parts of the hemispheres and near the corpora striata, than at any other part of the brain. These symptoms are serious in proportion to their extent, and to their approximation to the medulla oblongata; the prognosis is a very unfavourable one, for death appears to me to be inevitable.

Such are the lesions, which the different stages and varieties of cerebral congestion in new-born children may present. The symptoms are usually characterized by a state of sinking, prostration, and sanguineous congestion of the limbs, body, face, and especially by the proper signs of pulmonary congestion, which almost always accompanies that of

the brain. It is difficult in young infants to ascertain the peculiar effects of apoplexy of the right or left hemisphere on the opposite side of the body; for the brain at the time of birth can hardly be said to be formed; it neither enjoys as yet the organic form nor the vital properties which it acquires in the progress of its development.

The treatment of cerebral congestions ought to be confined to sanguineous evacuations, produced by causing the blood to flow by the umbilical cord in infants at the period of birth, or by the application of two, three, or four leeches to the base of the cranium. Everything that can excite and accelerate the movements of the circulation ought to be removed.

INFLAMMATION OF THE CEREBRO-SPINAL APPARATUS.

It is without doubt a great advantage that the brain in children is one of the last of the viscera that becomes organized; for if, at the period of birth, it possessed all the organic and vital properties which are observed in the digestive or respiratory apparatus, it would be like them exposed to frequent inflammations. But its pulposus and we might almost say, inorganic state, renders it but little disposed to phlegmasiæ consequent upon the congestions of which it is always the seat at the time of birth. I can also affirm that well marked inflammation of

the cerebral substance is rare in new-born children. That of the meninges is more common.

Cerebral meningitis is much more common at the base than at the upper part of the brain, and the only alteration which is found in children that die from this phlegmasia often consists of nothing more than a pellicular exudation, more or less thick, applied in irregular layers on the surface of the arachnoid membrane corresponding with the base of the cranium. These concretions are almost always found between the tunica arachnoides and pia mater.

One of the most immediate effects of cerebral meningitis is the effusion of serum into the ventricles. This effusion, designated by authors under the name of hydrocephalus acutus, often takes place before the formation of pellicular concretions, and even when the inflammation of the membrane exists still under the form of a simple injection. The effusion of serum into the ventricles of the brain occurs very quickly in infants. The slightest meningeal or cerebral irritation will effect it, and as the sudden presence of this water in the ventricles produces, either by its contact or by the pressure and distention which it creates, a greater degree of pain and a new train of symptoms, meningitis or encephalitis complicated with hydrocephalus then assumes its peculiar character. Indeed, to the restlessness and convulsions which appear in a moderate degree at the commencement of this disease, follows suddenly the greatest excitement; the child by its acute cries expres-

ses the violence of its pain, which for a moment ceases, to be renewed with increased intensity. This remission in the symptoms is very remarkable; it sometimes observes a periodical return, and it is this without doubt that has induced some authors to describe the hydrocephalic fever as intermittent. But this remission is common to all excessively painful diseases, and especially to such as produce certain lesions of the nervous system; this is a fact worthy of observation, and which deserves consideration in the history of every periodical irritation. When the effusion is considerable the convulsions are less; the limbs which were very remarkable for their spasmodic rigidity, become completely flexible; the face assumes a peculiar expression, arising from the permanent dilatation of the pupils, and the fixed dull stare of the child; the pulse, which was remarkable for its frequency and quickness, becomes very slow, and is scarcely perceptible. Yet the child will sometimes of a sudden come out of this state of prostration, and a new state of excitement shews itself; the limbs are convulsed anew, the globe of the eye becomes the seat of spasmodic movements; but this exacerbation is of short duration, and is soon replaced by a state of coma, which usually continues until death. Children a little older than those whose pathology I am considering, exhibit other symptoms deserving the attention of the physician; such especially is the pain in the head, which gives to the child the sensation of something separating the bones of the cranium,

an expression which I have heard a child of six years of age use ; and in order to convey some idea of the suffering, compared it to that which might be produced by driving a wedge violently into the head, to separate it in different directions.

The secondary symptoms, or those which do not depend directly on acute hydrocephalus in young infants, are vomiting, difficulty of respiration, and angina, with alteration of the tone of the cry. This last affection doubtless arises from the violence and frequency of the cries. There often exists, also, an obstinate constipation. Sometimes hydrocephalus becomes chronic, after having presented the usual symptoms of the acute form of the disease. The patient then falls into a state of stupor and idiocy, which continues during the remainder of life.

The anatomical lesions which appear on examining the body are numerous and variable. In a few of the cases, nothing is found but a simple vascular injection of the meninges, together with more or less clear serum in the ventricles. Ought this to be considered as hydrocephalus without meningitis? I think it ought not; inflammation does not always cause the pathological alterations which characterize it from the first period of its existence; we may see every day meningitis and encephalitis characterized, during life, by the most marked symptoms, without offering any appreciable lesion on an anatomical examination after death. The only conclusion that can be drawn from this apparently negative fact is, that the inflam-

mation had not had time to produce all the anatomical alterations which are usual; one only of these results exists, that of the effusion of serosity. This effusion varies with respect to its quantity and its seat. The quantity cannot be appreciated, and it cannot be told at what degree it begins to cause distension or painful compression of the brain; its seat is usually in the cerebral ventricles or in the great arachnoid cavity; it has, however, often been found infiltrated under the pia mater, or else between this membrane and the tunica arachnoidea. Its colour varies from a clear to a turbid yellow; it is sometimes mixed with albuminous flakes, sometimes of a gelatinous form between the convolutions of the brain, and is very often sanguinolent at the time of birth. Where hydrocephalus has been considerable, the parietes of the lateral ventricles are soft, and sometimes reduced to a pulp; an alteration which is doubtless the mechanical effect of the distension and compression caused by the fluid, to which, on this account, irritating properties were formerly attributed; but chemical analysis has proved this opinion to be incorrect, and demonstrates that the fluid of hydrocephalus contains nothing that will corrode the substance of the brain. The latter is often very much injected and of a very firm consistence; and I have found, in one instance, small bloody effusions throughout the two hemispheres. Sometimes it is, on the contrary, pale and in a state approximating to softening, or completely softened. The pia mater is always

strongly injected, and on its surface, as well as on that of the tunica arachnoidea, there is found a layer of albuminous concretions. The plexus choroides, which are almost always of a dark red, are, in some instances, enveloped in a thick coating of pellicular productions. Lastly, meningitis may cause, besides an effusion of serum in the ventricles, a true suppuration on the surface of the brain. (*Vide* Dr. Abercrombie, *Pathological and Practical Researches on the Diseases of the Brain*, Edinb. 1828.)

From these considerations, it follows that meningitis appears in two stages or varieties. First, it is simple, consisting of nothing more than a vascular injection or a spotted redness, with or without the formation of pellicular layers on the surface of the brain; and in this case it gives rise to general convulsions, spasmodic agitation of the muscles of the face, and to violent cries which are doubtless produced by the pain attending it. Secondly, it may be accompanied with a serous or sero-purulent effusion in the cerebral cavity, and then the restlessness and convulsions are redoubled, to give place, very soon, to a state of coma more or less profound, accompanied with permanent dilatation of the pupils, rigidity of the limbs, soon followed by their flexibility; a destruction of the intellectual faculties succeeds, if the child be of sufficient age to have them developed. These symptoms vary much with respect to their duration, intensity, remissions and exacerbations; sometimes they are to be seen on one side of the

body, sometimes on both sides at once; but whatever be their varieties of form, their fundamental character always exists, and the practitioner ought to be able to distinguish them in the midst of the epiphenomena which meningitis is constantly exhibiting and which make this disease one of the most serious and insidious which can attack a young infant. Indeed the irregularity in the duration and character of the symptoms, the sudden transition from the exacerbations to the remissions, the numerous complications, rapid progress of the disease, all tend to deceive the physician, and to prevent a proper diagnosis, or to render the treatment unavailing. Let us add to this, that sometimes the most serious symptoms accompany a very circumscribed meningitis, whilst at other times the anatomical lesions exist to a great extent without producing any well-marked symptoms, and we can readily conceive the difficulty of forming a diagnosis, and of treating this disease.

There are cases where effusion of serosity appears to be very sudden, causing the immediate death of the patient. This variety has been denominated apoplexia hydrocephalica. But is the effusion sudden? May it not occur slowly, not producing any effect until it has become abundant? Do we not also see that remissions for a greater or less time may be followed by sudden and unexpected exacerbations? On this account, I think that this variety requires to be studied with more attention than has heretofore been the case. As to hydrocephalus which appears

to exist without inflammation, and which may be compared to ascitic dropsy, it must be placed in the class of chronic hydrocephalus.

The treatment of meningitis ought to be very decisive. We should apply, early in the disease, two, four, or six leeches at the base of the maxilla; the application of refrigerant compresses to the head, the administration of calomel and other purgatives, and finally the application of several blisters to the legs or arms, should form the basis of the treatment. Gœlis especially recommends mercury in the second period of the disease, in doses of half or a quarter of a grain twice a day until it produces a purgative effect. I have seen the application of a large blister either to the neck or thighs followed with success.

Inflammation of the Brain. It is very difficult to ascertain the presence of inflammation of the brain in young infants, besides it is of less frequent occurrence than congestion, of which I have already given the history. Yet when hydrocephalus, accompanied with meningitis, exists, the species of turgescence exhibited by the brain, the substance of which is of a grey ash colour and always injected, should, I think, be attributed to inflammation. The brain in this case appears to be tightly invested by its membranes, and quickly escapes when they are cut. This state may arise on the one hand from a serous effusion in the cavity of the ventricles, and on the other, from an inflammatory turgescence.

Induration of the cerebral substance is often found

without any symptoms indicating its existence during life. Yet I have, in two instances, seen some convulsive movements in the face, where the brain exhibited a very intense redness, with a firm consistence of its tissue.

M. Bouillard found in an infant five weeks old, that died after having exhibited a contraction of its limbs and a spasmodic stiffness of the neck, a sanguineous congestion of the encephalon, the substance of which was also very firm. (*Archives Générales de Médecine*, 1828.)

It is generally very difficult to detect in young infants the existence of encephalitis from the symptoms. There is, however, a distinction founded on facts, which appears conclusive, much insisted upon by M. Lallemand, and which will enable us to make a diagnosis of the seat of the disease. The symptoms of inflammation of the cerebral mass are made known by aberration of the intellectual functions, whilst meningitis shews itself by convulsions with or without delirium; but how can the effects and signs of delirium be seen in young infants, whose mental faculties scarcely exist? We have already seen that when there is an almost complete disorganization of the cerebral mass, there will often be no symptom of this lesion, and that the child will perish without giving reason to suspect by any sign that encephalic disorganization was the disease with which it was affected; ought we then to be surprised that serious encephalitis should exist at this early age without any

corresponding symptoms? Is not this phenomenon, which is peculiar to the age and pathology of young infants, explained by the little importance and use of the cerebral hemispheres, the organization of which is not yet complete? But it is not so with meningitis. The cerebro-spinal membranes, when but slightly inflamed or irritated, immediately cause convulsions of the face and limbs, more or less strong tetanic contractions, pains, cries, and restlessness, which physicians ought carefully to consider; for this assemblage of symptoms is almost always a certain indication of meningitis, and then the cerebral or medullary substance may participate in the inflammation, or be unaffected by it, without the possibility of distinguishing the cases in which this complication exists from those in which it is not present. These remarks are applicable to most cases; but it is necessary to add that the rule is not universal or exclusive; there may be some exceptions, and symptoms of encephalitis may be noticed which, without being so well marked in infants as in adults, may yet be sufficient to excite the attention of the physician.

Let us endeavour now to ascertain the nature and probable seat of the symptoms which it appears natural to refer to the brain.

Convulsions. Cerebral or spinal meningitis is most frequently the cause of convulsions. If there exist cases where it is difficult, on examining the body, to discover traces of inflammation of the meninges, it is because of the extreme difficulty of distinguishing

their passive congestion from phlegmasia; and also, on the other hand, it is easy to conceive that an irritation of the tissue of an organ may arise before the product of inflammation can manifest itself, at least to a sufficient degree to be evident to our senses. Besides as it is much more common to find convulsions in infants with meningitis, than to meet with them without this inflammation, analogy would lead to the conviction that the convulsions of children, whatever their form and degree, whether known as spasms, cramps, twitchings, &c., all arise from cerebral or spinal meningitis.

Tetanus. This occurs much more rarely in our climate than in hot countries, where a large number of children die from it. I am not in possession of sufficient facts to elucidate the nature of this disease, having seen but two cases of it in young infants; they were both characterized by rigidity of the vertebral column and of the jaw. I found, on dissection, nothing more than an effusion of a quantity of coagulated blood in the spine. This blood was effused between the two laminæ of the tunica arachnoidea, and filled the whole of the medullary canal, from the medulla oblongata to the sacral region. Were the symptoms of tetanus to be ascribed to this hæmorrhage of the spine? I am disposed to think they were.

The treatment of encephalitis does not differ from that of meningitis, which has already been described. Besides, encephalitis is almost always accompanied by meningitis.

In the appendix to Dr. James Stewart's translation of Billard's treatise, the translator inserts the following observations in a note on meningitis:—

“The most important remedy in this disease is early bloodletting. It is a disease of so dangerous a character that it is of the highest importance it should receive prompt attention as soon as its nature is perceived. A purgative of calomel ought to follow the bleeding, both for the purpose of removing any irritating matters, as well as by its influence on the liver and entire secretory surface of the intestines to effect a powerful revulsion from the head. Free leeching from behind the ears ought not to be omitted. The state of the gums must also be examined, and cut if necessary. The use of mercury in this affection, both externally and internally administered, has received the sanction of all practical writers. Dr. Mills, in a paper published in the *Transactions of the King's College of Physicians* in Ireland, recommends its use in combination with the watery extract of opium.” He remarks, “the good effects of a combination of these remedies seem to depend on their power of equalizing the circulation, increasing the secretions, and exciting the action of the cutaneous vessels, in consequence of which the congestion of the blood in the brain or in any other part is removed.” Occasional revulsive baths to the lower extremities, while cold is applied to the head by means of a bladder partially filled with iced water, should be used while

the head continues hot. A blister is often serviceable on the neck or between the shoulders, after the first violent symptoms are subdued.

When effusion has occurred, little or no benefit can arise from a perseverance in the active antiphlogistic course. Hydragogue cathartics have been sometimes successful under most unpromising circumstances in children advanced beyond the period of infancy, and diuretics might be advantageously employed after effusion has occurred. A case came to the writer's knowledge where an infant of six months old, after having every symptom of effusion, and the disease, to appearance, fast approaching to a fatal termination, recovered after a spontaneous discharge of a large quantity of urine.

Joy,
1832. An excellent article on hydrocephalus is to be found in the tenth part of the *Cyclopædia of Practical Medicine*, published in 1832. It is written by Dr. Wm. B. Joy, of Dublin. After glancing at the history of the disease, he gives an elaborate description of its symptoms, prognosis, diagnosis, morbid anatomy and treatment.

It was generally supposed that *acute hydrocephalus* was a disease which, until the beginning of the last century, had escaped the observation of practitioners; but it appears that Hippocrates was certainly acquainted with it; for in the treatise *De Morbis* (lib. 2. cap. 6.) this species of water in the brain is distinctly noticed, and he says that it gives rise to acute head-

ache, pain in the eyes, double vision, blindness, vomiting, and fever: and he recommends purgatives, emetics, and errhines, as the means best suited for its removal.

Dr. Joy remarks that in a great majority of cases, premonitory symptoms may be detected; and of these the greater number and the most striking are connected with derangement of the digestive organs. The appetite is either capricious or defective; the tongue furred and the breath heavy; epigastrium and hypochondria occasionally tumid and tender; the biliary secretion deficient or vitiated; urine high-coloured and scanty, with unhealthy complexion and harshness of the skin. To the attentive observer slight indications of the derangement of the cerebral functions may even at this early period be discovered.

He then treats of three different forms of attack. 1. The gradual. 2. The rapid or violent. 3. The secondary or metastatic.

In the first, the pecursory symptoms are the most obvious, the disease comes on slowly, and, at its commencement, its true nature is very obscure. There is, for many days or weeks, evident derangement in the functions of the abdominal viscera, with feverishness and loss of spirits; the succeeding symptoms are a dragging of one of the legs, or a painful stiffness in the back of the neck; pain in the head, severe, and complicated with vomiting, both being much aggravated by motion; inability to support the weight of the head, with sighing and

dejected looks, intolerance of light, contracted pupils, and occasional flashes of light ; white tongue and costiveness, rapid pulse, flying pains in various parts of the body, and frequent exacerbations. This stage usually lasts ten days or a fortnight.

In the second or rapid form, the precursory symptoms are of shorter duration. The fever appears suddenly and violently ; there are frequent flushings, severe headache, occasional brilliancy of the eye, with increased sensibility of the retina and of the whole nervous system, and frequently pain and tenderness in the abdomen.

In the third form of attack, its approach is most insidious. The symptoms of the early stage are almost all absent, and palsy and convulsions often afford the first evidence of the brain having become implicated. Even pain in the head is sometimes not complained of. The *first* is the most frequent mode of attack ; the *second* occurs seldomer than either of the other two, but is the most regular in its progress, and the most amenable to treatment, provided active measures be adopted at the commencement. Recoveries from the *third* form are very rare.

Dr. Joy regards the prognosis of hydrocephalus in a more favourable light than earlier writers on the disease. " Since its diagnosis in the earlier stages has become more accurate, and its inflammatory nature in the majority of cases been generally recognised, patients have been saved much more frequently than formerly. Recovery has been known to take

place after the occurrence of all the most decided symptoms of the disease; slow pulse and stupor, strabismus, dilatation of the pupil and blindness, convulsions and paralysis; and no medical man who has a due regard for his own character or for the feelings of the friends of a hydrocephalic patient, should desert a case of this kind at any stage, however unpromising it may be."

At Geneva, according to Odier, about eighteen children on an average are attacked by it yearly; and of these, about six or one-third recover:—

	CASES.	RECOVERIES.
Odier	18	6
Cases recorded by Brichteau	11	4
Dr. Mills	28	7
Gölis	37	5
	<hr/> 94	<hr/> 22

or one recovery in $4\frac{3}{11}$ cases.

Success in the treatment depends so much upon a correct *diagnosis* of the disease in its early stages, that this division of the subject cannot be too much studied; and Dr. Joy's remarks are well worthy of an attentive perusal. He says, "there is, perhaps, nothing more characteristic of this affection of the brain than the rapid fluctuations which the several functions of the body undergo, and that often within a very brief space of time." It is often very difficult to distinguish hydrocephalus at its onset, from other febrile complaints; and there are no symptoms which

can afford us *certain* evidence of effusion having actually taken place. The distinction between this disease and infantile remittent fever is thus described: "We may generally avoid confounding it with the remittent fever by attending to the extreme irritability of the stomach, and its aggravation by the erect posture and by motion; the greater severity and constancy of the headache; the disposition to somnolency, the child often falling asleep the moment after it has been replaced in bed, or after it has been answering our questions; the knitting of the brows and aversion to light and noise, the pupil being at first contracted and subsequently unnaturally dilated; the caution in moving the head, and the frequent raising of the hands to it; the thrusting back of the neck; the variability and extreme excitability of the pulse; the green stools or obstinate costiveness. The morning remissions, moreover, if they occur at all, are much less marked in hydrocephalus than in the infantile remittent.

The appearances on dissection are very minutely described in the article now under consideration. (Vol. ii, p. 461.) The chief are, considerable congestion of the vessels of the brain and sometimes patches of extravasated blood in the pia mater. Effusion of serum under the arachnoid and between the convolutions; opacity and thickening of the arachnoid, and depositions of coagulable lymph, or more rarely of puriform matter on its surface, or between it and the pia mater; these occur especially at the base of the

brain, about the pons varolii and decussation of the optic nerves. The mass of the brain itself, in some rare instances, has appeared evidently infiltrated with serosity; the substance of the brain is generally softer than natural, especially towards the centre.

In most instances the ventricles contain a considerable quantity of fluid, sometimes limpid, sometimes turbid or puriform, with shreds of coagulable lymph floating in it, as well as lining the walls of the ventricles. Small vesicles, not unlike hydatids, are occasionally found attached to the pia mater and choroid plexus. Dr. Joy also refers to minute tubercular granulations dispersed through the brain, noticed by Laennec; but considers it only a casual occurrence. He mentions, likewise, the appearance of tubercles or abscesses in the brain, caries of the petrous portion of the temporal bone, &c., as not unfrequently coexisting; these he considers of a date anterior to the hydrocephalus, and occasionally, undoubtedly its cause. The nature of the effused fluid is somewhat different from that found in other serous cavities; being for the most part not coagulable by heat or acids. The following is the analysis of it by Marcet:—

Water	990·80
Muco-extractive matter, with a trace of Albumen	1·12
Muriate of Soda	6·64
Subcarbonate of Soda	1·24
Phosphate of Lime	0·20
	<hr/>
	1000·00
	<hr/>

with traces of phosphate of magnesia and iron.

It is also noticed that unequivocal examples of disease in the viscera of the abdomen have been detected in too many cases to be considered a mere casual coincidence. The principal of these are, enlargement and traces of inflammation of the liver; tubercles on its surface or in its substance, as well as in that of the spleen and mesenteric glands; muc-enteric inflammation, and firm contraction of the intestinal tube; and intus-susception of the small intestines.

Predisposing causes. The most influential seems to be the period of life, viz.—infancy and childhood. Its connexion with precocity of intellect is matter of daily observation, and large-headed children are the most subject to the disease. A scrofulous habit predisposes strongly to the disease. Hydrocephalus and scrofulous affections seem to be mutually convertible into each other.

Exciting causes. Disorders of the digestive or respiratory organs, difficult dentition, scarlatina, measles, and other diseases which induce debility or excite febrile action in the system. The administration of narcotics and spirits to children. External injuries, extension of inflammation from the external ear to the brain; sudden suppression of accustomed discharges, or drying up of sores behind the ears, or eruptions about the head.

Treatment. In the precursory stage, active mercurial purgatives, which should be persevered in with the double object of rendering the evacuations natural,

and relieving the uneasiness in the head. When threatening symptoms have arisen soon after an injury of the head, though it may have been trifling, Dr. Joy advises venesection, or a few leeches to the temple, as a precautionary measure.

The chief indications in hydrocephalus are to reduce the force of the cerebral circulation; to obviate all sources of irritation, whether originating in the abdominal organs or elsewhere, which might react on the brain, and thus aggravate, if they did not give origin to, the disease; to alleviate pain, vomiting, and convulsions, even when we fail in removing their cause; to support the strength in the advanced period of the disease; and finally, when death seems inevitable, to render its approaches as easy as possible. For fulfilling the first and most important of these indications, our chief resources are to be found in the antiphlogistic class of remedies. Blood-letting, active and repeated purgation, cold applications, mercury, and blisters, are amongst the most accredited remedial agents, and are here arranged nearly in the order of their relative efficacy.

Blood-letting. "The advantage of early blood-letting is more generally agreed upon than that of any other measure whatsoever. We have sometimes seen cause to regret that general blood-letting had not been earlier performed, or carried far enough, but never the reverse."

Purgatives. "It is chiefly at the commencement of the disease that active purgatives are proper; but

where there is a high degree of irritability of the mucous membrane of the stomach and intestines, they will be useless or even injurious till these states have been subdued by blood-letting in some of its forms. When the usual purgatives seem to aggravate the vomiting without moving the bowels, or when they produce mucous stools attended with much irritation, a perseverance in their use cannot fail to be prejudicial."

Cold. "A bladder containing pounded ice mixed with water, kept in constant contact with the forehead, temples, and upper part of the head; in conjunction with an erect position of the head and trunk, persevered in for many days together, has been known to exert a surprising influence over inflammation of the brain, both in adults and children."

Mercury. "To give the mercurial treatment a fair trial, it must be commenced before the inflammatory stage is very far advanced. In whatever form mercury is employed, it is usually requisite to continue its use for a great number of days uninterruptedly; and when either it, or any other medicine (except digitalis) has produced a favourable change in the disease, its employment should never be abruptly terminated, but on the contrary, very gradually relinquished."

Blisters. "In the second stage of the disease, a remarkable alleviation of the symptoms is frequently produced by the application of large blisters to the

head or nape of the neck; a number of these may be applied in rapid succession to the vertex and all round the head; or perhaps what is more effectual, the blistered surface may be kept in a state of suppuration for several days consecutively, by dressing it with ointment of savine or Spanish flies. A blister may sometimes be applied to the epigastrium with advantage."

Digitalis. "What we have seen of its use in this disease, has not disposed us to value it highly."

Opiates. "In the second and third stage of hydrocephalus considerable benefit has resulted from the use of opium. The contraction of the pupil which ensues after its use, has been pointed out by Drs. Crampton and Cheyne as affording evidence of the remedy having been carried as far as is safe. When its use is once commenced, the patient must be kept steadily under its influence; as, if suddenly withdrawn, the symptoms recur with increased violence.

"An issue or seton in the arm or neck has sometimes seemed to have a remarkable influence in warding off this disease. We know an individual of a family strongly predisposed to it, whose life appeared to have been saved by an issue long kept open in the arm. Though the eighth child of the family, he was the first who survived infancy, the seven older ones in whom this precaution had been neglected having all died of hydrocephalus. Dr. Cheyne also mentions the good effects of establishing an artificial irritation at some distance from the morbidly disposed organ. In children of a peculiarly precocious intellect, it

should be our object rather to retard than to accelerate the development of the brain and of the faculties connected with it; and it is only by postponing the interests of their intellectual to those of their physical education, till the constitution has become established and the period of danger is past, that this object can be obtained."

For the description of *chronic hydrocephalus* given in the second division of the article above quoted, I beg to refer the reader to the second volume of the *Cyclopædia of Practical Medicine*, p. 473; and I shall conclude my analysis of Dr. Joy's opinions with the following remarks upon the treatment:—

"The internal administration of calomel, together with mercurial ointment rubbed into the head every night, the head being covered with a woollen cap; blisters to the scalp, and small doses of quinine during convalescence; appear to be the remedies the most to be depended upon; and when other kinds of treatment have failed, the operation of puncture may be performed; which, in cautious hands, and where only a moderate quantity of water is drawn off at a time, has rarely been attended with any immediate danger; but has occasionally appeared to effect a cure, or has palliated the symptoms."

Griffiths,
1835. In a treatise on hydrocephalus by Griffiths, published in London in 1835, the disease is described as an inflammation of one or both of the immediate membranous envelopes of the brain,

frequently of a specific character, sometimes acute, sometimes chronic; terminating, if not subdued, in the ordinary manner of all inflammations of serous membranes,—in an effusion of serosity into the cavity which the membrane lines.

Like most other writers also, he notices that children of a scrofulous or rickety diathesis are the most liable to its attacks. He refers to certain premonitory symptoms which are the first indication of the disease; these are followed by a regular access of febrile phenomena, nausea and vomiting, with constipation. It is also stated that the remittent fever of infants frequently terminates in hydrocephalus.

The following are enumerated as the causes of this disease:—a blow or fall on the head; sordes collected in the bowels; the irritation of teething; a scrofulous and rickety diathesis; the sudden repulsion of certain eruptions; infantile remittent fever; and a disordered state of the liver.

The treatment recommended for acute hydrocephalus, consists of abstraction of blood, locally or generally, the free and repeated administration of purgatives, diaphoretics and nauseating doses of emetics, particularly tartarized antimony; lancing the gums, when teething appears to be the cause; and calomel to act upon the liver. Blisters are also recommended in the last stage, and mercury to the extent of putting the system under its influence.

In *chronic hydrocephalus*, Mr. Griffiths speaks favourably of the operation of paracentesis of the cranium.

Copland,
1835.

The third part of Dr. Copland's *Dictionary of Practical Medicine* appeared in 1835, and contains an excellent description of hydrocephalus, under the head of "Dropsy of the Head," acute and chronic. Indeed it furnishes almost all the information that can be needed on the subject; the reader will there find the literary and descriptive history; the forms and stages of the disease; the appearances on dissection; the diagnosis, prognosis, causes, pathological opinions and treatment, discussed in a masterly and comprehensive manner. Without attempting to analyse it, I strongly recommend an attentive perusal of the article itself; and shall give merely a brief review of the opinions of Dr. Copland himself on some points connected with hydrocephalus.

With respect to the much disputed question as to whether the disease commences with disorder of the digestive organs, or whether the primary symptoms are referable to the brain itself, Dr. Copland remarks: "I am convinced, that the true acute hydrocephalus originates more frequently in the encephalon, than the abdominal functions indicate, and at a period anterior to the disorder which these functions manifest,—such disorder often proceeding from the silent morbid action in the brain, reacting on it, and promoting the evolution of those changes constituting the disease; and that, when hydrocephalic symptoms supervene more suddenly and violently, and without much previous disorder of the chylopoietic viscera, or nervous system, they have a more intimate relation

to acute or sub-acute inflammation of the brain and its membranes, than to those states of morbid action which terminate in copious effusion, and to which the term hydrocephalus is more strictly applicable. The chief exceptions to these inferences will be found in those who inherit a peculiar morbid diathesis or predisposition to the malady—who are scrofulous or weakly constituted—and in these the brain and its membranes will often coetaneously suffer, in a greater or less degree, with one or more of the digestive organs; the excited action it experiences being either attended, or soon followed, by deficient power, and by relaxation of the exhaling surfaces.”

After a very lucid description of the symptoms which characterize the different stages of hydrocephalus, Dr. Copland concludes with the following remarks, the truth of which is obvious to anyone whose experience has furnished him with examples of this dangerous affection:—“It is seldom that the early history of the case is so precise as to enable the physician to draw a correct inference as to its commencement. In some instances, I have observed slight symptoms of cerebral disease, for some weeks, or even months, after repeated attacks of congestion or of inflammatory action within the head, of a well-marked character, but supposed to have been removed by treatment. In some of these cases, the disorder of the digestive organs was so evident as to give rise to the idea of the primary affection of these viscera, indicating the difficulty of ascertaining the parts first

deranged. The information furnished, in most instances, seldom enables us to carry our pathological analysis sufficiently far back to connect the early ailments with their causes; and, consequently, we often fail in ascertaining the quarter where disease commences."

The appearances on dissection are described as generally of an inflammatory character, except in the sub-acute form, where the effusion is greater, and the signs of inflammation less observable. Tubercular formations in various situations within the cranium are also referred to, as well as various diseased appearances in the abdominal viscera.

The portion of the article devoted to the consideration of the diagnosis and prognosis, is so minute and important that I prefer to make reference to it merely for the purpose of directing the attention of practitioners to its diligent perusal; there is nothing superfluous; nothing admitting of improvement by condensation; and nothing that I can describe half so well as it is there described by the author. The book, moreover, is easily accessible to all who desire to be furnished with information upon this interesting subject.

Dr. Copland's views of the curability of the disease are cheering: "if recognised early, a large proportion of cases will recover; and however bad the case, the supervention of hurried breathing is the only symptom that should lead us to despair or paralyze our efforts."

One of the pathological inferences drawn by Dr. Copland is, "that the nature of the cerebral

affection, and the exact state of vascular action, in the early periods of the disease, are not manifest; but if it be at all inflammatory—which admits of dispute—the vascular action possesses more of an asthenic or ataxic, than of a sthenic character; or is attended by a perverted, rather than by a dynamic, state of vital power; and by imperfect performance of the digestive and assimilating functions.” A state of inflammation may however be afterwards developed by falls or other exciting causes. He considers that great errors in practice have occurred owing to not distinguishing between cases of inflammation of the brain and membranes and acute hydrocephalus; and states his belief that many of the cases published as examples of the latter disease cured by large sanguineous depletions, were in reality those of acute or sthenic meningitis or encephalitis.

Craigie,
1840. Dr. Craigie, of Edinburgh, in his *Elements of the Practice of Physic*, published in 1840, has given a good description of hydrocephalus, and coincides in opinion with those who regard the disease as essentially of an inflammatory nature. He says, “This disease does not consist in dropsy of the brain, but it is to be regarded as inflammation of the cerebral membranes, terminating sooner or later in watery effusion or secretion.” In accordance with this view, he advises antiphlogistic treatment and gives the following *therapeutic summary*:—

1. Blood-letting, either general or local, is indispen-

sable wherever there are headache, intolerance of light and sound, sleeplessness and screaming, quick or irregular sharp pulse, and general heat of skin, or heat of the head and face. It may be done either by opening a vein at the bend of the arm, or by opening the temporal artery in adults, or by applying leeches to the temples in infants.

2. Purgative medicines, exhibited so as to expel excrements and morbid secretions and restore the healthy action of the canal, are indispensable where the epigastric or umbilical region is swelled, tense or tender, the bowels slow, the fæces lumpy and hard, or are oily, glossy, and like unchanged bile, or resemble dark green chopped vegetable matter.

3. When the head is hot and painful, cloths soaked in cold water or ice water, or vinegar and water, or other refrigerants, are beneficial.

4. Blisters, if deemed requisite, should be applied only after blood-letting and purging to considerable extent have been previously practiced. Croton oil liniment may be used under the same circumstances.

5. To the energetic and seasonable use of these remedies, most cases of acute or sub-acute meningeal inflammation will yield. But if the evacuations have been carried as far as circumstances permit, recourse may then be had to foxglove and mercury, either conjoined or separate. The ordinary form of calomel is the most convenient.

6. Mercury must not be used, or it must be discontinued, if its use is attended with griping pains of

the belly, bloody stools, tenesmus, or painful diarrhœa. In such circumstances opium or hyoscyamus may be exhibited, so as to produce sweating.

The following observations respecting purgatives and diuretics, are of practical utility :—

“ In the exhibition of the neutral salts or castor oil, the great point is to give them in small doses, and to go on with them steadily and unremittingly. When given in large doses, they are too often rejected by the stomach—already irritable and capricious; and if they pass into the duodenum, they may excite merely a serous discharge and severe griping, without expelling the hard excrements and morbid secretions. Given, on the contrary, in small doses, and continued steadily for some time, they operate slowly and gradually, but with certainty, in expelling the morbid matters, and restoring the healthy state of the gastrointestinal membrane.”

With regard to digitalis, and diuretics in general, two rules should be scrupulously observed; first, never to administer it without premising blood-letting, either general or local, or both; and secondly, not to have recourse to it unless blood-letting and the full exhibition of purgatives has been attempted, and been unsuccessful in removing the symptoms.

Davis,
1840. In 1840, Dr. David D. Davis, professor of Obsteric Medicine in University College, London, published a book on acute hydrocephalus, with the twofold object of proving that acute hydro-

cephalus, or water in the head, is an inflammatory disease; and that it is curable equally, and by the same means, with other diseases of inflammation.

In his preface he remarks that inflammation of the serous tissues of the brain in acute hydrocephalus should exhibit the ordinary results of inflammation of serous tissues in general, superadded to any results which might be attributable peculiarly to inflammation of those tissues themselves. And he presumes that acute hydrocephalus is an inflammatory affection of the vessels of the brain and its investing membranes, because of the evidence supplied by the morbid appearances and conditions of the tissues especially concerned.

The results of the inflammatory changes in question are :—

1. Injuries of texture of one or more of the investing membranes of the brain, consisting of opacities of their tissues and fibrinous attachments of one or more of those membranes to contiguous surfaces of immediately adjoining membranes.

2. An inflammatory transudation or secretion of coagulable lymph or fibrine, appearing in the several forms of coatings, linings, and separate masses of fibrine deposited on the surfaces and within certain cavities of the brain.

3. Quantities of serum, sometimes effused upon the external surfaces of the brain, and presenting visibly in the spaces amongst its convolutions, and occasionally, but not frequently, interposed between

certain other investing membranes of the cerebrum: this latter appearance is for the most part a result of violence from falls and other accidents.

4. Purulent matter, occasionally but not frequently forming a part of a case of acute hydrocephalus, complicated with an accidentally disordered condition of adjoining tissues; as of the tissues within the temporal bone, including perhaps the entire apparatus of the organ of hearing, bone and all.

5. The usual fluid contained within the chambers of the brain, which has given to the disease the incorrect designation of dropsy of the brain. This is a fluid *sui generis*, and is the produce exclusively of inflammation of the serous membranes investing the brain, and of the vascular tissues concerned in supplying the encephalon with blood. This is not blood, nor serum, nor purulent matter, nor fibrine; but a fluid *sui generis*; an infiltration from the mass of blood by the cephalic tissues already adverted to in a state of inflammation. Its constituents, as analyzed by Berzelius, are as follows:—

Albumen	1·66
Matter, soluble in Alcohol with lactate of Soda	2·32
Chlorides of Potassium and Sodium	7·09
Soda	0·28
Animal matter, insoluble in Alcohol	0·26
Earthy Phosphates	0·09
Water	988·30
	<hr/>
	1000·00

Berzelius concludes with observing, that the peculiar fluid of hydrocephalus may be considered as the

serum of the blood, having about the degree of dilution which ordinary serum would have if diluted with about seven times its volume of pure water.

Dr. Davis states that the proximate cause of acute hydrocephalus is an inflammatory condition of the blood-vessels of the brain and its membranes, in consequence of which a morbid transudation of a transparent fluid, together with lymph, and sometimes with other fluids, takes place into the ventricles of the brain, and into whatever other spaces they can find their way into, within the encephalon, even as far as the theca spinalis inclusive—and proceeds to establish these facts by ample references in support of them to competent authorities. He first refers to a dissection performed by Borelli in 1676, in a case of hydrocephalus the consequence of a severe cutaneous affection of the head which had been badly treated by repellents. On opening the head he found about two pounds of aqueous fluid. He also quotes a case from Morgagni; and another published by Epiphany Ferdinand in his "Medical Histories," published at Venice, in 1621, in which the symptoms detailed were unquestionably those of acute hydrocephalus, and were treated by blood-letting and other antiphlogistic remedies. The latter case however is given by Ferdinand, not as an example of hydrocephalus, but as one expressly of amaurosis, or gutta serena; and Dr. Davis is of opinion that it is doubtful whether Ferdinand had knowledge of the existence of hydrocephalus, as an inflammatory disease of the brain; in fact he observes

that, "in looking over the intermediate period between this remarkable case of Ferdinand, published in 1621, and the date of Dr. Quin's thesis on internal hydrocephalus, 1779, there appears to have been not so much a want of improvement in the treatment of acute hydrocephalus, as a total absence of all knowledge of the subject."

Then follows a case by Dr. Chas. Quin, which, according to Dr. Davis, has established the following important particulars. 1. The fact that the malady described was undoubtedly a case of acute hydrocephalus. 2. He has made it appear probable that the occasional cause of the disease was accidental, and imputable to the fall and slight bruise which the patient received on her forehead on the 30th of January, inasmuch as she complained of headache on the 31st, which became rapidly more severe, so as to confine her to her bed on the 2nd of February. 3. He has satisfactorily proved that the proximate cause was an inflammation of some of the vascular tissues of the brain or its envelopes.

In corroboration of his own views as to the nature of the disease, Dr. Davis quotes, besides a dissection of his own at University College Hospital, thirty-seven cases by Dr. Gölis of Vienna, and several by Dr. Cheyne; and concludes thus:—"I shall here close the evidence in proof of the inflammatory nature of acute hydrocephalus. The numerous forms of inflammatory results exhibited in the foregoing dissections will, I apprehend, be accepted by all candid and prac-

tical men as finally decisive of the truth of the first proposition propounded in this work ; namely :—that acute hydrocephalus is an inflammatory disease.” (p. 224.)

Dr. Davis insists particularly upon the importance of the greatest care and attention on the part of the physician to form a correct diagnosis of the disease in question, and especially to notice and become conversant with the precursory symptoms of head affections in children ; and he gives such a clear, correct and concise description of the pathognomic symptoms of hydrocephalus in each of its three stages, that I cannot further the obtaining a correct knowledge of the signs of the disease in any better manner than by quoting his description verbatim.

“ *First stage or stage of turgescence.* Among the most important symptoms indicative of this stage is perhaps a slight giddiness, with a momentary confusion in consequence of all quick movements of the head ; aching pains of the hands and feet, such as have been proposed by some writers to be identified with rheumatic pains of the same part ; similar pains of the nape of the neck ; disturbed and unrefreshing sleep, occasionally interrupted by talking or muttering ; diminished relish for food and drink, with or without other gastric symptoms ; a scanty evacuation by urine or stool ; disappearance of the natural bloom of ordinary health without any known cause ; sudden changes in the accustomed tint of the complexion ; a stumbling gait without the usual firmness

and power of equilibrium ; indifference for things for which the patient had previously shewn great fondness and preference ; peevishness ; intolerance of light ; dislike of notice ; a natural pulse, with only now and then a few pulsations stronger or omitted ; fits of absence and musings, with deep sighs ; a dry skin ; a general loss of strength ; a marked change of the ordinary appearance of the patient. From the presence of the greater number or all of the above symptoms of acute hydrocephalus, with a careful consideration of its causes predisponent and occasional, together with the age and constitution of the patient, the physician may decide with a considerable amount of certainty on the presence of the formative stage or that of turgescence of the disease.

"Second stage, or that of inflammation. In the stage of inflammation, the remarkable symptoms are the great sense of pressure on the eyes, pretty constant and continuing during sleep ; these pains frequently alternating with painful affections of the stomach and bowels, without at first being accompanied by any considerable accession of febrile disturbance. In a small proportion of cases we occasionally encounter violent attacks of fever, with or without convulsions ; preceded for a brief period by symptoms of turgescence, as well as also by symptoms of intense anxiety and restlessness ; retreating of the eye backwards into its socket, with much morbid sensibility of that organ ; in sleep it is only half covered, its pupil being in the meantime contracted. Add to the foregoing

symptoms an increased heat of the head; an altered countenance with great paleness of the complexion; dryness of the nostrils with indurated and fissured lips; entire absence of appetite both for food and drink; repeated vomitings, always increased by movements of the body; a peculiarly sour smell of things ejected from the stomach; an entire suppression, or great diminution of the power of digestion; a remarkable and characteristic fetor of the breath; a constant dull pain in the regions of the stomach and liver; a great subsidence of the abdomen, although it might immediately before the accession of the disease have been full and prominent; general and rapid emaciation; obstinate constipation; urine scanty and turbid from being charged with a white heavy sediment; acute hearing; sleep disturbed, accompanied by much grinding of the teeth, but not often interrupted at this stage of the malady by frightful dreams; the heat of the head and stomach compared with that of the rest of the body greatly increased; the general debility very considerable, and more or less rapidly advancing; the pulse slow and irregular, with some intervals of intermission between the strokes of the artery; the skin more and more flaccid. About this period the shrunk and trembling hand is carried involuntarily towards the head, and this happens concurrently for the most part with an entire change of countenance, a reduced capacity for speech and conversation, with an obvious collapse of all the powers of life.

Third Stage. Those symptoms which mark the period of effusion and palsy are principally the following:—A sudden transition from the highest state of sensibility to that of extreme dulness of all the senses; inability to sit up in bed without help; an oblique position in bed; a frequent involuntary movement of the hand towards the head; a similar action of one or both feet against the bed-clothes, one lower extremity being kept upright and resting against the heel, so as to be instantly ready to be rocked from side to side, or to be stretched out at full length in response to the harassing restlessness of the patient; frequent application of the fingers to the ears, mouth, and nostrils, accompanied by much uncertainty of the movements of the hand to the head; a rapidly increasing dulness of the senses, with an occasional exception, however, of the sense of hearing, which may be tormentingly sharp and quick even to a late period of the malady; a downward look of one or both eyes; deceptiveness of the sight, with double vision, and a convulsive opening and shutting of the eyes for some seconds. Then follow sudden, but uncertain flushings of the countenance, with sometimes a gloomy earnestness and a threatening mien during a convulsive play of the eyes; emaciation in the highest degree; a clear gold yellow scanty urine, with the characteristic deposit, and passed unconsciously; obstinate constipation; a weak, soft pulse, but as irregular as in the former stage, if not more so; a respiration intermitted by frequent sighs, the

breath becoming increasingly offensive; constant and audible groaning; sudden and loud screamings; grinding of the teeth; a state of the greatest weakness. After the lapse of from four to seven days of these symptoms variously combined, there returns, in some patients, a short recovery of mind: for a brief period they recover their ability to speak, to long for and to take food, to wish for their play-things, to recognise their favourites and play-fellows, and even to call them by their names, and to be entertained by their conversation. Their parents, and even occasionally their less experienced medical attendants, are thus exposed to be deluded, but only for a very short time; for the little patient soon again relapses into his former state, and sinks still lower into the complication of pitiable symptoms usually attendant on the dying state. These are convulsions, with terrible spasmodic contractions of the spinal muscles; palsy of one side of the body; vehement fever, although in the midst of great prostration of strength, accompanied by the colligative perspirations of the moribund state. Hectic redness of the cheeks, in fatal contrast with the utter loss of vision; palsy of the iris, or spasmodic contractions of the pupil with a blood-shot albuginea; complete deafness; difficult deglutition; a trembling movement of the unpalsied hand; diminished warmth of the unpalsied side; and an approach to suffocation from efforts to vomit without effect, are, in the greater number of cases, the more prominent parts

of a picture the most melancholy that can be well conceived, that of a protracted and cruel disease yielding up its victim to the last fatal sufferings."

In strict conformity with his views of the proximate cause of acute hydrocephalus, or as he prefers to term it, *hydrophrenitis*, Dr. Davis urges very strongly the performance of blood-letting as the first measure to be adopted. He advises it at as early a stage of the disease as possible, "at the first possible opportunity that could be made available under the particular circumstances of the case subsequently to the final and confident decision of the medical attendant as to the nature of the disease." He even advocates it as a prophylactic measure, a state of pyrexia being present; remarking that "whether it might prove in the further progress of its development a case of small-pox, measles, acute hydrocephalus, or of any other fever whatever, the operation of a timely abstraction of blood would be a measure of unquestionable advantage in the calculation of its proving a disease of any pyrexial importance."

His directions as to the mode of its performance correspond with those offered by Dr. Clarke. He infinitely prefers cupping to the application of leeches, and bewails the deficiency of good practisers of that art. "At five years and upwards fainting may be easily induced by dexterous management of the operation of ordinary venesection by the usual incision of the median vein. At an earlier age it would be more convenient to obtain the required

quantity of blood, by cupping, from behind the ears." When cupping cannot conveniently be secured, "the best substitute is that of bleeding by incision of the jugular vein."

In regard to the quantity of blood to be abstracted, Dr. Davis acknowledges but one useful, safe, and satisfactory test; which is, to carry the first bleeding, provided the opportunity is given to prescribe it at the onset of the disease, to full fainting. "It is not a state of faintishness that is wanted, it is full and decided fainting."

Again he says, "I never mean simply the disposition to faint, which the word faintishness, or the expression of being faint, sufficiently well expresses, when I use the term fainting." According to Dr. Davis, the quantity to be taken from a child of one year old will amount to four or five ounces. From an early age forward to one year old, the quantity of blood to be abstracted should be from three to five ounces, according to the age and vigour of the child, the amount of heat of its head, and the degree of phlogosis already present. "In cases of two years old, with an oppressed circulation of the head from teething or from any other febrile cause, my quantity is seldom less than six ounces, and never less than five and a half."

"In cases of between three and five years old I usually prescribe the abstraction of between five and ten ounces of blood. At these ages, the best rule is to order bleeding to full fainting. Children between

six and ten years old will require an abstraction of blood to an amount seldom less than from ten to eighteen ounces of blood, according to their sexes, habits, states of the constitution, amount and character of the existing fever, and other circumstances of presumed ability to sustain and to require the operation." One good bleeding at the onset of the disease is said to prevent the necessity for repeating the operation, and to be far more beneficial than several smaller ones.

After having controlled the circulation by one decided abstraction of blood, Dr. Davis recommends the exhibition of an emetic (for a child six months old, $\frac{1}{4}$ or $\frac{1}{5}$ of a grain of antim : tart : and about 5 grs. of ipecacuanha) as soon as possible after the child has recovered from the fainting consequent upon the loss of blood. The intention of the emetic is not simply, nor even principally, to cause an ejection of the contents of the stomach ; but to reduce the excitement of the heart and arteries, and to keep repressed the tone and rythm of the arterial system.

The next means recommended is cold to the head, which he advises to be applied by means of water in Mackintosh's water cushions. The child's feeling of dislike or otherwise to the application may be generally relied upon as an indication of the propriety or otherwise of continuing the cold application. Dr. Davis has not a high opinion of blisters for this disease ; and as a first measure, without previous abstraction of blood, he believes their use might be

attended with a great aggravation of the symptoms. He is also favourable to the employment of mercury, and exhibits it freely ; but has more confidence in it as a purgative and cholagogue, than in what is called its specific action upon the system ; and states that he seldom uses it in response to its assumed influence as a resolvent of inflammatory action, excepting as an auxiliary of the lancet, or as an almost hopeless substitute for its use, when considered too late to have recourse to adequate repeated abstractions of blood with any considerable hopes of a successful issue.

I have now to notice a work which received
Bennett,
1842. the approbation of the Medical Society of London, and gained for its talented author the Fothergillian Gold Medal for 1842. Its title is "The causes, nature, diagnosis, and treatment of Acute Hydrocephalus, or Water in the Head ;" and the writer, Dr. James Risdon Bennett, of London. He divides his subject into seven heads. 1. General characters of the disease. 2. Statistics. 3. Morbid anatomy. 4. *Ætiology*. 5. Pathogeny. 6. Diagnosis. 7. Treatment,—and the Essay is well worthy of attentive perusal. Not the least of its merits is that of having in a measure harmonised and explained the various and discordant opinions of former authors as to the nature and treatment of the disease, as well as having opened the eyes of practitioners in this country to certain conditions and modifications,

which had not before attracted so much of their attention as their importance demanded. I do not propose to quote largely from Dr. Bennett's work, being much more inclined to recommend it for careful study; but some of his opinions and conclusions will be noticed, and I shall exhibit, more at large, his description of a form of cerebral affection not yet distinctly referred to in this report, viz.—Pseudo-hydrocephalus.

It will have been noticed that much reliance has been placed by various authors upon the conditions of the pulse to distinguish the different stages of hydrocephalus; but Dr. Bennett states, and I quite agree with him, that he is far from considering the state of the pulse at any period as an infallible index, either of the stage of the disease, or the state of the brain. "In cerebral diseases, more than in almost any others, the pulse merits the designation of *res fallacissima*."

In the chapter on the statistics of hydrocephalus, which is exceedingly interesting, Dr. Bennett remarks that the increased mortality of hydrocephalus in crowded cities must be attributed not merely to the influence of climate on the children, but also to that exerted on the parents, and therefore, in some measure, to the increase of hereditary predisposition, one of the most important causes of the disease. Another conclusion drawn from the tables is, that hydrocephalus is very much more frequent in male than in female children. "All the registration

reports agree on this point ; and it may therefore be considered as a well ascertained and remarkable fact."

We have seen how much discrepancy there is in the opinion of various authors as to the essential nature of acute hydrocephalus ; some have insisted on its inflammatory nature, and curability by prompt and severe antiphlogistic remedies ; others have contended that the symptoms do not depend upon inflammatory action, and that depletory treatment is not applicable ; although, it must be confessed, the treatment generally adopted by practitioners of the latter opinion has not been sufficiently successful to give either weight to their opinions or unqualified sanction to their mode of practice. It had, however, been almost universally observed and acknowledged that scrofula is a strong predisposing cause of the disease ; that it in fact almost always occurred in children who were either themselves scrofulous, or whose parents were so. But up to this period, it does not appear that scrofula had been considered, except by few, *essential* to the production of the symptoms of water in the head ; although some French pathologists considered it so, and used the term "tubercular meningitis" as an appropriate designation of the disease. Dr. Bennett argues this question cleverly and successfully, and I here introduce the conclusions he has arrived at with regard to the nature of acute hydrocephalus.

1. That in many instances the disease consists simply in *inflammation of the brain and its membranes* ;

the symptoms and the *post mortem* appearances varying according as the inflammatory action is seated primarily in the substance of the brain, or in the meninges, and according as it is more acute or chronic; and that in some of the most acute forms, rapidly terminating in death, little or no effusion may be found.

2. That in by far the largest class of cases, the disease is essentially *the result of scrofulous action*, and may, or may not, be attended by the signs of inflammation; that the most characteristic lesions in these cases are softening of the central parts of the brain and the effusion of serum; but that meningitis, chiefly of the base, is a very frequent secondary lesion, and is usually of a manifestly strumous character; and that, therefore, in this, the largest and most fatal class, acute hydrocephalus is but a modification of scrofulous disease.

3. That there are cases, from their symptoms, hardly to be distinguished from the last class, in which effusion into the ventricles is the only morbid appearance met with after death; and that in these instances the essence of the disease appears to consist in some alteration in the condition of the nervous matter, probably allied to irritation, and that they may, therefore, be said to constitute a purely *nervous variety* of hydrocephalus.

4. That there is a class of cases distinct from the above, but closely allied to them, which may generally be traced to some source of exhaustion, either direct or indirect, in which the *post mortem* appearances are

generally indistinct, and of a trifling kind; consisting, for the most part, of some degree of congestion of the large vessels, and a little effusion of serum; and that in some of these cases the effusion has probably resulted from injudicious treatment had recourse to with a view to cure an imaginary inflammation; these being the cases described by Dr. Hall and others under the designation of *hydrencephaloid disease*.

With regard to antiphlogistic treatment, he says, "In proportion to the acute and sthenic character of the symptoms, and the early period of the disease, in proportion to the absence of evidence of scrofulous habit or predisposition and of previous debilitating causes, should our reliance be placed on a simple, prompt, and active antiphlogistic treatment." He also advises antiphlogistic treatment in the consecutive variety, or that succeeding to scarlatina and other exanthemata. In those cases which present decided evidence of strumous action, greater caution and discrimination in the employment of blood-letting are recommended, and such measures advised as may allay irritation of the nervous system, and obviate the tendency to effusion and to exhaustion; namely, the application of cold, purgatives, diuretics, counter-irritants, and, when the symptoms appear to be dependent upon irritation, opiates and sedatives. Iodine and hydriodate of potash are noticed as remedies worthy of more extended trial than has yet been given them. Stimulants and tonics are also in certain stages of the complaint, imperatively demanded;

and Dr. Bennett adds, "Too exclusive inflammatory doctrines have naturally led to the rejection of stimulants and tonics; though, even when the nature of the disease is inflammatory, stimuli are not infrequently the most important remedies."

PSEUDO-HYDROCEPHALUS.

There are certain forms of disease of not infrequent occurrence which closely simulate hydrocephalus, and which may be conveniently arranged under the common designation of pseudo-hydrocephalus. They differ materially in their pathology, and are not amenable to the same treatment, although the general character of the symptoms is so similar, that they are very liable to be mistaken for one or other of the varieties already described.

1. *Hydrocephaloid disease.* Distinct mention of the affection to which this term has been given by Dr. Hall, was first made by Dr. Abercrombie, in the Edinburgh Medical and Surgical Journal for November, 1818; unless indeed the *apoplexia ex inanitione* of the older pathologists be supposed to be the same disease. It was first, however, explicitly and fully described by Dr. M. Hall. Dr. Hall's first account of it was given in his Medical Essays, in 1825, and he subsequently read a paper on it at the Medico-Chirurgical Society in 1828. There appeared, soon after this, the admirable account of Dr. Gooch

in his work on the more important diseases of women. These three eminent physicians agree in all essential respects in the account they have given of the affection, and they have so admirably depicted it, that it would be folly on my part to attempt any further description. "This affection," says Dr. Hall, "may be divided into two stages; the first, that of irritability, and the second that of torpor. In the former, there appears to be a feeble attempt at reaction; in the latter, the powers appear to be more prostrate. These two stages resemble in many of their symptoms the first and second stages of hydrocephalus respectively. In the first stage, the infant becomes irritable, restless and peevish; the face flushed, the surface hot, and the pulse frequent; there is an undue sensitiveness of the nerves of feeling, and the little patient starts on being touched, or from any sudden noise; there are sighing and moaning during sleep, and screaming; the bowels are flatulent, and loose, and the evacuations are mucous and disordered. If, through an erroneous notion as to the nature of this affection nourishment and cordials be not given; or if the diarrhœa continue, either spontaneously or from the administration of medicine, the exhaustion which ensues is apt to lead to a very different train of symptoms. The countenance becomes pale, and the cheeks cool, or cold; the eyelids are unclosed and unfixed, and unattracted by any object placed before them; the pupils unmoved on the approach of light; the breathing from being quick, becomes irregular

and affected by sighs; the voice becomes husky and there is sometimes a husky teasing cough; and eventually, if the strength of the little patient continue to decline, there is crepitus or rattling in the breathing; the evacuations are usually green, the feet are apt to be cold."

Dr. Abercrombie says, "I have many times seen children lie, for a day or two, in a kind of stupor resembling coma, and recover under the use of wine and nourishment. It is often scarcely to be distinguished from the coma which accompanies diseases of the brain. It attacks them after some continuance of exhausting diseases, such as tedious and neglected diarrhoea, and the patients lie in a state of insensibility; the pupils dilated, the eyes open and insensible, the face pale and the pulse falls. It may continue for a day or two, and terminate favourably, or it may be fatal. This affection differs from syncope in coming on gradually, and in continuing a considerable time, perhaps a day or two; and it is not like syncope induced by sudden and temporary causes; but by causes of gradual exhaustion going on for a considerable time. It differs from mere exhaustion in the complete abolition of sense and motion, while the pulse can be felt distinctly and is sometimes of tolerable strength."

Dr. Gooch observes (with reference to Dr. Hall's statement), "the only difference between our experience is this—that he attributes the state which I have been describing to the diarrhoea produced by

weaning, or to the application of leeches for some previous account. In most of the cases I have seen, however, the child has had no previous illness, and the leeches had been applied subsequent to the drowsiness, and as a remedy for it." My own observation bears out Dr. Gooch's statement, that the affection may come on without any very manifest cause of exhaustion.

I have certainly seen many instances among the children of the poor in which the affection (though generally in a minor degree) has come on gradually, much in the same way that similar affections of the brain occur in connection with chlorosis, without any previous diarrhœa, purging or depletion. It appears, indeed, from Dr. Gooch's statement, that the first symptoms came on in some instances before the bowels had been disturbed, though this had always been the case at the time that he saw the patients. This point is important with reference to the pathology; for, though admitting most fully that exhausting discharges are, in the great majority of cases, the manifest causes of the affection, and will always aggravate and accelerate the disease, I believe the cerebral symptoms are sometimes directly referable to alterations in the vital conditions and properties of the brain, rather than the result of any simple changes in the circulation within the head, the consequence of exhausting discharges. Such changes in the circulation are, no doubt, the most frequent and important causes of the functional derangement of

the vital properties of the brain; but alterations in the quality of the blood and nutrition of the brain, may equally induce the state of things described by Dr. Hall and his fellow-observers. Hence, defective nutrition of the body and an imperfect supply of the other vital stimuli, particularly of air and light, may, by first inducing a state of irritation, eventually induce congestion, or the symptoms simulating hydrocephalus; and I think I shall be borne out in the statement, that it is in debilitated, weakly children, and chiefly those of the poor, that the hydrocephaloid disease is seen, excepting where it manifestly succeeds to direct exhaustion. There is one symptom that does not appear to have been noticed in any of the accounts of this affection, except by Drs. Evanson and Maunsell, and that is squinting. A notion prevails, I think, that it is absent in the hydrocephaloid disease; but this is not the case; it is frequently present, as well as blindness.

Squinting, indeed, is a symptom that often attends slight and temporary derangements of the brain in weakly susceptible children when suffering from derangements of the chylopoietic organs (especially of the liver) attended by febrile action. Ignorance of this remarkable fact may give rise to much unnecessary alarm and anxiety.

2. *Erethism, or irritation of the brain in infants.* Dr. W. Nickoll has thus designated a state of brain occurring in children, which appears to hold an intermediate place between the state of brain in the

affection we have been considering and that of inflammation. It may, on the one hand, run into inflammation, if neglected; and on the other, if too actively treated, is very apt to be followed by symptoms of exhaustion, and of the hydrocephaloid disease of Dr. Hall. Dr. Nickoll says, "It is a state in which inordinate effects arise from ordinary impressions upon different parts of the nervous system;" it is the reverse of that condition which occurs in sleep. The child is wakeful, scarcely ever sleeping, irritable, highly sensitive to every object of sight and sound; the pupil is in many instances more or less contracted, the limbs are in action, the head tossed about; the child cries without any apparent cause, the secretion of tears, and from the schneiderian membrane is often increased; there is unusual liveliness and animation, it wakes suddenly from sleep, and starts at the least noise when awake; the fists are generally clenched, with the thumbs turned in, and the forearms bent upwards on the arms; and sometimes a degree of *opisthotonos* is observed, the legs being drawn up, while the head is thrown back. This state of things constitutes the sensitive form of *erethism*, which is usually, though not always, accompanied by increased temperature of the head and of the surface generally, and by an accelerated pulse. The modification of this affection, which Dr. Nickoll terms "*Torpid Erethism*," is marked by a want of animation in the child, which is fretful when roused from its dull state, and droops its head;

and though not sleeping, can hardly be said to be awake, being indisposed to move, and indifferent to all objects: there is a general pallor and chilliness of body, and a dull, inanimate expression of countenance, a rolling or turning up of the eyes, and a plaintive moaning, or shrieking. It is in the weakly and scrofulous that these affections are most frequently seen. There is apparently an original difference of nervous constitution, which is predisposed to be thrown into this state of erethism; and, when this predisposition is not connate, defective nourishment and a debilitated state of system, from any cause, are apt to induce it. Painful dentition, worms, an unhealthy state of the alimentary canal, disordered states of the liver, burns, ulcers, as well as surgical operations, and concussion of the brain, are among the chief existing causes. In this state of system, convulsions, it is well known, are apt to occur. In many cases, it is manifestly the spinal system which is in the first instance the seat of irritation. Many of the phenomena are evidently of an excito-motory character; such as the clenching of the fists, the opisthotonos, and the convulsive twitchings. The condition of the vascular system is not always the same; it is not invariably one of diminished power from previous causes of exhaustion, in which case the condition of brain, and of the system generally, resembles what is called reaction from loss of blood; a state of things which very frequently, indeed generally, to a greater or less degree, precedes the

hydrocephaloid disease, a form which the case speedily assumes, if for the relief of the erethismal condition recourse be had to bleeding and incautious purging.

Extreme susceptibility of the nervous and excitement of the vascular system, to which the term reaction is generally applied, and which so frequently terminates in that particular form of coma attending the hydrocephaloid disease, is less apt to be mistaken for hydrocephalus and treated antiphlogistically, than is that form of erethism, which, not having been induced by any direct source of exhaustion, is often attended in the onset by a certain excess of power of the vascular system, and by increased determination to the head. The state of things appears to be this: there is a preternatural mobility of nervous system which has given rise to excitement of the heart and arteries, and, from the peculiar state of brain, determination to the head. We have thus all the elements for inducing the more important symptoms of hydrocephalus.

If the case be so considered, and treated antiphlogistically, irrespective of the peculiar state of the nervous system, exhaustion immediately follows, and then we have, in an aggravated form, the symptoms of reaction; which, if the same treatment be pursued, soon ends fatally, and probably with absolute effusion into the ventricles. The body is examined, this effusion is detected, and is imagined to be the cause of death, and the result of an inflammatory state of

the cranial contents which antiphlogistic measures have failed to overcome. Or, the pathology of such cases may be thus stated: in certain states of the nervous system, unpreceded by any cause of exhaustion, an increased quantity of blood may circulate through the brain, and give rise to all the symptoms of the first stage of an inflammatory affection, but which are not to be removed simply by antiphlogistic means; as these will aggravate the original condition of brain, thus inducing new and still more dangerous symptoms, and the case will terminate fatally, with all the marks of the advanced stage of hydrocephalus. On the pathology of such cases, judicious treatment throws most light. If there be any manifest cause of irritation present, either from teething, or a disordered state of the bowels or liver, and this be removed, and the child then placed in as quiescent a state as possible, by excluding it from light and noise and every source of excitement, giving a dose or two of some sedative, and nourishing but unstimulating diet, and subsequently a gentle tonic, all the symptoms of cerebral disease vanish.

3. Children are, undoubtedly, subject to a state of brain more correctly perhaps denominated *torpor* than anything else, which generally comes on slowly in the course of protracted illnesses of a debilitating kind, and is chiefly marked by a dull, vacant, listless aspect of countenance, with a somewhat dilated pupil, and a remarkably unexcitable state of system. It has appeared to me that this condition of brain and

nervous system is generally connected with a depraved and vitiated state of the whole body, which does not admit of speedy correction, but which is most satisfactorily treated by tonics, especially iron, persevered in for some time. The circumstances in which this state of torpor occurs are, for the most part, very much the same as those in which the erethismal state is induced; and the only mode of explaining the different effects on the brain appears to be, assuming an important difference of nervous constitution in the two classes of cases.

Such are the principal conditions of brain which I conceive should be carefully distinguished from hydrocephalus, more strictly so termed. It would be easy to point out modifications of the states we have just considered, and to give them particular names; but it is very difficult to describe nice shades of difference in the symptoms arising from particular modifications of the conditions of the nervous and vascular systems, and the relations they hold to each other; and still more difficult to do so without entering into theoretical discussions, or giving hypothetical explanations open to numerous objections. There can be little doubt that not a few of the reported cases of hydrocephalus have been of the character just described, and that, on the other hand, many of the cases we have now mentioned have terminated fatally, in consequence of having been mistaken for the inflammatory forms of infantine cerebral disease. This error has doubtless been fostered and confirmed by

the results of *post mortem* examinations, and I have no hesitation in expressing my conviction that, not merely effusion, but various other evidences of inflammatory action, have often been the result of treatment resorted to, where inflammation did not exist, and which has induced the very action it was intended to subdue.

Dr. Risdon Bennett's Essay was published in 1843, and fairly represents the state of our knowledge of the cerebral diseases of infancy, as it existed at that period. In the same year, a splendid work on the diseases of children was published at Paris, written by M. M. Barthez and Rilliet. It not only makes us fully acquainted with the amount of knowledge of these diseases prevailing at that time on the continent; but appears to me to be, without exception, the most minute and complete work of the kind ever brought before the public. I think we must in fairness acknowledge that we possess no work in the English language upon diseases of children, which can be compared to this in extent and minuteness of description; and as I believe that it is not so generally known to us as it undoubtedly ought to be, from not having been translated, I have looked upon the present as a favourable opportunity of presenting to my readers, a tolerably copious translation of those portions which refer especially to the "Cerebral Diseases of Infancy."

Barthez & Rilliet,
1843. The "Cerebral Diseases of Infancy"
 comprised in the work of M. M.
 Barthez and Rilliet are the following:—

1. Simple Meningitis.
2. Diseases of the venous sinuses of the dura mater.
3. Cerebral congestion.
4. Cerebral softening. Encéphalite.
5. Hypertrophy and induration of the brain.

These are classed under the head of *Inflammation*.

6. Hydrocephalus. (Under Dropsies.)
7. Cerebral hæmorrhage.
8. Convulsions.
9. Contraction of the limbs.
10. Tuberculization of the nervous centres.

Of *Meningitis*, or *simple acute inflammation of the membranes of the brain in infants*, it is needless for me to speak, as M. Rilliet's views upon the subject have been placed before a large number of practitioners by means of a translation published periodically in the volume for 1847 of the Journal of the Provincial Medical and Surgical Association. To this journal I therefore refer my readers; and proceed to the consideration of the diseases included under the second head, viz.:—

DISEASES OF THE VENOUS SINUSES OF THE DURA MATER.

Phlebitis of the sinuses is spoken of as a rare disease; or as one rarely discovered, from its offering

no consideration of practical importance, although it is interesting in an anatomical point of view.

Morbid anatomy. This embraces: 1. The changes which take place in the blood. 2. Those which occur in the vessels; and 3. The secondary lesions of the membranes and of the brain itself.

In their natural state, the sinuses of the dura mater are found to contain after death a certain quantity of liquid blood, or a few small clots which occupy a portion only of the vascular channels; and sometimes they are found empty. But when diseased, one or more of the sinuses, especially the superior longitudinal, are distended by dark soft masses of coagulated blood, which, however, are sometimes firmer, reddish, elastic, dense, thick; being easily detached from the lining membrane, which retains its polish. The corresponding part of the dura mater is tense and forms a projection externally. The concretions sometimes extend to the cerebral veins, giving them the appearance of having been injected at the surface of the brain; but the deep veins very rarely present the same appearance. Sometimes the blood found in the sinuses is mixed with pus. M. Tonnelé has noticed the presence of false membranes, of a yellowish colour, and of the consistence of coagulated white of egg, moulded to the shape of the vessel which contained them; but M. Rilliet supposes them to have been layers of the fibrin of the blood deprived of colouring matter.

2. The lining membrane of the sinuses is generally

perfectly healthy, or may be slightly reddened by the blood; but the external cellular coat is occasionally decidedly thickened.

3. The secondary lesions are hæmorrhage and dropsy. The former occurs either under the pericranium, in the cavity of the arachnoid, or in the substance of the brain. The latter occupies either the cavity of the arachnoid, the sub-serous cellular tissue, or the ventricles. The other alterations which have been noticed, may be regarded as coincidences; such as traces of inflammation of the membranes or brain itself. One remarkable circumstance is that in none of the cases which have come under our observation have we found tubercular disease within the head, although most of the patients were in a high degree scrofulous.

Symptoms. We are of opinion that in the present state of our knowledge it is impossible to form a correct diagnosis of this affection. In the cases we have witnessed there has been an entire absence of cerebral symptoms.

Causes. Stagnation of the blood in the sinuses is promoted by every cause of impediment to the return of the venous blood to the heart; and we may mention in particular, tumours situated in the vicinity of the great vessels which convey the blood from the head to the heart. Purulent absorption may be a cause of phlebitis of the sinuses. Inflammation may also be propagated by continuity of tissue, as from caries of the petrous portion of the temporal

bone. But the most general cause is the previously debilitated and cachectic condition of the patient when inflammation of the sinuses supervenes. In all the cases analysed by M. Rilliet the children were enfeebled by chronic disease, a great number were tuberculous, others affected by rickets, and others weakened by prolonged convalescence from acute disease. With respect to age and sex, there were seven girls and ten boys; six were two years old; three, four years; one, five years; one, six years; one, seven years; two, nine years; one, ten years; one, eleven years; and one, fourteen years old.

Prognosis and Treatment. Whether looking to the effects of this malady, or to the state of body in which it occurs, it must evidently be considered a serious disease; and with respect to treatment, as we have no distinct indications of its presence during life, so we possess no means of curing it; all that can be said is, that since debility seems to exercise so much influence in producing it, we cannot be too careful to avoid reducing our patients, by treatment, to a state of weakness which exposes them to so many serious diseases.

CEREBRAL CONGESTION.

It is very difficult to resolve the question as to the nature of cerebral congestion in infants; to decide whether it existed during life or was produced after death; whether it be the consequence, or the cause,

of pathological changes. We have found the same appearances of congestion after death in persons in whom no cerebral symptoms had presented themselves, as in others who had died after symptoms of more or less severe nervous disease. In all these cases the cerebral veins and sinuses contained a large quantity of blood; the pia mater everywhere minutely injected except in the ventricles; sub-arachnoid infiltration sometimes slight, sometimes abundant; the grey matter was of a rosy tint, sometimes almost red, and this colour was commonly uniform and general. In some cases of congestion, from impeded circulation, the colour of the grey substance was even violaceous; but often there was no sensible difference of colour, whatever might have been the cause of the congestion. The white matter presented numerous red points, and pressure caused drops of blood to issue from the cut surface. Most frequently both the pia mater and substance of the brain were injected; but in some cases the injection was limited to the pia mater, and more rarely to the cineritious substance alone. Usually the congestion was general, but sometimes it occupied a part only of the brain.

Does cerebral congestion, such as now described, constitute a special disease, exhibiting particular symptoms, following a regular course, and having a known termination? Do we recognise in the child the same forms of congestion as in the adult? Our experience answers in the negative. We have very

often discovered congestion in individuals who had died of other diseases, who did not at any period suffer from cerebral symptoms. In a practical point of view the important thing is to know whether we can recognise cerebral congestion in an infant by special and characteristic symptoms, and so be enabled to prescribe a definite method of treatment. For our own parts we admit that we are unable to say what the symptoms are, and, consequently, to specify the treatment.

SOFTENING OF THE BRAIN. ENCEPHALITE.

Softening of the Brain, although a disease common in old age, is rare in the adult, and still less frequent in early life; we have met with it only under the following circumstances:—

1. In children who had died of diseases of a very different nature, the ventricles containing more or less serum, the fornix, septum lucidum, and occasionally the walls of the ventricles were softened to a greater or less extent; but this lesion, which during life was not revealed by any symptom, appeared to be nothing more than simple œdema.

2. In cases in which softening was the consequence of chronic lesions of the brain, it was situated around or in the neighbourhood of them. Thus we have seen the substance of the brain softened under an inflamed pia mater, around granulations,

tubercles, &c., in which cases the softening was evidently secondary; and amongst all the cases which have been brought to our knowledge, we have found but two which seemed to be undoubted examples of idiopathic softening.

HYPERTROPHY AND INDURATION OF THE BRAIN.

The anatomical characters of the disease described under the name of cerebral hypertrophy, are in some respects identical with those assigned by certain physicians to general induration of the brain; and it is difficult to separate these pathological conditions into two distinct maladies. An increase in the density of the cerebral mass is the principal and most appreciable phenomenon, and this is common to both affections; the only difference between them is that, in hypertrophy, the increase in the size of the brain is very apparent; whilst, in general induration it is scarcely perceptible. But this character is not sufficient to establish a line of demarcation between them.

There is a manifest increase of consistence in the encephalic mass, but it varies much in degree. In the first degree the tissue is firm and slightly elastic; the brain may be separated into fine layers, and has a similar consistence to that which it acquires after maceration in alcohol; the grey substance generally loses its colour, and the white has an unusually brilliant appearance.

In a more advanced degree the cerebral substance offers resistance to the scalpel, and is not broken down without considerable pressure. In a still more advanced stage the brain is elastic and has acquired a firmer consistence.

When in addition to the condition just described there is sensible hypertrophy, the brain offers a peculiar appearance; its size and weight are sometimes considerably increased, filling accurately the cavity of the cranium; the membranes are tense and closely applied to the convolutions, which are flattened, and protrude when the membranes are divided. The anfractuositities are almost obliterated; the ventricles are in a great measure effaced and contain no fluid; the membranes are sometimes pale, sometimes injected. In no case has inflammation of the arachnoid or pia mater been observed, nor have tubercles been found.

It is impossible to determine clearly what are the symptoms of hypertrophy of the brain, owing to the paucity and heterogeneous nature of the materials at command. The following observations will however throw some light upon the subject:—

1. In one form the disease is primary, and occasioned by poisoning with lead. (*Observations de M. Papavoine.*) There is a general feeling of illness, followed by pain in the body, copious green vomiting, with or without diarrhoea, headache, or severe abdominal pain. These symptoms are speedily followed by violent convulsions and loss of consciousness. As

the disease progresses we observe alternate convulsions and coma, dilatation of the pupils, contractions of the limbs, coma and death. Febrile symptoms appear only towards the close of the disease, which lasts about four or five days. Hypertrophy and induration are discovered on examination after death.

2. In another form, the disease is also primary, but may be traced back to a distant period, perhaps even to birth. It is attended with considerable increase in the size of the head, similar to that which takes place in hydrocephalus; thus, a boy five years old had a head as large as that of an adult, and sufficiently heavy to cause him to fall when he attempted to run. After a time there came on cerebral symptoms, variable in nature and intensity, and sooner or later terminating in death. In M. Burnet's case, severe convulsions, followed by loss of sight and diarrhœa, marked the commencement of acute symptoms. At the end of a fortnight the eyes were very restless, without expression; the pupils contracted and turned upwards; strabismus divergens in the left eye; all the senses, except the sight, were in a natural state; and the movements of the limbs were under the control of the will. For a month, there was no perceptible alteration; then debility, somnolency, and irresolution appeared; five weeks later, the drowsiness increased, signs of double pneumonia were discovered, and the child died.

Another patient was seized with inflammation of the bowels, at the age of five years. On the

sixteenth day, a sudden increase of the symptoms took place without any evident cause; the intellectual functions were completely destroyed; the pupil was large, but the iris still sensitive. The respiration became difficult, the pulse diminished in force and frequency, and in a few hours the child died. After death there was found considerable hypertrophy of the brain, with more or less induration.

3. In a third form, the symptoms were those of idiocy; and induration, without hypertrophy, was discovered after death.

4. Lastly, in a fourth form, the disease is secondary, and becomes developed during the progress of various diseases; such as typhus fever, myelitis, and diseases attended with very severe pain. In none of these cases was induration of the brain revealed by peculiar symptoms, but the patients had delirium, or suffered extremely acute pain. Here also examination after death discovered induration in the first degree, without hypertrophy.

The following is a remarkable case of hypertrophy of one of the convolutions, accompanied with corrosion of the cranium:—A boy, two years old; first attack of convulsions three months before death—three months later, a second attack followed by coma, strabismus, and paralysis of the muscles of the neck.

Autopsy. The head was narrow before and behind, wide in the parietal region, and projecting very much at the sinciput. The fontanelles ossified; parietes of the skull of variable thickness, in some places very

thin and even perforated in some points; in others, very thick—the convolutions of the brain prominent, pressing forcibly against the depressions in the bone, and perforating them in two places. The brain generally flabby, the convolutions being everywhere softer than the other parts. The grey matter was of a deep red colour; the white also of a reddish tint and dotted. Two spoonfuls of serum in each ventricle, the walls of which were softened. Dura mater of a violet colour; arachnoid smooth, transparent; pia mater very thin, minutely injected, and adherent to the convolutions. The vessels full of blood.

Another case of partial induration of the brain occurred in a scrofulous child eleven years of age; who exhibited no other symptoms of cerebral disease than slight contraction of the upper extremities, which were painful when attempts were made to extend them.

Autopsy. Pia mater not injected; plentiful sub-arachnoid infiltration; membranes easily detached; grey substance pale, white, not dotted. On the inner surface of the left hemisphere along the great fissure, there was one convolution much firmer than the rest, particularly in its centre, where it was red; the redness was circumscribed, and here the cerebral substance had the consistence of membrane. Some transparent serum in the ventricles; their parietes in a natural state and the rest of the brain very firm.

Under the head of dropsies, M. M. Barthez and Rilliet introduce *hydrocephalus*, or rather, *hydre-*

cephalus; which may have its seat either in the arachnoid, ventricles, or pia mater; or the brain itself may be infiltrated with serum. It is very difficult to determine what quantity of fluid so situated may be sufficient to constitute disease; and with respect to dropsy of the pia mater, they remark that it has no distinct symptoms, is followed by no ill consequences, and requires no treatment.

Dropsy of the ventricles is admitted to exist when the quantity of fluid they contain is sufficient visibly to distend their cavity; when there is not fluid enough to produce this effect, the quantity is considered normal, or at all events, not sufficient to constitute disease.

In *œdema of the brain*, the fluid is not extravasated so as to form a collection, but is infiltrated into the tissue, which it softens without altering its opaque white colour. It is supposed often to take place after death, although in many cases it may be a product of disease.

The liquid infiltrated or effused in pure hydrocephalus, is generally limpid, transparent and clear; not coagulable by heat, containing but little, if any, albumen; nor has it any product of inflammation mixed with it. But the disease may result from a former extravasation of blood, in which case the fluid retains something of its original character, being serous, citron coloured, albuminous, and turbid or mixed with blood.

ACUTE HYDROCEPHALUS.

This disease consists in a rapid, but non-inflammatory accumulation of serosity in the cranial cavities or in the substance of the brain, and is of rare occurrence. The membranes, generally of a pale and healthy colour, are sometimes injected, and thus establish a transition from simple dropsy, to that which results from inflammation. The substance of the brain is healthy, or perhaps slightly congested, and sometimes softened by infiltration where it is in contact with the fluid. It is extremely difficult to determine what are the symptoms which indicate the disease now under consideration; those which seem principally to relate to it are extreme restlessness, cries or rather continual groans, superseded shortly before death by great prostration, loss of consciousness, coma, dilatation of pupils and paralysis. But in some cases, these are not all present; and in others, where the disease has not been discovered until after death, they have been entirely absent.

The existence of this disease is almost denied by M. M. Barthez and Rilliet, as well as by Guersant and Blache, as an *idiopathic* affection; but it is frequently met with as a consequence of other diseases, particularly those which are complicated with anasarca, as measles, nephritis, scarlatina, gangrene, entero-colitis. Age appears to have con-

siderable influence in the production of this complication; for in thirteen children, one only was upwards of six years of age; but both sexes were equally liable to it.

The chapter on chronic hydrocephalus gives a good description of the disease, but offers nothing in the way of novelty or usefulness which is not to be found in other writers upon the subject. From the dependence generally of the dropsy on some other disease of the brain, such as tumour, tubercles, extravasation of blood, &c., a very unfavourable prognosis is drawn, and but little is recommended in the way of treatment that promises much hope of success.

HÆMORRHAGE.

The next in order of the cerebral diseases of children is hæmorrhage, which may occur either in the scalp, under the pericranium, between the cranium and dura mater, between this and the arachnoid, in the cavity of the arachnoid, in the meshes of the pia mater, in the substance of the brain itself, or into the ventricles. Hæmorrhage into the pericranium, and dura mater, are passed over without much notice, except that they are of little diagnostic or therapeutic importance; but hæmorrhage of the arachnoid is treated as a more serious affection, and is said to arise—First, from extravasation, in consequence of fracture or rupture of vessels: Secondly, from

exhalation: Thirdly, from disease of the arachnoid, the second being the only source from which our authors had observed it arise in children. The symptoms denoting the occurrence of arachnoidean hæmorrhage are exceedingly obscure, and are often confounded with those of other cerebral diseases. A boy, two years old, was attacked with convulsions five weeks before death, which recurred every day, lasting ten minutes or a quarter of an hour. A week before he died, they became more frequent; in the intervals, there was considerable perspiration on the head, the feet and legs being cold; two days before it died, it suffered from pain in the head and free epistaxis. There was diarrhœa during the whole course of the disease. Extravasation of blood was found in the arachnoid—no other lesion was discovered, so that the convulsions could be attributable only to the presence of the clot.

Hæmorrhage of the pia mater is mentioned as being of much rarer occurrence in children than that of the arachnoid. The following case is reported from M. Tonnelé:—"The dura mater was much distended, and a dense, thick layer of coagulated blood, of a deep colour, was extravasated under the arachnoid at the upper part of each hemisphere. The veins ramifying upon the upper surface of the brain were distended with clotted blood, and some had given way at several points. The symptoms were as follows; the first day depression, unwonted seriousness of manner at intervals, with some convul-

sive movements. Next day, the trunk and lower limbs were extremely rigid; deglutition difficult, pupils fully dilated and immovable, the face pale, the pulse feeble and intermitting—death soon followed.”—The substance of the brain was healthy.

Cerebral hæmorrhage, or *hæmorrhage into the substance of the brain*, although of frequent occurrence in old people, loses much of its importance when it occurs in children. Of little extent and rarely primary, it scarcely ever shews itself except in the last days of life, or in the course of a disease otherwise incurable. It is then sometimes completely latent; pathological examination after death alone discovers it, the practitioner is unable to recognise it. The symptoms which have been observed have been such as throw no light upon the diagnosis of the disease, and are quite different to those assigned by authors to apoplexy; and, as if everything conspired to render the diagnosis of cerebral hæmorrhage in children obscure, cases have occurred in which most of the symptoms of apoplexy were present, and yet no extravasation was found after death. The symptoms generally exhibit themselves under one or other of the following types, viz.—convulsive, inflammatory, paralytic; the first form belongs more especially to meningeal apoplexy, the second to hæmorrhage of the cerebral substance itself.

The causes of hæmorrhage in the head are stated to be—

1. Improper treatment of diseases of the scalp.

2. Diseases of the sinuses of the dura mater.
3. Compression of the superior vena cava by enlarged bronchial glands.
4. Pressure on the vessels by hypertrophy of the liver or spleen.
5. Cachexia and general debility, usually connected with tuberculization.
6. Occasionally the hæmorrhage is primary, not depending upon previous disease.

Meningeal hæmorrhage is most frequent in very young children, especially from one to two years and a half; whilst cerebral and ventricular hæmorrhages are rare at this period, and more frequent at a more advanced age. Sex appears to have little or no influence. The prognosis is unfavourable; and owing to the great uncertainty of the diagnosis, it is difficult to arrive at any reasonable mode of treatment. When however, the disease is chronic, occupying the arachnoidean cavity and causing an increase in the size of the head similar in appearance to chronic hydrocephalus, the operation of making a puncture to evacuate the fluid is spoken of as more likely to be successful than in the latter disease.

In the acute form the treatment consists in bleeding, cold applications to the shorn head, purgatives (especially calomel,) and purgative injections, warm pediluvia, sinapisms, blisters, and a general antiphlogistic regimen. M. Legendre advises the same kind of treatment; and, in the chronic form, salivation, purgatives, diuretics, and compression.

Passing over the subject of *convulsions*, which appear most frequently to be symptomatic of some other disease, we proceed to the consideration of tuberculization of the nervous centres and its consequences, treating, in succession, of the morbid anatomy of meningo-cephalic tuberculization; the symptoms, diagnosis, causes and treatment of tubercular meningitis (acute hydrocephalus of authors) and tubercles of the brain; latent tubercular disease of the brain and its membranes; and of tubercles of the bones of the cranium.

1. MORBID ANATOMY.

Tubercles of the meninges are scarcely ever found on the inner surface of the arachnoid. Those which are situated under the arachnoid or in the pia mater are generally yellow granulations and miliary tubercles; grey granulations are rare.

It is most common to meet with a mixture of grey and yellow granulations. The yellow granulation, singly, is more frequent than the other kinds.

When the cranium and dura mater are removed, they present themselves through the transparent arachnoid in the form of a small yellow spot, giving scarcely any sensation of resistance to the finger; the resistance is greater when the granulation is grey, when it sometimes forms a slight projection on the surface of the arachnoid. If we remove the arach-

noid, we find that the spot corresponds with a small yellow rounded body, presenting the same appearance as granulations of the lung. The removal of the pia mater brings others into view, enclosed within the convolutions; in the parts which are in contact with the substance of the brain they are of a rounded form, but are flattened when they are in contact with the arachnoid. They vary in size, some being so small as to be scarcely distinguishable. Sometimes they are so numerous as scarcely to be counted; at other times it is impossible to discover more than one or two on each hemisphere. The seat of meningeal granulations is either on the surface of or between the convolutions; occasionally they are met with in one of these situations and not in the other; or in one hemisphere they may be on the surface, and in the other at the bottom of the anfractuositities; generally they appear in both situations; sometimes, but very rarely, the granulations on the surface are yellow, the deep ones being grey, or semi-transparent—they frequently distribute themselves along the course of the great cerebral veins, but not so generally as has been supposed; they are to be met with on every part of the external surface of the brain, but are more frequent upon the hemispheres than at the base.

The granulations are very frequently isolated and separated from each other by a more or less considerable interval; sometimes, however, they become aggregated so as to form layers; but then we find traces of inflammation, acute or chronic, around

them. The granulations are disseminated in the products of the inflammation, in such a manner that one can almost always discover them to be still distinct from each other. It is possible, however, for them to run into each other, and form tubercular layers, similar to those of the pleura.

Miliary tubercle. This form of tubercle is frequently developed in the meninges; is always of a rounded form, and may acquire a considerable size—we have seen them as large as a pigeon's egg. They are much less numerous than granulations, there being commonly only one, two, or three, about the size of a pea or a nut; we have never seen more than fifteen or twenty, which were then about the size of hemp seeds. They are generally separate, but sometimes coalesce, forming an irregular mass.

The seat of miliary tubercles is about the same as that of granulations; but they are comparatively more frequent at the convex surface than at the base, on the left hemisphere than on the right, and rarely occupy the fissures.

The tubercle in its progress becomes surrounded with a vascular net-work, and by its pressure, becomes united with the membranes by adhesive inflammation; and occasionally we have seen the corresponding part of the cranium hollowed. By degrees it depresses the substance of the brain, penetrates it more and more, and at last becomes quite embedded in it, retaining, however, its intimate relation with the pia mater to which it remains firmly adherent. Tubercles are

much less frequently met with in the membranes of the cerebellum than in those of the brain.

Tubercles of the brain. The crude yellow tubercle is the kind which most frequently affects the cerebral substance. It is generally found as a yellow round miliary tubercle, from the size of a millet seed to that of a nut; but it may acquire a much larger size. When these tumours are very large, they are sometimes formed by the union of a number which were originally distinct. Cerebral tubercles are generally less numerous than when they are situated in the membranes; we often find but one or two, sometimes more, but as far as we have observed never more than fifteen or twenty.

Tubercles may locate themselves in almost every part of the brain, but are more frequently situated in the hemispheres; and the cerebellum is as liable to be the seat of them as the brain.

Secondary lesions of the meninges. Inflammation of the meninges is of frequent occurrence in those affected with tubercular disease, and by one of those coincidences for which it is difficult to account; such inflammation may develop itself, whether there be at the same time tubercular disease in the meninges, or whether these are quite free and tubercular disease be found only in other organs. In the latter case, the inflammation always presents the character of tubercular meningitis.

The morbid appearances about to be described are common to both kinds of meningitis, namely, to

meningitis with tubercles in the meninges, and to the meningitis of tuberculous subjects without the presence of tubercles either in the membranes or in the brain. The most usual seat of the inflammation is the pia mater; the arachnoid scarcely ever exhibiting marks of disease. The glandulæ Pacchioni are generally large and numerous; and, in some cases, the arachnoid is opaque and thickened.

It is in the pia mater alone that real traces of inflammation are found, from simple congestion to extensive and abundant suppuration; from simple infiltration of a limpid fluid to one of a greenish colour and gelatinous consistence. Sometimes the meshes of the pia mater are firm, red, brittle, moist, and yield a bloody fluid on pressure. This inflammatory thickening must be distinguished from chronic thickening of the pia mater around cerebral or meningeal tubercles. In the latter case, the membrane is very thick and hard, but it is pale, elastic, tears with difficulty, and yields no fluid on pressure.

Sometimes there is a deposit of yellow concrete pus or a pseudo-membranous production. If this substance be soft, friable and inelastic, it is concrete pus; if, on the other hand, it be a little smoother, harder and more elastic, it is false membrane. In one instance we found some liquid pus on the hemispheres amongst a group of granulations. The results of congestion or inflammation of the pia mater in tubercular meningitis usually appear as follows:—

Generally, the small vessels universally injected.

Serous infiltration varying much in quantity.

Gelatinous infiltration or plastic lymph commonly partial, and found either along some of the convolutions, or at the centre of the base, or in the fissures.

Acute or chronic thickening of the pia mater occurs most frequently in the form of layers or small masses, surrounding clusters of granulations or tubercles, extending more or less between the convolutions; and situated chiefly at the base.

Concrete pus is generally disposed in layers which follow the course of the vessels, surrounding and adhering to them, and may be met with at any part of the surface.

Injection and infiltration of the meninges are frequently, but not always, present; but these do not often exist together in the same patient.

Gelatinous serosity is met with but in few cases, and then chiefly at the base.

Concrete pus or false membranes are found much more frequently at the base than upon the hemispheres.

Meningitis is incomparably more frequent at the base than at the upper part of the brain, whilst the contrary holds good with respect to tubercles.

Inflammation of the meninges and tubercles may exist independently of each other; and it is not uncommon to see tubercles of the meninges accompanied simply with injection or infiltration to an extent which does not amount to meningitis.

It more usually happens that traces of inflammation

are discovered around the tubercles; but it is not rare to find the inflammation occupying a part at a distance from the tubercles.

The intensity of the inflammation does not more frequently than otherwise bear an exact relation to the number of tubercles.

The meningitis of tuberculous subjects differs from simple meningitis in several particulars:—

In the former, the suppuration is concrete, scarcely ever liquid; in the latter it is liquid, and seldom concrete. The former is generally seated at the base, and when it occupies the convex surface of the hemispheres, it is in relation with the tubercles; in the latter, it is almost always on the convex surface. The former, when it occupies the convexity, is generally limited to a few convolutions; the latter extends itself over chief of the brain, occupying at once both the base and convex surface.

The former invades almost exclusively the pia mater; the latter commonly the cavity of the arachnoid. These differences do not depend upon the presence or absence of meningeal tubercles, but exist alike in scrofulous children and those which are not so.

Secondary lesions of the cerebral substance are as follows:—

1. General vascularity, with rosy discoloration of the white, and also of the grey substance.

2. Softening of the cerebral substance, either from inflammation, or from simple imbibition.

3. Effusion into the ventricles.

When the effusion coincides with meningitis, it is formed with rapidity, is generally turbid, but not great in quantity. This constitutes acute hydrocephalus. When the effusion is connected with cerebral tubercles only, the fluid is secreted slowly and in great quantity, dilates the parietes of the cranium, and constitutes chronic hydrocephalus.

It seems that tubercles of the cerebellum are those which determine, by preference, chronic effusion; and they may, indeed, more easily than in any other situation, exercise pressure upon the strait sinus and veins of Galen. Thus, in thirteen cases of chronic tubercular hydrocephalus, the cerebellum was the seat of tubercle in eleven; the cerebellum and optic thalamus in one; and the right anterior crus of the cerebrum in the other. We are not aware of a single example in which tubercles limited to the hemispheres had either caused or been coincident with chronic hydrocephalus.

Cerebral apoplexy is sometimes coincident with cephalic or general tuberculization. The bones of the cranium are not often affected; but in one instance we noticed an external depression, which corresponded with a depression in the cerebral substance. Other organs of the body are frequently the seat of tubercular disease, and softening of the stomach is by no means an unusual concomitant.

2. TUBERCULAR MENINGITIS. (ACUTE HYDROCEPHALUS.)

This disease is characterized anatomically,—

1. By a deposit of tubercular matter in the meshes of the pia mater, in the form of rounded granulations scattered over various parts of the hemispheres or base, of various sizes, generally opaque or white, sometimes grey and semi-transparent, generally isolated, sometimes united; in a few very rare cases, this granulation is the only diseased appearance.

2. By inflammation, evidenced by the secretion of concrete pus or false membrane in the pia mater, which membrane is thickened, of a yellowish or greenish colour, friable, and sometimes adherent to the surface of the brain. This inflammation is generally concurrent with tubercular granulations of the meninges; in some rare cases it occurs independently of them, and it most commonly occupies the base.

3. By a particular state of the arachnoid, rendering this membrane slightly glutinous to the touch.

4. By a white, creamy softening of the central parts of the brain, occupying, in most instances, the *septum lucidum* and the fornix, seldom extending itself to the inferior walls of the ventricles.

5. By extravasation of more or less serosity into the ventricles.

6. By a deposit of tubercular matter in other

organs, generally in an incipient state, or in an acute form.

The disease thus characterized makes its appearance generally when the health is, to all appearance, perfectly good; more rarely it follows some other affection, especially confirmed tuberculization; it begins with headache, vomiting, constipation, and slight acceleration of the pulse; in a few cases, with agitation and delirium. The intelligence is preserved, the powers are little depressed, the appetite is diminished, the thirst moderate; the attacks of vomiting are few in number, the matter vomited being alimentary or bilious, and they seldom last more than two or three days—in some very rare cases, there may be a repetition of them during several weeks. The constipation remains, the pulse diminishes, and becomes irregular; the child is dejected and sorrowful; from time to time it grinds the teeth; it avoids the light, and its look is expressive of doubt, often of surprise, at times a little fixed; and this state of countenance contrasts remarkably with the clearness of the intellect. As the disease progresses, respiration becomes unequal, irregular, and interrupted by deep sighs and prolonged yawning; a slight degree of somnolency is observed; the countenance is alternately flushed and pale, and expressive of astonishment, indifference, or wandering; frequently there is difficulty in raising the eyelids—the globe of the eye is seen to move slowly in different directions, as if by mechanical, rather than by vital impulse. Sometimes the features

are devoid of all expression, and, save from frequent alternations of colour and paleness, present a cadaverous appearance. The eyelids are gummy at their inner angle, and the nostrils dry; the tongue remains moist, but the abdomen alters in shape; the hypochondriac and iliac regions become marked; the central portion of the belly is depressed, the retraction being sometimes carried to such an extent, as to render the pulsations of the aorta visible. The constipation yields to purgatives and not to the natural course of the disease, and diarrhœa succeeds. These symptoms, whether individually or collectively, are uncertain in duration, and are then succeeded by nervous phenomena; the somnolency increases, or delirium or agitation supervenes. The little patients utter loud cries. The delirium is oftener calm than violent; it is of uncertain duration, generally lasting not more than two or three days, and is then succeeded by greater somnolency and true coma, which alternates with it. At this period, disorders of motility appear; paralysis generally partial, contraction of the limbs, stiffness of the trunk, locked jaw, picking at the bed-clothes, subsultus tendinum and convulsions; the pupils are dilated, sometimes one more than the other, and there is strabismus; the general sensibility becomes obtuse, and sometimes, but rarely, that of the organs of the senses also. The pulse is small and rapid, the skin hot and often perspiring, the breathing irregular, the stools and

urine are passed involuntarily; the coma becomes permanent, and shortly before death the face is purplish, and covered with perspiration, the eye hollow, the countenance vacant, the cornea dull, the nose sharp, the nostrils dry, the pulse more and more feeble, respiration accelerated and stertorous. These symptoms announce approaching death, which is sometimes delayed for a day, or else hastened by an attack of convulsions.

Such is the course of tubercular meningitis in a great majority of cases; but the symptoms above described are subject occasionally to variation in their order, intensity, and duration.

In all the cases we have observed, the progress of the disease has been uninterrupted; some of the symptoms have at a certain period of the malady undergone a remission, but this has never *extended to the whole*. Thus we have seen delirium, and even coma, succeeded by a calm, and complete return of intelligence: but in these cases, *the pulse remained irregular*, the abdomen preserved its retracted condition, the countenance its astonished and fixed appearance. Under such circumstances, we have never hesitated to persist in the diagnosis and prognosis we had before entertained.

The usual duration of the disease is from eleven to twenty days; but it may occasionally last six weeks or two months, dating from the first appearance of vomiting. In twenty-eight cases the disease lasted—

7 days in 1	20 days in 1
9 " " 1	23 " " 1
11 " " 2	24 " " 1
12 " " 1	26 " " 1
13 " " 3	27 " " 1
15 " " 1	29 " " 1
16 " " 1	37 " " 1
17 " " 2	44 " " 1
18 " " 1	60 " " 1
19 " " 5	67 " " 1

Symptoms. The modifications of the pulse are, perhaps, the most important of all the symptoms in the diagnosis of the cerebral affection. When meningitis occurs at a period of good health, or, at least, when the child appears to be well, the pulse is generally accelerated at the commencement. The acceleration is of short duration, and after a few days the pulse returns to its natural frequency, or falls below it; this change continues for an uncertain time, but has relation to the duration of the disease, so that if the pulse beat only 60, 80, 90, we may be sure the disease will last yet some days. But when the pulse again increases in frequency, the fatal termination must be regarded as approaching, within limits varying between two or three days, and, in some very rare exceptions, between five and six. In almost every case the pulse is irregular, but not always at the same period; the irregularity always coincides with diminished frequency.

The pulse is moderately accelerated at the onset of the disease;

It is irregular, with or without diminished frequency, in the middle period ;

It is very rapid and small the day before, and the day of death, seldom several days before.

Febrile complications, either before or after the attack of meningitis, influence the frequency, but not the regularity of the pulse.

We have scarcely ever found the pulse at the same time permanently irregular and slow in any other disease, acute or chronic, than in tuberculo-inflammatory affections of the brain and its appendages.

Heat comes on generally at the same time as acceleration of the pulse. When the pulse becomes slow, the heat of the skin is sometimes great, sometimes slight ; and generally when the pulse again becomes frequent, the heat of skin increases also.

The *countenance* is generally pale ; but the cheeks are flushed when the little patients are roused, and an endeavour is made to fix their attention ; shortly before death the face assumes a violet tint.

The *sweats* are copious, sometimes general, but commonly more profuse about the face than anywhere else. They generally come on three or four days before death, and coincide almost always with the acceleration and smallness of the pulse, and the violet colour of the face.

Respiration is generally irregular, sometimes interrupted by sighs, and occasionally there is a momentary suspension of the act ; the child appears *to forget to breathe*. Irregularity in the breathing generally

comes on from one to six or seven days before death, and when once manifested, almost always lasts until a fatal termination takes place. In a great majority of cases the breathing is not accelerated until within a short period before death. During all the earlier period of the disease, the respiration does not exceed 20 or 28, unless it be complicated with pulmonary disease.

Appetite is seldom entirely lost, and *thirst* is seldom intense. The teeth and gums are generally moist. The *tongue* is moist at first, but occasionally becomes dry a few days before death.

In a large majority of cases, *vomiting* appears at the commencement, generally on the first day, sometimes on the second or third, but rarely later than this—and often lasts only two or three days. But there are many exceptions to this rule; in three cases, the vomiting continued thirteen days in the first, and nearly two months in the others: in one of the latter it alternated with attacks of intense headache. The matter vomited consists sometimes of the food taken; at other times it is entirely bilious; the vomiting occurs generally but two or three times a day, and when once it has ceased it seldom re-appears.

Constipation is a frequent but not a constant symptom, and when occurring conjointly with vomiting, is of great value as an indication of meningitis. It occurs at the commencement of the disease in three cases out of four; sometimes it appears at a later

period. It is generally obstinate, and resists repeated doses of purgative medicines; occasionally it yields readily, and is followed by more or less diarrhœa, the stools being of a greenish colour. Almost all our patients have had diarrhœa at some period of the disease, perhaps from seven to twelve days from its commencement. In one case the stools remained natural during the whole time, and another patient had diarrhœa from first to last, which was explained after death by the existence of slight softening, and three small ulcers in the intestines.

At a certain period, generally about the sixth day, *the abdomen becomes flattened, hollow, retracted towards the spine*, and remains so until death. The retraction, however, although a constant symptom, varies both as to its extent and the period at which it commences. It is almost exclusively in cerebral diseases that we have observed this symptom.

Abdominal pains occur at various periods, but seldom at the commencement; they are not generally very acute, the seat of them is uncertain, and they are increased by pressure.

Headache is a constant symptom, and occurs at the onset of the disease. It is generally severe, affecting the frontal region; children who are old enough complain of it spontaneously, and it is accompanied with moaning; it usually lasts until the appearance of delirium or coma, after which it would be impossible to ascertain its existence.

A very remarkable fact in the history of meningitis

is that the intellect is often perfectly clear; it generally remains so during the first few days; and when after this period the intellectual faculties become affected, the signs of it are so slight and indefinite, that it is very difficult to make a precise diagnosis, if other more positive symptoms be wanting. In one-fifth only of our patients has there been perversion of the intellectual faculties from the commencement. Delirium may come on at various periods from the fifth to the twenty-fifth day; it is often calm, but sometimes on the contrary fierce, attended with screaming, agitation, and frequent changes of position. The result of our investigations leads us to the conclusion that there is no relation between the intensity of the inflammation, the number or situation of the tubercles and the delirium.

Somnolency and coma are very frequent symptoms in meningitis; we have found them absent in three cases only. The drowsiness does not generally come on until after the third day, and the coma supervenes at a still later period. Coma when once present, does not necessarily continue till the termination of the disease; being often replaced by delirium, screaming, restlessness, and re-appearing shortly before death, when it announces a quickly fatal termination. In one very remarkable case, profound coma supervened on the seventh day; on the tenth the child had quite recovered its consciousness; delirium re-appeared on the eleventh, and complete coma on the fourteenth.

Convulsions are less important with regard to their frequency than to the exact period of their occurrence. Meningitis not complicated with tubercular disease of the cerebral substance is never ushered in by convulsions. Experience proves, on the other hand, that in cases in which convulsions appear at the commencement, or, by their frequency, intensity, or periodicity, constitute an important symptom, they almost always coincide with tubercles of the *brain*. Convulsions present various degrees of severity; being sometimes limited to the extremities, upper lip, or eyeballs; when general, they are of variable duration. Frequently convulsions have been terminal. Other disorders of motility, such as subsultus, carpalogy, catalepsy of the extremities, spasmodic contractions of the eyelids, grinding the teeth, and trembling of the hands, appear at an advanced period of the disease, and are of short duration. Grinding the teeth is an exception, as it occasionally appears near the commencement of the attack, and for that reason is of greater importance.

Partial and evanescent abolition of motion is not rare in meningitis; but there is scarcely ever severe general and permanent paralysis.

The general sensibility undergoes several modifications at an advanced period of the disease, but it is rarely exalted. It happened so in four only of our patients; and is much more frequently observed to become obtuse in various degrees, from slight diminution to complete abolition. It generally

begins about the seventh day, and increases with the progress of the disease. One instance we have noticed in which the organs of the senses lost their sensibility before that of the skin; in some cases they become blunted at the same time that cutaneous sensibility disappears.

Frequently, at a time not distant from the commencement of meningitis, children avoid the light by placing their hands before their eyes; and we observe also twitchings of the eyelids and transient grimaces, which probably depend upon the same cause. Strabismus is present in almost half the cases, dilatation of the pupil in three-fourths. Strabismus is sometimes divergent, sometimes convergent; it comes on at an advanced period; we have not noticed it before the eighth day; it is variable in its duration, seldom lasting more than eight days. Dilatation of the pupils occurs frequently one or two days before death, or on the day of death. The senses of hearing and smelling are generally preserved longer than that of sight, and are seldom lost until just before death.

The diseases which may be mistaken for tubercular meningitis are:—1. Inflammatory meningitis. 2. Acute hydrocephalus. 3. Cerebral hæmorrhage. 4. Cerebral congestion. 5. Cerebral symptoms arising in the course of eruptive fevers. 6. Certain functional cerebral disorders. 7. Slight gastritis. 8. Typhoid enteritis. 9. Typhoid fever.

DIAGNOSIS.

TUBERCULAR MENINGITIS.

1. *Symptoms at the commencement.* Headache varying in intensity, vomiting, constipation, slight acceleration of the pulse. In a great majority of cases the intellect is unaffected.

2. In appearance a mild disease.

3. Onset insidious.

4. *Progress.* Slow, irregular, alternately better and worse; slowness or irregularity of the pulse; nervous symptoms varying in degree, form, and duration; generally but slight agitation; delirium often quiet.

5. *Duration.* More prolonged, seldom lasting less than seven days, and sometimes prolonged to fifteen, twenty, or forty days.

SIMPLE MENINGITIS.

1. Headache very severe, excessive agitation, with screaming, preceded or followed by coma or drowsiness; prolonged shivering followed by severe fever, bilious vomiting, with or without constipation.

2. In appearance a severe disease of an irregular type.

3. Onset that of a rapid and severe acute affection.

4. Rapid, with progressive and continued aggravation of symptoms; febrile symptoms often persistent; nervous symptoms of the same nature, except the agitation, which is *excessive* and lasts until death; delirium active.

5. Most frequently very short, thirty-six hours perhaps, and seldom beyond the fourth day.

The acute secondary hydrocephalus which appears in the course of eruptive fevers, differs from tubercular meningitis both in its own proper symptoms, and in the circumstances which precede it. Thus, in this form of hydrocephalus, the convulsive or comatose symptoms predominate, but they are not necessarily preceded by constipation, headache, or vomiting, or

especially by these three symptoms combined. Sometimes even it begins with diarrhœa; the pulse is frequent, full and regular, instead of being slow and irregular. The previous history and concomitant symptoms will, moreover, tend to prevent a mistake in diagnosis.

DIAGNOSIS.

CEREBRAL CONGESTION.

Commences with deep coma, or with precursory symptoms, consisting of tingling and numbness of the upper limbs, and occasionally of the corresponding half of the face; sometimes it declares itself by delirium, great agitation, violent twitchings in the tendons, convulsions, a kind of tetanic rigidity, partial paralysis, and difficult respiration.

In the progress of the disease, the power of motion and sensation are entirely lost; the countenance is sometimes flushed, but generally natural; at other times convulsed; the eyes swollen, injected, bright, fixed, or continually moving horizontally.

TUBERCULAR MENINGITIS.

Begins with headache, vomiting, constipation; never with coma, tingling or numbness. In a few cases there is delirium, but never rigidity or paralysis.

The countenance is about the same in *confirmed meningitis*; but the look is more commonly uncertain, astonished, or fixed, sad, and fallen, and coma comes on by degrees; sensibility and motility are in part preserved; and with the exception of grinding the teeth, convulsive movements of the face seldom occur, and then at a late period of the disease.

Pupils sometimes much dilated, sometimes natural, but always little or not at all sensible to light.

Respiration may be either natural or stertorous.

Pulse generally full and large, but soon becomes weak.

Duration is only a few hours, and in some cases sudden death, as by syncope, takes place.

Pupils only at an advanced period of the disease become insensible to light.

Respiration often irregular and accompanied with deep sighs.

Pulse at first slightly accelerated and soon irregular and slow; it becomes accelerated again only towards the last.

Duration is at least some days. When death takes place suddenly, it is by an attack of convulsions.

Cerebral hæmorrhage may sometimes be mistaken for tubercular meningitis; but the former often begins with repeated attacks of convulsions, whilst this is seldom the case with the latter unless the inflammation be complicated with cerebral tubercles. It is more difficult to distinguish when it takes on the inflammatory form; the symptoms are then very much alike, but are generally of shorter duration and less regular than in meningitis, and the disease is of much less frequent occurrence.

In the other diseases mentioned as likely to be mistaken for meningitis, the previous history, the difference in degree of some of the symptoms and the temporary nature of others, the mode of attack, and the progress of the disease, are so many helps to lead us to a correct diagnosis.

The *prognosis* of tubercular meningitis, according to

the testimony of all pathologists, as well as from our own experience, is extremely unfavourable. This was the opinion of R. Whytt who states that not one of his cases recovered, and it is confirmed by most other physicians since his time. We certainly ought not to anticipate the future, and affirm that this disease must always necessarily terminate in death; but rather to hope that as its nature is better understood, a successful mode of treatment will one day be discovered. But experience is the fruit of the past, and this teaches us that, in an immense majority of cases, tubercular meningitis is, as Camper declared, *immedicabile vitium*.

CAUSES.

Age. Children are most subject to tubercular meningitis at from six to ten years of age; then, in order of frequency, from three to five years, from eleven to fifteen, and least so from one to two years.

Sex. According to our own observation, the disease is much more frequent in boys than in girls.

Like all other scrofulous affections, meningitis appears to be hereditary; it may also succeed to other diseases, as measles, &c., and tubercular disease itself, whether of the membranes, of the brain, or even of other organs, is a cause of inflammation of the meninges. The spring, and especially the month of March, appears to be the season most favourable to the development of tubercular meningitis.

The following may be enumerated as exciting causes, viz. :—Insolation, fright, fits of passion, falls, blows on the head, and the repercussion of diseases of the scalp.

TREATMENT.

Prophylactic. The child should be accustomed from a very early age to have but little covering on the head, and the hair cut short. The limbs should be kept warm, the head raised in bed, and the bed-clothes light. Premature development of the intellectual faculties should be restrained rather than encouraged; exercise must not be carried to fatigue; and the general hygienic treatment advised for scrofula is to be adopted.

Curative. The indications are, first to attack and remove the acute inflammatory symptoms; then to favour the passage of the tubercular affection into a chronic state, and afterwards to treat this by the most effectual means. The following is a *résumé* of the treatment:—

A. A strong and healthy child is suddenly taken with severe headache, attended with vomiting and constipation; the pulse is slightly accelerated, and there is slight fever; the intellect is clear. An attack of tubercular meningitis is at hand, and the following treatment should be adopted:—

1. From 4 to 10 leeches, according to the age, to the anus or inner part of the thighs.

2. Give in the course of the day from 20 to 40

centigrammes of calomel, according to the age, in doses of from 5 to 10 every two hours.

3. A glyster containing castor oil or some other purgative.

4. Cover the feet with hot flannels, or linseed meal poultices, lightly sprinkled over with mustard.

If the pulse maintains its frequency, but not otherwise, the leeches are to be applied again on the following day.

B. The disease progresses, or the physician is not called in until the second stage has arrived; the vomitings have ceased; the constipation continues, or is overcome with difficulty; the pulse is slow and irregular, the abdomen retracted; the intellect is clear, but the peculiar confused expression of countenance is observed.

1. Calomel is to be given as above described.

2. Mercurial and iodine ointment to be rubbed daily into the upper part of the thighs.

3. Cold cloths to the shaven head.

4. Apply mild mustard cataplasms.

C. The disease pursues its course; the child answers questions slowly; there are alternations of coma and drowsiness; and the pulse is still slow and irregular.

To the preceding, we add the following treatment:—

1. A large blister to cover chief part of the shorn scalp.

2. If the blister cannot be used in this way, it may be applied on the inner part of each thigh or calf of the leg.

3. If constipation be not yet overcome, some castor or croton oil must be given instead of the calomel; but the dose should not be repeated.

D. The disease having arrived at its third period, the pulse being frequent, the coma profound and almost constant, &c. The only treatment which now can be advised is,—

1. The application of cold.
2. Mercurial or iodine frictions.
3. Suspension of the calomel if there be diarrhoea.
4. Mustard cataplasms.

E. A child in good health, is seized on a sudden with some of the symptoms of meningitis; there is headache returning at intervals and accompanied with vomiting and slight constipation; but there is no pyrexia, and these symptoms continue some time without the supervention of the second stage.

1. The treatment for tuberculization in general must be employed, iodine and ferruginous preparations, exercise in the open air with the head uncovered, taking care to avoid exposure to the perpendicular rays of the sun.

2. The hair is to be kept short, and iodine frictions used upon the head.

3. When symptoms of meningitis become marked, we must have recourse to the treatment indicated under the head A.

F. A child, of strumous habit, has pain in the head and spontaneous attacks of vomiting; tubercular meningitis is to be feared; iodine frictions to the head must be added to the general treatment of scrofula.

If symptoms of meningitis become more decided, the treatment described under A must be employed, with the exception of abstraction of blood.

3. TUBERCLES OF THE BRAIN.

1. *Chronic form of cerebral tuberculization.* This generally makes its appearance at a time when the health is so good as to lead to no suspicion of the existence of tubercular deposit; more rarely it is preceded by symptoms of tuberculization, general or local, primary or secondary. It comes on generally with violent convulsions, analogous to attacks of epilepsy; less frequently, the convulsions are partial. Sometimes they are the only cerebral symptoms, but at other times are accompanied with headache, vomiting, &c. In other cases, the commencement of the attack is marked by severe headache, lancinating or throbbing, general or frontal, continued or intermitting; sometimes isolated, sometimes accompanied with other nervous symptoms, such as sadness, apathy, strabismus, uncertainty in walking, &c. In a few cases, paralysis of one side of the body, or loss of sight, preceded or not by vomiting, are the first symptoms observed. Occasionally it is ushered in by stiffness of the muscles of the neck, or by exalted sensibility with diminished intelligence. And lastly, the disease may commence with acute symptoms like those of the first period of meningitis, as headache, vomiting and constipation.

Progress. The convulsions re-appear at intervals, and are followed by muscular debility, paralysis or rigidity; or diminution or loss of sight, strabismus, dilated pupils, and loss of intelligence. Sometimes headache predominates, the paroxysms being violent and lasting several hours. Motility is generally much more affected than the intellect, which is often not much perverted until an advanced period of the disorder.

As the disease progresses, the evacuations become involuntary; the pulse and respiration are quickened, and the symptoms before enumerated continue, except headache, which generally disappears.

Termination. Death sometimes occurs from the natural progress of the cerebral lesion; at other times, from the supervention of tubercular meningitis, or acute hydrocephalus, or from a violent attack of convulsion; and more rarely, from some disease unconnected with the principal malady.

The duration of this form of tubercular disease is generally from three to seven months; sometimes it lasts from one to two years, and in a few cases even longer.

2. *Chronic tubercular hydrocephalus* very frequently accompanies chronic tuberculization of the brain; we have met with it twelve times in twenty-five cases of this nature. It seldom shows itself under two years of age, commonly between four and nine years. In one case, it appeared at the age of three months, and in another, it was probably congenital; and its duration is usually more prolonged than that of simple tuberculization of the encephalon.

3. *Acute form of cerebral tuberculization.* This disease is generally preceded by symptoms indicative of general or local tuberculization, and comes on with violent and frequent attacks of convulsions, occasionally followed by coma and rapid death. When it is of longer duration, various symptoms, such as headache, partial paralysis, dilated pupils, strabismus, and occasionally also vomiting and constipation, appear in the intervals between the attacks of convulsion. The *duration* of this form varies from two to three days. After death, appearances of meningitis are found as well as tubercles, and it is difficult to determine to which disease the symptoms were attributable. But, considering that meningitis alone never begins with convulsions, and that in one case the acute convulsive form was observed in a child affected with cerebral tubercle without inflammation of the meninges, we are naturally led to the conclusion that this form occurs in connection with the existence of tubercle of the brain and the secondary lesions dependent upon it.

Paraplegia generally coincides with the development of tubercles in the cerebellum.

Hemiplegia, or *partial paralysis*, results, *in general* but not always, from the development of tubercle in the opposite side of the brain.

Ramollissement of the substance of the brain around the tubercle does not necessarily occasion paralysis.

DIAGNOSIS.

In forming a correct diagnosis, the following particulars are of great value :—

1. The age of the child, the cerebral form being much more frequent after, than before, the age of three years.

2. The circumstances which preceded the attack, and especially the causes under the influence of which the disease became developed.

3. State of health at the period of invasion.

4. The primary symptoms, as convulsions, lancinating headache, (continued or intermitting,) paralysis, amaurosis, and, much more rarely, rigidity.

5. Lesions of the cranial parietes, exophthalmia, nasal or auricular discharge, coinciding with cerebral symptoms, or having been preceded by continued vomiting.

6. The chronic progress of the symptoms deserves especial consideration ; for time alone will sometimes discover the nature of the disease. Chronic symptoms with respect to motility, are more to be depended on than disorders of the intellect.

7. Regard must be had also to the great frequency of tubercular disease in childhood, and the infrequency of other kinds of chronic cerebral disease.

The diseases with which tubercles of the brain may be confounded are either organic or functional. Of the former,—1. Meningitis. 2. Hypertrophy. 3. Hydatids

and cancer of the brain. 4. Chronic arachnoidean hæmorrhage. 5. Chronic hydrocephalus. Of the latter,—convulsions, rigidity, and paralysis.

When tubercular disease of the brain begins with the symptoms of *meningitis*, without convulsions, it is impossible to denote the characters by which these two diseases may be distinguished, until a more advanced period of the malady. When it presents itself under the *chronic form*, it is necessary, in order to establish the diagnosis, to distinguish cases in which it commences with convulsions from those in which it is announced by other cerebral symptoms. In the former, it may be confounded with hypertrophy of the brain, chronic arachnoidean hæmorrhage, convulsions and epilepsy; in the latter, with hydatids and cancer of the brain, chronic hydrocephalus, and rigidity of the extremities.

1. *General hypertrophy of the brain.* The guide in cases of this nature are the circumstances which have preceded the appearance of convulsions. For instance, a child has a large head, which has increased in size in a disproportionate manner, without producing well defined cerebral symptoms. If under these circumstances, an attack of eclampsia supervene, followed by nervous symptoms in a chronic form, we may suspect the case to be one of hypertrophy arrived at its second period.

2. *Chronic arachnoidean hæmorrhage* accompanied by some enlargement of the head, and simulating hydrocephalus, may be mistaken for hydrocephalus

the result of cerebral tubercles. The diagnosis is based upon the following considerations: the *age of the child*; chronic hæmorrhage in the form of hydrocephalus being a disease which occurs exclusively in children under three years of age; whilst hydrocephalus from cerebral tubercles is rare before that age. *The mode of attack*; tubercular hydrocephalus being frequently preceded by convulsions, whilst this symptom is more rare at the commencement of arachnoidean hæmorrhage.

3. *Cancerous tumours*. The only characters by which we can here arrive at a probable diagnosis are:—the previous history, hereditary predisposition to scrofula, signs of tuberculization general or local, and especially the great frequency of encephalic tubercles in children compared with the extreme infrequency of other kinds of cerebral disease. But we find, in authors, cases of hydatids and cancerous tumours of the brain which have followed a course exactly similar to that of cerebral tubercles.

4. *Idiopathic epilepsy*, like cerebral tubercles, begins with convulsions; and it may happen, that after a first attack we observe derangement of the general health, slight pyrexia, vomitings, and various disorders of motility;—symptoms which do not present themselves after succeeding attacks; it is therefore of the greatest importance in cases of this nature, not to pronounce hastily, but to suspend our judgment for a few days. If epilepsy be essential, the child will maintain a state of perfect health;

whilst if it be connected with the existence of cerebral tubercles, there will almost necessarily be observed more or less disorder of motility, of the functions of the organs of the senses, or even of the intelligence.

5. *Essential rigidity of the extremities* is sometimes difficult to distinguish from that connected with cerebral tubercles. The following considerations will aid the diagnosis :—

This symptom very rarely marks the commencement of the latter disease, because it depends upon softening, which is always consecutive.

When it does take place at the beginning of the attack, the stiffness exists not only in the fingers and toes, but also in the muscles at the back of the neck. Moreover, it is but a symptom of some actually existing general or local acute disease, or of some special physiological disorder; and is never attended with the cerebral symptoms.

Lastly, under the influence of appropriate treatment, it has a tendency to disappear rather than to increase.

6. *Essential paralysis of the extremities* is a rare affection. It is distinguished—1. By its mode of attack, the paralysis being instantaneous and complete; whilst it generally comes on gradually when caused by cerebral tubercles. 2. By the absence of every other nervous symptom except loss of the power of motion. It also occurs in very young children, whilst the paralysis of tubercular cerebral disease occurs principally in those who are more advanced in life.

The *prognosis* in tubercular disease of the brain is always unfavourable; indeed we are not cognizant of a single well authenticated case of recovery.

Children are most subject to cerebral tuberculization, with symptoms, from three to ten years of age; it rarely occurs at an earlier period, and very seldom from eleven to fifteen years. Boys appear to be more subject to it than girls.

Age and sex of twelve children affected with tubercle of the brain :—

From three to five years	6	{	Boys . 4
		{	Girls . 2
From six to ten and a half years	4	{	Boys . 3
		{	Girl . 1
From eleven to fifteen years	2	{	Boy . . 1
		{	Girl . . 1

Treatment. The obscurity of the diagnosis interferes with the employment of any rational method of treatment; and unfortunately when the disease is recognised, there is, as in other tubercular affections, but little hope of cure. Attention must be paid—
 1. *To the intimate nature of the disease*; and 2. *To the manner of its commencement and the nature of the symptoms.* These two considerations are often the only ones by which the practitioner can be guided in his treatment.

The preparations of iodine are indicated in this, as in all other scrofulous affections, and should be employed both internally, and externally in the form of ointment rubbed upon the head, or spread on lint

and laid upon the scalp. Iodine baths may also be used. If iodine cannot be borne, or fails to produce any good effect, steel and bitter tonics may be substituted for it.

A seton or issue may be applied to the arm or back of the neck. Blood-letting and other antiphlogistic remedies are inapplicable unless the case is attended with acute symptoms indicative of inflammation.

The diet should be nutritious without being stimulating, and the child should be as much as possible in the open air.

4. LATENT TUBERCULIZATION OF THE BRAIN AND ITS MEMBRANES.

Although tubercles of the brain and membranes most commonly occasion the dangerous symptoms before described, it may happen that they produce only slight derangement of the cerebral functions, or go through their whole course without giving rise to symptoms that lead to the suspicion of disease in the encephalon. The pathological anatomy of latent tuberculization is the same as that of regular meningitis, with the addition of appearances of chronic inflammation of the meninges.

5. TUBERCULIZATION OF THE BONES OF THE CRANIUM.

Whether tubercles arise primarily in the bony

tissue, or in the brain or its membranes, they occasion alterations in the cranial parietes when they come in contact with the bone. When tubercle originates in the membranes and consecutively extends to the bones, it corrodes and at last perforates them. When it originates in the bone itself, it may be encysted or infiltrated, and produces disorganization of the bony tissue, the result of which is also perforation, and the establishment of a fistulous opening, by which the cranial cavity, or that of the organs of the senses, communicates with the external air.

When the tubercles are situated upon the orbit, or cribriform plate of the ethmoid bone, they may occasion serious disease of the eye or exophthalmia, or destruction of the interior of the nasal fossæ.

In four of our patients, we have found complete destruction of the membrane of the tympanum. The internal ear was converted into a large hollow filled with thick greenish fluid, with a number of small portions of bone floating in it. In three of the cases, it was impossible to discover any vestige of the parts belonging to the internal ear; whilst in the fourth, a large splinter, detached from the interior of the petrous portion of the temporal bone, contained the cochlea and a part of the semi-circular canals. We also found the auditory and facial nerves where they enter the auditory foramen, but could not trace them into the interior of the abscess. In two cases, the petrous portion of the temporal bone, examined at the interior of the cranium, presented no appreciable

alteration; the dura mater retained its ordinary colour and consistence; it was detached easily from the bone; the bony tissue beneath it showed no trace of vascularity. In the other two cases the dura mater was diseased. In two, there was a large perforation behind the ear, causing an artificial communication between the interior and exterior auricular passages.

It is difficult to determine from what point these serious lesions take their origin; but we are inclined to believe that the bone is primarily affected. Two encysted tubercles were very evident on the side of the large cavity above described. The encysted tuberculous matter became softened probably, and this softening converted the internal and middle ear into a single cavity bathed with pus; and afterwards the membrane of the tympanum became ulcerated, and allowed the pus to escape externally. In none of the four cases was the disease of the bone similar to caries; the osseous tissue was neither black, soft, nor crepitating; but only infiltrated with pus, or separated into large sequestra.

The substance of the brain in the vicinity of the diseased petrous bone was healthy, except in the cases in which the dura mater covering its posterior surface had been destroyed or inflamed. All four children were scrofulous in the highest degree.

After the occurrence of suppuration, and the escape of pus from the ear for two or three months, paralysis of the face supervenes; but it is limited to motion, the sensibility of the integuments remaining. This

symptom is of great importance since it clearly indicates alteration of the osseous structure around the motor nerve of the seventh pair. It is important also to notice whether any small portions of bone escape externally with the discharge.

The *prognosis* of tubercular disease of the petrous portion of the temporal bone is always unfavourable; because, on the one hand, this affection leads us to apprehend the existence of tuberculization of the brain and other organs; and on the other, because it can never be cured without complete deafness, even supposing it limited to the petrous bone.

With respect to the question as to whether the otitis be the cause or the effect of encephalic inflammation, we have no doubt,—1. That the disease of the bone is scarcely ever the result of the cerebral disease. 2. That the cerebral affection is in most cases simply a coincidence. 3. That when disease of the encephalon exists in the part corresponding to the alteration of the bone and dura mater, the inflammation has unquestionably been transmitted from the ear to the brain.

Treatment. This should be both general and local. The former is the same as for tubercular disease. The latter consists in the free employment of emollient injections into the interior of the ear, in order to prevent an accumulation of purulent matter. One or two leeches may be applied near the concha to prevent engorgement of the membrane lining the auditory meatus. Perhaps also the canal might be

touched very lightly with nitrate of silver. If an abscess in the mastoid process have preceded the discharge, it should be opened. Issues, setons, &c., have been advised to be applied to the back of the neck as revulsives.

CONCLUSION.

In the preceding pages I have introduced the opinions of many of the best writers on the cerebral diseases of infancy; it would have been no difficult matter to have noticed others who have done good service in promoting the knowledge of this interesting department of medicine, such as Gölis, Legendre, Guersent, Green, Conquest, Watson, West, Willshire, and others; but it is doubtful whether, by adding to the number, I should have increased the utility of the descriptions. Moreover, I trust the compilation I have made will be found sufficiently copious to afford a tolerably complete history of what was known in earlier times, and is now known, respecting the nature, causes, and treatment of this class of diseases.

The experience of an individual, however extensive his opportunities, can scarcely furnish sufficient materials for a comprehensive report; but I have ventured to add a few remarks arising out of my own observation, which, I hope, though brief, may assist in throwing a few rays of light upon some practical point yet veiled in obscurity. In pondering what has

been written on cerebral diseases, we shall be struck, not so much with any deficiency of knowledge as to their characters, pathology, or symptoms, as with the indefinite and unsatisfactory methods of treating them; and the hiatus in this most important respect is probably due to the desire manifested to base principles of treatment upon *post mortem* appearances; but whilst the latter, although fully known and accurately described, vary so much in relation to the symptoms they are supposed to occasion, how can the former be depended upon for safely averting the great dangers we have to encounter? There is much, very much, to be learned in the treatment of these diseases; in what manner can such knowledge be most easily and usefully obtained? Owing to the present advanced state of knowledge, we are enabled to determine certain generalizations, and to state a few established facts, which afford useful hints for practical application.

1. Cerebral diseases occur most frequently in children of a scrofulous habit, or born of scrofulous parents.

2. Scrofula greatly modifies the character of cerebral, as well as other diseases.

3. Cerebral diseases may exist independently of scrofula.

4. Headache, vomiting, constipation, and more or less pyrexia, are a combination of symptoms denoting, in children, serious, and often unmanageable, cerebral disease.

5. A species of hydrocephalus, chiefly indicated by the preceding symptoms, is generally accompanied with, or depends upon, tubercular disease of the brain or its membranes.

6. There exists another species of hydrocephalus, attended with the usual symptoms of phrenitis, which is of a strictly inflammatory nature, and curable by strictly antiphlogistic remedies.

7. Hydrocephalus resulting from tubercular disease may assume an active inflammatory type, and be scarcely distinguishable from the last variety, except from not being so amenable to antiphlogistic treatment.

8. Symptoms similar in many respects to those of acute hydrocephalus, in one or other of the above forms, may arise from a state of system diametrically opposed to inflammation; and are curable only by a nourishing and mildly stimulating plan of treatment.

9. Hydrocephalus, generally speaking, does not occur before the age of two years; and boys are more liable to it than girls.

10. Treatment, in order to be effectual, must be commenced at an early period.

11. The *symptoms* of cerebral diseases in children, and the *post mortem* appearances, have not a definite or constant relation to each other; and the former are more useful than the latter as indications of treatment.

12. Costiveness is not essential to the phrenitic variety of hydrocephalus.

13. Many cases, accompanied with symptoms so

frequently in connexion with tubercular encephalitis as not to be distinguishable from the latter form of disease, admit of being cured; and may, therefore, be fairly admitted as instances of the *curability* of a disease which is generally supposed to be incurable. Professor Golfin, of Montpellier, in a paper in the second volume of the *Revue Medico-Chirurgicale*, relates some cases of acute hydrocephalus arrived at the second, or even the third stage, and apparently become desperate, relieved by the free use of mercurial ointment. Three cases are related in which, after all other means had failed, the patients were saved by the free employment of a large quantity of mercurial ointment. In one case this was continued for eleven days, 184 grammes having been rubbed into the thighs and armpits in that period. Little or no effect was produced upon the mouth.

Case of acute hydrocephalus. A boy, two years and a half old, well nourished, robust, and with a prominent forehead, became unwell on December 8th, 1841. The symptoms were those of an inflammatory cerebral affection, attended with fever. The disease had made considerable progress by the 14th, which was the day on which the author first saw the patient. The prognosis was the more unfavourable, inasmuch as the great fontanelle was unclosed to the extent of an inch in diameter. Every means was put in requisition—blood-letting, calomel internally, mercurial friction on the nape of the neck, blisters, cold applications to the head—without benefit. The dis-

ease went on increasing and seemed on the 26th to have reached its height. The little patient lay powerless and stupid, the head and face flushed and hot, there was grinding of the teeth, the pupils were relaxed, and insensible to light. The child had ceased to scream. The diuretic medicine resorted to had failed to promote the urinary secretion. While in this state, on the twentieth day of the disease, there flowed from the right ear such a quantity of pure limpid fluid as drenched thoroughly the child's neckerchiefs. On the same evening the patient was much relieved. By the use of diuretics, the flow of urine was now maintained, in a copious current, during many days. The coma, in which the child had been for some days, disappeared; the pupil regained motion; in six weeks the little patient was completely cured. (*Medical Gazette*, vol. xxx, p. 811.)

Case of acute hydrocephalus. Iodine—Cure. W. M., aged 6 years, of scrofulous habit, well but delicately formed, of quick perception and excellent memory, with a remarkable fondness for reading and study, has almost from birth been subject to slight convulsive actions, starting during sleep, and awaking with a scream; but, in other respects, enjoyed good health until about the beginning of April, 1847, when he began to lose his appetite, his bowels became deranged, and his sleep more troubled. On the 18th he was attacked with violent purging, which, however, soon ceased; but he became very restless and feverish, and complained of pain and heaviness in the head.

For several nights, and frequently in the course of the night, unless constantly watched, he jumped completely out of bed, screaming violently. A purge of hydrarg. c. cretâ and scammony was given, and acted freely—cold was applied to the head—he was put into a hip bath, and ordered to take small doses of calomel and antimony, and a mixture of acetate of ammonia. This treatment was continued for ten days, but his appetite completely failed, and he became stupid, sitting for hours with his chin upon his breast, and not answering questions, unless previously roused by a loud noise, or by shaking him, when he started and appeared frightened, but answered collectedly, although very briefly and in a peevish tone. He complained of no pain, and was not feverish—pulse very small and quick—tongue covered with white fur, but moist. Blisters were applied behind the ears, and at the back of the neck, the calomel and antimony continued; and as he took no food, and appeared very feeble, a mixture of bark and ammonia was prescribed—the bowels being costive, aperients were from time to time given.

About the 29th he began to complain that he could not see distinctly, and at the same time his speech became very difficult, so that he could hardly be understood, and his hearing was also greatly affected. In a few days he became quite deaf, to all appearance blind, and very seldom attempted to speak, when he could not be at all understood; the pupils were widely dilated, and the pulse hardly to be felt at the wrist.

While in this state, (about May 2,) he was ordered five drops of Lugol's sol. of iodine every four hours. Two days afterwards he became more sensible, could hear a loud noise, and took food. The iodine was continued, the dose being from time to time increased; and he gradually recovered the senses of which he had been deprived, being in better health at the beginning of June than before the attack. He has remained in good health up to the present time.

Hydrocephalus. Cure. A child, three years of age, on February 14th, 1830, had been lethargic, and costive for a week; then was affected with "fits," and tossing of the head; and about March 14th, showed a tendency to stupor but could at times notice objects; its arms were in perpetual motion, yet not altogether spasmodic; the pupils dilated; much emaciation; no fever.

Mercurial-antimonial ointment, calomel, magnesia, and henbane.

17th. Quieter from the medicine.

20th. Spasms subsided; more sense, but vital functions low; salivated by the mercury.

23rd. Exhaustion and costiveness—aperients.

24th. Fits of screaming for two hours together, but no spasms; pupils dilated; eyes staring; sleeplessness, the head seemingly enlarged—calomel, pulv. Doveri, aperients.

31st. The head much enlarged; eyeballs rolling much when asleep.

April 3rd. Sleepless and costive—calomel, castor oil, acetate of morphia.

Progressive amendment to the 16th, when it was convalescent; and in May it was continuing well.

In the last month of treatment, the child used of calomel a scruple, ung. hydr. fort. a dram, croton oil twelve drops, scammony a dram, rhubarb a dram and a half, magnesia a dram, Epsom salts an ounce and a half, Dover's powder a scruple, acetate of morphia a grain, tincture of henbane two drams. (*Medical Gazette*, vol. xxxv, p. 703.)

Hydrocephalus. Cure. A. B., aged eleven years, of leucophlegmatic habit, was attacked with scarlatina on the 1st of September, 1840, the fever continued in a mild form for about a week. He remained very feeble and languid until the 28th, when he became œdematous. He was seized with sickness and vomiting on the 4th of October, which continued until the 7th. On Monday evening, the 5th, at six o'clock, he was seized with convulsions, which continued until six o'clock the following morning. He became blind, and continued to be so until the 8th, the pupils continuing immovable. His sense of hearing was very acute. He laboured under severe dyspnœa, constant cough, and jactitation of the limbs, from the time he became convulsed until the 7th, when he, for the first time, slept for a quarter of an hour, since the attack of convulsions. He began to complain of his head, accompanied with a sense of heat, on Monday morning, the 5th. On Monday evening, the pupils were dilated, the tunica albuginea pale, the pulse quick, feeble, and hurried; the tongue furred

and dry, the bowels confined, the urine scanty, the face œdematous. He was delirious, and continued to be so until the 7th. I ordered a blister to the shaved head, purgative mixture to be taken frequently until it operated; pil. hydrarg. gr. ij. every two hours, with a dose of a diuretic mixture consisting of liq. ammon. acet., tr. scillæ and tr. digitalis. He had no motion until the 7th, when he was freely purged, the stools being dark and very offensive. He voided very little urine until this time, when so copious a diuresis supervened that he was almost constantly wanting to void urine, and often wetted his bed. He began now to sleep soundly and frequently. On the 8th the delirium left him. He still continued to be purged. The œdema had very much diminished. On the 7th the extremities became very cold, and the pulse scarcely perceptible; he appeared to be dying. Towards evening, however, he rallied, and from that time continued gradually to recover. His cough continued to be troublesome for several days. Since he became sensible he has had no pain in his head; his appetite has returned, and he was disposed to take more food than was proper for him. His purging continued until the 11th, when his motions became natural in colour and in consistence. On the 14th the œdema was gone; he continued to void urine freely, taking one dose of his diuretic mixture daily. November 5th, he is now very well again. (Dr. Crowther, *Medical Gazette*, vol. xxvii, p. 323.)

Acute hydrocephalus. Cure. A boy, whose head was disproportionately large, had from his birth frequently suffered from indigestion, and the greatest variety of children's diseases, which very much checked the development of his body. In April, 1837, when he had completed his second year, after being chilled in the feet, and taking indigestible food, he was attacked with a gastro-rheumatic fever, and hardly had he got over this, when, in consequence of taking cold again, one of the most destructive of children's diseases came on. The patient could not bear his playthings; became very peevish; complained of violent headache; could not hold up his head, but let it fall from one side to the other, and when lying down, plunged it deep into the pillow. The temperature of the head was burning hot, whilst the extremities felt cold; the carotids pulsated strongly; the face was of a corpse-like paleness; the eyes red and intolerant of light; the nose and the external auditory meatus quite dry; the tongue clean and red; thirst great; appetite gone; bowels costive, urine scanty; the pulse frequent and hard. To this were added vomiting, terror, coma vigil, the greatest indifference, seizing the head with the hands, grinding of the teeth, respiration hardly audible or visible, and interrupted by sighs, and repeated exclamations that he was burning or falling. It was equally obvious that the disease was inflammation of the brain, and that the child was in great danger. Several leeches were applied to the mastoid process,

a blister was put on the back of the neck, mercurial ointment was rubbed on the submaxillary glands, and two and a half grains of calomel administered daily. On the seventh day of the treatment the submaxillary glands were considerably swollen, the angle of the mouth was sore and its cavity reddened, but there was no remarkable mercurial odour, and no commencement of salivation. On this day, fifteen grains of calomel having now been taken, and two drams of mercurial ointment rubbed on, a happy change took place. In the evening, the left nostril again secreted mucus, and afterwards the right; the eyes again poured out tears when the child cried; and each external auditory meatus likewise began to secrete mucus. The return of these natural secretions, which deserve the greatest consideration, afforded the surest sign of the decrease of the morbid processes. In order to aid these critical endeavours of nature and give the last blow to the disease, six more grains of calomel were used, and another dram of mercurial ointment; so that in all, twenty-one grains of calomel and three drams of mercurial ointment had been employed. It was now time to discontinue the treatment, as was shown by the mercurial fever coming on, and which disappeared again in a few days. In this manner the child fortunately escaped its threatened fate; it recovered rapidly, and still enjoys the most perfect health. (Dr. Bierbaum, of Dorsten, *Medical Gazette*, vol. xxvii, p. 671.)

See also three successful cases reported by

Mr. Fluder, in the 31st volume of *Medical Gazette* p. 23—treated by hydriodate of potass. These and many other similar cases that might be quoted, prove the disease to be, sometimes at least, curable; and the contrary opinion cannot but exercise a very prejudicial influence upon the prognosis and treatment. If we believe a disease to be incurable, we are apt to relax in our efforts to subdue it, and shall probably remain in comparative ignorance of what is, after all, the most important subject for investigation, namely, the best method of treatment.

The treatment of the diseases of children, in general, both as to the nature of the remedies to be used and the mode of employing them, requires considerable tact and discrimination. We have tender bodies to deal with; their period of life greatly modifies the action of medicines; errors of judgment are of more dangerous consequence, and life is altogether in greater jeopardy. In the cerebral diseases of children it is undoubtedly often necessary to reduce arterial action, and blood-letting has sometimes been attended with success. But in very young children it is itself a dangerous remedy, and probably not a few infants have fallen a sacrifice to its depressing influence. The usual method of employing it has been to apply leeches, and children have bled to death from leech bites. Cupping is an operation not easy to perform in children, but it is preferable to leeching, because by it the quantity of blood abstracted can be regulated, and the bleeding

can be stopped as soon as enough has been removed. Fortunately, blood-letting, as a remedy, is seldom indispensable at the period of life in which children are most frequently affected by cerebral diseases; my own experience would almost say never; for in a period of forty years, I have not myself drawn blood half a dozen times either locally or generally (save by scarification of the gums or eyelids) from a child under six years of age, for any complaint whatever.

How then are inflammatory complaints to be treated? What are we to do in a case of phrenitic hydrocephalus if we are not to bleed? Are we possessed of any other effectual means of combating inflammation? Yes, we have many other resources for lessening vascular action in children, which will oftentimes enable us to spare a fluid so necessary to existence as the blood, and so often wanted in later periods of diseases when it may be difficult, if not impossible to supply it. The *warm bath* is a powerful agent for relieving the circulation in infancy. *Antimonial medicines* will reduce power to almost any necessary amount in children. *Purgatives* also; but owing to the great susceptibility of the intestines in children to take on irritation with which the brain very quickly sympathizes, it is not often advisable to use them very freely; we may, however, safely employ enemata, which have the effect of reducing the pulse and lessening heat of skin in a very satisfactory manner, as well as of removing offending matter and

encouraging a flow of bile. But there is another class of medicines for abating inflammatory affections in children, both safe and effectual, provided the stomach be not too irritable to retain them, viz., *diuretics*; and I have repeatedly observed that, whether in fevers or inflammations, promoting a flow of urine has in a striking manner produced an antiphlogistic effect.

These measures may also be employed in combination; and when they are thus combined and judiciously applied, I have still to learn that they are not capable of effecting as much for the removal of febrile action, with scarcely the possibility of harm, as can usually be effected by blood-letting.

In the more advanced stages of inflammations, *calomel* for the removal of lymph and *iodine* (liq. potassii iodidi comp.) for the absorption of effused fluid, are well known and trustworthy remedies.

But the history of the cerebral diseases of infancy proves that in some cases, these measures even might be attended with fatal prostration, although the symptoms, generally speaking, scarcely at all differ from those which accompany acute inflammatory diseases of the encephalon requiring strict antiphlogistic regimen; as in certain cases of hydrencephaloid disease commencing with febrile disturbance. How are we to determine, under such circumstances, whether to depress or to support, when to lessen power and when to stimulate? In doubtful cases, an error in judgment so easy to occur, may irretrievably

turn the scale; and we ought to give the patient the benefit of the doubt, rather than run the risk of removing all chance of recovery by too great activity of treatment. It is perfectly wonderful how, in circumstances the most desperate, nature will sometimes display her restorative powers, when they are not interrupted, but only carefully assisted, by treatment.

In endeavouring to mark out correct indications of treatment, a minute attention to symptoms will avail us more than a reference to the supposed pathological state of the organ in which the disease is situated, in very many instances of cerebral disease. It is generally acknowledged that scrofula almost always coincides with cerebral disease in children, and that it always modifies the character of inflammation wherever located; when, therefore, we have distinct evidence of scrofula, let our treatment of the cerebral disease be modified according to this constitutional defect, and let us beware of excessive or prolonged reduction of vital power.

The occurrence of *pyrexia* in the diseases of children, is an important guide in the treatment. If a child have slight difficulty of breathing and hoarseness, and there be no fever, we attach but little importance to these symptoms, and they may be generally removed by simple remedies; but when fever is present also, they probably indicate the approach of a severe malady. A child may have sickness and pain in the body of a doubtful nature; but if the pulse be quiet, and there be no fever, we shall consider

the symptoms without alarm, and confidently expect to remove them. So also in head affections, unattended with fever, we ought not to resort hastily and actively to depletory measures, however much we may be inclined to suspect the existence of certain pathological conditions supposed to require antiphlogistic treatment.

But there may be febrile excitement in a case where antiphlogistic treatment would be fatal. How are we then to judge? If the fever be of an intermittent character, leaving the patient feeble and depressed in the intervals, the pulse being unsteady and variable, it behoves us to be guarded in our employment of lowering remedial measures.

There can be no question that the right mode of attacking a disease, let its nature be what it may, is first to ascertain as nearly as possible its intimate character, its natural course and termination, and what are the lesions usually connected with it, and then to adapt our remedies accordingly. But these are not the only considerations required; we are not to mark out at once a determinate object or indication, to be fulfilled by particular measures, and to adhere to one undeviating method of procedure, without reference to the changes or modifications which may occur in the progress of the case; we are not to steer direct for a destined port, regardless of the storms or winds we may encounter in our voyage, and which may render deviations from our appointed course not only desirable, but necessary to

ensure our safety! In acute hydrocephalus the indications are to remove inflammatory action, and to promote the absorption of the products of that action; but if we discover signs of debility co-existing or alternating with febrile symptoms; if we notice a weak, feeble, or irregular pulse, or, what is a far better guide than the pulse in infancy, *coldness of the cheeks*, with a tendency to coldness in the extremities; however severe other symptoms apparently connected with increased action may remain, we cannot persevere in the employment of antiphlogistic or depressing measures without incurring the risk of being suddenly called upon to administer cordials and nourishment to sustain the feeble or expiring powers; and this, in many instances, when too late to save life.

In the treatment of the diseases of children, the following circumstances seem especially deserving of attentive consideration:—

1. The delicate, perhaps incomplete, structure of the vital organs; the intolerance, for the most part, of powerful medicines or doses; and the great restorative powers of nature at an early period of life.

2. The necessity for adapting our remedial agents to the delicacy and susceptibility of the structures they are intended to influence, and fulfilling any given indication of treatment by the least possible violence or precipitancy—by the gentlest possible means.

3. Whilst entertaining a just idea of the nature and history of the disease we have to treat, we must at the same time minutely observe particular

symptoms, and vary our plan of treatment according to the information which those symptoms are capable of affording.

4. The importance of endeavouring to the very last to preserve life, however desperate the circumstances may appear; and of always keeping in remembrance that “whilst there is life, there is hope.”

THE END.

