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**Practical Remarks**  
ON  
**DISORDERED STATES**  
OF THE  
**CEREBRAL STRUCTURES,**  
OCCURRING IN  
**INFANTS.**

MEDICAL SOCIETY  
LONDON

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BY WHITLOCK NICHOLL, M. D. M. R. I. A. F. L. S.  
&c. &c.

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“Quæcunque porro ex observatis ad congrua demonstrationis principia applicatis, casti ope ratiocinii, legitime deducta sunt; quanquam per se in sensus non cadunt; non minorem profecto fidem mereuntur.”

GAUBIUS. INSTITUT. PATHOL. MED. 20.

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1851

GENERAL PRINCIPLES  
OF THE  
DISORDERED STATES  
OF THE  
INTERNAL AND EXTERNAL  
GENERAL STRUCTURES  
OF THE  
INFANTS.

BY WHITLOCK NICHOLLS, M.D. F.R.S.E. F.R.C.P.

Author of "General Principles of the Disorders of the Infants of the Breast," "General Principles of the Disorders of the Infants of the Lactating Mother," "General Principles of the Disorders of the Infants of the Lactating Mother," &c.

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1851



TO THE  
PRESIDENT AND MEMBERS  
OF THE  
ASSOCIATION  
OF THE  
KING'S AND QUEEN'S COLLEGE OF PHYSICIANS,  
IN  
IRELAND,

**THIS ESSAY**

IS RESPECTFULLY DEDICATED,

BY THEIR OBEDIENT AND OBLIGED SERVANT,

**WHITLOCK NICHOLL.**



ADVERTISEMENT

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## ADVERTISEMENT.

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A great part of the substance of the following pages is contained in a paper, which was read before the Association of the College of Physicians in Ireland,\* and which has been published in the third volume of the Transactions of that learned Body. I have made some additions to the original paper. In submitting the Essay in its present form to the notice of my professional brethren, I offer them a sketch, the imperfections and deficiencies of which may be remedied by more extended observation and experience.

\* The paper was read on the 6th of December, 1819. Some of the remarks contained in it may be found in a short communication which I sent to Dr. Uwins of London, and which was published by that gentleman in the London Medical Repository for August, 1819.



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## PRACTICAL REMARKS,

&c.

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**I**T very frequently happens, that the consequences of a diseased state are confounded with the cause from which they arise, and that such consequences are considered as constituting disease, while that cause, or, in other words, the real disease, is entirely over-looked.

This remark is particularly applicable to cases in which there is some diseased affection of the cerebral structures ; and it is more especially so, when such affection occurs during the period of infancy. Thus, we frequently find Convulsions, occurring in infants, spoken of, and treated, as a form of disease ; while the irritated, or otherwise altered, condition of



some part of the Nervous System, which is the cause of those irregular Muscular movements is disregarded. But, perhaps, of all the consequences of disordered states of the cerebral structures, there is no one effect of disease so frequently confounded with the causes which produce it, as dropsy of the cranial brain, or Hydrencephalus. The accumulation of exhaled fluid, which is expressed by this name, is an effect which may result from a great variety of causes; yet we commonly find this effect spoken of as a disease of the cranial brain; while the various altered states, of which it is an effect, are considered as so many various effects to which this Disease may give rise. Thus, medical writers, (instead of portraying various affections of the Cranial brain, each of which may, ultimately, produce an accumulation of watery fluid in the ventricles of that organ,) use the term *Hydrencephalus* as a generic term, under which the various states, of which such accumulation is an effect, are comprehended; these states being considered as so many distinct species of one common genus. This application of the term *Hydrencephalus*, has led medical men in general, to consider all the affections of the



cranial brain that present themselves in infants, as partaking of one common nature and character ; it has led them also, to confine their views and their fears to one event, namely to the effusion of watery fluid into the ventricles. It has thrown an obscurity over the symptoms which present themselves in different cases of affection of the cranial brain in infants, and, as it has taught Physicians to look for one common origin of the disease which they have styled dropsy of the brain, it has led them into disputes respecting the cause which gives rise to this dropsy. Thus, when Dr. Whytt, and, after him, Dr. Carmichael Smyth, assert Hydrencephalus to be what is called a passive dropsy, arising from a faulty state of the cerebral exhalants, the effect of debility and laxity ; when Drs. Quin and Rush assign inflammation and congestion as the causes of the increased effusion ; each of these opinions may be considered as assigning *a* true cause of Hydrencephalus, although each is incorrect, in as much as it considers the cause which it assigns as *the only* cause. The essays of Dr. Cheyne on Water in the Brain, like all the other essays of that accurate delineator of disease, are full



of instruction ; and, together with the excellent letter of Dr. Yeats on the early symptoms which lead to water in the brain, they form an admirable study of the complicated forms of disorder which present themselves in children at an early age. But, I think, that these works, excellent as they are, would be still more beneficial, if they did not direct the attention of medical men so forcibly to that one state, Hydrecephalus. For, in a majority of instances, that state is a *sequela*, an effect of disease,\* and, where it occurs, if we should be able to remove it, we may not, by so doing, remove the disease, but, merely, one of the effects of disease.† And, in several cases of affection of

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\* “la collection d'eau dans le crâne et dans le cerveau est l'effet de diverses causes qu'il faut connoître pour les combattre, et pour les prévenir, s'il est possible ; car quel remède seroit assez efficace pour guérir des hydropisies du cerveau, quand, indépendamment de l'eau qui inonde ce viscère, il est désorganisé dans sa substance, &c. *Portal, Anatomie Medicale* iv. 76.

† “In our pathology of these affections, do we not attach too much importance to the effusion, ascribing to it symptoms which we have reason to believe may exist without it, and directing much of our practice to promoting its absorption, while, even if we could rely upon this effect being produced, the original and fatal disease would remain unchanged.”

*Dr. Abercrombie, Edin. Med. and Surg. Jour.* XIV. 292,



the cranial brain in infants, that state does not occur at all, either as an effect, or as a cause, of disease. In such cases, therefore, if our attention is directed to the presence of a collection of fluid in the ventricles, we not only assume the existence of a state which is not present,\* but we may lose time, by employing means which are not applicable to the case. In other cases, a collection of fluid in the ventricles may actually take place, forming the principal, if not the sole, cause of the patient's sufferings; the accumulation may have been formed without any previous perceptible disease; or the precursory disease, which induced the accumulation, may have subsided. In these latter cases, the practitioner, who regards all cerebral

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\* "Caveant medici prædicere se deprehensuros aliquid in capite eorum qui morbo cerebri interierint. Nescio quæ fiat ut morborum Cerebri et notitia et curatio difficillima sit: Notitia quidem, quoniam multi convulsi sunt, Pavoribus consternati, Phrenitide, Apoplexia, Epilepsia, sublatis, Lethargicis affectibus oppressi, sideratique, in quibus nullum fere vestigium mali, aperto cranio, inventum est, nec sanguis, nec aqua, nec ichor, quanquam Medici, qui historiam morbi vidissent, et terrificæ symptomata observassent, certo affirmarent sibi que persuaderent, se aut inter membranas, aut in cavitatibus, aut alia in parte, aut abscessum, aut sanguinis, aut aquæ copiam deprehensuros: —Adeo est obscura morborum Capitalium ratio et evolutio difficilis." BALLONIUS.



affections in infants as Hydrencephalic, may succeed ; for the fears inspired by his dread of Hydrencephalus, may prompt the adoption of a plan of treatment which has for its object the removal of effused fluid, and this object, if attained, may procure a mitigation, or a removal of the unpleasant symptoms.

There is a state or condition of the Cranial Brain in infants, which may be called *a state of irritation*, an *irritated state*, or, in one word, *Erethism*. What this peculiar condition of the Cerebral structure is, I cannot explain. It is a state, distinct from that which is called Inflammation of that structure, for it may exist without any perceptible increase of the quantity of blood that flows through the Cerebral blood-vessels. It is a state, under which, inordinate effects arise from ordinary impressions upon different parts of the Nervous System. In its perfect form, and under a high degree of it, it is a highly sensitive condition of the Cranial brain, a condition the very reverse of that under which sleep occurs. Under such a condition of the cranial brain, the child is wakeful, scarcely ever sleeping ; it is attentive to every



sound, and to every object of sight ; its temper is irritable ; the Retina is highly sensible to light, so that the child quickly winks if its face be turned towards the window, or towards a candle ; the pupil is, in many instances, more or less, contracted, but this is not always the case ; the limbs are much in action ; the head is often moved about, or is shaken from side to side ; the child cries without any apparent cause, and it is soothed only by tossing it, by carrying it about, by putting it to the breast, or by letting it suck the cheek of the nurse, or its own fingers ; the secretion of tears is, in many instances, increased, causing suffusion of the eyes, and redness of the edges of the Tarsi ; the secretion of the Schneiderian membrane may be increased, causing a stuffed state of the nasal passages, producing sneezing, and exhibiting the appearance of that state which is, popularly, called *a cold* ; the bowels are, in many cases, relaxed, yet no disordered state of the stools may appear. During such a state as I have described, there may be a degree of animation, and a quickness of observation, much beyond what are commonly met with in children of the same age. So that, although a morbid condi-



tion of the cranial brain be present, the child may be considered as particularly healthy, on account of its being wakeful and lively, and sensible to the most trifling impression. But it frequently happens, that an attentive observer may detect other symptoms; the child may start in its sleep; it may be very readily awakened; when awake, it may start at the slightest noise, as at the shutting a door, at the moving a chair, at passing the finger over the wickerwork of its cradle,\* or on being slightly moved, or if touched gently†; a sudden frown may pass over the forehead and may quickly disappear; the eyes may be closed irregularly, or alternately, or a winking of one eye, or frequent winking of both eyes, or a firm closing

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\* Dr. John Clarke—Commentaries on diseases of children.

† Hippocrates remarks, that children, from the period of birth to the seventh year, who have acute fever with constipated bowels, who are wakeful and are easily terrified, who scream (κλαυθμυρίζωσι) and who change colour, are very liable to be attacked with convulsions. And Galen, commenting on this remark, observes, that convulsions are so very readily induced at an early age, that want of sleep, alone, will bring them on, “ἐπὶ δὲ τῶν παιδῶν ἀρκεῖ καὶ τὸ ἀγρυπνεῖν μόνον.” *Hippocratis Prognost. 34 cum Galeni Comment.*



of both eyes, may be, from time to time, detected; the hand may be raised frequently to the head; the child may cry, without any evident cause, as if it were pricked with a pin; at other times, it may shriek; the fists may be clenched, the thumb being bent in, and laid flat across the palm of the hand, the fore-arms being bent upwards on the arms. Should a similar condition of the Spinal brain be present, the child may be bent backwards, presenting a state of *opisthotonos*;\* its legs may be drawn up, while the head is thrown backwards.

Such a state as that which I have portrayed, constitutes the simple form of what may be termed *Sensitive Erethism*.

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\* "That spasm of the lower jaw, which usually accompanies Tetanus, is no unusual occurrence in common nervous affections. The same disorders are often attended with what is called Episthotonos, Opisthotonos, and Emprosthotonos; which are forcible contractions, of longer or shorter duration, of the muscles of the abdomen and back, so as to bend the whole body with great violence forwards or backwards, or to keep it perfectly rigid. All these symptoms are, however, transitory, often alternating with other nervous symptoms, and *always*, I believe, arising from excessive irritation of the brain or spinal marrow."

PARRY ON TETANUS.



During the presence of the sensitive form of Erethism of the cranial brain, there is, in many cases, an increase of heat in the head, and, not uncommonly, in the rest of the body also. The pulse, in such cases, is, generally, accelerated. But an increase of heat, in the body generally, or in the head only, is by no means a constant attendant upon an erethismal condition of the cranial brain; for a high degree of that state may be present, yet no increase of temperature may be perceptible in any part of the body.

There is another form of Erethism of the cranial brain in infants, in which there is a great want of animation, the child being dull, yet fretful when roused, or touched; the head being suffered to droop, or being reclined on either side; there being an absence of sleep, a state that can hardly be called waking,\* with

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\* In the Sensitive form of Erethism of the cranial brain, there is complete *ἀγρυπνια* in a great degree, whereas, in the state which I am now describing, and which I call *Torpid Erethism*, the wakefulness is conjoined with *Torpor*, constituting a state which resembles that to which Hippocrates applies the term *κῶμα ὄυχ ὑπνωδεις*, or *κῶμα ἀγρυπνον*, in which the propensity to sleep is overcome by frequent startings, the patient, immediately on the super-



an indisposition to move, an indifference towards all objects ; general pallor and chilliness of the body ; a rolling or turning up of the eyes ; a dull inanimate appearance of the eyes ; a plaintive moaning, or shrieking ; the child starting out of sleep with a note expressive of pain or displeasure ; a wrinkled state of the integuments of the forehead ; the hands being raised to the head, or thrown much about ; the body, and the lower extremities, being, perhaps, extended, and being frequently much in action ; the head being thrown backwards. This form of disease may be distinguished by the term *Torpid Erethism* of the Cranial brain. In this form of Erethism, there generally is a coldness of the surface of the body, or of the extremities, which alternates, in some instances, with a natural degree of temperature ; and, in such cases, the head may preserve its natural

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vention of sleep awaking in a state of alarm. Galen, in his remarks on wakefulness connected with coma, says, that the presence of too great a quantity of blood (whose quality is rendered acrimonious by the admixture of bile) may produce both coma and wakefulness ; the brain being oppressed by the load of blood, but being also *irritated* (*ἰεργίζουσα*) by the bile, so as to prevent sleep. See Hippoc. *Prædic. lib. I. prædict. 1 cum Galen. comment.*



temperature, or its heat may be increased, while the face is either palid and cold, or is irregularly heated.

Erethism of the cranial brain may exist as an effect of original structure of that substance. In many instances, a tendency to this state appears to exist, although nothing may have occurred to call that tendency into action. Those children which have a languid frame of body, con-nate, or acquired from defective, or depraved, nutriment ; infants, in short, of that habit which is better known than described by the term *scrofulous*,\* have, in many instances, a condition of the cranial brain which approaches nearly to erethism, or may readily be brought into that state. Where a tendency to an ere-thismal state exists, the slightest irritation, offered to any part of the Nervous System, may be sufficient to produce that state.

The causes which may give rise to erethism of the cranial brain in infants, are numerous.

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\* "There is a diseased condition of the brain, which is certainly produced by the agency of Scrofula, I mean a tubercular state of the brain." CHEYNE.



It may be produced by concussion, as by a fall, or a blow; by keeping the head too hot,\* whether by clothing, or by exposure to the sun, or to a fire; by long-continued exposure of the eyes to a high degree of light; by the long absence of sleep; by an inflamed state of the *meatus auditorius externus*. But, among the most frequent causes of erethism of the cranial brain in infants, are impressions on the anti-cerebral extremities† of nerves. Thus, the process of dentition is a very common cause of this condition of the brain. Impressions on those nervous extremities which occupy the viscera, on those especially which are spread out in the substance of the liver, and in the alimentary canal, produce this state in a great proportion of the cases which present themselves. Thus, the presence of worms, of unhealthy secreted fluids, of unnatural, or of undigested food, the action of drastic purgatives, or an accumulation of fæces, in the Ali-

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\* It may be the indirect effect of diminished temperature also.

† By anti-cerebral extremities of Nerves, I mean those extremities which do not terminate in cerebral substance.



mentary canal ;\* a morbid state of the mucous lining of that canal ; an inactive state of the secreting apparatus of the liver ; congestion of bile, or of blood, in the liver ; an inflamed, or otherwise disordered state, of that viscus, or of other contents of the abdominal cavity ; these may, severally, give rise to an erithismal condition of the cranial brain. In short, whatever causes great irritation in any part of the body, whether in any of the great cavities, or on the surface of the body, may produce an erethismal condition of that brain with which the nerves of the irritated part principally communicate. Thus, that condition may be induced by surgical operations,† by painful ulcers, by burns,‡

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\* “Pereunt convulsi (infantes) dum acre acidum intestina rodit, et totum systema nervosum adeo mobile in hac ætate irritat.” *Van Swieten, Comment. IV. 682.*

† See Bedingfield's Compendium of Medical Practice.

‡ I lately attended a child aged five years, who was in a state similar to that which I have described under the term Torpid Erethism. She made a loud plaintive moan, which was unceasing ; the head was thrown backwards, and the trunk was bent in a complete state of *opisthotonos*, the arms being raised and extended. She was inattentive to all objects of sight, and to sound : she had not slept for several days and nights ; and she had taken scarcely any nutriment during that time. All these symptoms had suc-



and the like.\* Erethism of the brain may succeed to the sudden suppression of habitual

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ceeded to an extensive ulceration of the integuments of the *Biceps* of each arm, which was caused by her cloaths taking fire. In this case, the irritation offered to the nerves of the arms, had produced *torpid erethism* both of the cranial, and of the spinal, brain. After placing her in a warm bath, I directed that she should take five grains of *Pulvis Ipecacuanhæ compos.* in two drachms of *Liq. Ammon. Acet.* every five hours. This medicine was continued for a few days, and under the use of it the symptoms subsided, and the child became quite well.

\* Dr. Armstrong, speaking of *Hydrencephalus*, lays down two varieties; one, in which the local irritation is established first in the brain; the other, in which it is first established in the chest or belly, or even on some external part, and, he says, that, in this latter variety, the distant irritation primarily increases the heart's action, and, by so doing, disturbs the circulation in the Cerebral blood-vessels, where that organ is at all predisposed to disorder. See his work on *Typhus*, 3rd edit. page 321.

And again (page 337) he says, that local irritation induces fever by increasing the heart's action, through the intercourse which exists between that organ and the nervous system.

So (in page 469) he observes, that, when an affection of the liver, or indeed of any remote organ, operates on the brain, so as to produce ultimate madness, this operation is not direct, but indirect; for that the affection of the remote organ proves an irritant to the heart, the increased action of which excites the mania, by propelling the blood too powerfully to the brain.

This, he remarks (page 321) is the true explanation of



discharges, whether from parts in the neighbourhood of the brain, as from the scalp, or from the external ear, or from other situations; it may be connected with the presence of tumours or of tubercles within the cranium; or it may be caused by spicula of bone proceeding from the inner table of the skull. It may arise from an increase of the quantity of blood that circulates through the cerebral blood-vessels; or from a more rapid circulation of that fluid through those vessels, the consequence of increased action of the heart.\* In some cases, an erethismal state of the cranial brain

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most of those diseases, whether chronic or acute, which are technically said to arise from sympathy of one part with another.

This may be a correct explanation of the fact in some instances, but I think that, in very many cases, the altered condition of the brain is the direct result of the effect of the impression, which effect is communicated, as Willis expresses it, “*a partibus affectis τω πρώτῳ ἀιθητηρίῳ.*”

\* Does torpor of the kidneys lead indirectly to the production of an Erethismal state of the Brain? That is, does the circulation of blood, which retains the constituents of urine, or into which urine has been carried after it has been secreted, through the Cerebral blood-vessels, produce, in any degree, such a condition of the Cerebral structure? I think that this question may be answered in the affirmative.



succeeds to that opposite condition of that organ, which in subsequent pages I term torpor of the cranial brain.

An Erethismal condition of the cranial brain may manifest itself even from the first moment of the child's existence; or it may be induced at any subsequent period by any of the causes which have just been enumerated. In some cases, very mild shades of this state of the brain may be present, while in other cases, there may be an assemblage of all those symptoms which I have described as characteristic of each form of the erethismal condition. In the milder forms of this affection, and in the early stage of it, the only symptoms which it produces, may be, great wakefulness, great sensibility to slight impressions, with restlessness and animation in a high degree; and, as these symptoms are generally hailed by nurses as proofs of the health and vigour of a child, it frequently happens, that the presence of this affection is over-looked. These, however, are not the only cases in which such a condition of the brain fails to attract attention; for it very often happens, when an erethismal state of the brain arises during the



presence of disorder of some other part, or function, of the body, that, although the symptoms which it produces are urgent, they are viewed only as being connected with such primary disorder, while the morbid condition of the brain is entirely disregarded. Or it may happen, as is too frequently the case, that our attention is entirely occupied by the symptoms to which an Erethismal condition of the brain gives rise, to the exclusion of all consideration of the cause upon which those symptoms depend. Thus, such a condition of Cerebral substance, in what way soever it arises, may produce an assemblage of symptoms to which the general term *Fever* is applicable; or it may cause convulsive affections, or sundry other derangements of functions; yet our attention may be engrossed by these several effects, while the cause from which they arise is entirely overlooked.

The Erethismal condition is not confined to the Cranial brain, for the Spinal brain may also assume this state. In some cases, the whole of the Cerebral structures appear to be in a state of erethism, while, in other instances, this con-



dition is propagated from one brain to the other, or the two brains labour under it alternately.

An erethismal condition of the spinal brain, may, by giving rise to a similar condition of the cranial brain, produce all the symptoms which I have enumerated when speaking of erethism of this latter organ; but, if it exist without inducing erethism of the cranial brain, the principal symptoms to which it gives rise, may be: Restlessness; irregular and incessant movements and twitchings of the extremities; writhing of the body; hurried respiration; and irregular action of the Alimentary canal.

Erethism of the spinal brain may be of two kinds, (viz.) Sensitive, or Torpid. In the former case, the symptoms which I have just enumerated will be induced. The restless activity, and the irregular actions, of the muscles of the trunk and of the extremities, will be attended with the free exercise of voluntary motion. In the majority of such cases, the action of the intestinal canal will be increased, and the whole canal will be more irritable. The heat and sensibility of the trunk and of the extremities



will be increased, rather than diminished. Whereas, in the torpid form of erethism of the spinal brain, the restlessness, and the irregular actions of the muscles of the trunk and of the extremities, will be conjoined with a diminution of the power of voluntary motion, or with diminished exertion of that power. I think too, that in this latter form, the involuntary contractions are more permanent than they are under the Sensitive form. The temperature and the sensibility of the trunk and extremities, will be below the natural standard. And the action of the bowels, if it be not retarded, will, I think, be found to be more irregularly exerted than it is under the sensitive form of erethism of the spinal brain.

Erethism of the spinal brain may be the consequence of a similar condition of the cranial brain; it may be produced by blows; by diminution of temperature; by altered states of the *theca vertebralis*, or of the *canalis vertebralis*; by impressions on the nerves of the Abdominal viscera, and especially by morbid states of the Alimentary canal. In short, it may proceed from irritation offered to any of



those nerves which communicate freely with the Spinal brain, whether such nerves occupy the great cavities, or be seated in the extremities, or on the surface of the body.\*

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\* Thus, Erethism of the spinal brain may arise from the local irritation produced by the separation of the umbilical chord, inducing Tetanic symptoms, (see a paper on Trismus Nascentium, by Dr. Colles, in the 1st vol. of Dublin Hospital Reports) especially if the child be placed under circumstances which favor the production of such a state of the Cerebral structures, or which tend to cause an irritable state of the exposed surface of the chord (see paper by Dr. Joseph Clarke, in the 3rd vol. of the Trans. of the Royal Irish Academy.) Trismus Infantum is said to be a common affection in Cayenne, Minorca, and hot countries, and in those parts of Europe where the rooms are heated by German stoves, and the children oppressed by swaddling cloaths. The strongest and the most healthy infants are, chiefly, the subjects of that affection, which comes on from the second to the seventh day after birth, rarely later than the ninth day, occurring about the time of the separation of the navel-string. (See Edin. Med. and Sur. Journal, VII. 225.) In the island Heimaey, the only one of the Westmann-Eyar cluster on the southern coast of Iceland which is inhabited, almost every child that is born is carried off by Tetanic disease, which rarely occurs on the main-land. This disease comes on very soon after birth, producing *strabismus*, rolling of the eyes, *subsultus tendinum*, with contraction and stiffness of the muscles of the back, and is called by the Icelanders, Ginklofe. When it has continued from one to seven days after birth, Trismus generally comes on, and sometimes *Opisthotonos* (which strictly is the Ginklofe,) and, in some cases, *Emprosthotonos*, which they term Klums. (Dr. Holland, in Sir George Mackenzie's Travels in Iceland.)



Although the cerebral structures are, during infancy, very easily made to assume that state which I have termed erethism, yet such a state is not peculiar to that age. Erethismal states of the cranial and spinal brains present themselves very frequently to our notice in the persons of adults, in whom they give rise to symptoms closely resembling those which accompany these states in childhood. Irritability of temper, inability to bear the effects of the most trifling sounds,\* wakefulness, restlessness, febrile symptoms, the whole train of what are called *Nervous symptoms*, convulsive affections;† these may, severally, be traced, in many adults, to

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\* Dr. Parry mentions instances of persons in adult age, who were thrown into convulsions, by the mere sight of certain colours, or of liquids, by slight noises, as by the falling of a pin, and by other similar trifling irritations.

† In many cases, of Hydrophobia, dissection has not discovered any marks of disease in any part of either brain, nor in any other part of the body. May we not attribute the peculiar symptoms which present themselves in such cases, to an erethismal condition of some portion of the Cerebral structures? May not Tetanus and Hydrophobia be induced by similar conditions, existing in different portions of those structures?

*See Parry on Tetanus and Rabies Contagiosa.*



erethismal conditions of one, or both, of the cerebral structures.\*

As, on the one hand, we find, that an increase of the quantity of blood that circulates through the cerebral blood-vessels, tends to the production of erethism of those structures; so do we find that erethism of these structures may cause the cerebral blood-vessels to contain more than their due quantity of blood. So that, when erethism of either brain has existed an uncertain time, an increase of the quantity of blood that is contained in the blood-vessels of that brain may be superadded to the erethismal state.†

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\* In elderly persons we sometimes meet with symptoms which are attributable to an erethismal state of the cerebral structures; in many of these cases, the peculiar condition of those structures appears to be produced by some change which is the effect of age.

† “It must be granted that such a state of irritation of the sensorium may lay the foundation of an excitement of the vascular structure of the brain, and thus very frequently produce organic disease.”

“If a man have his leg amputated, on account of a compound fracture, and afterwards becomes delirious and dies; I grant that fullness of the vessels of the head will be found on dissection; but was not the vascular action caused by preceding nervous irritation?”

*Abernethy, Surgical Works, Vol. I, 223, & note to page 56.*



The combination of a great increase of the quantity of blood contained in the blood-vessels of either brain, with an erethismal condition of the same organ, appears to constitute that state which is expressed by the term Inflammation.\*

Inflammation of the cerebral structures is, then, a state which includes in itself erethism of those organs; but erethism of those organs may exist independently of any perceptible increase of the quantity of blood that is contained in the cerebral blood-vessels. When erethism of these structures exist in combination with a great increase of the quantity of blood that is contained in the cerebral blood-vessels, such erethism may either precede, or be superadded to that increase.

A highly sensitive form of erethism of the cranial brain in infants, coupled with a great

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\* "Excitement local as well as general may exist without inflammation, but inflammation cannot exist without excitement."

"If opportunely attended to, simple irritation may generally be soon removed, but if neglected in its origin, it may tend to produce not only an increased afflux of blood, but an actual inflammation."

*Armstrong on Typhus, 3rd Edit. page 22 and 23.*



increase of the quantity of blood that is contained in the blood-vessels of that organ, constitutes what is termed active, or acute, inflammation of the cranial brain. A less sensitive form of erethism of that substance, combined with a more moderate increase of the quantity of that blood, constitutes, probably, what has been termed a sub-acute form of inflammation of the cranial brain. And a moderate increase of the quantity of that blood, joined to the more torpid form of erethism, may, possibly, constitute the chronic form of inflammation of the cranial brain. The same remarks are applicable to the spinal brain also.

Inflammation of the cranial brain in infants is characterized by the following symptoms: redness of the conjunctiva; highly-contracted pupil; great intolerance of light, and of sounds; suffusion of the eyes; great restlessness; wakefulness; charged state of the blood-vessels of the head; throbbing of the arteries of the neck and head; dry, hot, mouth; thirst; startings; shriekings; hurried, unmeaning manner, and expression, of countenance; pulse, throbbing, full, strong, increased in frequency.



The spinal brain of infants may also be the seat of inflammation. In which case, all those symptoms which attend sensitive erethism of that structure, will be present, in a high degree.

Inflammation of the cerebral structures may be produced by any of those causes which have been enumerated as productive of erethism of those organs, or by any causes which induce a plethoric condition of the cerebral blood-vessels.

An increase of the quantity of blood that is contained in the cerebral blood-vessels, may exist simply, without any previous erethism, and without inducing that state. Such increase constitutes simple Plethora of the cerebral blood-vessels.

Simple plethora of the blood-vessels of the cranial brain in infants, is characterized by the following symptoms: increased heat of the head; a full eye; a redness of the countenance, with a want of animation; a heavy, listless, state;\* in-

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\* Sic summè plethoricos sæpe invenimus debilissimos; post largam verò sanguinis missionem redeunt illicò pristinæ corpori vires. *Van Swieten, Comm. II, 270.*



disposition to move the head; uneasy sense of fulness in the head, causing the child to seek support for the head; giddiness; shaking of the head; uneasy respiration; sighing; the pupil either of a natural size, or rather dilated; sickness; loss of appetite; heat, and dryness of the mouth, and skin; an inactive state of the bowels; a sensibility to impressions, but a heedlessness of them; a turgid state of the vessels of the head; the pulse not much accelerated, full, perhaps oppressed.\*

Plethora of the blood-vessels of the cranial brain may arise from various causes. It may proceed from an increase of the general mass of circulating blood; or from an obstruction existing to the passage of that fluid through the blood-vessels of some other part of the body, as through those of the viscera, or of the

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\* "Sanguinis etiam in cerebro copia interdum somnum longum, interdum deliria, eaque cum risu et hilaritate aliquâ, insomnia cum spectris et visis rubris: si tamen sanguis est tenuis, in vigiliâ propensionem excitat, et proinde modò in somnum ruunt, modò mox expergiscuntur; pulsus arteriarum in temporibus magnus est et plenus. Dolor qui adest magis in parte anteriori percipitur."

*Sennerti Opera* II. 283.



extremities. Or, the arteries of the cranial brain may have their tone diminished, in which case, they will offer less resistance to the momentum of the blood than is offered by other arteries, and, thus, an increased quantity of blood may enter the cerebral arteries. An increase of the temperature of the head, may cause the arteries of the cranial brain to receive an increased quantity of blood. The same effect may arise also from certain impressions on the anti-cerebral extremities of nerves, as on those of the liver, or of the Alimentary canal.\* Or it may be produced by irritation of the gums, during teething, which causes an increased quantity of blood to be received by the blood-vessels of the head generally.

It may happen, that, although the arteries of the cranial brain receive only their natural and due share of blood, at each contraction of the

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\* See a paper by Dr. Clarke in the fifth volume of the Medical Transactions.



heart, yet, in consequence of some obstruction existing to the passage of that fluid through the cerebral veins, in any part of their course, that fluid may accumulate in those veins, or in the sinuses of the cranial brain. Such an accumulation is distinguished by the term Congestion in the cranial brain.

In Congestion of the cranial brain, there is a general coldness of the body ; the child throws the head backwards, or leans it on either side ; a comatose state is present ; the eyes are prominent and fixed ; the pupils are fully dilated, not becoming contracted on exposure to strong light ; there is stiffness of the body, and of the limbs, with grinding of the teeth ; irregular actions of the muscles of the face and eyes take place ; there is a more or less entire absence of vision, together with a more or less complete insensibility to all impressions ; the muscles of the eye-ball may act irregularly, producing squinting ; the bowels are torpid ; the secretion of urine is scanty, or suppressed ; the pulse, for the most part, slow and oppressed ; respiration, slow and laborious.



Whatever impedes the return of blood from the head may induce congestion in the cranial brain. Thus it may arise from pressure made on the Jugular veins; from impeded respiration; from malformation of the heart, and large vessels; from defective action of the heart; from an impediment existing in any part of the round of the circulation, as in the blood-vessels of the liver, of the bowels, or of other viscera.

Congestion may also take place in the blood-vessels of the Spinal brain, subjecting that structure to an inordinate degree of compression. This state may arise from causes similar in their nature to those which induce congestion in the cranial brain. The symptoms attendant upon such a state, will be the same as those which arise from inordinate compression of the spinal brain, when produced by accumulation of water or by other mechanical causes.

It happens, in a great many cases, that the fluid which flows from the exhalants of the cranial brain, becomes accumulated in the ventricles of that organ, and between the membranes which envelope it.



The fluid usually poured out by the exhalants of the cranial brain, is under a due and healthy condition of that organ and of its vessels, removed in the same proportion as it is effused; by which removal an accumulation of that fluid is prevented. But if a greater quantity of that fluid be effused, than is removed, it is evident that an accumulation of it within the cranium must ensue. Such accumulation, then, may be the consequence of diminished removal, or of increased exhalation, or of both these causes combined.

We find that irritation of the nerves in any part of the body, is, very generally, attended by increased flow of fluid from the exhalants of such part. Thus, the application of a heated substance, of stimulants, as Cantharides and the like, is followed by increased exhalation in the part to which that application is made. In like manner, we find, that erethism of the cranial brain disposes the exhalants of that organ to pour out an increased quantity of fluid.

In some cases, when an impression on distant anti-cerebral extremities of nerves (such as those which are spread out in the liver, or throughout



the alimentary canal)\* produces such an effect on the cranial brain as causes increased exhalation from the exhalants of that organ, we find, that there are scarcely any symptoms present which denote the existence of an erethismal state of the cranial brain ; the symptoms which eventually arise in such cases, being chiefly, if not entirely, such as may be attributed to the presence of a collection of exhaled fluid in the ventricles of that organ. And, in some of these cases, the increase of the quantity of fluid poured out by the exhalants is so moderate, that a considerable length of time may elapse, before such an accumulation is formed, as may produce marked and decided symptoms.† In such cases,‡ a collection of fluid in the ventricles may be

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\* See an excellent paper on Hydrocephalus Internus by Mr. Thomson, in the first number of the London Medical Repository.

† The quantity of exhaled fluid, accumulated within the cranium, which is requisite for the production of marked symptoms denoting inordinate compression of the cranial brain, varies very much in different cases. In some instances, a vast quantity of fluid has been accumulated in the ventricles, without producing any decided symptoms.

‡ In these cases, the pupil may, in the earlier stages, be of a natural size.



established, without any suspicion having been entertained, that diseased action was going on within the cranium, or that any source of irritation existed in any part of the abdominal cavity.

As, in simple plethora of the cranial brain, the arteries of that organ receive a præter-natural quantity of blood at each contraction of the heart, it follows, that an increased quantity must pass from those vessels by their several terminations; and, as exhalants form a part of such terminations, an increased quantity of fluid may pass from their open mouths, unless, indeed, the extra quantity of blood finds a readier passage through the veins of that brain than through the exhalants.

If any obstruction exist to the return of blood from the cranial brain by the veins of that organ, in any part of their course, and if, at the same time, the arteries of that brain continue to receive their ordinary quantity of blood only, it follows, that congestion of blood in the vessels of the cranial brain will take place; or an increased quantity of fluid must pass by the open mouths



of the cerebral exhalants; or both these consequences may ensue.

In Inflammation of the cranial brain, there exists a two-fold cause of undue exhalation. In the first place, such a state includes erethism, which, as I have already stated, disposes the cerebral exhalants to pour out an increased quantity of that fluid. In the second place, the arteries of the cranial brain, during inflammation of that organ, receive an increased quantity of blood in a given time, and, consequently, an increased quantity must pass by the terminations of those arteries, of which terminations the exhalants form a part.

A faulty state of the exhalants of the cranial brain, may, perhaps, dispose them to give passage to a præternatural quantity of fluid.

But, although erethism, plethora, inflammation, and congestion, may, severally, be the cause of increased exhalation within the cranium, yet such an effect is not the necessary consequence of either of these states. For these several states may each so affect the cranial brain as to produce death, without having produced an accu-



mulation of exhaled fluid in the ventricles ; or they may each subside without giving rise to such accumulations. It may happen, however, that, when either of these states has induced increased effusion, such state may subside, leaving the accumulation of fluid as its remaining effect;\* or such state may continue, after it has given rise to such accumulation.

An increased exhalation of fluid into the cavities of the cranial brain, succeeds, in some cases, to suppression of the secretion by the Kidnies. It takes place also, in many instances, at the close of measles, scarlet fever, typhus, and hooping cough.†

An accumulation of watery fluid in the ventricles of the cranial brain, may induce general torpor and paralysis, together with irregular and convulsive actions of muscles ; stridor dentium ; dilated pupil, unaffected by strong light ; stra-

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\* " There is scarcely an organic affection of the brain which is not accompanied by serous effusion." CHEYNE.

† See Armstrong on Typhus, 3rd edit. 321.—Abercrombie on Ischuria Renalis, Edin. Med. & Sur. Jour. Vol. 17.



bismus; general insensibility to impressions; a shrill, piercing, shriek, frequently repeated (*cri hydrencephalique*); torpor of the bowels; scanty secretion of urine. The train of symptoms will depend upon the preceding state, of which the collection of fluid is the consequence; upon the rapidity with which the collection has been formed; and upon the continuance, or the disappearance, of the primary state which has led to increased effusion. The symptoms present during such accumulation of exhaled fluid, will also depend upon the time that has elapsed since that accumulation took place. For we find, that, although the collection of a certain quantity of fluid in the ventricles, may bring on symptoms which indicate a subdued, compressed, state of the cerebral substance, yet, in, a longer, or shorter, period of time after such collection has been formed, the brain may become, as it were, reconciled to the increased compression, and those symptoms may, in some instances, gradually subside, and they may, in a greater or less degree, disappear; and they may not return, until an additional accumulation of exhaled fluid increases the compression to which the brain has been subjected. In this way, all the



symptoms, which have been enumerated as attendant on an accumulation of exhaled fluid in the ventricles, may subside; they may then return with greater violence; until, after we have been, alternately, alarmed, and flattered by false hopes, the child is carried off during a strong convulsion, or under a series of convulsions. Or a paralytic state of the limbs, may ensue; or the muscles of one side may be paralyzed, while those which are not paralyzed may be convulsively affected. The pulse, which is slow and oppressed when the collection of fluid has recently taken place, may afterwards become struggling, feeble, and rapid.

It may happen, also, that exhaled fluid may be accumulated within the vertebral cavity, causing inordinate compression of the spinal brain.\* Such an accumulation may be produced by causes similar to those that give rise to collections of exhaled fluid within the cranium. In such cases, as in all others where the spinal brain is subjected to inordinate com-

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\* Lieutaud, Lib. II, Sect. V, Art. vii.



pression, all those parts of the body, whose nerves communicate, principally, or entirely, with the spinal brain, at, or below, the compressed portion, will have their temperature and their sensibility reduced, and the muscles of those parts may be paralyzed, or convulsively affected,\* or they may cease to be under the influence of the will, while they are thrown into involuntary and irregular contractions. The sphincters of the Rectum and bladder may lose their powers; the intestines may become torpid; uneasy sensations may be referred to the back, and, perhaps, also to the contents of the cavity of the abdomen; and, if the compression take place high up in the vertebral canal, respiration may be rendered slow and laborious.

There is a state of the cranial brain, which may be termed Insensibility, or Torpor; a state characterized by general insensibility to impressions of every kind, and by all those symptoms which have been enumerated as the con-

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\* See Dr. Reid's paper on Tetanus.

Trans. of the Irish Coll. of Physicians, Vol. I.



sequences of congestion, or of accumulation of exhaled fluid, within the cavity of the cranium.

Torpor of the cranial brain may arise from whatever causes that organ to be inordinately compressed between its unyielding parietes externally, and its own blood-vessels internally. Thus, it arises from a plethoric state of the arteries of the cranial brain ; from congestion in the cranial brain ; from collections of exhaled fluid within the cranium, (arising from any of the causes already mentioned, whether from erethism, simple plethora, inflammation, congestion, or a faulty state of the exhalants, or of the cerebral absorbents ;) from effusion, or extravasation of blood ; from collections of purulent fluid ; from an aneurismal state of the cerebral arteries ; from tumours and tubercles ; from hydatids ; from the presence of balls or other foreign substances ; from thickening, or indentation, of the cranium, and the like. It may arise from concussion of the cranial brain ; it may be the consequence of a preceding erethismal state ; it may arise from some peculiar alteration of the cerebral structure, as from induration, or softening, or disorganization,



of that substance ; it may be caused by loss of a part of that substance ; it may be connected with, and dependent upon, original formation ; it may proceed from a loaded state of the alimentary canal, or from some morbid condition of that canal, especially of the mucous lining of it.\* It may be produced by worms in the intestines ; by disease of the mesenteric glands ; by congestion of bile, or of blood, in the liver, or from some other faulty state of that viscus. It may be produced by extreme cold ; by intoxication ; by respiring a vitiated atmosphere or carbonic acid gas ; by sedatives externally applied, or internally administered ; or by other poisonous substances. It may be the consequence of disordered states of the lungs ; of impeded respiration ; of diminished action of the heart ; or of a diminution of the general mass of blood.† In adults, torpor of the cra-

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\* For observations on the connexion between the digestive organs and the cranial brain, see *Abernethy*.

† Although the presence of an undue quantity of blood in the blood-vessels of the cerebral structures, will, by subjecting those organs to inordinate compression, cause the functions which are dependent on those organs, to be imperfectly, or irregularly, performed, or to be entirely



nia brain is a frequent consequence of the sudden disappearance of what are termed gouty attacks from different parts of the body. It is produced by the long continuance, or by frequent repetitions, of Sensual states (i. e. of those states which produce Sensations), or by the long continuance, or powerful exertion, of muscular action. And it is produced by Passions, or by the powerful exertion of the Faculties\*.

Torpor of the spinal brain may proceed from any cause which produces undue compression

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suspended, or destroyed; yet we find that the want of a certain quantity of blood in those blood-vessels, will also cause a disturbance, or diminution, or suspension, or destruction, of those functions. How does it happen, in patients who have laboured under general dropsy, when, after the exhibition of powerful hydragogues, the dropsical accumulations have every where disappeared, that, at the period of apparent convalescence, sudden death is so common an occurrence? Can it arise from a sudden removal of pressure to which the cranial brain and its vessels have been so long subjected?

\* "Est apoplexiæ species, solo spirituum defectu orienda." *De Haen*, I. 324.

A high degree of Torpor of the cranial brain, arising from causes which are not apparent on examination after death, constitutes the Apoplexia Cephalica of Dr. Stoker, (Trans. of the Irish College of Phys. Vol. II.) which corresponds with the Apoplexy from Nervous Torpor of other writers.



of that structure, as by displacement of the vertebræ, or by other altered states of the vertebral canal; by collections of exhaled fluid, of pus, of extravasated blood; or by plethora or congestion, in its blood-vessels. In short, it may proceed from a great variety of causes, similar to those which produce torpor of the cranial brain; or it may be the consequence of this latter affection\*. The symptoms induced by torpor of the spinal brain are such as have been enumerated when speaking of accumulations of exhaled fluid within the vertebral canal.

Although increased compression of the cerebral structures rarely fails, ultimately, to induce torpor of those organs, yet, when the degree of increased compression is slight, the primary effect of it may be the production of an erethis-

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\* “Les affections immédiates du cerveau et celles de ses nerfs se transmettent à la moelle épinière, ainsi qu’aux nerfs qui en proviennent; de même les affections aussi immédiates de la moelle épinière et de ses nerfs affectent ordinairement plus ou moins vite le cerveau et ses nerfs: de sorte que les maladies cérébrales et les maladies spinales sont souvent comme une extension les unes des autres; cependant l’influence des maladies cérébrales est plus grande, plus rapide sur la moelle épinière, que ne l’est celle des maladies spinales sur le cerveau.

*Portal, Anatomie Medicale, IV. 113.*



mal state of the affected brain, which may be succeeded by Torpor, or may become blended with it, or may alternate with it. I have already stated that Torpor may be the result of previous Erethism, in cases where no increased compression of the cerebral structures is present\*. We find, in the natural and healthy performance of the several functions of the body, that a torpid state of the Cranial brain regularly succeeds to a sensitive condition of that organ, and that this latter state succeeds to the torpid state. This succession of opposite states is exemplified in Sleep, and Waking; Sleep being Torpor of the Cranial brain, while waking is its Sensitive state. After the continuance of the sensitive state for some hours, an opposite state comes on, and this leads to the restoration of the sensitive state. The greater the degree in which the Sensitive state is called into action, (as by the frequent production of Sensation, or by the long continuance of Sensation) the sooner is the Torpid state

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\* Does Torpor of the cerebral structures induce an altered condition of the blood-vessels, exhalants, absorbents, (of all, or any of these,) belonging to those structures? If it does not directly do so, it will indirectly affect the cerebral blood-vessels and their several terminations, by producing diminished action of the heart.



induced. In many cases, where the Sensitive state exists in a high degree, it very soon is resolved into a state of Torpor, and these two opposite states alternate frequently and rapidly with each other. The greater the degree of preceding *Sensitiveness*, the greater the degree of succeeding Torpor.

This alternation of a high degree of the erethismal condition, with a high degree of Torpor, and the mixed state which occurs mid-way between these two extremes, is frequently seen exemplified in infants. It was well marked in a case which I have recorded\*, and which I may here repeat as well illustrating my present subject.

The infant daughter of a very respectable surgeon, was observed to be, from her birth, lively, and wakeful, scarcely ever sleeping during the day; she was highly sensible to impressions. She was suckled by her mother, a very healthy young woman. Nothing amiss had ever been noticed in the stools. When she was scarcely

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\* See Trans. of the Assoc. of the Coll. of Physicians in Ireland, Vol. III, 268.



six weeks old, she awoke as with a hesitation of breathing, and the muscles of the face were convulsed. She became still more restless, and she was very fretful. Her father gave her a dose of calomel and put her in a warm bath; the stool, which followed the exhibition of the calomel, was perfectly healthy. After this I saw the child. She started when the door was opened, or when a chair was moved hastily, or when any one coughed, or if any part of her body was touched. She cried very much and very loudly, and she was appeased, and that momentarily, only by being placed in a sitting posture, by being carried about, or by being put to the breast. The pupils were of a natural size; there was no vomiting; no heat of skin; no heat of the head; no flushings of the cheeks; no increased throbbings of the arteries of the head and neck. When this highly sensitive and wakeful state had continued for several hours, the child became gradually more heedless of noise, until, at length, she ceased to notice them; the crying then subsided, and the child bore a horizontal posture. During this state, the eye appeared to be insensible to the light of a candle; the pupil, which was rather enlarged, vibrating as it were, between con-



traction and dilatation when strong light was thrown upon the eye ; the fore-arm was bent on the arm ; the fingers clenched ; the thumb laid flat across the palm ; the upper extremities, in this state, raised, and in constant motion ; the head sometimes moved about, but not in a great degree ; the lower extremities sometimes drawn up suddenly ; the lips moving ; no moaning ; occasional rolling of the eyes ; the eyes fully open ; there was not a moment during which some muscles were not in quick action ; the body was bent backwards. When this state had continued for four or five hours, sleep came on, out of which the child awoke, appearing in its usual state ; its arms being pliant ; its hands open. Then came on the fretful, crying, restless, state ; then the torpid restless state, during which the muscles were in constant action, the fore-arm bent, the fingers clenched as before ; then sleep ; after which, apparent recovery. And, thus, the sensitive erethismal state, followed by torpid erethism, which gave place to sleep, to which apparent recovery succeeded, repeatedly ran its course. The cranial brain, after its highly sensitive state had been long kept up, gradually assuming a state approach-



ing more and more to torpor, until its actions were at rest, and then sleep was present; but, after a short rest, the brain *awoke* to its original state. It was remarked, that, when the sensitive state of the brain recurred, the bowels were relaxed, notwithstanding the use of opium; the eyes were suffused; the child sneezed, and it had an increased quantity of moisture in the nostrils, and an increased flow of saliva from the mouth; but when the sensitive state declined, the bowels were no longer relaxed; the coryza disappeared; secretion having been increased by the erethismal state. At one period, during the torpid erethismal state, there was complete opisthotonos, to a great extent, so that the spinal brain was also affected with the erethismal condition. In one instance, during this child's indisposition, the fretful and sensitive state, and the more torpid state, occupied two nights and the intervening day, during the whole of which time there was scarcely any sleep, none for a longer period than a few minutes; then came on sleep which lasted several hours. This state of things continued about a fortnight, the train of symptoms being repeated every day, or every two days; after



which time, the child continued without any marked symptom of disease, there being, however, still, an absence of sleep during the day; this condition lasted several weeks, the wakefulness gradually declining, until the child became perfectly healthy and it has continued so ever since. [It is at this time, May, 1821, sixteen months old.] Throughout the whole progress of this case, which was a well marked specimen of pure erethism, alternating with a more torpid condition of the cranial brain, there was not the slightest perceptible alteration in the state of the blood-vessels of the head.

We meet with similar successions and alternations of states as affecting the spinal brain exclusively.\* At one time, there may be a high degree of irregular and involuntary action of muscles, while, at the same time, contraction of those muscles may be procured by the exertion of the will. After this, those muscles may cease to be obedient to the will, but their irregular and involuntary actions may continue. To this

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\* See a case reported by me in the Trans. of the Irish College of Physicians, Vol. III, page 154.



state, may succeed one, in which all action of those muscles ceases, they being perfectly paralyzed; and, when this last state has existed an uncertain time, the first of these three states may recur, and, thus, a repeated succession of these three states may continue for a considerable time. The first of these states may be considered as depending upon sensitive erethism of the spinal brain; the second, as being produced by torpid erethism of that organ; and the third, as depending upon torpor of the spinal brain\*.

Thus, then, sensitive erethism may pass into torpid erethism, and to both these states complete torpor may succeed. Or erethism may induce plethora, or may succeed to it; and in either case, if both these states exist at the

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\* We meet with this complication and alternation of erethism with torpor, not in infants only, but also in adults of every age. How often do we meet with cases, in these latter subjects, where, conjoined with hurried eager manner, and with restlessness and irritability of temper, there is a quick, restless, voluntary exertion of muscular action, together with involuntary and irregular contractions of the same muscles; and where all these actions are blended, and alternate, with a paralytic state of those muscles.



same time in close combination, inflammation will be present. Or, when inflammation has existed, the plethora may subside, while erethism remains\*; or the erethism may subside, while the plethora continues; or both these states may subside, and torpor may succeed†; or torpor may be succeeded by erethism‡, which may lead to inflammation.§ Hydrecephalus may be the consequence of erethism, of plethora, of inflammation, or of congestion.

\* See remarks on fever kept up by simple irritation, after the inflammatory state of the brain has subsided.

*Armstrong on Typhus, 3rd edit. 167.*

† “Notandum, quod in morbis inflammatoriis capitis aliquando diu maneant quædam læsiones functionum cerebri licet jam dudum deferbuerit morbus, atque omnis febris abesse videatur; unde sæpe debilitas, stupor, somnolentia, &c. supersunt.” *Van Swieten, Comment. Lib. II. 284.*

‡ Hippocrates considered fever succeeding to Apoplexy a favourable omen; [*Aphorism. Lib. VI. aph. 51.*] it denotes that the torpor of the cranial brain has ceased, and that an opposite condition of that organ has succeeded to it, which latter condition is of an erethismal nature.

§ Thus the immediate effect of concussion of the cranial brain, is torpor, which may ultimately be followed by inflammation.

*See Abernethy on Injuries of the Head.*



From what I have stated, it appears, that affections of the cerebral organs in infants are numerous, and that they differ from each other, in kind, as well as in degree. The several states which I have enumerated, are: Erethism, (sensitive, or torpid;) simple Plethora; Inflammation; Congestion; collection of watery fluid in the Ventricles (or Hydrencephalus); and Torpor.

I think that I am correct in stating, that each of these conditions of the cranial brain may exist as a distinct affection, and that, in the pure, uncombined, form of each of these states, each condition has distinguishing characters, by which its presence is denoted. But, when we review these various conditions, and consider how they may be blended; when we look over the list of causes from which they may severally arise, and see how many of the causes of each condition may exist at the same time; and when we take into the account, the influence which various modes of treatment have upon disease, how much they alter its features, and modify and interrupt the train of symptoms; we shall be prepared to meet with appearances very dif-



ferent from those which are traced upon paper, and we shall not be surprized at being called upon to treat cases, in which there is an assemblage of symptoms, that baffle all our attempts at classification, and defy all nosological distinctions.

With regard to the diagnosis in the different states of the cranial brain which I have enumerated, little remains to be said, in addition to what has been already stated under these separate heads. The appearance of the pupil is very generally resorted to as a test of the peculiar state of that brain, but this appearance alone will not be a sufficient guide. The degree in which the pupil is affected, may depend upon the particular portion of the cranial brain which is the seat of disease. Generally speaking, the pupil is much contracted in simple erethism, particularly in the sensitive form of erethism. In torpid erethism, the degree of contraction may depend upon the degree of torpor which is blended with the erethismal state; the pupil may, however, be much contracted, even when a high degree of torpor exists in combination with erethism. In simple plethora, the pupil



may be of its natural size; or, if that state have induced torpor, the pupil may be dilated. In plethora combined with erethism (i. e. in inflammation) the pupil is highly contracted, and the surface of the eye is red and suffused. In congestion, the pupil is dilated, as it is in torpor, of which latter state congestion is one cause, and, in many of these cases, the presence of a powerful degree of light, will, scarcely, if at all, produce contraction of the dilated pupil. The continuance of the dilated state of the pupil in the presence of strong light, in these cases, distinguishes torpor of the cranial brain from that very different condition of that brain which we sometimes meet with, under which great dilatation of the pupil exists in combination with a high degree of sensibility to light in the Retina, and, in which state, a slight degree of light will produce instantaneous, but momentary, contraction of the pupillary sphincter, the pupil immediately relapsing into its previous dilated state. Such a state of the pupil is met with in highly sensitive and debilitated persons, in whom, however, the state which I have termed erethism, may be altogether absent. A dilated pupil is produced, in many instances,



by a depraved, or loaded state of the alimentary canal ; by worms ; by diseased mesenteric glands ; or by other causes acting in the abdominal cavity ; even when there are no symptoms present which denote general torpor of the cranial brain. Large doses of opium, if they produce torpor of the cranial brain, cause, by so doing, dilatation of the pupil ; whereas, moderate doses of opium, given in a healthy state of the cranial brain, or, in many cases, where the pupil is dilated, are found to induce contraction of the pupil ; the same effect may result from large doses of that drug, where the exhibition of it does not produce torpor of the cranial brain. In an erethismal state of the cranial brain, where the pupil is closely contracted, opium, in moderate, or even in rather large doses, may, by removing that condition of the cranial brain, remove also that high degree of contraction of the pupil which results from that condition. The juice, or the extract, of the plant Belladonna, whether it be taken into the stomach, or be applied to the surface of the eye or be applied to the eye-lid, or to the parts surrounding the orbit, produces dilatation of the pupil.



The appearance of the pupil, then, must be taken in conjunction with other symptoms, before we can ground our diagnosis upon it. A contracted pupil, with a general increase of sensibility to impressions; with restlessness; with an unquiet state of the head; with startings; with rolling of the eyes; indicates the presence of the sensitive form of erethism of the cranial brain. A contracted pupil, conjoined with a general want of animation; with moaning, pallor, and coldness; with turning up of the eyes; with a torpid state of the whole body; denotes the existence of what I have termed torpid erethism. A considerable degree of erethism of the cranial brain may, however, exist, without inducing any perceptible alteration in the state of the pupil. A contracted pupil, together with flushed cheeks; with redness of the conjunctiva; with a charged state of the bloodvessels of the head and neck; with great heat of the head, and of the body generally; with shaking of the head, starting, great restlessness, and intolerance of light and of sound; denotes the presence of inflammation of the cranial brain. A dilated pupil, succeeding to an erethismal state of the cranial brain, or preceded



by a highly contracted pupil, denotes torpor of that brain. A dilated pupil, appearing in the first instance, with a disordered state of the alimentary canal, whether with a relaxed, or confined, or a loaded state of that canal, without insensibility to impressions, seems to point out that the primary cause of the dilated state of the pupil, is seated in the abdominal cavity. If pressure on the region of the liver produce uneasiness, or bring on contraction of the muscles of the lower extremities, or a twisting, writhing, and shrinking, of the body, or, as Dr. Cheyne expresses it, if it make "the patient wince;" or if a deficiency of bile, or a vitiated state of bile, be denoted by the appearance of the stools; the primary cause may be suspected to have its seat in the liver or in the ducts of that viscus. When a dilated state of the pupil is brought on by disease in the mesenteric glands, the existence of such disease will be denoted by a turgid, hard, state of the belly; by fever; by emaciation; by griping pains; and, sometimes also, by a milky appearance of the urine. A dilated pupil, existing with general torpor of the whole system; with constipated bowels; with heaviness of the head; with a comatose



state; and with a greater, or less, degree of insensibility to impressions; points out torpor of the cranial brain, in what way soever induced.

Whatever be the form under which a diseased condition of the cranial brain manifests itself in infants, certain facts must be borne in mind, namely: That, although the cranial brain appear to be the seat of disease, yet the primary cause of the morbid condition of that organ may exist in some part at a distance from the cranial brain; as, for instance, in the neighbourhood of the anti-cerebral extremities of nerves which are spread out in the liver, or in the alimentary canal, or in the gums; and that, as long as such primary cause remains, and continues to operate, it is absurd to expect to get rid of the affection of the cranial brain. Secondly: That although such cause be removed, or have ceased to operate, yet, if it have existed for a considerable length of time, or have been very powerful, it may have induced a state of the cranial brain, which may remain after the operation of such cause has ceased. Thirdly: That each of the states of the brain which have



been enumerated, may arise from various, and from very different, causes. Fourthly: That the different states require different modes of treatment. And, lastly: That either of these states may, as I have already shewn, induce, or may pass into, a different state.

Although we should be able, then, to ascertain the precise nature of the particular affection which we are called upon to treat; although we may decide upon its being a case, of erethism of either kind, or of simple plethora, or of inflammation, or of congestion, or of torpor; much will yet remain to be ascertained, before we determine upon the treatment which is to be adopted. We must review the several causes from which such particular form of affection may arise, in order that we may, by ascertaining the cause of the affection before us, direct our remedies to the removal of that cause, and may, thus, endeavour to get rid of the disordered condition of the brain, which has arisen from that cause, and which is, probably, kept up by its continued operation; remembering always, that, although the main object must ever be the removal of the cause of the disordered state of



the cerebral structure, yet such state may, as I have observed, continue, although the cause from which it arose have been removed, or have ceased to operate. We must also remember, that, although the cause be still present, and still operating, we may, while we are directing the principal part of our attention to the removal of that cause, find it necessary, to apply remedies also, at the same time, to mitigate, or to keep under, that state of the brain which has resulted from, and which is kept up by, the continued operation of that cause.

The most common affection of the cranial brain in infants, is that which I have endeavoured to describe under the term *erethism*; the other conditions of that organ, being, in many instances, the consequences of erethism. The usual exciting causes of erethism of the cranial brain have been already enumerated. The knowledge that these causes may give rise to such a state, will lead us to enquire into, and to ascertain, the particular cause of the case before us. Where a child is, from habit of body, original, or acquired, disposed to an erethismal state of the cranial brain; where there



is precocity of intellect; where the general appearance of the child is such as is expressed by the term scrofulous; where it is known that other children of the same family have laboured under affections of the cranial brain; where there is a high degree of sensibility generally; where there is a highly sensitive state of the retina, with a contracted pupil; or where there is a general languor of expression, with dilated pupil; in all these cases, we must cautiously guard against any of those exciting causes which may call into action a morbid state of the cranial brain. We must not be lulled into fatal security, by that high state of liveliness and animation, which, in some instances, accompanies the milder forms, and the earlier stages, of erethism of the cranial brain; nor must we suffer marks of an irritable temper to pass unnoticed; and we must be cautious lest we impute to mere waywardness of disposition, what may be, in fact, an indication of the presence of an insidious disease.

There is no point connected with the management of infants, that claims greater attention, than the regulation of their diet. The majority



of nurses never take the digestive powers of a child into consideration, nor do they ever seem aware that the process of digestion is necessary to convert food into aliment. They think that if they introduce large quantities of rich food into the stomach of an infant, they pursue the most certain means of rendering that child strong and healthy, whereas they adopt the most infallible method of engendering a diseased state of it. When an infant is brought up *by hand* (to use a nursery phrase) it is difficult to restrain the nurse from giving it food which is of too rich a quality, or which is altogether improper at an early age. If the stomach and duodenum of an infant are overloaded with food, sickness will be induced, or the process of digestion will be imperfectly performed, in which latter case, flatulence and acidity will be present, and the chyme will be in an unhealthy state. The stomach and duodenum, being distended with food, and with air, will oppose the free descent of the diaphragm, and will, consequently, interfere with the process of respiration, giving rise, in many instances, to attacks resembling those of spasmodic asthma. The distension of the diaphragm may oppose



the free entrance of the bile from the common biliary duct, and, by so doing, may lead to congestion of that fluid in the liver. "I have no doubt" says Dr. Yeats,\* "that the repeated absorption by the lacteals of the acrid contents of the duodenum, produces disease and enlargement of the mesenteric glands". The distended duodenum may also, as the same intelligent writer observes, press "upon the lacteals and glands of the mesentery, and will interrupt the ready transmission of the chyle to the thoracic duct." The presence of acrid fluids and of indigested food, in the bowels, may produce griping pains, or may give rise to irregular actions of the muscles of the abdomen and of the extremities. The irritation offered to the nerves in the liver and alimentary canal, may induce an irritated state of the cerebral structures, or may directly lead to increased effusion by the cerebral exhalants. An over-loaded, or unhealthy, state of the alimentary canal, may also directly induce plethora, or congestion, or torpor, of the cerebral organs.

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\* See a paper containing observations on the Duodenum, Medical Trans. Vol. VI.



The state of the alimentary canal in infants is much influenced by the condition of the cerebral structures. Thus, an altered state of the cranial brain may induce sickness, disordered secretion of the fluids which flow into the alimentary canal, and a relaxed, or constipated, state of the intestines. Disorder of the spinal brain may also quicken or retard the peristaltic action of the bowels.

The healthy condition, and the due action, of the liver, are also points of great importance in the œconomy of infants. As the state of the alimentary canal influences in a powerful degree the condition of the biliary system; so does the state of this system exert considerable influence over the condition, and the action, of the alimentary canal. I have already stated that a faulty condition of the liver may induce disorder of the cranial brain; it is necessary that we remember also, that a morbid state of the cranial brain may lead to an unhealthy condition of the biliary system.\*

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\* "In the course of my experience I have seen several cases of chronic diseases of the brain originate insidiously from blows or other injuries applied to the head: and in



As we find, then, that an unhealthy condition of the alimentary canal, and a disordered state of the liver, may mutually induce each other, and may, each, induce, or be induced by, a morbid affection of the cranial brain; it becomes highly necessary that we should be careful to distinguish between cause and effect, where these several disordered states occur; otherwise we may attack the effect instead of the cause. Thus, we may direct our attention to disorder of the liver; while the cause of that disorder exists in the alimentary canal, or in the head. We may apply remedies to the ali-

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the progress of most of these, the functions of the liver became more or less vitiated, though they had been natural previously to the occurrence of the accident."

*Armstrong on Typhus 3rd edit. 477.*

"Si fæces, quæ naturaliter flavescunt in infantibus, dentitionis tempore subitò fiunt æruginosæ, tunc periti medici convulsiones metuere solent, quia ex illa coloris mutatione concludunt, sensorium commune, et totum nervorum systema, turbari." *Van Swieten, Comment. IV. 747.*

See also Cheston's *Pathological Inq. and Obs.*; Mr. (now Dr.) Hastings's case and *Obs. Lon. Med. Rep. Vol. V. 78*; the letter of Dr. Yeats; Saunders on the liver, 154; Abernethy's *Surgical Works, I. 29, 49*; Armstrong on Typhus, 3rd edit. 550; Hennen's *Military Surgery, 332.*



mentary canal, to remove disorder of the stomach and bowels, the cause of which is seated in the liver, or in the cranial, or spinal, brain. And we may apply remedies to the cranial or spinal brain, to subdue or remove a morbid state of either of those structures, the cause of which is seated in the liver, or in the alimentary canal.

In many infants, a defective secretion of bile is observable from a very early age, or, perhaps, from the moment of birth. In some of these cases, the exhibition of medicine may procure, or, as it were, *force* a due secretion of bile as long as such remedies are administered, but, if the use of them be suspended for a day or two, the deficiency of bile is again denoted by the appearance of the stools. Or there may be a total want of bile in the fæces, even while we are using means which are calculated to promote the biliary secretion ; or, if during the employment of these means, a due quantity of bile appears in the stools, that appearance may last but for a day or two, after the expiration of which time the deficiency will be as great as before. In such cases, although the child may appear lively and healthy, we must be prepared to ex-



pect that much mischief will ensue, and that, sooner or later, the cranial brain will become disordered.

The affection of the cranial brain which succeeds to such a state of the liver, may be formed very slowly and insidiously; when it first manifests itself, it may appear temporary and but of very short duration; it may gradually develop itself, and produce symptoms which recur more frequently, which last for a longer time, and which at length become permanent. At first, it may be observed that the child is flatulent, that its bowels are sluggish, and that its stools are clay-coloured or white\*. Attacks resembling those of spasmodic asthma may then be noticed. After these have recurred several times, they may be attended by contractions of the angles of the mouth, and by a fixed state of the eyes. The duration of the attacks may then be lengthened, and, during their presence, the countenance may become discoloured, the body stiff, extended backwards, the respiration being

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\* “Εν Φρενιτικῶσι λευκὴ διαχώρησις, κακόν.”

*Hippocrates Prædict. Lib. I. 13.*



suspended for a considerable length of time. In the absence of these attacks, the child may appear lively and free from ailment. By degrees, as the attacks become more violent, the child, when suffering under them, may close its eyes irregularly, and unequally, and may fix them in a vacant stare. Or, while the child is laughing, and free from any urgent symptoms, it may be observed to close its eyes irregularly, or to fix them alternately for a moment or two, after which the state of its eyes may become natural as before. During the whole progress of this affection of the cranial brain, there may not be any increased heat of the head, nor flushings of the cheeks, nor alteration in the state of the pupils; and, in the interval between the fits, (as these attacks are always termed,) the child may appear in such perfect health, that it may be difficult to convince its friends that a serious disease is progressively increasing, which may ultimately prove fatal. The countenance of the child may gradually lose its gay and animated expression; the child may lose its energy; it may become delicate, palid, and listless, until, at length, after several repeated struggles, it is carried off under one of the convulsive attacks.



Such is the outline of many cases which I have seen, in which there was a permanent suppression of the biliary secretion, existing from birth, and depending, apparently, upon original malformation. In other instances, an inactive state of the liver has directly induced sensitive erethism, or torpid erethism, or torpor, or it has given rise to plethora, or to congestion, or to the gradual formation of hydrencephalus.

The milk of the mother, as it is the most natural, so is it the most proper food for an infant; but, if this be found to disagree, it must be changed for some other diet, or a wet-nurse must be procured. The particular detail of the rules to be observed with regard to the diet of infants who are brought up by hand, is already so fully laid down in the works of Drs. Underwood and Clarke, as well as in other treatises, that I need not offer any additional remarks on this subject. For the same reason I refrain from saying anything on the subject of clothing, further than observing, that, from the absurd notion of *hardening* infants, much irrecoverable mischief arises to children of a delicate frame, many of whom fall victims to the mistaken sys-



tem of exposing them to cold, or have feebleness of constitution induced by it.

When the secretion of bile is imperfectly or inadequately performed, we must examine whether this faulty state of the liver is the consequence of a morbid state of the alimentary canal, or whether it is one of the direct effects of a disordered state of the cranial brain, in either of which cases, our principal efforts must be directed to the removal of the primary disorder of which the faulty state of the liver is an effect. Calomel\* is the medicine usually employed to excite the biliary secretion in children; but, in children of a languid habit, in whom there is a tendency to scrofula,† and to an

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\* Calomel is given to promote the secretion of bile; it is also given where that fluid is too abundantly secreted. The mode of exhibiting it must be adapted to the particular state; in the former case, small doses of it should be given in repeated succession so as to produce the specific effects of mercury on the liver; whereas, if we want to remove from the alimentary canal an inordinate quantity of bile which has flowed into it, we should give one powerful dose, so as to produce its effects as a strong purgative.

† See Dr. Blackall's cautions respecting the exhibition of calomel to children. *Observations on the nature and cure of Dropsies*, 2nd edit. pages 37, 248, 249.



erethismal state of the cranial brain, we must be very cautious how we administer this remedy too frequently or too freely. In such children, if we want to promote a more copious secretion of bile, it will be more prudent to endeavour to attain that object by employing other remedies, such as nitro-muriatic acid, externally and internally, small doses of sulphat of potash with decoction of aloes, wine of aloes, or extract of taraxacum. Or if we find it necessary to employ mercury to promote the action of the liver, the mercurial pill, the grey oxide of mercury, and the hydrargyus cum creta, are less objectionable forms of that mineral.\* These several means may be assisted by the warm salt bath, by friction with salt, by applying a blister over the region of the liver, and by clothing the child in flannel. Great attention must be paid to the diet, both as to its quality, and as to the quantity given at a time, and a regular and due action of the bowels must be kept up. If the scanty secretion of bile be connected with inflammation of the liver, or with congestion of blood

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\* See the instructive remarks of Mr. Cooke on Hydrocephalus Acutus. Lon. Med. Repos. Vol. XI. 441.



in that viscus, we must remove these states before we attempt to excite a more copious secretion of bile. If “ as Dr. Cheyne observes, the patient wince when the right hypochondrium is pressed, leeches ought to be applied to it, or the margin of the ribs may be capped and scarified.\*” Calomel is, in many cases, given in repeated doses for a length of time, for the express purpose of removing an appearance of the stools, which is kept up by the calomel itself ;† the appearance to which I particularly allude, is the dark green hue, resembling that of stewed spinach, or boiled laver,‡ which is fre-

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\* Cheyne on Hydrocephalus Acutus, 2d edit. page 57. The reader is referred to the same part of this excellent work, for further remarks and cautions on the exhibition of calomel in cases of vascular excitement of the liver.

† In many chronic diseases, Dr. Armstrong observes, “ the secretions of the liver are disordered, not from an actual disease of that organ, but from an existing irritation in the nervous system ; and that irritation in some instances I have known to be created and maintained by the unnecessary employment of mercury, so that the changes of the biliary secretions were first occasioned by this preparation, which was afterwards continued, upon a mistaken principle, to restore those secretions to a natural state.” *Armstrong on Typhus*, 3d. edit. 550, 551. See also Mr. Cooke’s paper.

‡ Cheyne.



quently represented as being characteristic of such a condition of the cranial brain as terminates in hydrencephalus.

If the alimentary canal of an infant be in an unhealthy state, we must ascertain whether any primary affection of the cerebral structures, or of the liver, have any share in producing, and in keeping up, this morbid condition of the stomach and bowels. Under all circumstances, it is necessary to keep up a regular action of the bowels, and to remove any accumulation of fæcal matter which may have formed in the intestines.

When the digestion of an infant is imperfect, or when the action of the duodenum appears sluggish, yet no fault is perceptible in the state of the head, or in that of the biliary secretion, and no accumulation of fæcal matter is present, small doses of rhubarb and columba, of the compound decoction of aloes, and vinum ferri, will be useful ; and, to correct flatulence and acidity, mild carminatives with magnesia, or the aromatic spirit of ammonia, will be useful. The carbonate of iron with soda and aromatic powder, is also a good medicine, in such cases. Strict attention must be paid to the diet. When the



secretions of the intestinal canal are unhealthy, small repeated doses of the hydrargyrus cum cretâ or of the grey oxide of mercury, or of the blue pill, with minute doses of the neutral salts in infusion of senna and columba, will be exhibited with advantage, after the bowels have been freely evacuated by more powerful purgatives. If the bowels are loaded with fæcal matter, and with accumulations of unhealthy secreted fluids, (a state which will be denoted by fetid breath, and by all the other consequences of a morbid state of the alimentary canal,) it will be necessary to have recourse to calomel, combined with jalap, and scammony.

A high degree of wakefulness is a symptom which should always be closely attended to in infants, even when it is unaccompanied by any other indication of the presence of disorder\*; for such a state denotes a condition of the cranial brain closely bordering upon erethism; and

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\* "Contrarium illi malo (comati) est Pervigilium; unde intelligitur: et pro causa habet plerumque levissimæ inflammationis cerebri prima initia, quibus auctis in coma mutatur sæpe." *Boerhaave, Aphor. § 708.*



if it be suffered to continue, or if, during its presence, any irritation be offered to any part of the nervous system, there will be reason to expect that all those other symptoms will arise, which result from erethism of the cranial brain. In such cases, while we cautiously avoid all possible sources of irritation, whether in the alimentary canal, in the liver, or in the gums, we should order the child to be carried out frequently in the open air, with its head and face exposed\*; its body and head should be frequently sponged with cold water, and it should be immersed night and morning in cold or tepid water. If the wakefulness still continues, small doses of Pulv: Ipecac: Comp: may be given from time to time†.

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\* “ Propter vigilias interdum expedit leniter alvum movere. Sed ante omnia prodest frequens exercitatio interdium, et sub dio versari.” *Heberden Jun. de morbis Infantum.*

In a note to the original paper I asked “ would swinging the child in a crib, suspended from a height, in an exposed situation, during a part of each day, tend to diminish the inordinate sensibility of the brain?” I find that Van Swieten recommends this remedy. *See Comment. Vol. IV. 681.*

† Friction was strongly recommended by Asclepiades as



When symptoms are present which unequivocally denote the existence of erethism of the cranial brain, we must endeavour to allay this state, whatever the exciting cause of it may be. The rules which have just been laid down for the treatment of wakefulness, must be rigidly adhered to; Pulv: Ipecac: Comp: is a remedy peculiarly appropriate to this state.\* It must be given from time to time according to the urgency of the case.† This medicine may be advantageously combined with James's powder, especially in that state of the cerebral substance which may be expressed by the term *sub-acute*

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a remedy against wakefulness. See *Celsus, Lib. III. cap. 18. Aretæus de curat. morb. acut. cap. 1*

\* See Dr. Brooke's paper, Trans. of the Irish Coll. of Physicians. Vol. I, 79.

† The dose of the opiate must be regulated by its effect. In treating erethismal states of the cerebral structures with opiates, we must recollect that opium produces opposite effects in different cases, and in different doses. Opium may allay irritation of those structures, it may produce complete torpor of them, or it may act upon them as a stimulant. Our object in exhibiting opium in erethismal states must be, to allay irritation, we must therefore so administer it as to produce this effect, and this end will be best attained by giving the Pulv. Ipecac. Comp. in small repeated doses. This is a point too often over-looked.



*inflammation.*† Cold evaporating lotions should be applied to the head; or cold water should be poured in a continued stream on the head. The child should be kept in a cool, quiet, darkened room; with its head raised, and supported by a hard pillow. Every cause and source of irritation should be cautiously avoided. The urinary secretion should be promoted by small doses of nitre, with acetate of potash, in almond emulsion, to which a few drops of spirit of nitric ether may be added. The bowels should be kept open by means of mild glysters, or by small doses of castor oil; and the child may be frequently immersed in a tepid bath of a moderate temperature. In children of a full, robust, habit, if the symptoms are urgent, leeches should be applied to the temples. But, in that state of the cranial brain, which I have endeavoured to describe under the term *torpid erethism*, where there is great general pallor and coldness, with insensibility, and contracted pupil; the abstraction of blood will be a dangerous experiment, and may hurry our

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† See Dr. Cheyne on Hydrocephalus Acutus, page 61, and a paper by the same author, in Dublin Hosp. Reports, Vol. I, 315.



little patient out of the world. In such cases, we must endeavour to combat the affection by the means already pointed out; and, in addition to these, the head may be blistered.

I have already remarked that an erethismal state of the cranial brain may be induced by a morbid condition of the alimentary canal. I have also seen such a state kept up, if not induced in the first instance, by the continued exhibition of powerful purgatives, which, by their continued harassing effect on the bowels, keep up constant irritation of the cranial brain. The affection of the cranial brain in such cases, is, frequently, unobserved by the medical attendant, whose attention being directed solely to the alimentary canal, hopes to remove the indisposition of the infant by perseverance in the purgative plan. But, if symptoms be narrowly watched, it may perhaps be found that the child starts at slight noises, it is wakeful, peevish, restless, its head too hot, its face sometimes flushed, the head oftentimes thrown backwards. If, in such a case, the purgatives be omitted, if the child be immersed twice a day in a warm bath, if a little of the Pulv. Ipecac. Comp. be



given in a little carraway or dill water, while the head is bathed with an evaporating lotion, and if a mild un-irritating diet be enjoined, the symptoms of restlessness and irritation may gradually vanish. In such a case, if the opiate induce costiveness, that state must be removed by the gentlest laxative, as by small doses of castor oil, or by un-irritating glysters.

The primary cause of erethism of the cranial brain in infants is so often seated in the gums, that we should never forget to examine the state of the mouth, and if the least fulness, or increased redness, or increased heat, be perceptible in any part of the gums, that part should be freely lanced.

In all cases of erethism of the cranial brain, we must be always on the watch for symptoms which indicate the supervention of plethora of the cerebral blood-vessels, a state, which, combined with the erethismal state, constitutes inflammation of the cranial brain. The means which have already been pointed out, will, probably, prevent the accession of this state of the cerebral blood-vessels; should it, however, take place, leeches must be applied freely to the



head, or the temporal artery must be opened, or blood may be taken from the arm. The quantity of blood to be abstracted, must depend upon the urgency of the symptoms, and upon the effect which the abstraction produces. The head must be cooled by the application of snow, of ice, or of evaporating lotions, or, in the absence of these, by pouring cold water on the head, or by wrapping round the head towels soaked in cold water. The bowels must be purged by calomel and saline purgatives, after which, James's powder combined with calomel and nitre may be given in repeated doses. The child must be kept in a quiet, darkened, room, free from noise and disturbance.

It may happen, when an inflammatory state of the cranial brain has existed, that the remedies made use of may remove the plethoric state of the cerebral blood-vessels, while an erethismal state of the brain yet remains. In such cases, it will be proper to give the pulvis ipecac. comp. in repeated doses, combined with James's powder and nitre, to which small doses of calomel, or of the hydrarg. cum creta, may be added, and the other rules laid down for the treatment



of erethism of the cranial brain must be strictly attended to, as long as that state continues ; for if the erethismal state of that organ be not allayed, the child will continue wakeful, restless, and irritable ; and we may expect, that the plethoric state of the cerebral blood-vessels will, sooner, or later, return ; and that the child will, at length, be worn out, or permanent mischief may be established. And if, after all the marked appearances which indicate the existence of an erethismal state, have vanished, the child is wakeful, or very irritable, we must still procure rest, and allay irritation, by repeated doses of the Dover's powder, in such quantities, and at such times, as may be requisite\* ; recollecting, that there still exists a tendency to the revival of an erethismal condition of the cranial brain, which circumstances, apparently trifling,

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\* In protracted cases, where the erethismal condition appears to be the consequence of original formation, the long continued exhibition of opium, in any form, may induce a state of Marasmus. In such cases, although it may be proper to have recourse to the Dover's powder from time to time, to allay any increased degree of restlessness and irritation, yet we must endeavour to keep under the constant tendency to the erethismal state, by a steady perseverance in the rules already laid down for the treatment of wakefulness.



such as, the long-continued absence of sleep ; any error of diet ; an unhealthy condition of the alimentary canal, or in the liver ; or any irritation ; --- may suddenly call into action.\*

Whenever, therefore, erethism of the cranial brain has lately existed, we must be more than ever on our guard to avoid, and to ward off, all those causes which may give rise to such a state, or may call it into action.

When symptoms are present which denote the existence of an erethismal, or of an inflamed, state of the spinal brain, we must adopt a plan of treatment corresponding with that which has been recommended in a similar condition of the

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\* “ Whenever, therefore, at any period of a febrile disorder, there have been remarkable symptoms in the head, such as violent head-ache, with vomiting, and impatience of light, stupor, convulsive affections, or affections of the sight, though these symptoms may have entirely subsided, and the complaint again has assumed the appearance of simple fever, we must not consider the danger as over, but must be on our guard against a period of danger that is still before us. An attentive observer may generally remark, in such cases, something which leads him to suspect that the appearance of amendment is deceitful.”

*Dr. Abercrombie, Edin. Med. and Surg. Jour. XIV. 270.*



cranial brain. The bowels must be kept open; leeches and blisters should be applied to the neighbourhood of the spinal column; Pulv. Ipecac. Comp.\* should be given in repeated doses, combined with James's powder; the body should be immersed repeatedly in a warm bath; the child should lie on either side; and all sources of irritation should be strictly avoided.

In simple plethora of the cerebral blood-vessels, the object will be to relieve these vessels, to deprive them of their undue share of blood, and to prevent a return of their over-charged state. The body should be immersed in a warm bath, while cold lotions are applied to the head; blood may be taken from the jugular vein; leeches may be applied to the temples; the head must be kept in an elevated position; a full dose of calomel with James's powder should be given, followed by repeated doses of neutral salts, (repeating the dose of calomel and James's powder as occasion may require;) the several secretions should be promoted; every obstacle to the re-

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\* See a paper on the treatment of Tetanus, by Dr. Latham, *Med. Trans.* IV. 22.



turn of the blood from the head must be removed; and all those other causes which may lead to plethora of the cerebral blood-vessels, as well as those which have a tendency to produce erethism of the cerebral substance, must be carefully guarded against, or removed.

When congestion in the cranial brain is present, the jugular vein should be opened; a warm salt bath should be had recourse to; a full dose of calomel, with neutral salts, infusion of senna, and vinum aloes, should be exhibited; a stimulating glyster may be injected; the several secretions should be promoted, and every obstacle to the return of the blood from the head should be removed.

If there be reason to suppose that a collection of watery fluid in the ventricles of the cranial brain has taken place, we must combine those remedies which are calculated to procure the removal of the effused fluid, with such means as tend to support the general strength of the system. We must endeavour to ascertain the cause which has induced the hydrencephalic state, in order that, if such cause be still present, and



still operating, we may, by removing it, prevent an additional accumulation of fluid. The scalp may be freely blistered, and, if ulceration be produced, the chance of affording relief will be increased. The several secretions and excretions must be promoted, and every thing that can lead to plethora or congestion in the cerebral blood-vessels, must be cautiously guarded against. Mercury may be exhibited in small repeated doses, either in the form of calomel, or of the purified quicksilver rubbed down with honey; and mercurial ointment may be applied externally by inunction. Digitalis may be given in repeated doses, combined with nitre. If there be any symptoms present, denoting irritation of the cranial brain, pulv: ipecac: comp: should be given in combination with James's powder. During the presence of the comatose state, a strong infusion of green tea may be freely given.

If a considerable quantity of fluid be present in the ventricles of the cranial brain, our attempts to procure the removal of it by medicine, will, most probably, prove ineffectual. And, where the increased effusion is connected with



an alteration of structure in the cerebral substance, or with permanent disorder in that organ, the removal of the accumulated fluid will not restore the health of the patient. The sudden removal of the fluid may, indeed, accelerate death.\* It is probable, that, in many of the cases which are recorded as instances of the successful treatment of hydrencephalus, there was no accumulation of effused fluid, but that the symptoms were produced by simple torpor of the cranial brain. Where there is indisputable evidence of the presence of fluid in the ventricles, and where all other plans of relief have failed, recourse may be had to the operation of puncturing the head.†

In cases of torpor of the cranial brain arising from other causes than plethora, congestion, or hydrencephalus, the plan of treatment must depend, in a great measure, upon the cause which gives rise to it. If the torpor be blended with erethism, or if it alternate with it, our attention

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\* See Burns' *Principles of Midwifery*, page 526, note.

† See Dr. Vose's case in the 9th Vol. of the *Medico-Chirug. Trans.*, and the case of Mr. Lizars in the 16th Vol. of the *Edin. Med. and Surg. Journal*.



must be principally directed to the removal of the erethismal state, of which state the torpor may be the effect. In such cases, pulv. ipecac. comp. should be given, in repeated doses, in combination with James's powder and calomel, taking care to remove all sources of irritation which may exist in the gums, in the alimentary canal, in the liver, or in any other part. Leeches may be applied to the temples, and the head may be blistered.

Where the torpor of the cranial brain is the effect of a loaded, or otherwise disordered, state of the alimentary canal, recourse must be had to full doses of calomel, jalap, and scammony, with infusion of senna and vinum aloes, giving, at the same time, infusion of green tea\* with a little wine, or camphor mixture, and placing the child in a warm bath.

If the torpor proceed from the presence of worms in the alimentary canal, calomel with aloes may be exhibited, or the oleum terebinthinæ may be given by the mouth, and as a glyster.

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\* See a paper by Dr. Percival, *Dublin Hosp. Reports* Vol. I, 219, and a paper by Dr. Stokes, *Trans. of the Irish Coll. of Phys.* Vol. II.



When the torpor is the effect of a disordered state of the liver, our principal efforts must be directed to the removal of that state, which may, probably, be effected by following the directions already laid down, for the treatment of morbid states of that viscus. If the torpor proceed from the too free use of opium, a strong infusion of green tea and senna may be given, and the child may drink freely of coffee. If the opium be yet retained in the stomach, these remedies should be preceded by a powerful emetic.

When torpor of the cranial brain is the direct result of concussion, the child may be immersed in a warm bath, and we must cautiously mark the decline of the torpid state, at which time symptoms are apt to occur which denote irritation of the cranial brain. When the child has recovered a little from the first effects of concussion, we should give it a full dose of calomel; it must be kept perfectly quiet; and if any heat, or other febrile symptoms, arise, leeches should be applied to the temples.

When torpor of the cranial brain is the effect of general debility, or of loss of blood, the general strength of the infant must be supported



by light, nourishing diet; ammonia, with camphor mixture, and musk, may be given, together with small quantities of wine, and infusion of green tea; infusion of cascarilla, or columba, may also be exhibited, followed by small doses of vinum ferri. Heated towels may be wrapped round the head. The child may be immersed twice a day in a salt-water bath, and it should have the benefit of respiring pure air. The same remedies may be advantageously used in cases where the torpor is the direct effect of a high state of previous erethism; but, in these cases, we must be cautious not to exhibit stimulants too freely, or we shall increase the torpor instead of lessening it. In these latter cases, the head of the child may be blistered.

In all cases of torpor of the cranial brain, if the degree of torpor be very great, the means already pointed out may be assisted by glysters, of camphor mixture, of turpentine or of assafoetida.

The rules which have been given for the treatment of torpor of the cranial brain, will guide us in the management of a similar condition of the spinal brain. Where the torpor is blended



with erethism, we must, (as has already been said when treating of a similar compound affection of the cranial brain,) direct our principal efforts to the removal of the erethismal state. The body should be frequently immersed in a warm bath; pulv. ipecac. comp. should be given with James's powder, and liq. ammoniæ acet.; blisters and leeches may be applied to the neighbourhood of the spine; the bowels should be kept open by mild aperients; and every thing which has a tendency to produce irritation, of either of the cerebral structures, should be avoided or removed.

Where torpor of the spinal brain results from a diseased state of the bones composing the spinal column, a horizontal posture must be enjoined; if there be any tenderness, or increased redness, of the part affected, leeches should be freely applied to it; and, when all heat and tenderness are removed, friction, with stimulating applications, may be resorted to. Great attention must be paid to the general health, and especially to the state of the alimentary canal. The state of the spinal column may be such, as to



appear to require the application of caustics, or of a seton, but the management of such a case comes within the province of the surgeon.

In all other cases of simple torpor of the spinal brain, recourse may be had to repeated friction, aided by the use of stimulating liniments, composed of aq. ammoniæ, mustard, ol. succini, camphor, and the like; stimulating purgatives, and glysters of turpentine may also be used; and all those means should be adopted, which are calculated to promote the general health and strength of the infant.

FINIS.

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ERRATA.

Page 18 line 7 for erithismal, read erethismal.

Page 49 line 22 for noise, read noises.

Page 76 line 22 for spirst, read spirit.

Page 85 line ~~3~~ for in, read of.