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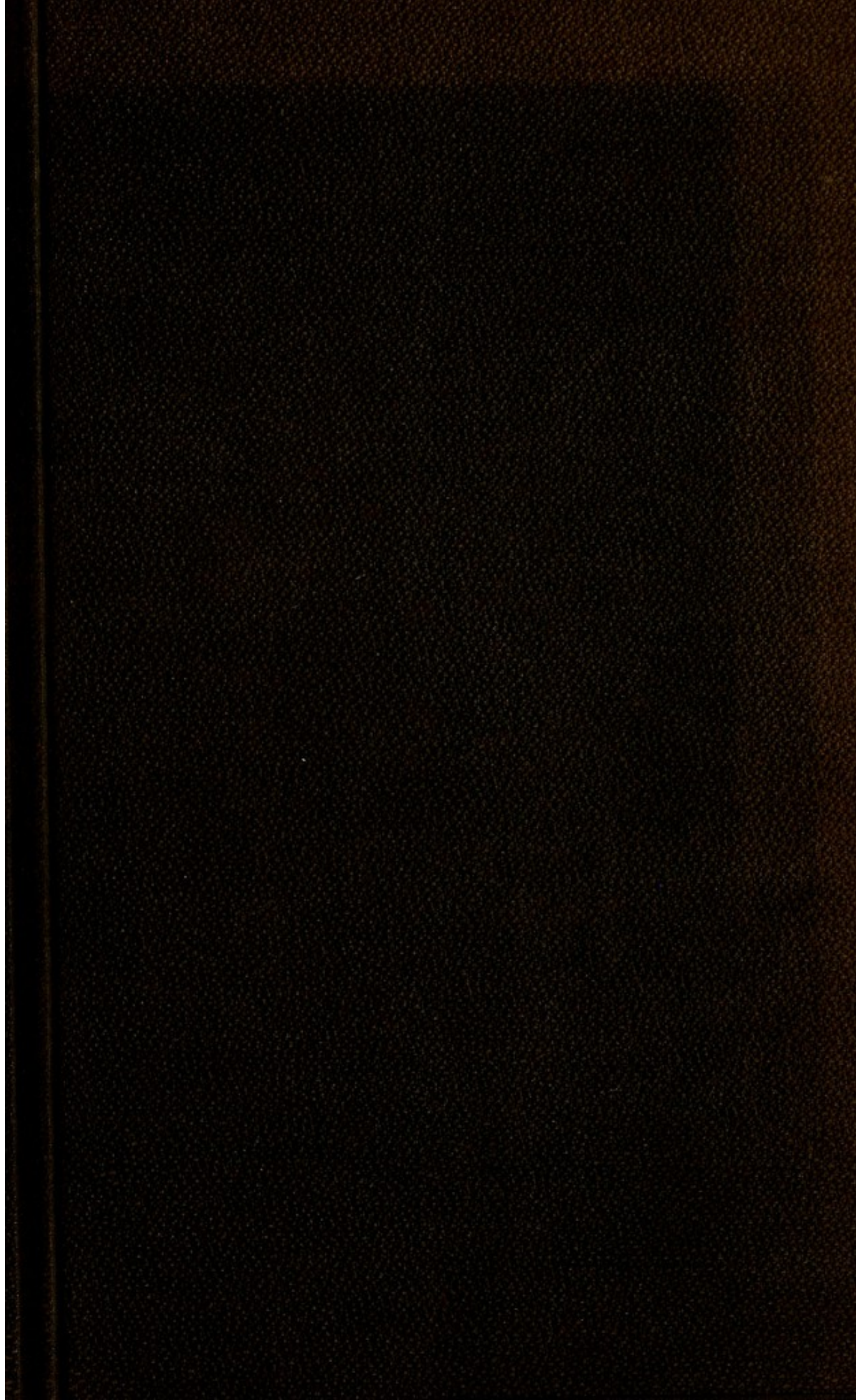
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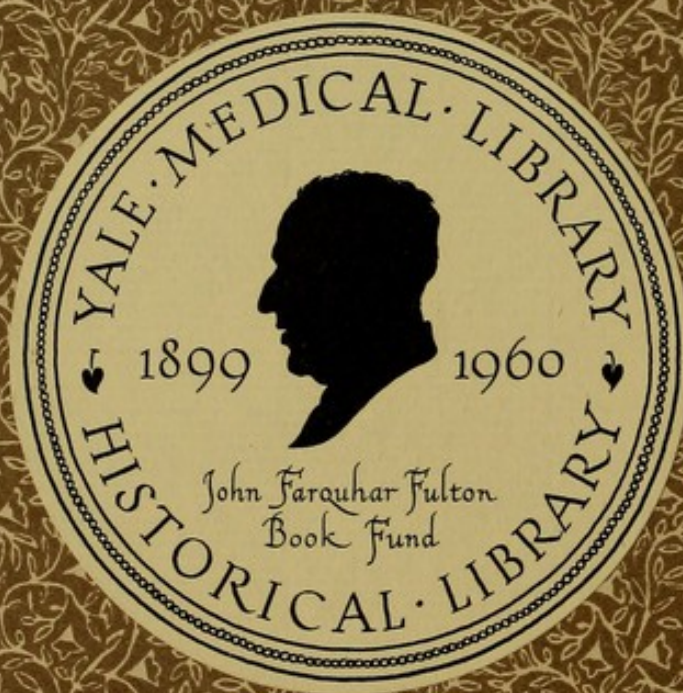
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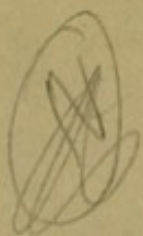
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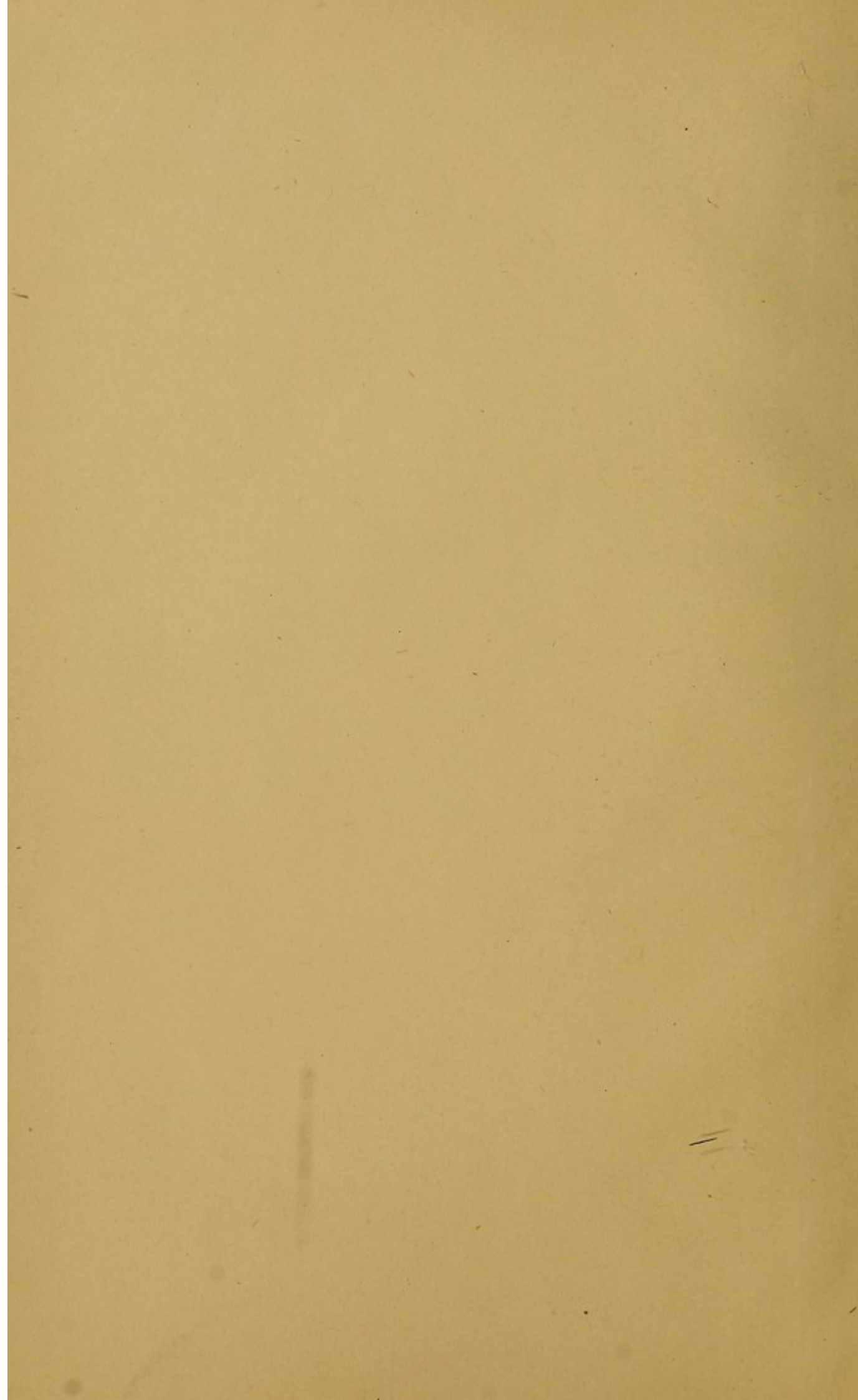
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A TREATISE
ON
INTRACRANIAL DISEASES:

INFLAMMATORY, ORGANIC, AND SYMPTOMATIC.

BY
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EASES OF THE NERVOUS SYS-
TEM," ETC., ETC.

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PREFACE.

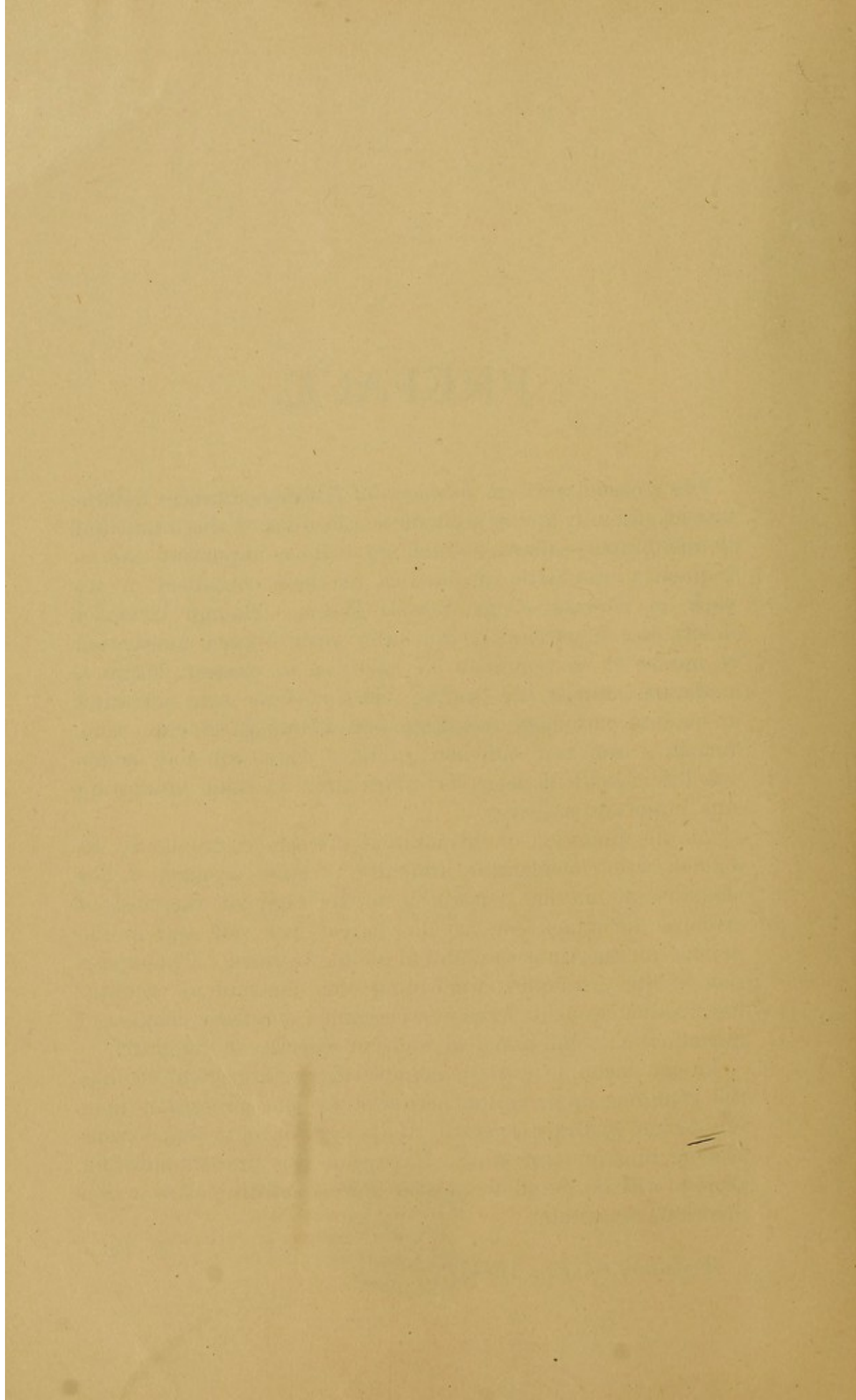
THE present work on *Intracranial Diseases* embraces inflammatory, organic, and symptomatic affections of the brain and its membranes—diseases which are quite as important, and as frequently met with in practice, as those contained in my work on *Diseases of the Nervous System*. Though intended chiefly as a *Supplement* to the latter work, I have endeavored to render it so complete in itself, as to present within a moderate compass the leading views of those most advanced in cerebral pathology and therapeutics, and, at the same time, furnish a safe and sufficient guide to those who may be disposed to consult its pages for information on these interesting and important subjects.

As the diagnosis of intracranial diseases is frequently attended with considerable difficulty, I have prefixed a few chapters on matters pertaining to the regional diagnosis of cerebral affections; for, as M. Charcot has well said in the preface to the American edition of his Lectures, "The exposition of the principles underlying the doctrine of cerebral localization seems to have now become a necessary chapter of introduction to the practical study of diseases of the brain."

In conclusion, I desire to acknowledge with grateful feelings the generous appreciation bestowed by the profession upon my former writings, especially those pertaining to the nervous system, and to express the hope that the present addition thereto will be found to possess merits entitling it to a like favorable reception.

C. P. H.

Wyoming, O., Jan., 1884.



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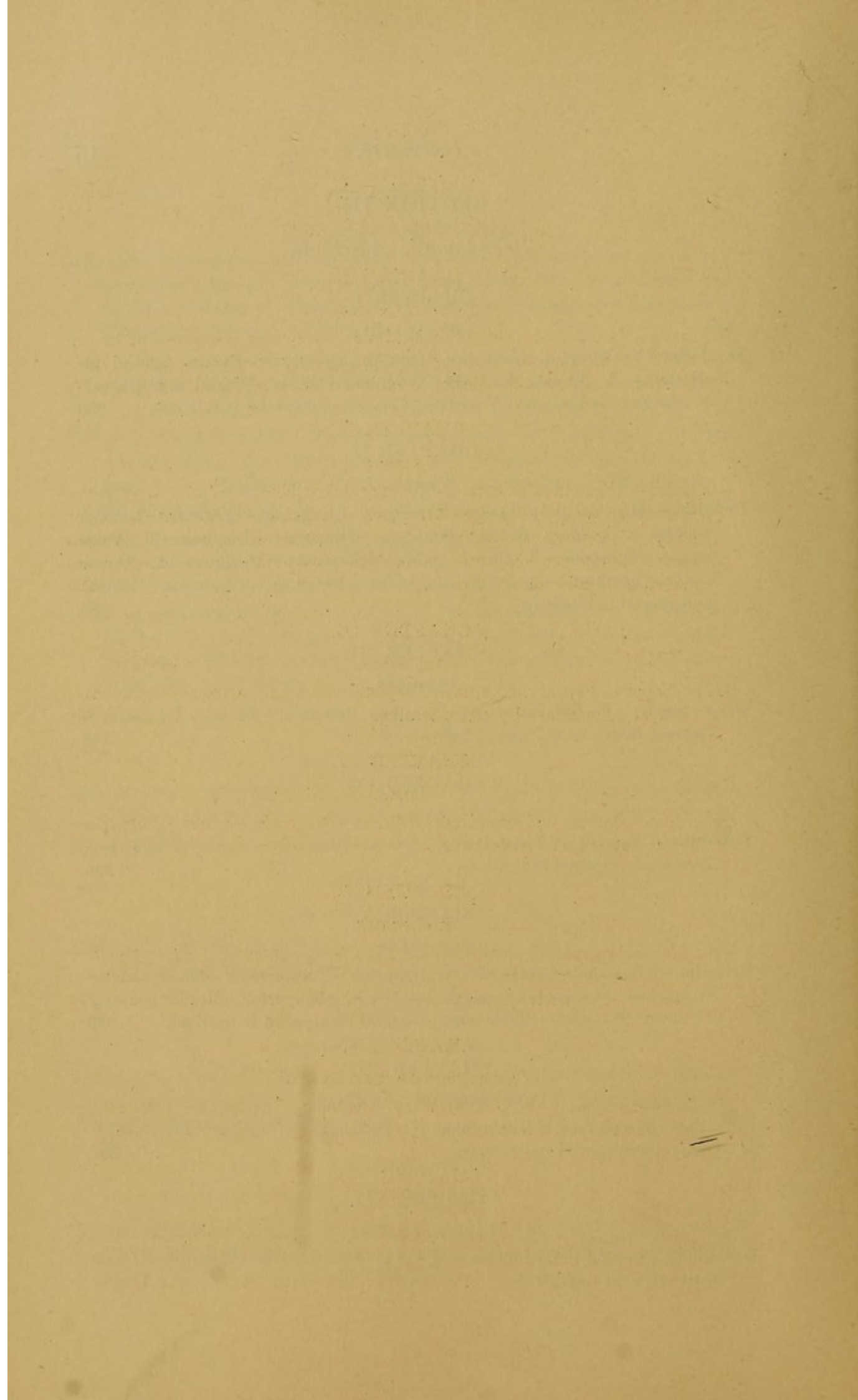
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A TREATISE
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INTRACRANIAL DISEASES.

PART I.

MATTERS PERTAINING TO REGIONAL DIAGNOSIS.

SECTION I.

PHYSIOLOGICAL CONSIDERATIONS.

CHAPTER I.

FUNCTIONS OF THE CEREBRUM.

ALTHOUGH numerous experimental researches had been previously made with a view to determine the special functions of different parts of the brain, it was not until the year 1870 that the cortical portion was found to be endowed with either sensibility or motor excitability; previous observations tending to show that neither pain nor convulsive action could be produced by stimulation or lesion of any portion of either the grey or white matter of the hemispheres. In that year, however, two German physiologists, Fritsch and Hitzig, by subjecting certain parts of the cerebral cortex of a dog to a weak galvanic current, discovered certain centres of motion in the grey matter of the hemispheres, which, when thus stimulated, could be made to produce certain well-defined muscular movements. These physiologists, by applying electricity to different portions of the cerebral surface, showed (1) that the grey matter of the hemispheres can be directly stimulated; (2) that

there are true motor centres in the cerebral cortex; (3) that the action on the muscular system is a cross-action, that is, that it acts only on the side opposite the seat of irritation; (4) that there are special centres or areas governing the movements of the extremities, the jaws, and the tongue; (5) that the special function of each area is limited to its particular centre, except so far as it may be affected by vicarious action; and (6) that severe hæmorrhage destroys the excitability of the grey matter of the cortex; thus accounting, perhaps, for the negative results reached by previous investigators. According to the same authorities, the motor centres, even when contiguous to each other, or occupying the same convolution, may be connected with widely different sets of muscles. Thus, the centre governing the supinator and flexor muscles of the forearm is found to be in close relation with the centre controlling the zygomatic muscles of the face, whilst adjoining the latter is a centre affecting the movements of the eyes and head. These results were afterwards confirmed by Ferrier, who repeated the experiments on the brain of a monkey, an animal whose cerebral convolutions most nearly resemble those of man.

The following is a brief summary of the results obtained by these observers, so far as they bear upon the theory of cerebral localization:

1. Notwithstanding the fact that, as shown by previous investigators, the hemispheres fail to respond to any form of *mechanical*, *chemical* or *thermal* lesion or stimulation, this is found not to be the case with *electrical* stimulation, the direct application of which to the surface of the hemispheres, in certain regions, causing definite movements in certain remote parts of the body; and, what is still more important, these movements are found to be associated with irritation of certain circumscribed areas.

2. While considerable differences exist between Hitzig and Ferrier in regard to the extent of cerebral localization, as well as in respect to the character and significance of the phenomena elicited by their experiments, the discrepancies between them may be satisfactorily accounted for, partly by the

manner in which they interpret them, and partly by the difference in their methods of investigation.

3. The method employed by Hitzig consisted chiefly in applying directly to the surface of the hemispheres, by means of blunted electrodes, a galvanic current of sufficient intensity to cause a distinct sensation when applied to the tip of the tongue. Ferrier's method was by means of a similar application of the electrodes of an induced or secondary current, of a strength sufficient to cause a pungent, but quite bearable sensation when applied to the tongue, affording a greater degree of stimulation without danger of producing disorganization.

4. An electrical current that will cause intense and indefinite action in an animal non-narcotized, will, according to Ferrier, excite only moderate and definite action in an animal merely rendered insensible to pain, and no effect whatever on one fully anæsthetized. The state of the cerebral circulation also greatly modifies its excitability, hæmorrhage lowering it in a marked degree. Great differences also exist in different animals, with respect to the degree and duration of the excitability of the hemispheres. Again, various regions of the brain differ in respect to their excitability. Thus, a current sufficient to cause a decided contraction of the orbicularis oculi, will, according to this authority, fail to produce any movement of the limbs. By observing this principle, using the faradic current, and applying a current of sufficient strength to produce a uniformly definite effect, Ferrier obtained positive results in regions of the brain in which Fritsch and Hitzig, with the weaker galvanic current, failed to elicit symptoms, and which they therefore termed inexcitable.

5. The situation of the motor centres in man, according to the physiological experiments of Ferrier on the monkey, an animal whose brain, as already stated, most nearly resembles that of man, is as follows: (*See Cut, page 20.*)

a. The centres for the movements of the *eyes* are situated on the posterior half of the superior and middle frontal convolutions (12), and the anterior and posterior branches of the angular gyrus (13, 13'). Electrical stimulation of the former (12) causes *elevation of the eyelids, dilatation of the pupils, conjugate deviation of the eyes, and turning of the head toward the op-*

posite side. Stimulation of the posterior centres (13, 13') causes the *eyes to move toward the opposite side*, with an *upward or downward* deviation, according as the electrodes are on one or the other branches of the angular gyrus.

The connection of this region (the *angular gyrus*) with the organ of vision, has been noticed by Hitzig, Goltz, McKendrick and others, the first two of whom experimented upon dogs, and the latter upon pigeons. Ferrier objects to Goltz's method of research—which consisted in washing away a portion of the brain after trephining over the spot selected for investigation—as not fulfilling the conditions required in investigations

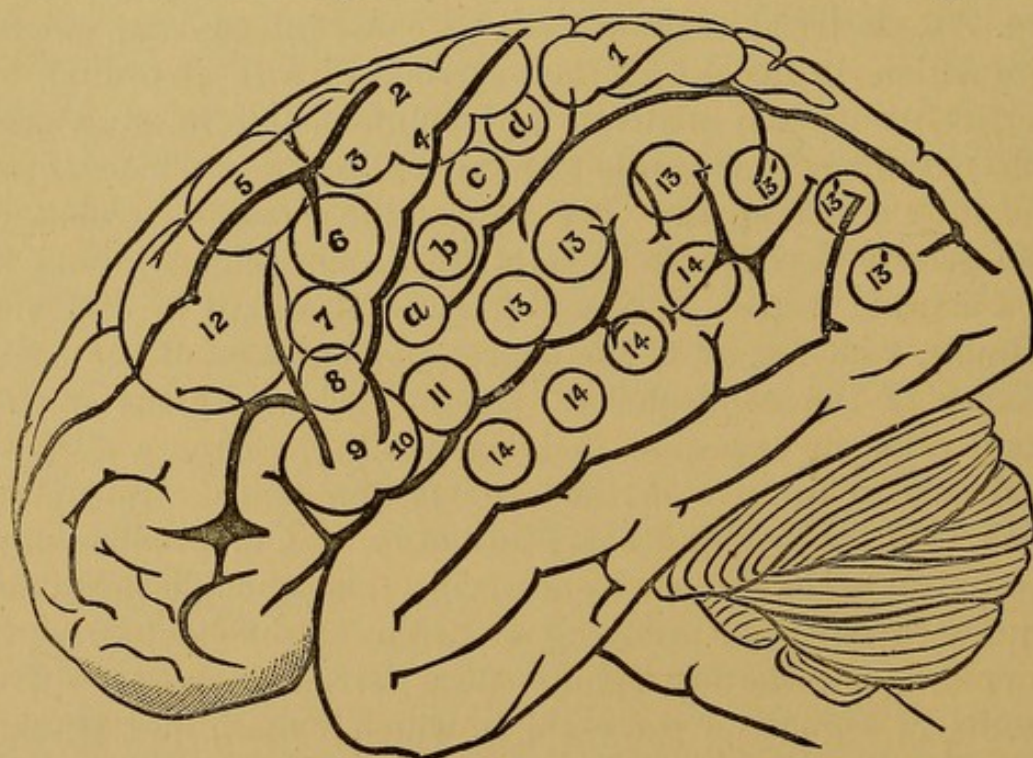


Diagram representing side view of the human brain.—(After Ferrier.)

of this nature. Ferrier's method of localized destruction of special areas, was chiefly by means of the actual cautery, varied occasionally with excision of the part. The result of his experiments upon this part was, that while *electrical irritation* of the angular gyrus, in which one of these motor centres for the eyes is situated (13, 13'), produces the *movements of the eyes, pupils, and head* above stated, its *destruction* causes *no paralysis in the muscles of either the eye, its lids, or the pupils.* *Unilateral* destruction of this centre, however, produces *temporary blindness* in the *opposite eye*; whilst *bilateral* destruction

of this centre causes *permanent blindness* in *both eyes*. It is plain from this that the centre of each hemisphere has a peculiar effect upon both eyes, which is explained by the peculiar decussation of the optic nerves in the optic chiasm. It is also plain that, as stated by Ferrier, the movements consequent on electrical stimulation of *this* centre are merely reflex indications of *sensory* stimulation. Whether, as he says, these movements are due to the associated action of lower centres, cannot be experimentally determined. We shall recur to this subject again, under the head of *sensory centres* (q. v.).

b. The centres for the movements of the *jaws* and *tongue*, are situated at the inferior extremity of the ascending frontal (Broca's) convolution, on a level with the posterior termination of the third frontal convolution (9 and 10). Electrical stimulation of this region is attended with *opening of the mouth*, and with *protrusion* (9) and *retraction* (10) of the *tongue*; action bilateral. These movements frequently continue after the electrodes are withdrawn. Ferrier found, in experimenting upon the dog, that the stimulation of this region also occasionally caused vocalization, or feeble attempts at barking or growling. In one experiment this was exhibited in a very striking manner. Each time the electrodes were applied to this region, the animal uttered a loud and distinct bark. To exclude the possibility of mere coincidence, Ferrier says he then stimulated in succession various parts of the exposed hemisphere, producing the characteristic reaction of each centre, but no *barking*. We shall see hereafter that Broca's convolution is, in man, the seat of *intelligent language*, and this experiment seems to confirm the truth of Broca's discovery, so far as experiments on the lower animals could be expected to do it.

c. The centres for the *mouth and lips* are situated on the ascending frontal convolution, above the centres for the jaws and tongue (7 and 8). Electrical irritation of the upper portion of this region (7), by its connection with the zygomatic muscles, *retracts and elevates the angle of the mouth*; whilst stimulation of the lower portion (8) *elevates the ala of the nose and upper lip and depresses the lower lip*, so as to expose the canine teeth on the opposite side.

d. The movements of the *upper extremity* are so numerous

and complicated, as to require many individual centres. That for *supination and flexion of the forearm*, is situated on the upper part of the ascending frontal convolution (6); that for *extension and forward movement of the arm and hand*, is situated at the posterior extremity of the superior frontal convolution (5); and the centre for *backward movement of the arm with abduction*, the palm of the hand being directed backward, as in swinging, occupies adjacent margins of the ascending frontal and ascending parietal convolutions (4). Centres for the extensors and flexors of the individual digits could not be differentiated, but the *prehensile movements* of the opposite hand are centralized in the ascending parietal convolution (*a, b, c, d*), the stimulation of which causes *individual and combined movements of the fingers and wrists*, ending in clenching of the fist. Paralysis caused by destruction of these centres, when the injury is limited to the cortical grey matter of the region included in them, is confined strictly to the voluntary movements produced by electrical stimulation of these particular centres, and without affecting the sensibility of the parts over whose movements they preside.

e. The centres for the movements of the lower extremity are situated on the posterior parietal lobule (1), and on the upper part of the ascending parietal and adjoining part of the ascending frontal convolution (2). The first of these centres (1) when electrically excited, *advances the lower or opposite hind limb*, as in walking. Occasionally this movement is confined to the *foot and ankle, the foot being flexed on the ankle and the toes widely separated*. Stimulation of the other centre (2) produces *complex movements of the thigh, leg, and foot*, with adapted movements of the trunk, by which the foot is brought to the median line of the body, as in scratching the chest or abdomen. Destruction of these centres, as in the case of those governing the movements of the upper extremity, causes paralysis of voluntary motion, without affecting the sensibility, the paralysis being confined to the movements resulting from electrical stimulation of these centres.

6. Whilst the great majority of physiologists, including Fritsch, Hitzig, Ferrier and other distinguished investigators, regard the above-described centres as directly motor, other

noted observers, as Eckhard, Schiff, Hermann, and Brown-Séquard, attribute the movements excited by electrical stimulation of the cerebral surface to a reflex, indirect, or vicarious action; and that, too, notwithstanding the fact that the results obtained by Hitzig and Ferrier are found to agree in most instances with clinical and pathological observation, as we shall see when we come to treat of the localization of cerebral diseases. Some contend that the movements observed are not due to the excitation of the cerebral cortex, but to the transmission of irritation to the motor ganglia below; in proof of which they point to the fact that Eckhard has succeeded in tracing one of the excitable fibres for the front leg from the cineritious substance down to the corpus striatum. MM. Lussana and Lemoigne, who also deny that the so-called cortical centres are true motor centres, found their objection upon the fact that *mechanical* stimulation does not excite them, and that galvanism and faradism are also generally insufficient when the animal is fully anæsthetised, as well as immediately after death. They also point to the discovery of Goltz, who, in his experiments upon the dog, found that the motor paralysis observed after destruction of the cortical centres, is neither complete nor permanent, like that which follows the destruction of the lower motor centres. Hence we find Dr. Brown-Séquard, the most noted skeptic on this subject, using the following language: "Take, for instance, the sense of volition; we find it destroyed or altered in diseases of the brain, yet cases are not wanting in which certain parts of the brain have been destroyed while volition was not lost; *and this is true of all the functions referred to the brain*. At times alteration or destruction of these functions attend lesions of the brain, at times again these lesions are present while the symptoms are absent, and at times an entirely different class of symptoms may appear. *Each alleged function of the brain may remain after the destruction of what is considered its centre.*"* Brown-Séquard also denies the doctrine of cross-paralysis, basing his opinion on the histories of less than three hundred cases in which paralysis occurred on the same side as the cerebral lesion. But as he had to ransack the entire literature of medicine to

* Lecture delivered at the Cincinnati Hospital, March 13th, 1872.

find these exceptions to the general rule, *that the paralysis is on the side opposite to the injury*, and as many of these cases were very old, and therefore probably incorrectly reported, his opinion on this point, as on that of the cortical motor centres generally, is diametrically opposed to that of most of his colleagues. Moreover, from what we now know regarding the variations in the course of the pyramidal fibres, such exceptional cases are perfectly consistent with the received rule on this subject.

7. The advocates of the cortical theory of localization rely for the support of their doctrine chiefly on the fact, that *paralysis of voluntary motion generally follows destruction of the corresponding cortical centres*, and that any apparent exception to this result is capable of explanation in a way consistent with their view. They allege, also, that the theory derives marked support, not only from clinical observations, but from anatomical and pathological considerations. They refer with emphasis to the researches of Betz, who found in the region anterior to the fissure of Rolando, corresponding to Hitzig's motor centres, *giant-pyramidal cells*, while in the region posterior to that fissure, *which is not excitable*, layers of nuclei predominate. Now these "giant-pyramids," which occur only in Hitzig's excitable zone, are not fully developed until after birth. Here, then, it is claimed, we have a striking analogy, so far as the nervous elements are concerned, to the motor elements in the grey matter of the spinal cord.

As for the transient character of the paralysis observed after destruction of cortical motor centres, it should be remembered that it applies only to quadrupeds; in man and the monkey the paralysis is permanent. In view of this fact, Ferrier pertinently asks: "If we were to say, with Hermann, that the recovery in dogs disproves the view of the motor functions of the cortex, how shall we account for the paralysis observed in man and monkeys?" The explanation usually given of the phenomena, as met with in quadrupeds, is, that a process of compensation is effected by another portion of the cortex taking on the function of that which has been lost. In the case of bilateral movements, it is only necessary to assume a vicarious action of the corresponding centre of the opposite hemi-

sphere. That such compensatory or vicarious action does take place where muscles of the opposite sides are usually associated in action, as in the movements of the eyes, chest, abdomen, etc., is evident, and seems to be satisfactorily explained by the theory of Dr. Broadbent, whose explanation is as follows: "Where the muscles of the corresponding parts on the opposite sides of the body constantly act in concert, and act independently, either not at all or with difficulty, the nerve-nuclei of these muscles are so connected by commissural fibres, as to be *pro tanto* a single nucleus. This combined nucleus will have a set of fibres from each corpus striatum, and will usually be called into action by both, but it will be capable of being excited by either singly, more or less completely according as the commissural connection between the two halves is more or less perfect. According to this hypothesis, then, if the centre of volitional action of one side is destroyed, or one channel of motor power cut across, the other will transmit an impulse to the common centre, and this will be communicated to the nerves of the two sides equally, if the fusion of the two nuclei is complete, and there will be no paralysis—more or less imperfectly to the nerve of the affected side if the transverse communication between it and its fellow is not so perfect, in which case there will be a corresponding degree of paralysis."

The above theory, which is in complete harmony with the facts of clinical experience, not only accounts for the comparative escape of bilaterally associated movements in case of corpus striatum hæmorrhage, which the theory was formed to explain, but serves also to clear up the transient nature of the paralysis resulting from destruction of the cortical centres in quadrupeds, the movements of which are more generally automatic than are those of man and the monkey. This explanation, however, is not quite satisfactory, since, after recovering from paralysis caused by the extirpation of one cortical motor centre, the destruction of the corresponding centre of the opposite hemisphere does not reinduce the paralysis from which the animal had previously recovered. Besides, even after the destruction of both cortical centres, the power of voluntary movement of the parts to which their influence seems to be

distributed is not entirely abolished. To account for these phenomena, Carville and Duret adopt the hypothesis of Flourens, Longet, and others, namely, that other portions of the hemispheres gradually assume the functions of the parts which have been destroyed. This law of functional substitution, however, is in direct conflict, not only with the doctrine of cortical localization of function, but with the results of the experiments on which that doctrine is founded. The law of substitution, in order to be consistent with the theory of cortical localization, requires to be limited to those centres of action already established—the lower ganglia—which, without resuming new functions, may in an indirect manner compensate for the loss of the upper centres.

THE SENSORY CENTRES.

7. We are indebted to Ferrier for most of our knowledge of the sensory centres of the cerebrum. We have already given the result of his experimental researches into that portion of the temporo-sphenoidal lobe known as the *angular gyrus*, in which is situated one of the motor centres controlling the *movements of the eyes, pupils, and head*, but whose destruction, while it produces no motor paralysis in the muscles of either the eye, the eyelids or the pupil (showing it to be not a direct but only a reflex motor centre), causes *loss of vision* in the opposite eye (which, however, is not permanent if the opposite gyrus remains sound), and when both angular gyri are destroyed, causes blindness of both eyes, *which is complete and permanent*, thus proving it to be a true sensory centre.

b. Pursuing his investigations, Ferrier found in the *superior temporo-sphenoidal convolution* a centre (14) which, under faradic irritation, caused the monkey operated upon to *suddenly retract or prick up the opposite ear, widely open the eyes, dilate the pupils, and turn the head and eyes to the opposite side*—phenomena which a loud sound made in the ear opposite the irritated hemisphere would be likely to produce. This inference, as to the nature of the effect produced by electrical stimulation of this centre, was confirmed by destruction of the convolution, which, as in the case of the visual centre, caused apparent deafness on the opposite side, and, when *both sides were de-*

stroyed, the animal became *totally deaf*, no motor paralysis being discoverable in either case.

c. In the lower part of the temporo-sphenoidal lobe, called the *subiculum cornu ammonis*, a centre was found which caused *a peculiar torsion of the lip and partial closure of the nostril on the same side*. This effect is similar to that produced by the direct application to the nostril of a powerful odor, rendering it highly probable that this is the special centre for the *sense of smell*. As in the preceding sensory centres, the conclusion drawn from the result of electrical stimulation of this centre, was confirmed by its destruction, which, when effected on both sides, caused the *loss of smell and taste*, showing that this region contains the centres of both these senses. Unilateral destruction of these centres produced the most marked effects upon the opposite side; bilateral destruction abolished the sensory function altogether.

d. Ferrier also succeeded in locating, with considerable certainty, the centre of *tactile sensation*, which he places in the region of the *hippocampus major and uncinata convolution*. This region is so difficult of access with the electrodes, as to render it impossible to reach it safely for electrical experimentation, and hence destruction of this region, which is found to *abolish tactile sensation on the opposite side of the body*, is the only reliable test. Ferrier finds confirmation of this being the special centre of tactile sensibility, in (1) *indirect or mediate electrical excitation*; (2) in *clinical and pathological evidence in man*, as given by Charcot, Raymond, Veyssi re and others, which, though not due to disorganization of the centres of sensation, interrupt the path of transmission from the organs of sense to the sensory centres in the cortex, *i. e.*, the centripetal fibres which proceed to the hippocampal region; and (3) the *impairment, or abolition of vision on the same side as the cutaneous an sthesia*, in which respect Ferrier's experiments on the monkey coincide with clinical observation, the function being abolished or greatly impaired on the side opposite to the lesion, as is the case likewise with the senses of taste and hearing, but not with the sense of smell, as the olfactory centre is in the hemisphere of the same side. Hence, as stated by Ferrier, "with the exception of the paths of olfactory sensation, section of the pos-

terior division of the internal capsule is practically, at one blow, interruption of all the sensory tracts, and is equivalent to extirpation or disorganization of the sensory centres of the cortex. The differentiation of these into regions of special sense is simply a terminal specialization of the centripetal paths which radiate from the internal capsule or foot of the corona radiata into the cortex."

e. The *occipital*, as well as the temporo-sphenoidal lobes are now generally regarded as containing sensory centres, although partial or complete removal of them fails to show any effect upon the motor or sensory functions. Ferrier, however, regards these lobes as specially related to the *visceral sensibilities*. He found that while their removal is without effect on any of the faculties of special sense, on the powers of voluntary motion, or on the functions of respiration and circulation; and while their removal is a less severe operation than the removal of the frontal lobes, in which the animals retain their appetite and eat and drink with apparently their usual relish, the removal or disorganization of the *occipital* lobes is attended with a *complete loss of appetite for food*, although the appetite for drink still remains.

8. The experiments we have described seem clearly to establish the following facts: (1) That there is a motor zone in the centre of the cerebral hemispheres, embracing the central and posterior portions of the frontal lobes; also, that there is a sensory zone, embracing the temporo-sphenoidal lobe, which is situated between the motor area, in front, and the occipital lobe, behind. (2) That these zones include distinct centres, each of which is endowed with its special and well-defined function. (3) That electrical stimulation of the motor centres produces contraction of certain sets of muscles with which they stand connected, while destruction of these centres produces paralysis of said muscles. And, (4) that electrical irritation of the sensory centres exalts their functions, while bilateral destruction of said centres abolishes their functions. This is as far, perhaps, as experimental physiology will enable us, in the present state of our knowledge, to go in the interpretation of cortical cerebral phenomena, for, as we have seen, some of the phenomena are inexplicable except upon the

theory of substitution—a theory which is still a subject of much controversy. We shall see hereafter, however, that the doctrine of special and exclusive primary centres in the cerebral cortex, derives very great support from anatomical, pathological and clinical considerations, which together furnish an amount of evidence in favor of the theory of localization that falls but little short of full demonstration.

But motion and sensation are by no means the exclusive functions of the cerebral convolutions. Experimental and clinical evidences have established the fact that the *anterior* portion of the cerebral cortex is eminently psychical in its nature, being the special seat of *volition* and *intelligent consciousness*. The removal of the cerebrum in animals does not destroy the perceptive faculties of *sight*, *hearing* and *taste*, as asserted by Flourens,* nor, if the basal ganglia are left undisturbed, does it permanently destroy the *mechanism of coördination* of muscular movements, but the animals simply appear stupid, as though deprived of *intelligence*. Both Hitzig and Landois† assert that when those portions of the cerebral cortex which govern the movements of the extremities, is excised, there is a *rise in the temperature* of the corresponding limbs, and that the elevation of temperature continues several months. A connection has also been observed between the cerebral cortex and the cardiac pulsations, a change in arterial pressure, dilatation of the pupils, salivation, and contraction of the spleen, bladder and uterus; but the true centres of some of these are not well determined, and there is reason to believe that they are really located in some other portion of the nervous system. The most important discovery, however, is that of Broca,‡ who, in the year 1861, succeeded in locating the seat of *intelligent language* in the *third convolution* of the *left anterior lobe* of the brain. This discovery has since been repeatedly confirmed, the most recent investigations tending, as I have elsewhere shown,§ to prove that the special centre for articulate language is in, or very near, the *island of Reil*.

* "Recherches expérimentales sur les propriétés et les fonctions du système nerveux," Paris, 1842.

† Virchow's "Archiv.," 1876.

‡ Broca, *Bul. de la Soc. Anat.*, 1861.

§ *Nervous Diseases*, p. 206.

CHAPTER II.

FUNCTIONS OF THE CEREBRAL GANGLIA.

MEYNERT* divides the cerebral ganglia into two principal parts, *the ganglia of the tegmentum pedunculi*, and *the ganglia of the pes pedunculi*, the former comprising *the corpora quadrigemina and thalamus opticus*, and the latter, *the corpus striatum and cortex of the brain*. These two great parts are again connected by commissural fibres, so as to form a special ganglionic system. We shall consider the two principal members of this system under the head of

1.—THE BASAL GANGLIA.

Electrical stimulation of the *corpora striata* causes general tonic contractions of the muscles of the *face, neck, trunk, and extremities*. When the irritation is confined to one of these ganglia, the spasms are unilateral, the flexors predominate over the extensor muscles, and the body is bent to the opposite side. According to Ferrier, Carville and Duret, muscular movements are not capable of being differentiated by the direct stimulation of these ganglia, as in the case of the cortical centres, although in Dr. Sanderson's experiments separate movements were produced after the cortical substance was removed; but this result is referred by Ferrier to the stimulation of the medullary fibres connecting the cortical centres with corresponding centres in the corpus striatum, although these centres are not capable of individual excitation when the electrodes are applied directly to the ganglion itself. Hence he infers there is in the corpus striatum a combination or integration of the various centres which are differentiated in the cortex.

* *Stricker's Handbook.*

Although Ferrier generally found the *optic thalami* insensible to faradization, there was *marked impairment of sensory function* when disorganized or destroyed by the actual cautery. On chloroforming a monkey, he inserted a wire cautery in such a manner as to traverse the optic thalamus completely. Before the animal recovered consciousness, the left eye appeared to be permanently closed, and when, after recovery, it opened its right eye, the right pupil was found to be dilated. The right side was completely paralyzed, cutaneous sensibility on that side was destroyed, and the animal was apparently blind; but as the medullary substance just external to the ganglion had been previously broken up, in an unsuccessful attempt to destroy the optic thalamus, it is not certain that the blindness in this case was not due, to some extent, to the lesion of the medullary fibres and cortical substance. The experiment proves, however, that both vision and cutaneous sensibility may be destroyed by an injury in and around the optic thalamus. Now, Veyssière, the result of whose experiments has been confirmed by Carville and Duret, has established, both by clinical evidence and by carefully conducted experiments on the lower animals, the fact that section of the posterior part of the peduncular expansion causes hemianæsthesia. Moreover, Türck, Demeaux, Bourneville, Charcot, and others, report cases showing that in man hemianæsthesia occurs whenever the corresponding regions of the internal capsule are destroyed by disease; while Ferrier's experiments show that, as a rule, vision is seriously impaired, if not quite abolished, on the same side as the cutaneous anæsthesia, *i. e.*, the side opposite the cerebral lesion. We see, also, that there is a differentiation of the paths and centres of sensation from those of motor impulses; and as the motor paths are limited to the corpus striatum and the anterior part of the internal capsule, the only path remaining for the transmission of sensory impressions from the periphery to the hemispheres, as pointed out by Ferrier, is through the tegmentum cruris cerebri, *the optic thalamus and its medullary connections with the cortex*. "To assert," says Ferrier, "in the face of these facts, that sensation can still continue, notwithstanding the total destruction of the

optic thalamus, both cells and medullary fibres, is to assert nothing less than a physical impossibility."*

It thus appears that *the optic thalami* bear the same relation to *the sensory regions of the cortex*, that *the corpora striata* do to *the motor regions*. The medullary fibres which converge to, and diverge from, the optic thalamus, are mostly distributed to the posterior and temporo-sphenoidal regions of the cortex, which, as we have seen, are special centres of sensation. L'Ys† says the body of this ganglion is made up of four separate ganglionic masses, (1) *centre antérieur*, (2) *centre moyen*, (3) *centre médian*, and (4) *centre postérieur*, which are connected with the olfactory, optic, auditory and tactile tracts respectively, and with corresponding regions in the cortex. As the researches of Meynert,‡ however, led him to somewhat different conclusions, Ferrier is not disposed to give full credit to these results. Moreover, the theory that the optic thalamus is called into action in the *upward* transmission of *sensory impressions*, and that the corpus striatum is the centre through and by which the *motor impulses* are transmitted *downward* to the opposite side of the body, though in harmony with the evidence just adduced, is yet far from being fully demonstrated. For, although hæmorrhage into the corpus striatum causes paralysis of the opposite side, instances are not wanting where both ganglia have been removed without the loss of either sensation or motion. Moreover, while MM. Lussana and Lemoigne§ state that destruction of the optic thalamus resulted in blindness of the opposite eye, Longet|| who succeeded in destroying the ganglion on both sides, was unable to detect any impairment of vision, or any influence upon the movements of the pupil. At the same time, it must be admitted that the distribution of the fibres of the *crus cerebri* are such as to point strongly to the *corpora striata* as *motor centres*, and to the *optic thalami* as presiding over *sensory impressions*.

* "Functions of the Brain," p. 266.

† "Recherches sur le Système Nerveux," 1865.

‡ Vide, *ante*.

§ "Fistologia die Centri Nervosi Encefalici," 1871.

|| "Traité de Physiologie."

2. THE CORPORA QUADRIGEMINA.

It is generally conceded that the *corpora quadrigemina* are the true *optic ganglia*, for when they are destroyed, vision is completely abolished, and the pupils no longer contract under the stimulus of light; but the experiments of Hensen* and Voelkers† appear to indicate that the exact seat of the centre or centres controlling the function of vision, contraction of the pupil, and the movements of the eyeball, is situated in the *aqueduct of Sylvius*, immediately beneath the tubercula quadrigemina; stimulation of the deeper portions of the nates, after removal of the upper, yielding more uniform results than before the section was made. This inference is sustained by the anatomical fact, that the deep origin of the third, or motor oculi nerve, can be traced to a *grey nucleus* in the floor of the aqueduct of Sylvius.

Unilateral destruction of these ganglia causes blindness of the opposite eye; but vision remains even after the hemispheres have been removed, provided the optic ganglia are uninjured. This fact appears inconsistent with the results of Ferrier's experiments upon the angular gyrus,‡ in which vision was abolished when both gyri were destroyed; but the probability is that these ganglia sustain a similar relation to that portion of the cerebral cortex, that the basal ganglia do to the other cortical centres.

Stimulation of the right side of the nates, according to Adamük,§ causes both eyes to move to the left, and stimulation of the left side, to the right; in front it causes an upward, and behind, a downward movement of both eyes, accompanied with divergence or convergence of the optic axes and corresponding changes of the pupil. We thus see that the centres governing the movements of the eyeball and pupil are, like the movements themselves, closely connected with each other.

The corpora quadrigemina have a marked influence on the *expression of the emotions*, such as fear, terror, joy, etc. They also appear to be connected in some way with the function of

* "Centbl. Med. Wiss.," 1870.

† Vide *ante*, op. cit.

‡ "Archiv. f. Ophthalmol.," 1878.

§ "Centbl. Med. Wiss.," 1870.

coördination of muscular movements, faradization of these bodies producing complex movements of all the voluntary muscles, especially of those concerned in *progression* and the *maintenance of the normal attitude*. This is in harmony with the discovery of Flourens,* that the removal of the corpora quadrigemina impaired the power of muscular coördination, and sustains the belief that the mechanism of coördination is of a complex character, involving not only the cerebellum, but the tubercula quadrigemina, pons Varolii, and other ganglia.

Faradization of the corpora quadrigemina, in animals, causes them to moan and utter peculiar cries; a fact that has led some to infer that the protracted moaning which is sometimes heard during attacks of epilepsy, is owing to irritation of these ganglia, just as the shrill cry that frequently ushers in the convulsive stage of that disease, points to irritation of the medulla oblongata.

3. THE CRURA CEREBRI AND PONS VAROLII.

The *crura cerebri* and *pons Varolii*, which form the greater portion of the meso-cephalon, are abundantly supplied with grey matter, showing that they are endowed with important ganglionic functions. The crura, as they diverge from each other in their upward course, are traversed by the third, or motor oculi nerves, the deep origin of which is just below the corpora quadrigemina. That some of the nerve fibres decussate between these points, is evident from the fact that destruction of one crus cerebri causes *paralysis of motion and sensation on the opposite side of the body*, and *paralysis of the motor oculi nerve on the same side*. Again, some of the roots of the facial nerve, which makes its exit from the side of the medulla oblongata, can be traced as far as the floor of the fourth ventricle, while others spring from the upper border of the pons Varolii. As the latter are below the point of decussation, we find that injury of the pons causes complete *facial paralysis on the same side*, and *paralysis of the extremities on the opposite side*. Moreover, the fibres of the pons decussate in such a manner,

* Op. cit., 1845.

owing to the separate origins of the roots above mentioned, that *both sides of the face* may be paralyzed and only *one side of the body*.

It appears from various experiments made upon the pons Varolii, that *automatic movements*, especially those governing *station* and *progression*, are regulated by it, independent of the action of the hemispheres. A somewhat similar function of the pons applies to the *sensation of pain*, which appears from the experiments of Longet* to be perceived by it even after the removal of both the hemispheres and the basal ganglia. We are justified, therefore, in regarding the pons Varolii as the ganglionic centre by which peripheral impressions are first converted into conscious sensations, and in which the voluntary impulses which stimulate the muscles to contraction, originate. This ganglion has also an important influence on *articulation*, for although intelligent speech does not seem to suffer from disease seated in this centre, yet, owing to paresis and incoördination of the muscles concerned in the formation of sounds, the pronunciation of words is rendered more or less clumsy and unintelligible.

4. THE CEREBELLUM.

Although the most opposite opinions have at times been entertained regarding the functions of this organ, and although its physiological action cannot even yet be considered as fully settled, no fact perhaps is better established, than that the cerebellum forms an essential part of the central mechanism by which *coördination of muscular movements* is effected. The fact is likewise well established, that this ganglion is capable of exercising *no truly mental function*, either of *sensation*, *volition*, *emotion*, or *intellect*. The experiments of Flourens† on pigeons, the results of which have been repeatedly confirmed, prove conclusively that the removal of the cerebellum, while not impairing the functions of sensation, volition and intelligence, causes in all cases loss of the powers of coördination. Au-

* Op. cit.

† "Recherches Expérimentales sur les Propriétés et les Fonctions du Système Nerveux," 2d ed., 1842.

thorities differ somewhat, however, as to the duration of these effects, Flourens asserting that the removal of the cerebellum causes permanent disorders of equilibrium, while the experiments of Dalton, Wagner, Mitchell and others, appear to show that *recovery* may take place after the removal or destruction of the greater portion of the organ.

The intimate connections of the cerebellum with the other portions of the encephalic mass, will serve to explain, to some extent, the complex movements and other phenomena produced by stimulation or lesion of different parts of the organ. Thus, *destruction* of the *anterior* part of the *middle lobe* causes a tendency to *fall forward*, while *irritation* of the same part, either by faradization or by disease, excites such muscular movements as would tend to counteract that effect. Again, destruction of the *posterior* part of the *middle lobe* induces a tendency to *fall backwards*, and of the *lateral lobes* to *fall sideways*, while stimulation of these parts provokes those movements which are calculated to counteract such tendency, such as movements of the eyes in different directions, contraction of the pupil, and the peculiar movements of the head and limbs. These forms of vertigo are so similar to those which occur in "Menière's disease," or *auditory vertigo*, as to lead some physiologists to infer that there is some sort of connection between the semi-circular canals of the ear and the cerebellum.* Few, however, are willing to accept such symptoms as positive evidence of the irritation of this centre, owing to the proximity of other points the irritation of which would be liable to excite similar symptoms, such as the corpora quadrigemina, the points of origin of the third, fourth and sixth nerves, and the different nuclei of the fourth ventricle. Moreover, as we have seen, the functions of cerebellar coördination cannot be completely separated from those of the optic lobes and pons Varolii, these parts, according to Ferrier, forming a combined mechanism incapable of being separated without producing a general derangement of function.

The influence of the cerebellum over peristaltic movements

* See Vertigo, Part II.

in the œsophagus and stomach, has been pointed out by Budge; and Schiff mentions a very acute form of intestinal inflammation, accompanied with hæmorrhage, which resulted from injuries to the peduncles.

Priapism has occasionally been observed in hæmorrhage of the middle lobe of the cerebellum, which has led some to regard this organ as the centre of the sexual appetite, but the effect mentioned was probably due to pressure of the clot upon the posterior surface of the medulla oblongata and pons Varolii. In fact, the centre of the sexual appetite appears from the most recent experiments to be located, not in the cerebellum, but in the lumbar region of the spinal cord. The relation of the kidneys, however, to the cerebellum, has been shown by Eckhard,* who found that galvanism of this organ produced *diabetes*.

* "Beiträge," 1878.

CHAPTER III.

FUNCTIONS OF THE BULB.

OWING to the fact that the medulla oblongata connects the spinal cord with the cerebrum, its functions are extremely varied and complicated. Thus:

1. As the centre from which are distributed most of the fibres which pass to the other intracranial ganglia, it receives and transmits both the *sensory impressions* and the *motor impulses* that pass to and from the cerebrum.

2. Its motor fibres decussate in the anterior pyramids, in such a manner as to connect each half of the brain with the opposite half of the body, producing in cases of injury and disease of the *cerebrum* the phenomena of *crossed paralysis*.

3. It gives origin to numerous important nerves, through which, in connection with their sympathetic relations, are manifested phenomena of *reflex coördination* originating in the following centres:

a. The *respiratory centre*, the exact seat of which is in the apex of the fourth ventricle, *at the point of the calamus scriptorius*. This centre has been termed by Flourens the *nœud vital*, or vital-knot, because any considerable injury at this point causes immediate death. Faradization or morbid stimulation of this centre produces sudden tonic contraction of the respiratory muscles of the neck, chest, and diaphragm. Epileptic and other convulsions generally arise from irritation of the medulla oblongata, as well as the sharp cry which ushers in the convulsive seizure.

b. The *cardio-inhibitory centre*, by which the heart is held under control, in obedience to sensory impressions transmitted to the medulla oblongata by means of sensory nerves. This

centre does not *cause* the *regular pulsations* of the heart, which are under the influence of the motor ganglia in the cardiac substance itself; but its movements are *inhibited*, or arrested in diastole, by impressions carried to the medulla oblongata. If the mesentery of the frog be exposed and slightly tapped, the heart will immediately cease to beat, but will soon resume its rythmical action. This shows the responsive action of the medulla to afferent sensory impulses, and also its inhibitory influence upon the heart. The rythmical action of the heart is under a two-fold nervous influence. One, the *inhibitory* or restraining influence, is exercised through the *pneumogastric nerve*, section of which accelerates the pulsations until they become too rapid to be counted; on the contrary, if the inhibitory action is called into full play by means of faradization, the heart will stand still during diastole. The *accelerating* action takes place through the *sympathetic fibres* proceeding from the medulla, and which reach the heart through the lower cervical and first dorsal ganglia of the sympathetic nerve.

c. The *vaso-motor centre*, which regulates the size of the blood-vessels. Dittmer* locates this centre in the lateral columns, after the fibres have been given off to the anterior pyramids; Clark places it near to the origin of the facial nerve; whilst others limit it to the floor of the fourth ventricle. *Stimulation* of this centre causes *contraction of the blood-vessels*, whilst *section* of it *paralyzes* them.

d. The *emotional centre*, which, acting through the *facial nerve*, gives expression to the countenance. Stimulation of this centre in the medulla oblongata produces *spasm of the facial muscles*, such as are often observed in convulsions arising from irritation of this portion of the nervous system.

e. The *centre for deglutition*, which harmonizes the action of the muscles of the lips, tongue, palate, and pharynx in the act of swallowing, more particularly in the last two stages of that act, or from the time the food passes the isthmus of the fauces.

f. The *oesophageal and gastric centre*, for regulating the movements of the oesophagus and stomach, and controlling the mechanism of the act of vomiting.

*Ludwig's "Arbeiten," 1873.

g. The *salivary centre*, which regulates the secretion of saliva, and possibly, also, that of the pancreatic fluid. The increased flow of saliva consequent upon the use of aromatic substances, such as ginger, cloves, etc., is due to afferent impulses sent through the *gustatory branch of the fifth cranial nerve* to the medulla oblongata, whence the efferent impulse is transmitted through the *chorda tympani branch of the facial nerve*.

h. The *centre for articulate speech*, which coördinates the movements of the lips, tongue, and palate in the act of speaking. This act is a complex one, requiring two sets of nervous influences, one acting through the *pneumogastric and spinal accessory nerves for respiration and phonation*, and the other for *lingual and labial movements through the hypoglossus and portio dura*, which act upon the muscles controlling the movements of the tongue, lips and palate. The nuclei of these nerves are not only situated close together, in pairs, but are so connected by commissural fibres extending from one side to the other, as to insure a simultaneous action of the muscles of articulation, even when the motor impulse is unilateral.

i. Finally, the medulla oblongata contains a *diabetic centre*, which, when irritated, produces a saccharine state of the urine. Experiments upon rabbits show that, when the animals are in good condition, a considerable amount of sugar is thus secreted, within an hour or two after the experiment is performed.*

j. The existence of distinct centres of reflex coördination in the medulla oblongata, which have not only been clearly demonstrated upon animals, but which, from pathological and anatomical considerations, are known also to exist in man, render it highly probable that the medulla is a *general centre for the coördination of muscular movements*, some of the special forms of which we have found to be possessed by the upper ganglia of the cerebellum, corpora quadrigemina, and pons Varolii.

* Ranney's *Applied Anat. of the Nerv. Sys.*, 1881.

SECTION II.

REGIONAL DIAGNOSIS IN BRAIN DISEASES.

CHAPTER I.

CEREBRAL LESIONS.

WE have seen that the investigations of modern physiologists prove most conclusively that the various groups of muscles are under the direct control of different portions of the grey substance of the cerebral cortex, as well as of the related ganglia below; for although lesions apparently contradictory of these results have from time to time been brought forward, Ferrier* has shown that in most cases the seeming contradictions are capable, not only of being reconciled with the theory of cortical localization, but oftentimes of confirming it in the most remarkable manner. This is especially true of lesions the effects of which are limited to particular areas, instead of being diffused, by pressure or otherwise, as in the case of tumors, where the effects are liable to be felt at a distance from the seat of lesion, and thus render the results more or less complex. Ferrier† enumerates the following lesions as being of special value in establishing the theory of localization of brain diseases, viz., "cases of wounds, laceration, or loss of substance, with various forms of chronic degeneration, such as atrophy, necrosis, etc., and the results of hæmorrhage, inflammation, and the like, which, though at first complex, subside into local

* "Localization of Cerebral Diseases," 1879.

† *Op. cit.*

lesions, such as softenings, cysts, and abscesses; or, in general, all lesions which exclude meningo-encephalitis, mechanical compression, or general cerebral disturbance." This distinction is all that is necessary, so far as *regional* diagnosis is concerned, whilst the diagnosis of the *nature* of the lesion will depend on other characters, such as the general symptoms, the mode of onset, and the various special features by which we are enabled to individualize the disease.

At the same time, however, it should be borne in mind that, so far as our present knowledge extends, there are no known *systemic lesions* in the brain.* The term *systemic* was applied by Vulpian to those lesions which are *systemically circumscribed*, that is, such as do not extend beyond the limits of certain clearly defined regions; as in the spinal cord, where there are lesions limited to the anterior cornua of the grey substance, to the lateral fasciculi, and to the posterior columns. But there are no such systemic lesions known to occur in the brain; no lesions invariably limited, for example, to the various portions of the cortex, to the thalami optici, or to the different ganglia of the corpora striata.† Not that anatomical demarcations of disease do not exist in the encephalon, but that they are relatively rare, and, to all appearances, wholly accidental. The explanation, according to Charcot, lies in the fact that the brain, unlike the other portions of the cerebro-spinal axis, is under the control of the vascular system; or, in other words, the arteries, veins, and capillaries "command the situation." For example, the most constant anatomical lesion of the brain at present known is that of Broca, confined chiefly to the third left frontal convolution, or the island of Reil; yet this is no exception to the rule, since aphasia, as we have elsewhere shown,‡ is found to depend upon obstruction of the middle cerebral artery or its branches. Hence, Charcot calls especial attention to the importance of vascular ruptures and the consequent hæmorrhage in the cerebral centres, and to the predominant

* Charcot, "Localization in Diseases of the Brain," 1878.

† I. e., the *lenticular* and *cordated nuclei* or *ganglia*, into which the corpora striata are now divided.

‡ See *Nervous Diseases*, p. 208.

influence of vascular obliteration by thrombosis and embolism, which result in extravasation, followed by partial softening of the brain.

Another fact that should be carefully borne in mind is, that although the brain is undoubtedly the organ of the mind, it may be greatly diseased without producing any very obvious mental disorder. On the other hand, well-marked mental derangement may occur without any characteristic morbid appearances showing themselves after death; and even in those cases where morbid conditions are revealed by post-mortem examination, such as the various forms of degeneration in the vessels, nerve-cells, neuroglia, etc., there has not yet been discovered any definite relation between the locality of the lesion and the symptoms observed. Hence, so far as certain faculties of the mind are concerned—the affections, desires, emotions, etc.—there is at present no well-marked localization of function—one sound hemisphere being sufficient for the performance of every mental function. It by no means follows, however, that there are no special centres of mental action, and therefore that there can be no differentiation or localization of mental diseases. Indeed, so far as the general seat of the intellect is concerned, it may be said to be already well established. Volition, also, when expressed in action, is differentiated both by *elevation of temperature** of the cerebral centre and by the motor phenomena. Mental symptoms, however, are not only frequently difficult of appreciation, but we are not yet in possession of the requisite criteria for determining with certainty whether the mind has, or has not, altogether escaped damage in every case attended with cerebral lesions. Moreover, the cases of bilateral cerebral lesions are comparatively few, and it is only in such, so far as diagnosis is concerned, that the mental symptoms or deficiencies can be said to have any weight. These considerations, however, only show the difficulties in the way of determining the localization of mental diseases and functions, and not the absolute non-existence of special centres of mental action. Strict research, therefore, may yet determine anatomical localizations of mental affections, but at present we

* Prize Essay of 1880, *Archiv. of Med.*, New York, April, 1880.

have no definite knowledge on which to base a regional diagnosis in diseases of this character.

The following general statements, based chiefly upon the observations of Ferrier, Charcot and Nothnagel, embrace results which have received clinical verification, and can generally be relied upon in the regional diagnosis of cortical lesions:

1. Although no exact localization of *mental disturbances* can yet be made, such derangements indicate, in general, disease of the *surface of the brain*, that is, of the grey substance of which the cerebral convolutions are chiefly composed.

2. Disease of the cortex may exist in a latent form, that is, without giving rise to decided symptoms; hence, the absence of symptoms is no proof that the grey substance of the convolutions is not affected by disease.

3. Diseases within the motor area, however, generally give rise to symptoms, either of a positive or negative character.

4. Lesions of the cortex outside of the motor area will produce no symptoms unless the cerebral membranes are involved, in which case there may be *convulsions*, and possibly, *headache*; these symptoms being the result of *irritation* of the motor and sensory areas of the cortex.

5. At present, *sensory disturbances* have but little value in the diagnosis of cortical lesions of the brain. Unilateral disturbances of vision sometimes occur, but so far they have only been observed in connection with diffused cortical lesions, such as progressive paralysis, cysticercus, etc., and are of no importance in regional diagnosis. As for *hemioopia*, it is only in cases where the symptom is developed suddenly, and is purely of a subjective character, that the existence of a cortical lesion can be suspected. If such a lesion exist, it will probably be located in the occipital lobe.

6. *Aphasic* or *dysphasic* symptoms indicate that the lesion involves one of the following localities, which are given in the order of their frequency: (a) the *third left frontal convolution*; (b) the *island of Reil*; (c) the *white substance between the third left frontal convolution and the base of the cerebrum*.

7. Lesions of the left parietal lobe, and more particularly of the *first temporal convolution*, are liable to produce *word-deafness*.

8. Cortical lesions generally give rise to motor derangements, the character of which is sometimes sufficiently diagnostic to indicate the seat of the disease.

9. The possible implication of the corpus striatum will often render the diagnosis of cortical lesions more or less doubtful, especially when they take the form of a simple hemiplegia, such as generally results from a lesion of that ganglion. In such cases no positive diagnosis can be made. Other associated symptoms, such as aphasia, may render the diagnosis more probable, but even then the aphasic or other cortical symptoms may be connected with a corpus striatum lesion.

10. Lesions of the cortex resulting in *actual destruction* of the grey matter of the motor area, are generally followed by *paralysis*; whilst *irritative lesions* of the cortex usually give rise to either *partial* or *general convulsions*.

11. Paralysis arising from lesions of the cortex generally indicate *monoplegias*, *partial hemiplegias*, paralysis of the *hypoglossal*, *facial* and *brachial nerves*, or of the nerves of the *face and arm*, or *arm and leg*; the leg alone is rarely involved.

12. Paralysis of motion, when confined entirely, or even chiefly, to the upper extremity, indicates not only that the lesion is located on the opposite side of the brain, but that it is probably confined to, or involves, the ascending convolutions of the parietal or frontal lobes.

13. When the paralysis is confined chiefly or exclusively to the muscles of the lower extremity, and is of intracranial origin, the lesion probably involves the convolutions at the upper extremity of the fissure of Rolando.

14. Monoplegias, even when of intracranial origin, do not indicate with absolute certainty, but only with great probability, the existence of a cortical lesion.

15. The associated symptoms are often of very great importance in determining the diagnosis. Thus, if with paralysis of the extremities, there is also paralysis of the facial and hypoglossal nerves, and especially if ptosis is also present, the paralysis is probably due to a cortical lesion. On the other hand, if the motor hemiplegia is associated with marked disturbances of sensibility, it indicates either that the lesion does

not involve the cortex, or if it does, that the lesion is extensive, and extends deeply into the white substance below.

16. Motor *irritative symptoms* arising from lesions of the cortex indicate that the seat of lesion is probably in the *ascending frontal* or *postero-parietal convolutions*, or in the *paracentral lobule*.

17. *Irritative symptoms* take the form of *partial* or *general convulsions*, which may either precede or follow paralysis of the affected muscles. If *partial*, they may occur either as the result of *hæmorrhage* or *softening*, or the *development of a tumor*. If *general*, they will be of an epileptiform character, the initial spasms always recurring in the same group or groups of muscles in the face or extremity, and always subsequent to an existing paralysis.

18. The paralysis which follows motor disturbances resulting from cortical irritation, is generally of the *transient variety*, but it may be permanent.

19. Motor paralysis, due to destructive lesions of the grey matter of the cortex, occurs on the side of the body *opposite the seat of the disease*, and is generally permanent.

20. It is probable that only those destructive lesions of the cortex which implicate the subjacent white substance, are capable of producing motor paralysis of the opposite side of the body; for no symptom of importance results from lesions of the *centrum ovale*, except such as occurs in the anterior and posterior central regions, namely, motor paralysis of the opposite side, similar to what is caused by lesions of the cortex and corpus striatum.

21. When, after an attack of hemiplegia from destructive lesions of the cortex, the paralyzed muscles become rigid, it indicates that a *secondary degeneration* of the nerve-fibres has set in, and is progressing downward along the spinal cord. This is most marked in cases where the lesion is seated in the paracentral lobule, but applies to some extent to the entire motor area of the cortex.

CHAPTER II.

LESIONS OF THE BASAL GANGLIA.

CHARCOT and Nothnagel have recently made the basal ganglia the subject of special investigation, with the view of affording a satisfactory explanation of the clinical phenomena exhibited by the various lesions of these important organs; and as the results which they have reached are of great practical interest and value, we shall present a synopsis of them nearly in their own words.

As before stated, Charcot bases his views of cerebral localization chiefly upon the anatomy of the cerebral circulation.

The following are his principal conclusions:

1. The symptoms which arise from softening of the entire region occupied by the basal ganglia, are those of *cerebral hemiplegia accompanied with cerebral hemianæsthesia*. We are not able to recognize the special symptoms which belong to destruction of the thalami optici, the caudated or the lenticular ganglia,* and still less, the various segments. It is possible, however, in some cases, to make a regional diagnosis, based upon the arterial distribution; as, for example, when the lesion affects all, or nearly all, of the territory of the lenticulo-striated arteries, or that of the lenticulo-optic arteries. In the latter case the symptoms of hemianæsthesia are present, whilst in the former they are absent.

2. In lesions confined to either one of these ganglia, and where the internal capsule is not involved, it is impossible to distinguish, during life, a lesion limited to the lenticular ganglion from one confined to the caudated ganglion; and

* The ventricular and extraventricular portions of the corpus striatum are now known as the *caudated nucleus* or *ganglion*, and the *lenticular nucleus* or *ganglion*.

lesions of the thalamus opticus generally confound themselves clinically with those produced in the two compartments of the corpus striatum.

3. The symptoms which accompany lesions of these ganglia are those of *common cerebral hemiplegia*. This form of cerebral hemiplegia may be called *central* to distinguish it from *cortical central hemiplegia*.

4. Paralysis dependent upon lesions of these ganglia is generally of motion only; to which, however, disturbances of sensation such as belong to central hemianæsthesia are sometimes added.

5. Hemiplegia arising from lesions confined strictly to these ganglia, is generally transitory, passing, lightly marked, and, in any case, is at first comparatively benign. This arises, doubtless, from the fact that these ganglia are scarcely ever affected in their totality.

6. If the internal capsule be involved, whether the grey substance of the ganglia be implicated or not, the hemiplegia is of a very marked and persistent character. Thus, even when very circumscribed, and especially when seated low down by the side of the peduncle, these lesions produce a motor paralysis almost necessarily accompanied by *late contractions*; a symptom of bad augury in these cases, because as a rule it indicates that the paralysis will be permanent.

7. If the lesion occupies any part of the *anterior two-thirds of the capsule*, that is, the region where the white tract separates the anterior extremity of the lenticular ganglion from the head of the caudated ganglion, and which belongs to the field of the *lenticulo-striated artery*, the paralysis will be exclusively that of *motion*; there will be no durable trouble of sensation.

8. But, on the contrary, if the lesion should extend to the *posterior third of the capsule*, in that region where it passes between the posterior extremity of the lenticular ganglion and the thalamus opticus, the presence of *cerebral hemianæsthesia* would be almost certain.

9. Most frequently the lesion extends to several parts, and *paralysis of sensation* will be accompanied with a more or less marked *motor hemiplegia*.

10. But it may happen that *cerebral hemianæsthesia* will occur alone, at least as a permanent phenomenon ; as, for example, in those cases where the most distant parts, the most posterior portion of the internal capsule, would alone be definitely altered.

11. The above observations are based upon truly *destructive lesions* of the internal capsule, such as lacerations or necrosis, producing irreparable loss of substance. But the internal capsule may be only indirectly involved, as where one of the grey ganglia, in case of interstitial hæmorrhage, may be so distended as to compress the nerve-fibres that compose the internal capsule, and so suspend their functions. In this case the paralysis would always be temporary, unless the compression was the result of a tumor.

12. The distinction just made should be carefully borne in mind, as the error has often been committed of attributing certain symptoms to destruction of some one of the grey ganglia, as the thalamus opticus, or the corpus striatum, which were only the result of a neighboring accident, and the incidental compression of the internal capsule.

13. The thalami optici are not, as commonly supposed, the seat of *common sensation*, as is shown by the fact that where a hæmorrhagic lesion of the posterior tract of the thalamus opticus produced, in the first instance—that is, when conditions of pressure existed—sensitive and sensorial disturbances, which disturbances cease in the later stage, that is, from the date when re-absorption removes the pressure from the posterior or lenticulo-optic region of the internal capsule.

14. As concerns the region of the basal ganglia, it is the participation or non-participation of the anterior or posterior regions of the internal capsule which determines the situation and gives significancy to the symptoms.

Nothnagel,* whose observations on the basal ganglia correspond with those of Charcot, adds also the following:

15. The motor hemiplegia resulting from stationary destructive lesions of the corpora striata, affects constantly both ex-

* "Topische Diagnostik der Gehirnkrankheiten; eine klinische Studie," Berlin, 1879.

tremities of one side, and the inferior branch of the facial nerve. Usually, also, the muscles of the trunk are rendered parietic. The hypoglossal nerve is either not at all, or only in the beginning affected, and seldom permanently. It is rarely the case that the extremities or the facial nerve are separately involved.

16. When hemianæsthesia is an accompaniment of corpus striatum hemiplegia, it is sometimes characterized by the fact that, along with the cutaneous anæsthesia the nerves of special sense—sight, hearing, taste, and smell—on the corresponding side are affected; but this is not the general rule, as the condition is usually confined to the skin.

17. The existence of hemianæsthesia indicates the implication of the most posterior part of the internal capsule, with the contiguous part of the corona radiata; nevertheless, lesions may exist in the posterior part of the internal capsule, between the lenticular nucleus and the optic thalamus, without giving rise to anæsthesia.

18. In most cases, the hemiplegia and the hemianæsthesia exist together; it is only occasionally that the hemiplegia disappears and the anæsthesia remains.

19. When the posterior portion of the internal capsule is involved, disturbances of a vaso-motor character occasionally occur in the paralyzed parts, such as increased temperature, redness, etc.

20. Although hemichorea frequently occurs in conjunction with hemianæsthesia, its relations to the corpus striatum cannot at present be accurately determined.

21. Thalamic lesions cannot give rise to motor paralysis. On the contrary, when paralysis exists we must suppose other parts to be involved, even if the optic thalamus should be the principal seat of the lesion.

22. The same is also true of sensory paralysis. We are not warranted in diagnosing the existence of a lesion of the optic thalamus, even though the relations which exist between injuries of the part of the internal capsule near the thalamus and sensibility, are such as to lead us to conclude that the lesion is situated near the thalamus, or in it, in such a manner

that the internal capsule is also implicated. This is true, also, of the vaso-motor tracts.

23. Crossed amblyopia or homonymous hemiopia may occur through lesion of the posterior third of the optic thalamus, but which of the two conditions exist in these cases cannot, at present, be determined with certainty. Such visual disturbances, however, do not indicate the existence of thalamic lesions with any degree of positiveness, as they may occur with other localized lesions of the brain, such as those of the occipital lobes, the optic tracts, and the corpora quadrigemina.

24. Such irritative motor disturbances as hemichorea, athetosis, and unilateral tremor, may possibly be due to lesions of the optic thalamus; but even if the fact were definitely established, they would be of very little diagnostic value, as they may also occur in lesions of other parts.

25. It is also possible that disturbances of the muscular sense, and disorders of psycho-motor reflex actions, are indications of thalamic lesions; but further observations and investigations are necessary to settle these points.

26. A lesion of the optic thalamus may, perhaps, under the most favorable combination of circumstances, be diagnosticated, provided the conditions mentioned under the last three sections be present, but even then there would be more or less uncertainty about it.

27. The symptoms resulting from lesions of the tubercula quadrigemina are sometimes hardly noticeable, and at others exceedingly ambiguous; so much so, in fact, as to render the diagnosis of diseases of these organs very difficult and uncertain.

28. Lesions of the nates are generally, but not always, accompanied with diminution of the sense of sight, or even blindness. This symptom, however, is too ambiguous to be necessarily referred to lesion of the corpora quadrigemina, unless it is of sudden development, and associated with engorged papilla, optic neuritis, and optic atrophy.

29. Lesions of the testes are usually accompanied with paralysis or paresis of the oculo-motor nerve, but neither the presence or the absence of this symptom is an unfailing guide for diagnosis.

30. When a unilateral paralysis of the oculo-motorius arises from a bilateral lesion, and is unaccompanied with alternate paralysis of the extremities, the corpora quadrigemina are probably the organs involved.

31. Conversely, bilateral implication of the motores oculorum appears to be sometimes due to a unilateral lesion of the corpora quadrigemina

32. Lesions of the nates appear to arrest the reactions of the pupil; though nothing exact is known on this subject.

33. It appears that disturbances of equilibrium and coördination may result from lesions of the testes, similar to those arising from disease of the cerebellum.

CHAPTER III.

LESIONS OF THE CEREBELLUM.

OWING to the great diversity and variableness of the symptoms, the diagnosis of cerebellar diseases is extremely difficult and uncertain. Moreover, they may exist in a latent form, and therefore be incapable of being diagnosticated. This is particularly the case where the lesions are of a destructive character, and are confined to one hemisphere; whereas, if only a single lobe is involved, or the lesions are of slight extent, the symptoms, though generally more characteristic, are at the same time more variable and more complicated. This will appear if we pass in review the symptoms belonging to the different regions of the organ.

Paralysis of the opposite arm and leg is frequently met with in lesions of the lateral hemispheres of the cerebellum, but is generally more marked in the leg than in the arm, and is also less pronounced than in the more ordinary forms of hemiplegia, being usually absent from the face, and not accompanied by much diminution of sensibility. Paralysis caused by superficial cerebral lesions may also be absent from the face, but it differs from cerebellar paralysis in being more marked in the arm than in the leg. Consciousness is seldom lost in lesions of this part, unless the injury is sudden and the lesion extensive. Vomiting is perhaps more frequently met with in cerebellar than in cerebral lesions; and intense paroxysms of pain are frequently complained of, especially in the occipital region. Slight tonic contractions of the facial and ocular muscles may occur, accompanied with more or less rigidity of the neck and of the paralyzed limbs; but the movements of the tongue are not generally interfered with, nor is there usually any difficulty in articulation or deglutition.

If the superior peduncles, which are in close anatomical relation with the corpora quadrigemina, are affected by the lesion, amaurosis may set in; but there is generally no mental disturbance or impairment, though there may be slight intellectual torpor or dulness, and perhaps some drowsiness.

But the symptoms resulting from lesions in one lateral hemisphere of the cerebellum are often much less pronounced, there being perhaps no paralysis, but simply a paretic condition, characterized by an unsteadiness or incoördination of movement, or what is called a titubating gait. This muscular weakness, which is generally more marked in the legs than in the arms, is sometimes so great as to render the patient quite unable to walk or even to stand.

Lesions of the middle lobe of the cerebellum are less frequently attended with manifest symptoms than are those of the lateral hemispheres. Bastion* says "that in almost all the cases of disease of the cerebellum in which excitation of the genital functions has been noted, the lesion has been situated in the middle lobe. Symptoms of this type have, indeed, been observed in about one-third of the recorded cases of disease of the median lobe of the cerebellum. In both sexes there has appeared to be an increase in sexual desires, and in male patients there have been frequent erections, with or without seminal emissions. Such symptoms in connection with lesions of this part have all the more significance because they do not present themselves where only the lateral lobes of the cerebellum are involved. With the limitation thus indicated, therefore, there would appear to be some foundation for the old phrenological doctrine as to the function of the cerebellum."

If the lesion of the middle lobe be a large one, vision may be more or less impaired, in consequence of the irritation or pressure exerted by it upon the corpora quadrigemina through the superior cerebellar peduncles.

Lesions of the middle peduncle of the cerebellum give rise to symptoms similar to those produced in animals by section of its fibres, namely, rotation in one uniform direction—*i. e.*,

* "Paralysis from Brain Disease," 1875.

from the sound towards the injured side—about the longitudinal axis of the body, with a deviation downwards and inwards of the eye on the injured side, whilst that of the sound side is directed upwards and outwards. Vulpian explains these phenomena by supposing that there is in these cases an interruption of motor power from the muscles of the side of the body corresponding with the lesion, thus unbalancing the action of those of the opposite side.

In order to understand the effect of lesions existing either here, or where the root of the peduncle is implicated in the substance of the lateral hemisphere of the cerebellum, it should be remembered that the fibres of the middle cerebellar peduncles decussate in the pons Varolii. Hence, if any paralysis is produced, it should be sought for on the same, and not on the opposite side of the body.

The following summary and estimate of cerebellar symptoms is based chiefly upon the observations of Nothnagel.*

1. The most characteristic symptoms of cerebellar affections are incoördination, a titubating gait, and intense vertigo. These symptoms are, however, met with in other brain diseases, and are therefore not pathognomonic. The diagnosis of cerebellar disease can only be made by taking into consideration all the phenomena, positive and negative.

2. Incoördination and vertigo, when dependent on cerebellar disease, always denote implication of the middle lobe, either by its being the primary seat of the lesion, or by its functions being disturbed through pressure.

3. These symptoms are so important, that whatever other grounds we may have for suspecting a lesion of the cerebellum, we cannot, in their absence, diagnosticate cerebellar disease with any degree of certainty.

4. As vomiting is frequently an accompaniment of other intracranial affections, is lacking in all cases of distinctive lesions of the cerebellum, and is not always present in those due to pressure from contiguous organs, it is not of itself conclusive evidence of cerebellar disease, though when constant

* Op. cit.

and severe it may assist in the diagnosis. The same is also true of loss or impairment of sight, and other interocular symptoms.

5. Anarthia, headache, and other, even the most diverse, derangements of the motor and sensory cerebral and spinal nerves may exist in conjunction with cerebellar disease, but as they are for the most part due only to pressure, they are of no diagnostic importance, and may even lead to errors of diagnosis. Occasionally, however, a symptom of this kind may be of some importance, as where paralysis of the whole of the right facial nerve points to the existence of a tumor on the corresponding side, and decided hemiplegia as having its seat on the basilar surface.

6. The only lesions of the crus cerebelli which are of diagnostic value, are those of an irritative character, and then only when the connection of the crus with the cerebellum is not interfered with. The symptoms referred to, consist in forced positions of the trunk, head, and eyes, rotations about the long axis of the body, and vertigo, with the inclination to fall to one side.

7. Of these symptoms, the turning of the body (which may take place in either direction) and the movement of the head and eyes, are the only ones which are characteristic of crus-cerebellar disease, and are wholly confined to lesions of the middle peduncle.

CHAPTER IV.

LESIONS OF THE CEREBRO-SPINAL ISTHMUS.

WE have already stated that the most marked pathological distinction between diseases of the cerebrum and those of the spinal cord, is, that while the cord is distinguished by the extensive existence in it of those lesions denominated *systemic*, the cerebrum is characterized by no such mode of pathological alteration. On the contrary, no systemic lesion is at present known to exist in the brain. The contrast will be still greater, if we take into consideration the fact pointed out by Charcot,* that the most common anatomical cause of disease in the encephalon, hæmorrhage by vascular rupture, whether resulting from the alteration known under the name of miliary aneurism, from softening consecutive to arterial narrowing, or from thrombosis or embolism, is something which in the spinal cord is almost unknown.

Now, the various regions of the isthmus, by which is meant the crura cerebri, the pons Varolii, and the medulla oblongata, constitute, so to speak, the transition between the cerebrum and the spinal cord; for in the former, and more particularly in the medulla oblongata, are found systemic lesions similar to those seen in the cord, and on the other hand, a considerable number of hæmorrhages and softenings are found resulting from vascular lesions, more especially in the pons, the pathology of which approaches more nearly that of the cerebrum.

Bastion says that some lesions of the crus cerebri can be diagnosed with the greatest certainty. Nothnagel, on the contrary, asserts that it cannot be affirmed with absolute certainty that lesions of these parts give rise to well-marked

* Op. cit.

symptoms. The truth appears to be, however, that when the lesion involves only the upper and outer part of the crus, that is, the part next to the cerebral hemispheres, the symptoms so closely resemble those met with in lesions of the optic thalamus, that no sufficient distinction can be made between them; but if the lesion should implicate the inner and inferior part of the crus, that is, the part near the pons, or if there should be a larger lesion, involving both the pons and the contiguous parts of the crus, so that the motor-oculi nerve on the same side becomes paralyzed simultaneously with the occurrence of crossed hemiplegia, the diagnosis would be neither difficult nor uncertain.

The symptoms produced by lesions in the lower and inner part of the crus cerebri, are those caused by a peculiar form of what is known as *alternate paralysis*. The motor-oculi nerve is paralyzed on the side of the lesion, and as a consequence, all the muscles of the eyeball are paralyzed, except the external rectus and the superior oblique, so that it is impossible to move the eye, except slightly in an outward and upward direction. The paralysis of this nerve also causes a partial closure of the eye on the same side from dropping of the upper lid, dilatation and sluggishness of the pupil, external strabismus, and double vision. At the same time there is a hemiplegic condition of the opposite side of the face and body, in consequence of which the tongue deviates towards the paralyzed side; articulation becomes generally more or less impaired; and sensibility on the paralyzed side is usually greatly diminished, especially in the limbs, the temperature of which is sometimes considerably elevated.

Similar symptoms to the above are produced by a lesion in one lateral half of the pons Varolii, especially in the lower part of it, where the paralysis of the face exists on the side of the brain lesion, and a more or less complete motor and sensory paralysis of the trunk and limbs on the opposite side. A lesion in the *upper part* of one lateral half of the pons produces the same general effect as in the lower part, except that the facial paralysis exists on the same side of the body as that of the paralyzed limbs. In both cases the paralysis is generally well-

marked, involving not only the superficial muscles of the face, but those concerned in articulation and deglutition. Sensibility is generally impaired in proportion as the lesion approaches or involves the side of the pons. Occasionally we have unilateral hyperæsthesia instead of anæsthesia; and either condition may exist with or without painful or other abnormal sensations in the paralyzed limbs. If the lesion involve the lateral part of the pons, similar symptoms may also present themselves in the face, in consequence of the implication of the trigeminus, together with paresis of the muscles of mastication, provided the motor division is also injured.

When the central parts of the pons are involved, if the lesions be extensive, the most profound apoplectic symptoms may appear, and if suddenly produced, death may speedily ensue. Under these circumstances, if life be prolonged for several hours or days, the temperature gradually rises on both sides of the body, until at the time of death it often reaches a maximum of 109° or 110° F.

Less extensive lesions of the central parts of the pons may also cause insensibility and coma, which, however, may afterwards gradually disappear. We then find a condition of general paralysis existing, both sides of the body being pretty equally affected. In these cases, if there is diminished or perverted insensibility, and at the same time well-marked facial paralysis, together with difficulty in swallowing and impaired articulation, the latter not aphasic, we may safely conclude that the symptoms are caused by a central lesion of the pons Varolii.

Slight or irritative lesions of the pons, instead of producing apoplectic symptoms, may in the beginning give rise to epileptiform convulsions, especially if the injury occurs suddenly. In other cases, however, such lesions neither produce convulsions nor loss of consciousness. If they irritate the fourth ventricle we may have diabetes mellitus, and if the lower part of the ventricle be implicated, as may happen if the medulla oblongata instead of the pons should be the seat of the injury, it may either take the form of diabetes insipidus, or of albuminuria.

Other symptoms also occur in lesions of the pons, such as early rigidity of the paralyzed limbs, trismus, or rigidity of some of the cervical muscles, conjugated deviation of the eyes, and a peculiar mental condition, known as *emotional weakness*, apparently of a hysterical character. Perhaps, as suggested by Althaus,* the polyuria, so frequently associated with hysteria, and which, as we have just seen, may arise from irritation of the lower part of the fourth ventricle, is a concomitant symptom of the same condition.

Lesions of the medulla oblongata, in addition to the usual symptoms of paralysis, give rise to the phenomena due to implication of nerve-roots, such as respiratory and circulatory disturbances, aphonia, dysphagia, anæsthesia, dysæsthesia, etc. Their diagnostic value, according to the estimate placed upon them by Nothnagel and other leading authorities, is given in the following summary:

1. Lesions of the crura cerebri may produce motor, sensory, and vaso-motor symptoms, but the phenomena are not usually sufficiently distinctive to serve as diagnostic marks of disease of the crura cerebri, as they may also occur in lesions of the upper part of the pons, or of the corpus striatum.

2. The paralysis resulting from lesions of the crura cerebri generally involves, not only the nerve-tracts of the extremities of the opposite side, but also of the facial, hypoglossal, and trigeminus of the opposite side.

3. A lesion of the crus can only be diagnosticated with certainty, when a paralysis of the oculo-motor nerve of the same side occurs suddenly, and simultaneously with paralysis of the nerves of the upper and lower extremities, or the facial nerve of the opposite side.

4. Motor and sensory disturbances of single nerve-tracts, and abnormalities in the excretion of urine, are of no diagnostic value in lesions of the crus cerebri.

5. Stationary destructive lesions of the pons Varolii derange the functions of the motor, sensory, and vaso-motor nerves of the extremities, and the fifth, sixth, seventh, twelfth, and possibly the eighth and eleventh cranial nerves, the number of

* "Diseases of the Nervous System," 1878.

nerves involved varying according to the extent and exact situation of the lesion.

6. The same group of symptoms are often met with in lesions of the pons that occur in those of the cerebrum, and cannot be distinguished from them unless they occur in conjunction with difficulties of articulation, and even inability to speak, when they may indicate with some degree of probability a lesion of the pons.

7. The only very certain indication of the existence of an intrapontine lesion, is the sudden onset of a well-marked form of cross-paralysis, which involves the motor and sensory nerves of the extremities on the side opposite to that of the lesion, and the trigeminus, abducens, facial, and hypoglossus, on the side corresponding to that of the lesion.

8. So far as relates to the implication of special nerves, it may be said that, if the abducens be paralyzed, and the other symptoms indicate at the same time the existence of an intracranial lesion, the latter will almost certainly be located in the pons Varolii.

9. Disturbances of respiration and of the circulation, difficulty of deglutition, and spasm of individual muscles, are only of importance, as aids to diagnosis in diseases of the pons, when accompanied by more characteristic symptoms.

10. Lesions of the medulla oblongata frequently produce no other symptoms than those due to paralysis of the extremities, and hence cannot be diagnosticated with any degree of certainty; but when the paralysis is associated with aphonia, and with respiratory and circulatory disturbances, they may generally be safely referred to injury of the medulla, since these symptoms are not observed among those of destroying lesions of other parts of the brain.

11. If any one of the symptoms which may arise from implication of the nerve-roots of the medulla be wanting, it not only aids us in more exactly locating the seat of the lesion, but also helps us to distinguish the lesion from that which produces progressive bulbar paralysis.*

* See *Nervous Diseases*, p. 168.

PART II.

INTRACRANIAL DISEASES.

SECTION I.

CEREBRAL AFFECTIONS.

CHAPTER I.

ANÆMIA OF THE BRAIN.

THAT the quantity of blood within the cranial cavity is always the same, as was formerly taught by the Edinburgh professors, is no longer an open question, having been fully settled in the negative by recent physiological experiments, as well as by abundant clinical and necroscopical evidence. Even were the brain entirely incompressible, which is not the case, variations in the quantity of blood circulating in it is rendered possible, not only by the vessels which pass between the two surfaces of the skull, but especially by the changes which take place in the quantity of the cerebro-spinal fluid, which is in an inverse ratio to the amount of blood contained in the cerebro-spinal blood-vessels. For example, in cerebral hyperæmia, where the vessels of the brain are found loaded with blood, the cerebro-spinal fluid is almost entirely absent; while, on the other hand, it is greatly increased in hydrocephalus, where the brain presents an anæmic or exsanguine appearance. Moreover, Donders, who watched the cerebral circulation through a

glass crystal inserted in an opening made in the skull of animals, saw marked variations in the size of the blood-vessels of the pia mater, which became dilated at every expiration.

There are three distinct forms of cerebral anæmia, namely, (1) *hypæmia*, which consists in a diminished supply of blood circulating in the vessels of the brain; (2) *hydræmia*, in which the circulatory fluid is deficient in hæmatin, the blood being too watery; and (3) *hypæmia et hydræmia*, in which both conditions exist. The first may be referred to whatever cause impedes the flow of blood to the brain, to contraction of the cerebral vessels by spasm or otherwise, or to any other condition whereby the intracranial space is lessened; the second, to the various causes which produce impoverishment of the blood, and give rise to general anæmia; and the third, to sanguineous losses, which, when excessive, always produce both paucity and poverty of the circulating fluid.

Symptoms.—The symptoms vary considerably, according as the anæmia is gradually or suddenly produced. When it occurs gradually, the symptoms at first are similar to those of the opposite condition of hyperæmia, namely, great excitement of the cerebral functions, headache, flashes of light before the eyes, confusion of sight, humming in the ears, vertigo, loss of memory, and sometimes convulsions. At a later period, if the disease goes on unchecked, symptoms of paralysis may supervene. This is particularly the case with infants and children, in whom a protracted diarrhœa is apt to produce a state of general and cerebral anæmia. The symptoms in these cases so closely resemble those of acute hydrocephalus, as to have had the name of “hydrocephaloid” applied to them. In addition to the symptoms above mentioned, the stage of excitement is marked by a flushed face, hot skin, frequent pulse, and a contracted pupil. This stage is soon succeeded by that of prostration and stupor. The face is pale, the pupils are dilated and fixed, and the special senses are lost; complete insensibility supervenes, the respiration becomes embarrassed, the pulse vanishes, and, unless the condition is quickly relieved, the case soon ends in death.

In the aged, however, the symptoms are somewhat different.

In these cases there is generally a narrowing of the cerebral arteries, in consequence of atheromatous degeneration of the inner coat; and the circulation is still further impeded by the rigidity of the vascular walls; for liquids are propelled more easily through elastic than through inelastic tubes. Another impediment in these cases is cardiac weakness, which is usually a marked symptom in advanced life. As a consequence, such subjects suffer greatly from vertigo, the slightest emotion or muscular effort being sufficient, in many cases, to bring it on. In fact, it is no uncommon thing for attacks of vertigo to appear and disappear several times a day without any apparent cause. If standing, the patient suddenly becomes blind, staggers, and, if not supported, falls to the ground. The horizontal position soon restores the brain to its normal condition, but, owing to the debility of the heart, the least exertion again disturbs the circulation, and the attack is liable at any time to be renewed. During the stage of excitement, which is not wholly wanting even in the aged, the temper is more or less irritable, the special senses are perverted, and there is more or less intolerance of light and noise. This stage, which is generally short and variable, is followed by great depression. The speech becomes slow, the mind apathetic, and, in many instances, the patient gradually sinks into a state of senile dementia. Generally the most marked symptom in these cases is drowsiness—a drowsiness, however, from which the patient may be easily aroused, but only to relapse again into sleep, sometimes alternating with a low delirium. As before stated, the muscular system is greatly enfeebled, and the heart's action is weak, irregular, and easily disturbed.

When cerebral anæmia sets in suddenly, as in flooding, traumatic hæmorrhages, and other rapid losses of blood, the symptoms presented are those of *syncope*, namely: rapid loss of consciousness, of the senses, and of voluntary motion, accompanied with a retarded pulse and respiration, and frequently with slight convulsions. At first everything turns black; vertigo, tinnitus aurium, faintness, sickness of the stomach, and vomiting, rapidly supervene; the surface becomes cold and pale, the pulse small and scarcely perceptible, and the

respiration slow and irregular; insensibility, trembling, and convulsions frequently follow; and these are succeeded in some cases by delirium and death.

Acute attacks of cerebral anæmia do not, however, always depend upon sudden loss of blood, but may arise from shock or fright. This is called *vaso-motor anæmia*, and is of different degrees of intensity. When slight, it simply causes pallor, more particularly of the face, with perhaps some chilliness of the skin. Severe attacks excite such an intense spasm of the cerebral vessels as to entirely empty the arterioles of blood, inducing vertigo, fainting, insensibility, and, in some cases, sudden death. In most cases, however, relaxation of the cerebral vessels quickly follows, and is succeeded by the opposite condition of hyperæmia, attended by excitement, and in some instances by delirium—symptoms which gradually disappear as the cerebral circulation becomes equalized.

Owing to the close vaso-motor connection of the blood-vessels of the posterior lobes with those of the abdominal viscera, anæmia of these lobes are sometimes accompanied with disturbances of the abdominal circulation sufficient to give rise to congestion of the liver, dyspepsia, constipation, disease of the uterus and of other abdominal organs; hence the frequent association of this form of anæmia with melancholy and hypochondria, which often appear to be of abdominal, rather than of cerebral origin.

Instead of simple paresis, there may be actual paralysis, and this may be either partial or general. Several cases are on record where hemiplegia was caused by venesection, the anæmia having been mistaken for cerebral congestion. This mistake is especially liable to be made in the case of young children suffering from exhausting diarrhœa, on account of the similarity of the symptoms to those of tubercular meningitis, as before mentioned.

Causes.—Of the various causes which give rise to cerebral anæmia, none is more common, or more potent, than the copious and protracted bleeding frequently met with in cases of flooding after childbirth, or in connection with miscarriages and abortions, and in the various forms of uterine hæmor-

rhage. Excessive menstruation, also, as well as venesection, hæmorrhoidal fluxes, and even nose-bleed, occasionally produce it. Injury of large blood-vessels, the rupture of aneurisms, and the ligature of the carotid artery, have all caused it; and in a few cases in which both carotids have been tied, death has resulted from the cerebral anæmia thus induced.

Other debilitating discharges, such as chronic diarrhœa and dysentery, overlactation, long-continued suppuration, and all diseases which impoverish the blood, such as cancer, tuberculosis, chronic nephritis, lead and mercurial poisoning, etc., are capable of producing it. Insufficient nutrition may likewise so impair the quality of the blood as to have a similar effect.

Cerebral anæmia may also result from any impediment to the circulation which prevents the cerebral vessels from receiving an adequate supply of blood, as in cases where there is aortic obstruction or mitral regurgitation; or in fatty degeneration of the heart and myocarditis, where the organ is too feeble to carry sufficient blood to the brain; also in those cases where the intracranial space is much encroached upon by tumors, extravasations of blood, or the effusion of serum.

The sudden diversion of large quantities of blood from the arterial to the venous system, as in tapping for ascites, or to remote organs or parts, as in the applications of Jounod's cupping boot, will sometimes be followed by this condition; at least syncope is not an uncommon result of such operations.

Cerebral anæmia is sometimes induced by the injudicious use of certain medicines, such as arsenic, calomel, tobacco, tartar emetic, oxide of zinc, and the various bromides. Allopathists frequently take advantage of this property of the bromides to produce artificial sleep, especially in cases where the insomnia is caused by cerebral hyperæmia. The same property, of course, renders these remedies homœopathic to cerebral anæmia.

Anæmia of the brain may be produced by certain mental emotions, especially fright, the shock of which is sometimes sufficient to cause syncope, and even death. How often people faint from the most trifling surgical operations, such as vaccination. I once witnessed a case of this kind in a strong,

robust farmer, who fainted entirely away before a particle of blood was drawn.

The passage of even a weak galvanic current through the brain often causes cardiac depression and syncope, and may so paralyze the action of the heart as to prove fatal.

Hammond* says that excessive mental exertion may produce cerebral anæmia. We know that this is a very common cause of cerebral congestion, but anæmia of the brain can only arise from it as a secondary effect of nervous exhaustion. I have myself witnessed it in this class of cases, but only in connection with general anæmia and neurasthenia.

Diagnosis.—Great care is necessary in some cases, especially with children, to distinguish cerebral anæmia from cerebral congestion. When caused by debilitating losses, and especially when associated with general anæmia, or with an impaired state of the assimilative functions, the history of the case, together with the fact that the symptoms of cerebral anæmia diminish or disappear when the patient is in the recumbent position, will generally serve to distinguish it from hyperæmia of the brain, with which alone it is liable to be confounded. In other cases it may be necessary to attentively consider all the characteristic symptoms of the disease. Thus, not only are the pain and vertigo increased by assuming the erect position, but the former, instead of being general, is usually limited to a particular part of the head; the face is pale, the skin cold, the pulse weak and rapid, and the pupils dilated; the ophthalmoscope exhibits retinal anæmia, and the patient, instead of being wakeful, is often overcome by drowsiness. Moreover, exertion and lowering treatment always increase, whilst the contrary influences mitigate, the disorder.

Prognosis.—However induced, cerebral anæmia is always attended with great danger to life, especially in the case of children, though when recognized and taken in hand early the disease, even in its acute form, will generally yield to appropriate treatment. But when there is such a sudden and profuse loss of blood as to render the patient pulseless, or

* "Diseases of the Brain," Seventh ed., 1881.

cause convulsions, recovery is always a matter of considerable doubt.

Morbid Anatomy.—The veins of the pia mater are found on post-mortem examination to be nearly empty, and the small quantity of blood contained in them, and in the sinuses of the dura mater, is thin and watery. The grey matter of the brain is so pale as to be nearly white, and the white substance has an abnormally white, or milky appearance, owing to the absence of the ordinary blood-points seen on section. The meshes of the pia mater contain an unusual quantity of serum, but the ventricles of the brain are generally empty.

Pathology.—That the symptoms of cerebral anæmia are caused in most cases by an insufficient supply of blood to the brain, and in others by an altered or impoverished state of that fluid, has been proven by the independent investigations of many observers. Jacobi, Fleming, and Hammond, by compressing the carotid arteries, and thereby cutting off the usual supply of blood to the brain, produced all the characteristic symptoms of the disease, including convulsions. Nothnagel, by irritating the peripheral nerves, produced similar phenomena in animals by reflex action. Kussmaul and Tenner proved that, while hyperæmia of the brain does not excite convulsions, faradization of the cervical sympathetic may cause not only dilatation of the pupil, but anæmia of the retina and convulsions, and that, too, notwithstanding the fact that only a portion of the vaso-motor nerves of the brain pass through the cervical sympathetic. They showed, also, that both cerebral anæmia and convulsions may be produced by simply suppressing the breathing, and thereby depriving the blood of oxygen.

We have seen that many cases of cerebral anæmia are due to an impoverished condition of the blood. In these cases there is a deficiency of the red corpuscles; and as these are the carriers of oxygen, the effect on the nutrition of the brain is the same as though the quantity of blood sent to that organ was below the normal standard; the only difference being, that the symptoms of cerebral anæmia are developed in a gradual instead of a sudden manner.

Treatment.—In simple *syncope*, all that is generally requisite in the way of treatment is, to place the patient, as quickly as possible, in a horizontal or recumbent position, so as to favor a return of blood to the brain. If, however, the fainting is of frequent occurrence, it will be found to depend upon general anæmia, or some other affection, against which the treatment will need to be specially directed. Thus, an exhausting diarrhœa, dysentery, or other acute or chronic discharge, will not only require to be promptly arrested, but the quality of the blood should be improved by the use of such articles of diet as are best calculated to restore the lost elements, more particularly the various forms of animal food, such as beef-tea, milk, eggs, and the different kinds of meat. Even in these cases the recumbent position should be enjoined, especially if the heart's impulse is much weakened; nor should the patient be allowed to assume the erect position, even for the evacuation of the bladder and bowels, so long as any considerable liability to syncope exists.

We have the testimony of Hammond, that a *weak galvanic current* is decidedly beneficial in these cases. This result is somewhat puzzling to this author, as the primary galvanic current applied to the brain or sympathetic nerve *contracts* the cerebral blood-vessels, instead of dilating them; just what it should do if it acts homœopathically, and hence, although he does not comprehend its action, he very properly advises that the tension should be quite low, and that the current should only be passed for a few seconds at a time.

The *Nitrite of Amyl* is a good palliative remedy in the treatment of cerebral anæmia, especially in acute cases, but as it causes *dilatation*, instead of contraction, of the cerebral vessels, it will need to be used low. A few drops, inhaled from a handkerchief, will, as a general rule, quickly dissipate the most alarming attack of syncope, especially if it be the result of a feeble action of the heart. This remedy is to be preferred, in most cases, to any other form of stimulant, not only on account of its promptness of action, but because it may be repeated as often as may be necessary without any deleterious result.

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Secale cor.—Cerebral anæmia, complicated with diarrhœa, metrorrhagia, spasms, and convulsions.

Sulphur.—Chronic cases, occurring in scrofulous, or cold, phlegmatic constitutions, especially when other indicated remedies fail to produce any lasting benefit; also, when preceded or accompanied by eruptions, or when caused by their suppression.

Veratrum alb.—Acute cases caused by violent purging, attended with fainting fits, spasms, and convulsions, and followed or accompanied by paralytic weakness. This remedy is suited to conditions similar to those for which *Secale* is indicated, but with this difference, that while the latter is better adapted to cases arising from flooding, *Veratrum* is better suited to such cases as depend on losses occasioned by excessive alvine discharges.

CHAPTER II.

CEREBRAL HYPERÆMIA.

CEREBRAL HYPERÆMIA, or congestion of the brain, is of two kinds, *active* or arterial, and *passive* or venous. In the former, a larger quantity of blood than usual is sent to the brain, constituting what is termed *rush of blood to the head*. In the latter, there is no actual increase in the amount of blood sent to the brain, but, owing to obstruction, it does not return freely through the cerebral veins, which therefore become overcharged with blood, constituting what is sometimes called *stagnation* of blood in the brain, or *hyperæmia by stasis*.

Symptoms.—There are two distinct classes of symptoms met with in this disease, namely, those of *excitation* and those of *depression*. The former embraces such symptoms as wakefulness, or morbid vigilance; pain in the head; intolerance of light, noise and pressure; singing or ringing in the ears; sparks or dark specks before the eyes; contraction of the pupils; redness and heat of the face; full and strong pulse; throbbing of the carotids; grating of the teeth; restlessness at night; vivid dreams; jerking of the limbs; vertigo; convulsions. The symptoms of depression are for the most part the reverse of these. Thus, the head feels dull and heavy; the limbs go to sleep, and have a heavy, paralytic feeling; there is great dulness of the senses; the pupils are dilated, the pulse small and frequent, and the respiration slow, irregular, or stertorous; nausea, vomiting, and constipation are of frequent occurrence, and there is generally more or less anæsthesia and paralysis.

The symptoms, however, vary greatly in different cases, both as to number and intensity. In some instances, the only

symptom complained of is *sleeplessness*. This condition is perhaps the most constant of any, as sound sleep is impossible while the brain is in a state of active hyperæmia, and consequently in an excited condition. Hence, although the patient may be greatly exhausted, and may even have lost much sleep, it is generally not until after midnight, and frequently not until near morning, that the cerebral circulation becomes sufficiently tranquil for the brain to sleep, and when it does, it is apt to be more or less disturbed by unpleasant dreams, so that when the patient awakes, he generally feels as tired and unrefreshed by it as though slumber had never visited his eyelids.

But it is not often that the only evidence of cerebral hyperæmia is wakefulness. In most cases some other of the symptoms of excitability are superadded. *Headache*, especially, is almost always present, and sometimes it constitutes the most striking feature of the disease. When severe, the suffering may be so great as to unfit the patient for every kind of mental or physical labor; but in most cases it consists of a dull, aching pain, such as we would expect from overdistension of an organ inclosed, as is the brain, within rigid walls. Even when no actual pain exists, there is always present a more or less uncomfortable feeling in the head, generally a sensation of fullness or tightness, which changes to pain whenever the patient's head assumes a dependent position, or when he engages in any protracted mental or physical employment.

Next in frequency, generally, are derangements of the *special senses*. Various noises in the ears, such as singing, ringing of bells, and the different forms of *tinnitus aurium*, are experienced in these cases, and sometimes the sound, which is wholly subjective, appears to come from the occipital region. Occasionally, the sound appears to be of the nature of an explosion, like the report of a pistol, which so startles and deceives the patient that he sometimes imagines himself to be the object of a murderous assault. In other cases the sensation is that of something suddenly giving way within the head, and is usually accompanied with a sharp, snapping sound. These cases are generally preceded or accompanied by intense vertigo and pain in the head, followed in some instances by unconscious-

ness, and appear to belong to what Dr. Searle styles "a new form of nervous disease."

Owing to a hyperæsthetic condition of the auditory nerve, the sense of hearing is often morbidly acute, so that sounds that would not attract the attention of others, not only annoy, but frequently become intolerable to the patient. Even the ticking of a clock, or the barking of a dog, may, in the excited condition of the patient's brain, render him almost frantic. This is especially apt to be the case at night, when the stillness of the hour, the wakefulness of the patient, and the dependent position of the head, combine both to exalt and to pervert the already exaggerated sense of hearing, thus giving rise to a great variety of illusions and hallucinations, which the mental condition is ill fitted to bear or to correct.

Of the other senses, none is more frequently disturbed than that of *vision*. The hyperæmia of the retina and optic nerve, which are readily distinguishable by the ophthalmoscope, generally gives rise to more or less photophobia and lachrymation, together with a variety of subjective symptoms, such as flashes of light, *muscæ volitantes*, moving vapors, etc. These symptoms, like all others pertaining to the head, are aggravated by the general congestion of the cerebrum, as well as by any cause which increases it, such as mental and physical exertion, dependent positions, etc.

Hallucinations of sight are also common, but, owing to their frequent dependence on diseases of the eye, they are more apt to be referred to disturbances in that organ than to congestion of the brain, which is not infrequently the true cause. Even diplopia does not always arise from strabismus, astigmatism, or other form of ocular disease, being sometimes due to simple hyperæmia of the brain; but in these cases it is generally transient, and limited to bright objects.

It is no uncommon thing for the senses of *smell* and *taste* to be exaggerated or perverted, and even lost. I have a patient now under treatment who has a natural dislike of the odor of musk, and whose life has long been rendered miserable by the constant perception she has of that "intolerable smell." At first I was inclined to attribute the defect to the

congested state of the Schneiderian membrane, but on careful investigation I found that the origin of the trouble corresponded with the setting in of unequivocal signs of cerebral hyperæmia, and, although decidedly chronic, it has already been considerably benefited by treatment based upon this view of its pathology.

General sensibility and the *power of motion* usually suffer to a greater or less extent, anæsthesia of the skin being generally associated with muscular paresis, and cutaneous hyperæsthesia with involuntary muscular movements of the limbs or of individual muscles. Thus, the patient sometimes experiences crawling sensations about the face, scalp, and limbs, as though covered with live ants, while the limbs themselves feel heavy, cold, or numb; or the reverse state may occur, attended with neuralgic pains, partial convulsions, etc.

But the most important phenomena known to arise from cerebral hyperæmia are those pertaining to the *general circulation*. Dr. Hammond,* but more particularly M. Krishaber,† has drawn attention to a class of cases in which the heart and general circulation are especially involved. These cases are characterized by an extreme "irritability of the vascular system, so that the least movement, such as rising erect from the sitting posture, or to the sitting from the recumbent, leads to the acceleration of the pulse of from 20 to 30 or even 40 beats a minute. Besides this, there are frequent and violent palpitations, either spontaneous, or provoked by the most insignificant causes, either mental or physical."

As this presents a perfect picture of some cases of narcotine poisoning, and also of the cardiac disturbances sometimes caused by dyspeptic troubles, it will be well to consider in this connection the results of Krishaber's more recent investigations on this subject. The following is a summary of the leading symptoms, as given by Hammond:‡

The disease is sometimes developed with great suddenness, but ordinarily it advances little by little to completeness.

* Op. cit.

† "De la Nénropathie Cérébro-cardiaque," Paris, 1873.

‡ Op. cit.

When the former is the case, the patient experiences, under the influence of great mental excitement, pain in the head, vertigo, an inability to speak, or, at least, imperfection of articulation. There are noises in the ears, flashes of light before the eyes, and occasionally, for a short time, double vision. The heart beats with increased force and rapidity, and is more or less irregular in its action; the face is flushed, and a feeling of suffocation is experienced. If he attempts to walk, his gait is uncertain or staggering, not only in consequence of the vertigo present, but from actual loss of power in the limbs. Numbness is commonly felt in some part of the body, and clonic spasms of the muscles, notably of those of the face, are generally present. With all these physical symptoms, there are others indicating mental disturbance. Chief among these are hallucinations or illusions of the senses, particularly of sight and hearing. Insomnia is an almost invariable attendant, and what little sleep the patient obtains is interrupted by unpleasant or even frightful dreams. Gradually the disorder becomes established, and the other functions, especially those connected with digestion, are deranged. From the first the urine is loaded with urates and phosphates.

No one can mistake this assemblage of symptoms for those of any other disease, as it exhibits a fair representation of cerebral hyperæmia. Such cases, however, are not always sudden in their onset; at least, I have known the phenomena to recur at regular intervals for long periods of time, the attacks assuming in some instances a regular tertian or quartan form, suggestive of malarial influence. Two years ago I had a case of this kind under treatment. The subject, a man æt. about 45 years, enjoyed good health up to about the age of 40, when he had an attack of typhoid fever. Since that period he suffered from regular tertian attacks of cerebral hyperæmia of the character above described. On his "well days," as he called them, his head was easy, his mind clear, the heart's action regular and normal, the digestive powers good, and the patient could walk about freely, and even attend to business. But on the alternate, or "sick days," he was obliged to remain quiet in bed, abstain from eating, and even from conversation,

as any attempt to assume the erect position, any emotional excitement, or even a light meal, would at once disturb the action of the heart, excite vertigo, noises in the ears, and all the other symptoms of cerebral hyperæmia. He had been treated by several eminent physicians of the old school, most of whom, regarding the disease as one of malarial origin, prescribed quinine in large doses, and thus greatly aggravated his disorder. Others, regarding it as a case of cerebral anæmia, also gave tonics with a like result. To cap the climax, others treated him for heart disease and dyspepsia, ringing the changes again upon tonics and stimulants, until the poor man well nigh despaired of recovery. The consequence was, that although I at once recognized the case as one of cerebral hyperæmia, and treated it accordingly, it required more than eighteen months' appropriate treatment to effect a cure.

Various other types of cerebral hyperæmia are met with in practice, some of which belong to the active, and some to the passive form. They are known as the *delirious* or *maniacal*, the *convulsive* or *epileptiform*, and the *apoplectic*. Other minor types are also occasionally seen, such as the *soporific*, the *paralytic*, and the *aphasic*.

1. *The Delirious Form*.—This form is generally the result of a high degree of active hyperæmia. There is vertigo, throbbing in the head, flushing and heat of the face, suffusion of the eyes, excessive restlessness and mobility, often combined with weakness, or an inability to maintain the erect position, and delirium, generally of an active, but sometimes of a low, typhoid, or passive character. In some cases the patient is irritable, extremely nervous and peevish, and apparently laboring under an attack of hysteria, or of delirium tremens. The delirium is often characterized by an inclination to laugh or cry, to talk foolishly, to escape from some loathsome or frightful object, while the whole expression is one of terror and feverish excitement. In other cases the patient is attacked with paroxysms of acute mania, during which he is disposed to injure himself or others, to fight, tear off his clothing, or destroy the objects within his reach. In either case, after a variable period of excitement, the patient becomes exhausted

and falls into a heavy stupor, accompanied by relaxation of the limbs, and, in some cases, by involuntary evacuations from the bladder and bowels. On awaking, there is more or less prostration, heaviness or numbness of the limbs, weakness and confusion of the mind, and an imbecile expression of the countenance, from which the patient only slowly recovers. Sometimes the injury is still more profound, paralysis being super-added to the above phenomena.

2. *The Convulsive Form.*—The spasmodic phenomena which characterize this form of cerebral hyperæmia resemble those of an ordinary epileptic seizure, being attended with a loss of consciousness, but without any premonitory cry or aura. Neither do the convulsions of cerebral hyperæmia ever occur during sleep, since, as we have seen, true sleep is incompatible with a hyperæmic condition of the brain. Those convulsions which *do* occur during sleep are, so to speak, *anæmic* convulsions, as, indeed, are probably all convulsions arising from irritation of the brain, whether the latter be in a state of general hyperæmia or anæmia. In the former case the hyperæmia, if active, may be so severe as to lead to œdema; this will necessarily produce more or less anæmia of certain parts of the brain, which in turn may give rise to convulsions. On the other hand, passive or venous congestion of the brain can only occur by depriving that organ of its usual amount of arterial blood, thus causing an arterial anæmia, which may also excite convulsions. So that, although convulsions depend upon an anæmic condition of the convulsive centre in the brain, it is possible for them to take place, not only during a state of general cerebral hyperæmia, but even in consequence of it.

3. *The Apoplectic Form.*—This form is the result of the highest degree of cerebral hyperæmia. In most cases the attack is preceded by the usual promonitory symptoms of apoplexy, such as headache, dizziness, weight or fulness in the head, drowsiness, confusion of mind, hyperæsthesia of the special senses, flushings of the face, epistaxis, and other symptoms of cerebral hyperæmia. Suddenly there is an increased determination of blood to the head, and the patient falls to

the ground in a state of insensibility. This condition, which is accompanied with more or less anæsthesia and paralysis, may last only for a few minutes, or it may continue for several hours. The paralysis is never complete, though it may affect one or all of the limbs. The muscles of the face are rarely implicated, though the patient, when spoken to loudly, answers in a slow, indistinct, and difficult manner. The respiration and circulation are more or less embarrassed, but there is seldom any stertor, flapping of the cheeks, or profound implication of the respiratory centre. The pulse may be slow and intermittent, or quick and scarcely perceptible. There is generally more or less difficulty of swallowing; and although the patient may be temporally roused by shouting to him, the perception of things in general is lost. Reflex excitability, however, usually persists, and may even be increased. Thus, a loud noise or a bright light will generally attract the patient's attention, and will sometimes cause discomfort. In most cases the attack gradually passes off, leaving both mind and body more or less enfeebled, but without any decided loss of either sensation or motion. Occasionally, it is true, a certain degree of paresis, or even hemiplegia, may remain for a few days, but it disappears much more quickly than in true apoplexy. Sometimes, however, the termination of the attack is much less favorable; the symptoms gradually grow worse and worse, involuntary discharges take place from the bladder and bowels, the patient sinks into a state of profound coma, and eventually dies.

Causes.—The causes of cerebral hyperæmia are very numerous. It is evident that whatever is capable of increasing the force of the general circulation, of augmenting the amount of arterial blood in the brain, or of giving it a peculiar direction to that organ; and also whatever obstructs or impedes the return of blood from the head, thus producing congestion of its sinuses and veins, may all act as the immediate causes of cerebral hyperæmia. No doubt such cases alone, without any peculiar predisposition, may produce the disease in most instances, but with many there is a marked liability to determination of blood to the brain—a liability which appears to be

hereditary; at least it seems to run in certain families, especially those of a sanguinous temperament. Overrichness of the blood, or a plethoric condition of the system, the cessation of growth, and the change of life, are all predisposing causes; and hence the aged and those in middle life are more subject to it than the young, and men more than women. Hence, also, it is often found to be associated with free living. But the most powerful predisposing causes, doubtless, are diseases of the heart, especially pericarditis, endocarditis, and hypertrophy of the left ventricle, in active hyperæmia; and dilatation of the right ventricle, fatty degeneration, and valvular diseases, in passive hyperæmia.

Among the more common *exciting* causes are: exposure to extremes of heat and cold, and especially to the direct rays of the sun; violent emotions; excessive mental labor; excitement of the passions, particularly the sexual; excesses in eating and drinking; the sudden suppression of habitual discharges, especially the hæmorrhagic, such as the catamenia, piles, etc.; sudden and violent physical exertion, more especially when the head is in a dependent position, as in stooping; the use of certain drugs, such as quinine, belladonna, opium, glonoin, nitrite of amyl, etc., and inflammatory conditions in the vicinity of the brain, such as quinsy, mumps, facial erysipelas, etc.

Passive or venous hyperæmia may be brought about by such causes as prevent a sufficiently rapid emptying of the jugular veins, such as a goitre or other tumor pressing upon them, or upon the descending vena cava; violent and prolonged straining, as in childbirth or at stool; playing upon wind instruments; violent fits of coughing, as in croup, whooping-cough, etc.; dilatation of the right ventricle, producing tricuspid insufficiency and pulmonary congestion; pleuritic effusions; emphysema; working in compressed air; intracranial tumors; and cerebral embolism, thrombosis, and extravasations.

Diagnosis.—There are some points of resemblance between cerebral hyperæmia and intracranial hæmorrhage, embolism, thrombosis, vertigo, epilepsy, softening, and uræmia; but as all of these affections are characterized by well-marked differ-

ences, they are not liable to be mistaken for this disease, provided proper attention is paid to the symptoms. The case is different, however, as regards cerebral anæmia, the first stage of which closely resembles that of cerebral hyperæmia. Thus, headache, vertigo, numbness, sense of constriction, tinnitus aurium, dulness and confusion of mind, lassitude, impaired memory, and even loss of consciousness, are common to both diseases. But in cerebral anæmia the face, instead of being flushed, is pale and cold; the pupils are dilated, not contracted; there is drowsiness instead of wakefulness; the vertigo is increased by the erect, and diminished by the recumbent position; the pulse, instead of being strong and slow, is weak, frequent, and irregular; there is no throbbing of the carotid and temporal arteries, but bellows-murmurs are heard at the base of the heart and in the veins of the neck. Moreover, the ophthalmoscope shows anæmia of the retina, instead of the large and tortuous arteries and checked disk belonging to cerebral hyperæmia.

Prognosis.—The prognosis in cerebral hyperæmia depends greatly upon the form and stage of the disease. Active cerebral hyperæmia is a much more rapid, but less fatal form, than the passive. Recovery from it generally takes place under homœopathic treatment, especially if it has not passed beyond the first stage. The passive form, though generally a more serious, is not a very fatal affection; but complete recovery from it cannot be expected to take place unless the causes which produce it are removable. Pulmonary congestion appears to be one of the most frequent complications in fatal cases, since, according to Althaus, six out of nine cases of sudden death from cerebral hyperæmia exhibited congestion of the lungs. The subjects of this disease are also liable to a number of other secondary lesions, such as encephalitis, softening of the brain, cerebral hæmorrhage, and general paralysis; lesions especially apt to occur in the convulsive form. As might be expected, the danger in these cases is generally in proportion to the frequency of the attacks. Old school authors give a mortality for this disease varying from ten to twenty per cent. I find upon looking over my Case-Books for the

past twenty years, during which time I have treated all such cases homœopathically, that of one hundred and forty-two well-developed cases, all but four, or at most five, recovered. Of the fatal cases, two (one a painter and the other a printer) died of softening of the brain; one (an excessive smoker) from paralysis of the heart; and one (a confirmed drunkard) from general paralysis. Besides these, there is one case, marked doubtful, of a lady about forty-five years of age, who was suddenly seized with delirium, and died comatose within thirty hours of the beginning of the attack. The diagnosis was acute congestion with effusion, but no post-mortem examination was allowed.

Morbid Anatomy.—Although the post-mortem lesions in this disease are sufficiently characteristic, they are not always present after death—a circumstance which some have endeavored to explain by assuming that, where the hyperæmia was of an active character, the distended arteries have emptied themselves just before death, either by discharging their contents into the veins, or by effusion of serum through the coats of the capillary vessels.

In the great majority of cases, however, we find after death the cerebral vessels loaded with blood, the convolutions of the brain more or less obliterated, and the pia mater detached so as to be easily lifted from the cerebral surface. The blood-vessels, both of the pia mater and the substance of the brain, are increased in size; the latter exhibiting, on section, larger and more numerous blood-points than usual, and the former having a red or rose-colored appearance. The white matter, besides being increased in density and consistence, has a slight pinkish appearance, and the grey matter appears dark red, or of a violet hue. The ventricles and subarachnoid spaces are often filled with serum, and the veins of the pia mater are more or less enlarged and tortuous.

Repeated and long-continued attacks of cerebral hyperæmia exhibit, on microscopical examination after death, minute granules of hæmatin in contact with the blood-vessels, and also, in the case of the smaller capillaries minute aneurismal

swellings. Two French observers, Durand-Fardel* and Calmeil,† were the first to point out a cribiform appearance (*l'état criblé*) which is seen on making a transverse section of the hemispheres in these cases. This appearance, which is supposed to be due to the distension and subsequent shrinkage of the capillary vessels, is caused by the presence of numerous fine holes, which are plainly visible to the naked eye. In some cases the cerebral capillaries are ruptured, blood being extravasated into the medullary substance, and forming rose-colored patches; more commonly, however, the vascular distension is relieved by effusion of serum through the coats of the capillaries into the brain and subarachnoid spaces. Subsequently the brain becomes atrophied, and its ventricles filled with serum.

Pathology.—We have already pointed out the fact, under the head of cerebral anæmia (q. v.), not only that a free vascular connection exists between the outer and inner surfaces of the skull, but that variations in the quantity of blood within the cranium may easily take place by means of the equalizing effect of the cerebro-spinal fluid, the quantity of which appears to be regulated by the amount of blood present in the cerebro-spinal blood-vessels. Moreover, these vessels, according to Robin‡ and His,§ are surrounded throughout their entire length by perivascular canals, or ring-like spaces, which in cases of chronic hyperæmia become permanently enlarged. Finally, by observations made through a watch crystal fixed in the hole of an animal's skull, the cerebral vessels themselves have been seen to increase and diminish in diameter according to the amount of pressure exerted upon their contents during the act of respiration.

That such changes may take place without causing undue pressure upon the cerebral tissue, is shown by the experiments of Pagenstecher on dogs, who found that about twenty-three fluid ounces could be injected into the cavity of the cranium

* *Traité pratique des Maladies des vieillards*, deuxième éd., Paris, 1873.

† *De la paralysie considérée chez les aliénés, etc.*, Paris, 1826.

‡ *Jour. de la Phys. de l'Hom. et des Anim.*, 1859.

§ *Zeitsch. f. Wissenschaft. Zool.*, 1865.

before producing symptoms of compression. It is believed, therefore, that in many cases of active cerebral hyperæmia the *quality* of the blood favors the congestion, by giving rise to an undue activity of the serous membranes surrounding the brain, and thus exerting more or less of a *suction* action in their direction.

Treatment.—Nearly every case of cerebral hyperæmia will be benefited, and many will be cured, by the removal of the cause. Hence, the first thing to be done is, to remove or lessen, as far as possible, the exciting causes. Thus, the passive form requires rest, both physical and mental, and the avoidance of everything calculated to disturb the circulation or affect the mind, such as excesses in eating and drinking, the excitement of the animal passions, and every form of mental and bodily exertion. Active cerebral hyperæmia generally requires similar restrictions, except that the injunction as to rest need not, in the majority of cases, be insisted upon to so great an extent. The patient, however, should abstain from all severe muscular exertions, especially while in a stooping posture. Care should also be taken to keep the feet warm, the head elevated and cool, and the clothing about the neck and chest loose and comfortable.

Cold to the head is an important adjuvant in the treatment of the active form of cerebral hyperæmia. Even ice and ice-water may be safely and advantageously applied to the head and neck in these cases, provided the feet and legs are immersed in hot water at the same time. If this precaution be not observed, it will be safer to apply *warm water* to the head, the evaporation from which produces a comfortable sense of coolness, and rapidly reduces the temperature of the parts to which it is applied.

Various agents are known to possess the power of contracting the cerebral blood-vessels, the most efficient of which are, the constant galvanic current, ergot, and the bromides of potassium, sodium, and calcium.

The *galvanic current* should be applied by placing one pole of the battery over the sympathetic nerve in the neck, and the other opposite the seventh cervical vertebra; using not to ex-

ceed ten Smee's cells, nor allowing the current to act for more than two or three minutes.

Ergot and the *bromides* are allopathic remedies, and therefore require to be used in material doses. Hammond recommends the former in drachm doses of the fluid extract, and the latter in twenty-grain doses, in solution, three times a day. I have myself obtained excellent results, in several cases, by giving the bromides in two-grain doses, every hour, but have seldom had occasion to resort to them in active cerebral hyperæmia, the homœopathically indicated remedies having generally given speedy and permanent relief.

General Indications.—*When caused by mental emotions:* Acon., Cham., Coff., Igna., Nux v., Opi., Ver. v.

Brain-fag: Arn., Aur., Calc. carb. and hypophos., Erythrox. c., Igna., Nux v., Pic. ac., Phos., Phos. ac., Puls., Rhus t., Sec. c., Sulph., Zinc. phosphide.

Alcoholic drinks: Arsen., Calc. c., Gels., Ip., Lach., Nux. v., Puls., Opi., Ver. v., Sulph.

Dentition: Acon., Bell., Calc. c., Cham., Coff., Gels., Ver. v.

Straining or injury: Acon., Arn., Bry., Calc. c., Cic., Merc., Rhus t.

Amenorrhœa: Acon., Apis, Apoc., Bell., Bry., Calc. c., Carb. v., Chin., Cimicif., Cocc., Cycl., Cupr., Dig., Graph., Kali c., Lycop., Merc., Nat. m., Phos., Puls., Rhus. t., Senec. g., Sep., Sulph., Xanth.

Hæmorrhoidal suppression: Acon., Cham., Calc. c., Carb. v., Nux v., Puls., Sulph.

Constipation: Bry., Igna., Nux. v., Opi., Merc., Puls., Sulph.

Visceral congestion, or chill: Acon., Arn., Ars., Bell., Bry., Calc. c., Cham., Dig., Ipec., Lycop., Merc., Rhus t., Stram., Sulph., Ver.

Hypertrophy of left ventricle: Acon., Aur., Cact. gr., Glon., Iod., Kalm., Spig., Spong.

Tricuspid regurgitation: Bell., Hysoc., Kali c., Puls., Tart. emet.

Vertigo, When there is much: Acon., Arn., Bell., Calc., Caust., Cic., Cocc., Lach., Lycop., Nit. ac., Nux v., Phos., Puls., Rhus t., Sep., Stram., Sil., Sulph., Ver.

Loss of consciousness, When there is: Arn., Bell., Baryt., Camph., Cic., Cupr., Hyos., Kal., Nux v., Opi., Phos. ac., Plat., Puls., Rhus, Stram., Ver.

Special Indications.—*Aconite*.—Great restlessness and anxiety, with dry, burning skin; throbbing pains in the head, with fulness and heaviness; piercing pains in the forehead and temples; vertigo, especially when stooping; flashes of light before the eyes; photophobia; buzzing in the ears; temporary blindness; disposition to faint; palpitations of the heart; aggravated by movement; more or less relief in the open air. Especially indicated in the active form, or when caused by violent emotions, such as anger or fright.

Amyl nitr.—Throbbing, with sense of heat and fulness, in the head; buzzing and throbbing in the ears; protrusion of the eyes; flushing of the face; beating of the carotids; violent palpitations.

Arnica.—Heat and burning in the head, with coldness of the remainder of the body; throbbing in the forehead and temples, increased by stooping or exercise; burning, buzzing and beating in the ears; vertigo, attended with nausea or vomiting; delirium, obscuration of sight, or loss of consciousness. This remedy is more particularly indicated after a blow or fall, or when the congestion is the result of mechanical violence.

Aurum.—Heat and roaring in the head, with scintillations before the eyes; desire for death, with suicidal tendency; aggravated by mental exertion.

Belladonna.—Redness of the face and eyes; roaring and humming in the ears; great sensitiveness to light and noise; painful stitches in the head; delirium, spasms and convulsions; morbid vigilance, or its opposite, stupidity; contraction or dilatation of the pupils; double vision; loss of consciousness; stiffness of the tongue and neck; aggravation of the symptoms by stooping, exercise, light or noise.

Bryonia.—Painful outward pressure in the forehead and temples; bleeding of the nose; intolerance of light and noise; buzzing in the ears; startings in sleep, with twitchings of

the facial muscles; red, bloated face; great impatience and irritability; nausea and vomiting; constipation.

Cactus.—Throbbing pain in the head, with red and bloated face; heavy, pulsating pain in the top and right side of the head, ameliorated by pressure, but aggravated by light and noise; vertigo; anxiety.

Cimicifuga.—Severe pain in the head, especially over the right eye; heat and fulness of the head, with throbbing and pressure; pain in the temple and vertex, with a sensation as though it would burst; heaviness and dulness of the head; the brain feels too large for the skull.

Coffea.—Great nervousness, wakefulness, and exaltation of the senses; heat in the head and face; epistaxis; buzzing in the ears; flushing of the face, with cold feet; red and glistening eyes; symptoms aggravated by talking. Well adapted to infantile cases, especially when caused by teething or diarrhoea.

Gelsemium.—Dull, pressive, and stupefying headache, extending from the occiput to the os frontis; vertigo, with dimness of vision; diplopia; buzzing in the ears; morbid vigilance, or its opposite, drowsiness; mirthfulness, alternating with depression of spirits; mental confusion; pain in the nape of the neck, with disposition to throw the head backward. This is generally one of our most reliable remedies in cerebral hyperæmia, whether caused by teething, mental emotions, suppression of the menses, or exposure to the rays of the sun.

Glonoïn.—Determination of blood to the head; throbbing headache, with very rapid pulse; flashes of light before the eyes; singing and buzzing in the ears; fulness in the forehead and vertex, with dulness of mind; fainting, with black spots before the eyes; vertigo; strong beating of the carotid and temporal arteries; great restlessness and impatience; when caused by extremes of heat or cold.

Hyoscyamus.—Dark red face, with sparkling eyes; delirious, drowsy, or unconscious; great nervousness, with twitching of the tendons; grating of the teeth; sudden startings during sleep; throbbing of the carotids; double vision; jerking of the limbs.

Mercurius.—Feeling of great fulness and pressure in the

head; sensation as if the brain was rigidly compressed; great restlessness and anguish, especially at night; burning of the eyes, with lachrymation; buzzing in the ears, with dulness of hearing; headache of a tearing, boring character; vertigo; frequent sweating without relief.

Nux vom..—Headache, with or without nausea or vomiting; dulness and confusion of the head; drowsiness, with a tendency to coma, or the opposite condition of wakefulness, with burning of the eyes, and intolerance of light and noise; ringing in the ears; vertiginous intoxication and cloudiness; symptoms aggravated by eating, by exercise in the open air, and by coffee. This remedy is particularly adapted to cases caused by excessive mental labor, by the habitual use of intoxicating liquors, and by sedentary modes of life.

Opium..—Comatose sleep, with apoplectic symptoms, such as stertorous breathing, sighing and moaning, slow pulse, dark red and bloated face; or drowsiness, with confusion of the mind, and sense of heaviness and pressure within the head; or else the opposite condition of wakefulness, with delirium, flushing of the face, scintillations before the eyes, humming in the ears, throbbing of the temporal arteries, spasms and convulsions. This remedy is especially indicated in those cases of cerebral hyperæmia characterized by symptoms of depression, and also in such as are caused by fright or debauchery.

Phosphorus..—Heat and throbbing in the head, with vertigo; buzzing in the ears; swelling under the eyes; emphysema; palpitation of the heart; burning and stinging pains in the brain; sense of weight in the forehead, increased by stooping; heat in the vertex. Especially suited to chronic cases, with tendency to softening of the brain.

Pulsatilla..—Oppressive, beating headache, with confusion of the mind; red and bloated, or pale face; scintillations before the eyes; buzzing in the ears; double vision; vertigo; drowsiness in the daytime and sleeplessness at night; bitter, bilious taste in the mouth; nausea or vomiting; scanty or suppressed menses; worse in a warm room, better in the open air.

Rhus tox..—Heavy, reeling headache; shaking or wavering sensation in the brain, especially when walking; burning,

throbbing pains in the head, with sense of fulness; vertigo when lying down; red and burning, or pale and puffy face; great restlessness, especially at night; pains aggravated by eating. Especially adapted to cases caused by cold, or when aggravated by damp weather.

Veratrum vir.—Heat, fulness and sense of weight in the head, with violent throbbing of the carotid and temporal arteries; flushed face; ringing in the ears; sensitiveness to light and sound; double vision; derangement of the stomach; oppressed respiration; palpitation of the heart; tingling and numbness in the limbs; vertigo; confusion of mind; loss of memory; spasms and convulsions; congestions caused by teething, or by alcoholic stimulants.

CHAPTER III.

CEREBRAL APOPLEXY.

THE term *apoplexy*, which is derived from a Greek word signifying "to strike," was originally used by the Greek writers to denote a sudden loss of consciousness and volition, with more or less disturbance of the circulation and respiration. Since the beginning of the present century it has been mainly confined to cerebral hæmorrhage, for although the symptoms may be induced in other ways, hæmorrhage into the brain is the most common cause of the apoplectic seizure. The term, however, is objectionable, when used to denote a particular disease or condition, partly because the group of symptoms to which it is applied is common to a variety of cerebral lesions, and partly because it has been used to denote hæmorrhage into other organs, as the lungs, the kidneys, etc. As a consequence, the term is now seldom used to designate a definite lesion or disease, but any condition of the brain characterized by the following group or train of

Symptoms.—In most cases the attack is preceded by certain premonitory symptoms, such as pain in the head, ringing in the ears, altered vision, vertigo, drowsiness, loss of memory, and other evidences of cerebral hyperæmia, to which are sometimes added, more or less numbness and pricking in the extremities. In other cases no premonitory symptoms are present, but the patient, previously in apparent health, falls down insensible, with a total abolition of all the sensorial functions, or manifests a momentary apprehension of impending danger, by raising his hands to his head and making some alarming sign or exclamation, at the very instant of falling. The degree to which the several functions are affected varies greatly in different cases. When very severe, sensation, consciousness, and voluntary motion, are all lost. In other cases,

there is a greater or less degree of senso-motory impairment, the patient being in a state of semi-consciousness, sensible to outward impressions, and capable, to some extent, of voluntary movements. The pupils are at first generally contracted, frequently in an unequal degree, but in some cases they are largely dilated, and insensible to the stimulus of light.

More or less paralysis is generally associated with the attack, however light the stroke. Usually, one side of the body is motionless, constituting *hemiplegia*. When paralysis exists, the tongue is turned towards the paralyzed side, the function of deglutition is lost or greatly impaired, the respiration is slow and heaving, and the breathing loud and stertorous; there is also retention, or involuntary discharge, of urine and fæces. Though the power of voluntary motion in these cases is lost, there is sometimes more or less rigidity or spasmodic contraction of the muscles, the symptoms being, as it were, of a mixed character, partly paralytic and partly spasmodic.

The pulse is sometimes slow, full, and bounding; at other times it is weak, small, and intermitting. In the former case, there is more or less heat and flushing of the face, with warmth of the extremities; in the latter, on the contrary, the face is pale and sunken, and the extremities cold.

We have aimed to give, in the above description, only so much of the symptomatology of this affection as may serve for the easy recognition of what is known as the *apoplectic state*; but it should be remembered that the assemblage of symptoms to which the name is applied may be produced in various ways, and may or may not be complicated with paralysis. In order, therefore, to avoid unnecessary repetitions, and at the same time enable the reader to obtain a comprehensive view of the whole subject, we shall treat at length, in separate chapters (q. v.), of each of the pathological conditions enumerated in the following list of

Causes.—*a.* Cerebral Hæmorrhage.

b. Hæmorrhage into the Cerebral Membranes.

c. Embolism of Cerebral Arteries.

d. Cerebral Hyperæmia.

e. Coup de Soleil.

f. Uræmic and Alcoholic Intoxication.

CHAPTER IV.

CEREBRAL HÆMORRHAGE.

SYN.—*Apoplexia Sanguinea.*

By *cerebral hæmorrhage* is meant the extravasation of blood from the cerebral vessels into the substance of the brain, or into its ventricles. The hæmorrhage may take place from either the large cerebral arteries, such as the middle cerebral and basilar, or from the capillary vessels of the brain. It may spring from a single vessel or from several, and may be more or less in quantity, producing clots of various dimensions, from the size of a pea to that of an orange, and even larger. It may set in gradually or suddenly, and continue until it meets with sufficient resistance from the surrounding tissues to check the further effusion of blood, or it may take place by fits and starts, according to the varying degrees of pressure exerted at different times upon the cerebral vessels.

There is no portion of the brain which may not be the seat of hæmorrhage. As might be expected, however, cerebral hæmorrhage occurs much more frequently in some situations than in others. Thus, in 579 cases reported by Gintrac, the cortical substance of the hemispheres was affected in 45; the anterior lobes of the brain in 17; the middle lobes in 127; the posterior lobes in 33; the corpora striata in 72; the optic thalami in 38; the crura cerebri and pons in 76; the cerebellum in 55, and the medulla oblongata in 2.

Symptoms.—Occurring as it does under such a great variety of circumstances, the symptoms by which an attack of cerebral hæmorrhage manifests itself, differ very much in different cases. They may, however, be divided into two classes, *apoplectic* and *paralytic*.

In the majority of cases, the attack is preceded by premonitory symptoms of various kinds, such as severe paroxysms of pain in the head; giddiness, especially when stooping or suddenly turning the head; flushings of the face, accompanied with coldness of the hands and feet; frequent bleedings at the nose, particularly in elderly people; flashes of light before the eyes; paralysis of the external rectus muscle of the eye; mydriasis; amblyopia from extravasations in the retinae; drowsiness; disinclination to work; neuralgic pains, involving, more particularly, the terminal branches of the ulnar nerve; twitchings of the muscles of the face, or some portion of the extremities, especially the fingers and toes; numbness of one side of the body; and sudden difficulty in speaking, in consequence of slight paralysis of the tongue, and other muscles concerned in articulation.

A greater or less number of the above signs may exist for days and even weeks before the actual onset of the attack, but none of them affords any positive indication of the gravity of the hæmorrhage. On the contrary, it often happens that in the apoplectic form of the disease they are wholly wanting. Whether present or absent, however, the attack is always more or less sudden in its onset. In a small number of cases, indeed, it may be absolutely sudden; but it much more frequently happens that the attack is immediately preceded by slighter symptoms, such as dizziness, noises in the head, dark specks before the eyes, tingling in the limbs, and thickness of speech.

In well-marked cases, the patient, if standing, suddenly staggers, falls, and at once becomes unconscious. Examining the patient, we now find that, although the functions of circulation and respiration continue to be performed, he is insensible to stimulation, and is paralyzed on one side of the body. His senses are so far extinguished that neither loud sounds, bright lights, nor substances having a strong and disagreeable smell or taste, make any impression on the brain. The face is livid, swollen and distorted, or pale and corpse-like. The breathing is slow and stertorous; the cheeks are flabby, and protrude during expiration; the mouth is more or less open, and is drawn towards the non-paralyzed side; the eyelids are

closed; the conjunctiva injected and insensible; the eyeballs fixed; the pupils sluggish, but variable as to size, being generally dilated, but sometimes contracted or unequal, according as the nerves of the iris are irritated or paralyzed.

If the hæmorrhage be great, or the attack very severe, the lower sphincters are more or less paralyzed, and all control over the urine and fæces is lost. The reflex excitability of the spinal cord is generally increased, owing to the fact that the inhibitory influence usually exerted by the brain is removed. Thus, if the sole of the foot be tickled, the leg will be drawn up, or jerked to one side.

Such is the general condition of the patient when the extravasation takes place into the corpus striatum and optic thalamus; when it opens into the meninges or the lateral ventricles, the limbs of one side are spasmodically affected, being either contracted or convulsed.

An apoplectic attack of this character may result in death within a few days, a few hours, or even a few minutes, according as the lesion is more or less severe. When slight, the apoplectic condition may last not more than half an hour or so. In other cases it may disappear more gradually, accompanied with symptoms denoting the return of consciousness. In fact, as there is every degree of injury and of shock in these cases, so there is every sort of gradation between the deepest coma and mere mental confusion—conditions which manifest themselves by various degrees of stupor, delirium, and mental incoherence. For example, when consciousness begins to return, if spoken to loudly, the patient may open his eyes, turn over in bed, or attempt to speak; or he may simply raise his eyelids for a moment without taking any further notice; or he may answer "yes" or "no," and again lapse into stupor.

Other symptoms also manifest themselves in different cases, or in different stages of the same case, according to the gravity of the attack. The movements of respiration and circulation, instead of being slow and regular, as at first, frequently become irritated and irregular. Thus, the breathing becomes short and superficial; or, having been accelerated, it becomes retarded and intermitting. Under these circumstances the air-

passages become more or less obstructed with mucus; and a mixture of mucus and saliva escapes from the half-open mouth.

But one of the most important and peculiar symptoms is the variation in the *animal temperature*. At first it undergoes a marked reduction, the thermometer in the rectum indicating, in most cases, a temperature of 96° or 97°F. This reduction appears to correspond to the continuance of the hæmorrhage. After the latter has ceased, the thermometer generally rises to about the normal standard (99.4°–101°), at which point, if the patient is to recover, it remains nearly stationary. But when the hæmorrhage is very extensive, or there is an unusual fall of temperature at the commencement, the mercury again rises, and this time may reach an elevation of 103°, 105°, and even 107°F., indicating a fatal termination.

Another peculiar symptom sometimes observed in these cases is, *the conjugated or conjoint lateral deviations of the eyes and head* towards the sound side. This deviation is sometimes seen during the period of unconsciousness, but it may continue afterwards, the patient after his return to consciousness having no power to correct it. By great effort he may succeed in turning the head in the opposite direction, but not the eyes. This symptom is not due to paralysis, but to spasm, excited partly by irritation of the third cerebral nerve, which produces internal deviation on the side opposite the lesion; partly by irritation of the sixth nerve, which causes external deviation on the same side; and partly by irritation of the eleventh, or spinal accessory nerve, which, by producing contraction of the sterno-mastoid muscle, causes the deviation of the head. Althaus says that this symptom always denotes a sudden and extensive injury to the brain, which mostly proves fatal; but Hammond declares that he has met with the deviations in about one-third of his cases of cerebral hæmorrhage, having been present from the beginning, and that they disappeared in a few days.

Should the patient live to reach the *second stage* of the disease, a different set of symptoms, characteristic of the period of inflammation, generally supervenes. This period usually sets in about the eighth or ninth day after the occurrence of the

extravasation, with symptoms of cerebral fever, such as restlessness, pain in the head, delirium, convulsions, nausea and vomiting. This stage may last from three or four days to a week, and then terminate, either in death, or, by a gradual abatement of the symptoms, in resolution. In the latter case, the mind becomes every day more and more clear, articulation more distinct, and movement of the paralyzed limbs more free and easy. For some reason, the leg usually recovers its power much sooner than the arm, so that the patient is often able to walk about long before he can make any use of the upper extremity. When, as sometimes happens, the arm regains its power before the leg, the termination is usually fatal.

An *acute bed-sore* sometimes forms over the gluteal region of the paralyzed side, and occasionally, but very rarely, over that of the sound side. This acute sloughing process, which occurs quite independently of pressure, or of any external irritating influence, may begin to manifest itself within three or four days after the apoplectic seizure. It commences in the form of an erythematous spot, or macula, which is soon succeeded by the appearance of bullæ filled with colorless serum, which afterwards becomes sanguinolent. The raised cuticle soon gives way, and is followed by a gangrenous condition of the part, which spreads so rapidly that the patient seldom lives long enough for the slough to separate; indeed, according to Charcot,* the lesion is one that almost invariably indicates a fatal termination of the case.

After the acute symptoms have subsided, that is to say, in about ten or twelve days after the occurrence of the hæmorrhage, there remains either complete hemiplegia, or a degree of paralysis corresponding to the locality and extent of the central lesion. When the entire corpus striatum is involved, there is complete paralysis of the opposite side of the body. In most cases, however, the paralysis is incomplete, the muscles which escape being those of the eye, neck, back, and chest. This incomplete form of facial paralysis readily distinguishes cerebral palsy from facial paralysis, properly so called. In the

* *Archiv. de phys.*, 1868.

latter affection it is utterly impossible for the patient to close his eye on the paralyzed side, whereas in the cerebral form he can shut it with apparent ease. He cannot, it is true, close the lids as firmly as he can those of the opposite eye, nor can he close the eye of the affected side without shutting that of the sound eye at the same time; at least he can only do so with great difficulty. Moreover, the muscles which chiefly suffer in these cases are those of mastication, so that when the patient attempts to close the jaw, the temporal and masseter of the sound side contract more energetically and promptly than those of the affected side. Other facial muscles are likewise implicated, rendering the cheek flabby, the nostril contracted, and the lip depressed and drawn towards the healthy side.

Owing to the peculiar action of the genio-glossus muscle, the tongue, in most cases of cerebral paralysis, deviates towards the paralyzed side. In a few cases, however, the tip of the tongue is turned towards the sound side, the lesion being in the medulla oblongata, below the point where its fibres decussate.

The diaphragm and muscles of the back are not affected in cerebral hæmorrhage, but the straight muscles of the abdomen appear to be weakened on the paralyzed side, as is seen when the patient attempts to assume the sitting posture by the aid of these muscles.

As before stated, the *upper extremity* is more profoundly paralyzed than any other part. The movements of abduction and adduction, flexion and extension, pronation and supination, are all rendered impossible. Unless improvement speedily sets in, contractions of the paralyzed muscles soon take place, the flexor muscles being generally more affected than the extensors. Not only the muscles of the arm, but those of the wrist and fingers suffer from contraction or paralysis. The flexors of the fingers are sometimes so forcibly contracted as to irritate the palm.

The *lower extremity* is at first as much affected as the upper, but it generally recovers more quickly from the paralysis. The flexor muscles of the paralyzed leg are apt, however, to

remain somewhat contracted in these cases, causing the patient to limp more or less in his walk.

As might be expected, most voluntary movements are more or less imperfectly executed for a considerable period after the attack. At times, indeed, especially when under the influence of strong excitement, the patient may be able to perform ordinary movements with facility; but until the muscular power has fully returned, they are made in a more or less awkward and difficult manner.

In some cases the paralyzed limbs become permanently contracted. This was formerly thought to be due to secondary encephalitis, but Charcot, Türck, and Vulpian have shown it to be the result of certain secondary changes in the nervous centres, especially sclerosis of the lateral columns of the spinal cord. This late rigidity of the paralyzed muscles differs from the early rigidity, not only by the lateness of its appearance, but by being both progressive and permanent.

Causes.—The chief predisposing causes of cerebral hæmorrhage are *inheritance* and *old age*. Statistics show that it occurs in the descendants of apoplectic parents much more frequently than in others, owing either to a similarity of physical conformation, or, which is more probable, to some inherited weakness of the system, the existence of which in the parents constitutes the original predisposition to the complaint. Thus, Piorry mentions the case of a woman, three of whose children had died of convulsions, while she herself was a paralytic, and her mother, uncle, brothers and sisters, to the number of twelve, had all died, either of cerebral hæmorrhage or of convulsions.

Old age, however, is the principal predisposing cause, and is doubtless the most powerful, as the great majority of cases occur after the age of forty. The greatest number of deaths from cerebral hæmorrhage occurs at about the age of seventy years, after which the number diminishes, but not the ratio. Hence, people advanced in life, especially if they are, or have been, very hard thinkers, or addicted to excesses of any kind, are very apt to be cut off in this manner. For these reasons, probably, women, whose habits of life are generally more regular than those of men, are less liable to the disease.

Cardiac affections were formerly supposed to favor the disease by causing more or less congestion of the brain, and when other circumstances concur to produce this condition, such as granular degeneration of the kidney, which leads to increased tension in the cerebral vessels, no doubt they contribute to the result. But ordinary hypertrophy of the left ventricle from disease of the aortic valves, instead of causing cerebral hæmorrhage, can at most merely compensate for the imperfect closure of the valves, without increasing the force of the cerebral circulation, and consequently without endangering the rupture of cerebral blood-vessels.

Very cold weather undoubtedly favors the production of the disease, as cerebral hæmorrhage is much more common in midwinter than in summer. The same is also true of sudden variations of temperature, especially from mild to cold weather.

The *exciting* causes of cerebral hæmorrhage are quite numerous, but they may be reduced to a very few classes, viz., to whatever tends to produce congestion of the brain; such as violent mental emotions, long exposure to the direct rays of the sun, heavy lifting or straining, hard coughing or vomiting, sexual intercourse, playing upon wind instruments, childbirth, the free use of alcoholic stimulants, compression of the vessels of the neck, dependent position of the head in stooping, etc. To these may be added, repelled eruptions, an overloaded state of the stomach, the sudden suppression of habitual discharges, long exposure to extreme cold, and an unhealthy state of the blood, such as exists in chlorosis, scurvy, typhus, syphilis, etc.

Diagnosis.—Cerebral hæmorrhage is liable to be confounded with both syncope and coma. In syncope, however, the surface is pale and cold, the features are contracted, the pulse is lost at the wrist, and the respiration is temporarily suspended—symptoms the very reverse of those usually met with in cerebral hemorrhage. Coma is a frequent accompaniment of various diseased conditions, and can only be differentiated by the *cause*, which, in cases of cerebral hæmorrhage, generally depends upon sudden pressure on the brain, while in other cases it is symptomatic of asphyxia, narcotic or uræmic poisoning, inebriation, cerebral concussion or inflammation, hysteria,

etc. Coma may also result from embolism, thrombosis, meningeal hæmorrhage, tumor, or abscess; but in these cases the diagnosis is generally more or less uncertain and difficult.

In case, however, a young person suffering from disease of the left side of the heart suddenly becomes unconscious, the probability is that the attack is due to cerebral embolism. The probability is considerably increased if the resulting hemiplegia occurs on the right side, as embolism in the brain is most frequently met with in the left middle cerebral artery or in some of its branches.

Cerebral hæmorrhage and thrombosis bear a close resemblance to each other, since they have a great tendency to occur in elderly people, and each is liable to be preceded by premonitory signs; but the development of the symptoms in thrombosis is generally much slower than in hæmorrhage, or in embolism; so that when the attack occurs in an elderly person, and is preceded by long-continued and well-marked prodromata, and especially if the arteries are rigid and the cardiac pulsations weak, we are justified in referring the attack to thrombosis.

As for cerebral tumors or abscesses, the symptoms, like those in thrombosis, are not only gradual in their development, but are frequently of an epileptic character. A fixed pain in the head is generally one of the most prominent symptoms; and the paralysis, although unilateral, is frequently limited to one or more of the cerebral nerves. Moreover, the symptoms, instead of gradually diminishing, as in cerebral hæmorrhage, become, as a general rule, more and more pronounced.

Cerebral hæmorrhage may be distinguished from asphyxia by the fact that in the latter the respiration is suspended. Moreover, the cause which suspends the respiratory movements, whether it be mechanical injury, strangulation, drowning, or the inhalation of noxious gases, is generally plainly manifest.

The comatose state of an epileptic paroxysm closely resembles that of an apoplectic seizure due to cerebral hæmorrhage, but the stupor of epilepsy is not usually accompanied by stertorous breathing, nor is it often of long duration. Moreover,

if the comatose condition is the result of an epileptic paroxysm, more or less froth, often colored with blood from a bitten tongue, may be found upon the lips, and not unfrequently small spots of extravasated blood may be seen under the skin of the forehead, eyelids, and cheeks.

Concussion is liable to be mistaken for cerebral hæmorrhage, unless the patient has received mechanical injuries of such a nature as to show that the symptoms are the result of a fall or blow, such as bruises, fractures, bleeding from the nose or ears, etc. It is possible, however, that the fall may have been the consequence of a hæmorrhage within the brain, in which case he may appear to be suffering from simple concussion when the chief injury is one of compression, perhaps complicated with fracture of the cranium.

Hysterical coma sometimes bears a very close resemblance to that of cerebral hæmorrhage, and may even be accompanied by well-marked hemiplegia; but in these cases there are generally other evidences of the hysterical condition present, such as the hysterical constitution, an unembarrassed state of the circulation, freedom from stertor, etc.

Uræmic coma is distinguished from the coma of cerebral hæmorrhage, by the history of the case, the absence of hemiplegia, the altered state of the urine, and the general presence of anasarca.

Alcoholic intoxication is frequently confounded with cerebral hæmorrhage, much to the discredit of the profession; though it must be confessed that the resemblance between the two conditions is sometimes so great as to render it extremely difficult to make a satisfactory diagnosis. When, with the usual signs of inebriety, there is neither hemiplegia nor stertor, it will generally be safe to attribute the symptoms to drunkenness, especially if the habits of the patient are of a character to warrant such a conclusion.

Prognosis.—Cerebral hæmorrhage is always a very dangerous disease; so much so, that it is generally impossible, soon after the attack, to determine the result with any degree of accuracy. As a general rule, however, it may be stated that the danger to life is in proportion to the severity of the seizure;

and in the severe apoplectic form the disease is almost always fatal within a few hours. If, however, life be prolonged three or four days, there is some degree of hope. Among the more important signs threatening a fatal issue, are: protracted coma, convulsions, general paralysis, dilated pupils, obstructed respiration, foaming at the mouth, frequent vomiting, coldness and clamminess of the surface, and involuntary evacuations. Still, if the vital powers are husbanded, the patient may possibly survive even these formidable symptoms, though it must be confessed, that if the patient escape for the time, he is very liable to sink sooner or later, either from a recurrence of the attack, or by a general failure of the vital powers resulting from the injury done to the brain. If, however, the patient survive the first onset of the disease without any subsequent aggravation of the symptoms, there will always be room for hope, even when the extravasation of blood is extensive. But it should always be remembered that about the eighth or ninth day of the seizure is a critical period, for then inflammation sets in about the clot and may destroy the patient.

Not more than one in three of the cases attended with coma and hemiplegia survives the attack; whilst few if any can be said to fully regain their health. Each succeeding attack leaves the system less capable of enduring a renewal of the hæmorrhage, so that finally the mental faculties, the power of speech, and the coördination of movements, are more or less defective. Besides, relapses are common, the disease being, as a rule, progressive in its nature. Consequently, although the patient may survive the second, third, and even fourth attacks, both the mental and physical powers suffer a gradual decay from secondary atrophy, which, as before stated, sooner or later terminates in death.

Mild forms of the disease, however, especially such as are not attended with loss of consciousness, are not generally fatal, though the risk of inflammation excited by the clot is so great, that the patient cannot be considered out of danger, even in these cases, until after the eighth or ninth day of the seizure.

Morbid Anatomy.—When the blood escapes into the substance of the brain, it forms one or more cavities by the sepa-

ration or laceration of the cerebral fibres, the hæmorrhage continuing until the resistance of the tissues becomes so great as to overcome the tension of the effused blood, when it ceases. The resulting cavities, and consequently the clots, differ greatly in size and shape, being round, oval, or irregular in form, and varying in diameter from that of a hazelnut or cherry to that of an orange. There is generally only one cavity and clot, though there may be several. In the former case, the clot is usually large, and occupies some portions of the grey matter.

Most cases of cerebral hæmorrhage result from rupture of the small branches of the middle cerebral artery. The blood penetrates the substantia perforata lateralis, and, pushing aside the optic thalamus, ruptures the corpus striatum, and finally invades the lateral, and sometimes the third and fourth ventricles.

Next in order of frequency comes the optic thalamus. In more than half of the cases collected by Andral, the hæmorrhage took place into either the corpus striatum or the optic thalamus, or else into both. In about fifteen per cent. of the cases it occurred in the corpus striatum alone; and in about seven per cent. of them in the thalamus opticus alone. We have already given Gintrac's statistics, in which it will be seen the corpus striata and optic thalami were found to be simultaneously involved in nearly nine per cent. of the whole number of cases.

Owing to pressure of the clot, the convolutions are often found flattened, the blood-vessels empty, and the cerebral tissue pale and anæmic. In most cases, the clot is mixed with debris of the cerebral matter, and the brain-tissue surrounding it is more or less softened. If the patient survive the stroke, the blood corpuscles and nerve-fibres undergo fatty degeneration, the effused serum is absorbed, and the fibrinous debris contracts and becomes hard, changing gradually from a black to an ochre color. Examined with the microscope, the altered matter is found to contain granulations of hæmatosin and crystals of hæmatin and hæmatoidin. In some few instances, however, absorption fails to take place, and the cavity remains distended with blood until a new hæmorrhage occurs,

or an abscess results. The condition of the blood-vessels will be given under the head of

Pathology.—The investigations of MM. Charcot and Bouchard leave little room for doubt, that cerebral hæmorrhage is generally due to what they term *miliary aneurisms*. These minute aneurisms form upon the smaller branches of the cerebral arteries, in consequence of an inflammatory condition which results in atrophy of their middle coat, on which their power of resistance chiefly depends. These dilatations vary in size from a millet seed to that of a large pin-head. They adhere to the perivascular sheath; and when ruptured they sometimes heal spontaneously by the formation of a clot in them, which afterwards undergoes degeneration. They are usually very numerous, and have been found in all parts of the brain; in the fissures between the convolutions, in the white substance of the hemispheres, in the basal ganglia, in the cerebellum, and in the pons Varolii. They are not, however, confined to the brain, but have been discovered in the central artery of the retina, in the œsophagus, on the visceral layer of the pericardium, and in the branches of the splenic artery. Nothing is positively known as to their origin, but it is reasonable to suppose that they owe their formation either to hereditary influences, or to debilitating causes, such as intemperance, malnutrition, and old age.

But although miliary aneurisms may, in the great majority of cases, be said to constitute an important factor in the production of cerebral hæmorrhage, they are not the only form of vascular disease existing in these cases; for not only is atheromatous degeneration of the cerebral blood-vessels a common pathological condition in the aged, but cases of cerebral hæmorrhage have been observed in which this condition affected all the arteries of the brain, while at the same time no miliary aneurisms were anywhere present.

Other conditions doubtless favor the rupture of cerebral blood-vessels, such as an increased tension of the blood in the vessels; an unhealthy state of the blood, such as exists in typhus, scurvy, etc., rendering it unfit for the nourishment of the blood-vessels; atrophy or softening of the brain substance;

and the various deteriorating influences mentioned under the head of *causes*.

Treatment.—The treatment of cerebral hæmorrhage is three-fold, *preventive*, *palliative*, and *curative*.

1. *Preventive Treatment.*—The preventive treatment consists in the avoidance, as far as practicable, of the ordinary causes of cerebral hæmorrhage, and the administration, when required, of the remedies recommended for *cerebral hyperæmia* (q. v.).

2. *Palliative Treatment.*—The palliative treatment of cerebral hæmorrhage consists in the application of such auxiliary measures, and the observance of such hygienic regulations, as are calculated to lessen the effects of the injury and promote the welfare of the patient, especially at the time of the stroke and during the period of unconsciousness. Thus, the patient should be kept in such a position as will favor the return of blood from the head. The head and shoulders should be raised by pillows, the clothing loosened about the neck, and free ventilation of the patient's chamber constantly secured. The lower extremities, and especially the paralyzed limbs, should be kept warm by means of flannel wrappings, frictions, etc.; and the bowels should be emptied from time to time with lavements of tepid water, to which may be added, if necessary, a tablespoonful or two of castor oil. Attention should be paid to the bladder, and the urine drawn off regularly with the catheter, until the patient becomes able to void it voluntarily.

The *diet* is also an important matter. In the early stages of the attack, nothing but gum-water, barley or rice-water, toast-water, and similar farinaceous drinks, should be allowed; but as the case advances, and improvement sets in, more nutritious substances may be cautiously administered, such as milk, beef-tea, soft-boiled eggs, etc., provided no ill effects are thereby produced; but if, on strengthening the diet, the face becomes flushed and headache ensues, all stimulating and highly nutritious articles of food should be immediately withdrawn. If symptoms of inflammation set in, the treatment recommended for meningitis and encephalitis should be observed.

3. *Curative Treatment.*—The curative treatment consists, *first*, in the administration, as required, of the remedies specially indicated by the symptoms; and, *secondly*, in the removal, as far as possible, of the secondary effects of the injury, especially the paralysis and anæsthesia.

No attempt, however, should be made to overcome the paralysis until the brain symptoms have entirely disappeared, nor until the period of inflammation has fully past. It will then be proper, in most cases, to take measures for the relief of the paralysis, and for the prevention of muscular contractions. For these purposes, in addition to the indicated remedies, we may make use of *massage* and *electricity*. The former is accomplished by kneading the affected muscles with the fingers, and by flexing and extending the joints every day for ten, fifteen, or twenty minutes at a time.

But the most successful treatment for hemiplegia, aside from medicine, is electricity. At first, or in recent cases, the induced current will usually be found to afford sufficient stimulation for the purpose. The current, which should be strong enough to produce contraction, or to cause slight pain, should be applied by means of wet sponges to the skin covering the muscles, or, if necessary, to the nerves. Old cases, and such as will not yield to the induced current, should be treated with the primary current, applied in such a manner as to be interrupted, as the constant current will not produce contractions. Electricity is also a potent agent in promoting the restoration of sensibility, in cases in which the anæsthesia does not disappear spontaneously.

Dr. Hammond extols the use of strong magnets in the treatment of the hemiplegia resulting from cerebral hæmorrhage. In one of two cases in which he employed this agent, the paralysis and hemianæsthesia disappeared within half an hour; and in the other the hemianæsthesia was overcome in less than five minutes. He made use in these cases of a magnet capable of sustaining ten pounds of iron, simply laying it against the paralyzed side of the body.

General Indications.—*Premonitory symptoms.*—Acon., Amyl nit., Bell., Cham., Gels., Glon., Hyos., Phos., Sepia, Stram., Verat. vir.

During the attack.—Acon., Arn., Bell., Cact., Coccul., Hyos., Lach., Lauroc., Nux v., Opium, Merc., Sanguin.

Subsequent changes.—Anacard., Caust., Cocc., Cupr., Kali, Plumb., Rhus, Stram., Zincum.

Special Indications.—*Aconite.*—Inflammatory stage, or when the head is hot, the carotids throbbing, the pulse full, hard and strong, or weak, but not intermittent, the skin hot or warm, but not cold, and especially when caused by suppressed hæmorrhages, or after fright or vexation.

Arnica.—Drowsiness, with moaning and insensibility; eyes staring or dim; pupils dilated or contracted; pulse irregular, intermittent, or full and strong; respiration labored and snoring; involuntary evacuations of fæces and urine; *paralysis*, especially of the *left* side. This remedy is particularly suited to stout, middle-aged, plethoric people, with strong hæmorrhagic tendencies.

Baryta.—Drowsiness, with semi-consciousness, in old people; dimness of sight; breathing short and suffocative; pulse small and irregular; anxiety, fear, and loss of memory; great restlessness and moaning; paralysis of the tongue; *general paralysis*, especially of the *right* side; frequent discharges of urine and fæces. Especially suited to old people, particularly those addicted to the excessive use of alcoholic drinks.

Belladonna.—During the first, or congestive stage, during the period of stupefaction, and also during the inflammatory period; drowsiness or loss of consciousness, with dilated pupils, slow and full pulse, labored, irregular, and stertorous breathing; or, red and staring eyes, with redness of the face and icy coldness of the extremities; convulsive movements; paralysis of the tongue, limbs, etc.; involuntary discharges of fæces and urine; dysphagia; wandering of the mind.

Cocculus.—Strong determination of blood to the head, followed by drowsiness, vertigo, and loss of consciousness; dimness of vision; pupils greatly dilated or contracted, with spasmodic rolling of the eyeballs; pulse small and hard; breathing tight and oppressed, with or without stertor; convulsions and paralysis, especially of the lower extremities.

Lachesis.—Congestion to the head, with blueness of the face; absence of mind when conscious; drowsiness, or sopor and insensibility; dim and distorted eyes; pulse small, weak and irregular, or full and hard; slow, heavy, wheezing respiration; trembling of the muscles, or *paralysis*, especially on the *left side*; when caused by mental emotions or the abuse of liquors.

Laurocerasus.—Patient speechless when conscious, or insensible, with complete loss of consciousness and sensation; bloated face; eyes distorted and staring; vision completely lost; pupils dilated or contracted, and immovable; pulse very small, slow and irregular; convulsions, with subsequent paralysis, including paralysis of the sphincters; great coldness, with clamminess of the surface, and deficient susceptibility to the action of remedial agents.

Mercurius.—Constipation, followed by vertigo and loss of consciousness; dilatation of the pupils, with vanishing of sight; dyspnœa; feeble, slow, and trembling pulse; urine suppressed, or dark and turbid; great sinking and prostration; spasmodic movements of the limbs; paralysis, preceded by formication and followed by contractions.

Nux vom.—Attacks preceded by constipation and high living, or by premonitory symptoms, such as vertigo, headache, roaring in the ears, etc.; sopor, with snoring; eyes dull and blurred; pulse full and hard, or small and weak; suffocative fits, or anxious dyspnœa; retention of urine; paralysis, especially of the lower limbs and lower jaw; cold extremities.

Opium.—Coma, preceded by headache, vertigo, and other evidences of cerebral congestion; pupils dilated, and insensible to light; pulse slow, full or weak, and intermittent; retention, or involuntary evacuation of urine; red and bloated face; trembling of the muscles; convulsive movements; dropping of the lower jaw; tetanic rigidity of the whole body; head hot, with cold sweat; foam at the mouth; respiration slow, heavy and snoring.

Pulsatilla.—Loss of consciousness, preceded by drowsiness, and occurring at the climacteric period, or preceded by an arrest or disturbance of the menstrual function; eyes dull and bleared; pulse almost imperceptible; respiration impeded and

rattling; retention or incontinence of urine; red and bloated face; violent palpitation of the heart; great weakness and trembling, followed by loss of motion.

Sanguinaria.—Attacks caused by venous congestion; burning heat and redness of the face; distension of the temporal veins; sharp pain in the back of the head; dizziness on quickly turning the head; burning of the ears; paralysis of the right side.

Sepia.—Attacks preceded by venous congestion, or by determination of blood to the head; headache coming on with flashing pains; vertigo when walking; intermitting pulse; cold feet; absence of mind; palpitation of the heart; jerking of the limbs; sudden stoppage of the menses. Especially adapted to women at the climacteric period, and to men addicted to drinking and venery.

Stramonium.—Vertigo, followed by stupor and insensibility; pupils dilated and insensible; pulse small, irregular, and almost extinct; deep, stertorous breathing; involuntary emissions of urine; spasmodic rigidity and trembling; stupefaction alternating with delirium; convulsive movements; paralysis, especially of the organs of speech.

Zincum met.—Attacks preceded by stupefying headache, with great drowsiness, cold hands and feet, and livid face; stupor, with vanishing of sight; quick and irregular, or slow and weak pulse; weakness, heaviness, and trembling of the limbs; anxious dyspnœa; palpitation of the heart; jerking and twitching of the muscles; senses remain disturbed after the attack; symptoms aggravated by wine.

CHAPTER V.

THROMBOSIS OF CEREBRAL VESSELS.

By *Cerebral Thrombosis* is meant the gradual closure of a blood-vessel in the brain, by the deposition of fibrine upon its internal surface. It differs from embolism (1) in the clot originating in the blood-vessel itself, instead of being carried into it from a distance; (2) in being either venous or arterial; and (3) in being gradual instead of sudden in its development.

Symptoms.—The gradual occlusion of a cerebral vessel by a thrombus, gives rise to a large number of initiatory symptoms, such as headache, vertigo, impaired memory, difficulties of speech, ocular troubles, diminished sensibility on one side of the body, tottering gait, and other evidences of approaching paralysis. These symptoms, however, are often interrupted by periods of apparent improvement; and even after paralysis sets in, the loss of power in the muscles of the face, arm, or leg, is not only gradual in its advance, but is interrupted by stages of remission, until at last the vessel is completely blocked up, when hemiplegia supervenes. Even then, unless speedily followed by death, improvement is likely to occur, and may continue for a considerable period; but as the disease is progressive, the attack is almost certain, sooner or later, to be repeated.

The symptoms vary in different cases, according to the seat and extent of the lesion. When considerable, as where a large vessel or a number of small ones are closed, the paralysis is progressive, and is accompanied with muscular contractions and mental torpor. As in embolism, when the left middle cerebral artery is plugged, right hemiplegia with aphasia is produced; whereas, if the same artery on the right side is occluded, there will be left hemiplegia, but no aphasia.

What is called *marantic thrombosis*, or that form which occurs in the condition known as marasmus, is most frequently seen in weakly infants, especially after exhaustive attacks of diarrhoea. In these cases, there is generally more or less rigidity of the muscles of the neck, back, and extremities; and in some instances ocular troubles are present, such as ptosis, strabismus, and nystagmus. There is also, as in hydrocephaloid, cerebral anæmia, followed by somnolence and coma; but these are not generally preceded, as in acute hydrocephalus, by marked excitement and convulsibility. Here the superior longitudinal sinus is the seat of the thrombus.

In adults, the symptoms of venous thrombosis are not usually so well marked. There is generally, however, more or less headache, and mental and physical depression; changes in the size of the pupils are also not uncommon; and in some cases there is nausea and vomiting, swelling of the veins which communicate with the affected sinuses, more or less œdema, trembling of the limbs, and even convulsions. Thus, when the superior longitudinal sinus is involved, we have swelling of the veins of the auricular and temporal regions, together with epistaxis from congestion of the veins of the nose. Thus, also, thrombus of the transverse sinus leads to œdema behind the ear; and thrombus of the cavernous sinus, which communicates with the ophthalmic veins, frequently causes a bulging of the eye between the lids, which are œdematous, and also hyperæmia of the fundus oculi.

Causes.—Whatever impedes the flow of blood in the cerebral vessels may lead to the formation of thrombi, not only in the cerebral veins and sinuses, but in the arteries. Hence, we find that coagulation of blood in the vessels of the brain is most apt to occur in debilitated states of the system, as in the advanced stages of tuberculosis and cancer; after typhus and other low fevers; exhausting diarrhoeas, especially in young children; chronic inflammation of the joints; diffuse suppurations; caries; syphilis; atheromatous degeneration in the aged and decrepid; cardiac debility; pressure from tumors and effusions, and other like causes. It has also been attributed to other agencies, such as exposure to intense heat,

severe mental strain or shock, and suppression of the menses; and there can be no doubt that blows on the head produce it, by exciting phlebitis in the sinuses of the dura mater.

The disease is much more common in males than in females, probably because the former, in consequence of exposure, are more subject to rheumatism, which seems to favor the disease by increasing the amount of fibrine in the blood, and also by impairing the action of the heart.

Diagnosis.—Cerebral thrombosis may be distinguished from cerebral hæmorrhage by the gradual development of the symptoms; from encephalitis by the absence of fever; and from both, by the previous history of the case. It may be distinguished from embolism by (1) its slow development; (2) the advanced age of the patient; (3) the evidences of atheroma, fatty degeneration of the heart, slight attacks of paresis or paralysis, and other characteristic symptoms; and (4) the absence, in most cases, of any previous history of rheumatism.

Prognosis.—The prognosis in cerebral thrombosis is unfavorable, not only because the conditions which lead to it are of an unfavorable character, but because the disease is progressive, and the danger of complete obliteration very great; in which case the probability that the collateral circulation will become sufficiently established to prevent softening is very remote. Moreover, the inefficiency of medical treatment in controlling the progress of the disease, is also an unfavorable omen.

Morbid Anatomy and Pathology.—Although a number of the older medical authors have recorded undoubted cases of thrombosis, Virchow,* in 1846, was the first to give a full and satisfactory explanation of its nature. Since then, many cases of cerebral thrombosis, both arterial and venous, have been met with, fully confirming Virchow's observations, and leaving no room for doubt as to the pathology of the affection.

Many of these cases are due to atheromatous degeneration of the cerebral arteries, of which the following, which recently occurred in my practice, is a good illustration. The patient

* *Neue Notizen*, Heft xxxvii.

was a man seventy-two years of age. For years he had exhibited symptoms of atheroma, and of fatty degeneration of the heart. The radial and temporal arteries were rigid from atheromatous degeneration; and when he came under my care, about four months previous to his death, there was evident disease of the aortic valves. The patient had already had two attacks of right-sided paresis, accompanied with aphasia; and shortly after I saw him he had another, which came on suddenly, and left him unconscious for a period of nearly three hours. He, however, slowly rallied again, but never fully recovered his speech, nor the use of his right extremities. About six weeks after this he had a fourth attack which proved fatal, dying in a comatose condition some forty-eight hours after the stroke. The post-mortem examination showed centres of softening in the cortex of the left middle lobe of the brain, which were clearly traceable to thrombi blocking several of the branches of the left middle cerebral artery, the walls of which were all affected with atheromatous degeneration. The other cerebral arteries, as well as the aorta and the aortic valves, were atheromatous, while the chordæ tendineæ and muscular structure of the heart had undergone fatty and calcareous degeneration.

A still more remarkable case of arterial cerebral thrombosis has been described by Heubner,* in which syphilitic thrombi were found closing the right anterior and left middle cerebral, the left vertebral, and the basilar arteries.

In consequence of the diseased condition of the blood-vessel, the internal coat becomes roughened—a circumstance which favors the deposition of fibrine at that point. The primary layer of the thrombus, thus formed, becomes gradually thickened by fresh accretions, until finally it fills the whole calibre of the vessel and completely obstructs it.

The clot which closes the vessel is, in the beginning, nothing but coagulated blood; but as the elements of which it is composed are deposited gradually, the red corpuscles are washed away by the current of blood which continues to flow through

* *Die Luetische Erkrankung der Hirnarterien*, 1874.

the vessel during the process of formation, so that the thrombus may be of every shade of color, from a white to a brown. For the same reason, the lower layers of the clot are usually of greater consistency than those nearer the centre of the vessel, and consist almost entirely of fibrine.

While the artery is undergoing occlusion, the part of the brain to which it is distributed is more or less anæmic; but as soon as it becomes entirely closed, the anæmic parts change to a pink or reddish color, which is known as *red softening*. This state is probably one of passive hyperæmia, combined with œdematous swelling and hæmorrhage; and unless the collateral circulation is speedily and adequately established, necro-biotic or *yellow softening* quickly supervenes.

Treatment.—The treatment of this affection resolves itself chiefly into (1) the removal, as far as possible, of all debilitating causes and conditions; (2) aiding the general circulation, when defective, by both local and constitutional means; and (3) the administration of such medicines as the symptoms may, from time to time, indicate—remedies which have already been given under the heads of cerebral *anæmia*, *apoplexy* and *hæmorrhage* (q. v.). After the collateral circulation has become established, *electricity* will often be found to be a useful auxiliary in restoring the strength of the patient, and especially in overcoming the muscular paresis or paralysis still existing.

CHAPTER VI.

EMBOLISM OF CEREBRAL ARTERIES.

By *cerebral embolism* is meant the sudden obliteration of one or more cerebral arteries or arterial capillaries, by small clots carried into them from distant parts of the body.

Symptoms.—Cerebral embolism, unlike cerebral thrombosis, has no precursory symptoms, but the patient is seized without premonition with symptoms of apoplexy, such as sudden loss of consciousness and paralysis. These symptoms, however, are generally less pronounced than in cerebral hæmorrhage, there being in many cases no coma, but merely confusion of mind, with sudden paralysis of one or more sets of muscles on the side opposite the lesion. There are generally no symptoms of compression, though there may be epileptiform convulsions. The pulse is usually small and weak, and the temperature is somewhat depressed. The symptoms, however, vary in different cases. Thus, there may be no paralysis whatever, or it may be limited to a single part, as the arm, the leg, the face, or the tongue. The faculty of language is generally either lost or greatly impaired; and sometimes there are ocular troubles, such as amaurosis, ptosis, or strabismus. There may or may not be headache, vertigo, vomiting, dilated or contracted pupils, and the other signs usually met with in cerebral hæmorrhage, the presence or absence of these symptoms depending upon the artery affected. Thus, if the embolus blocks the left middle cerebral artery, which is its usual site, we may have all the signs of corpus striatum hæmorrhage, or simply hemiplegia with aphasia. Similar effects will be produced by blocking of the right middle cerebral artery, except that there will be no aphasia. Obliteration of the basilar ar-

tery by an embolus causes vomiting; whilst plugging of the ophthalmic artery produces sudden amaurosis. The ophthalmic artery and its branches may be gorged with blood from embolism of the middle cerebral artery, and then the optic papilla will appear red, and the vessels of the retina, enlarged and congested.

Causes.—Acute and chronic endocarditis are the most common causes of cerebral embolism. The emboli, which consist of clots of blood, fibrine, atheromatous debris, or proliferated connective tissue, are detached from their several seats on the valves of the heart and other parts of the endocardium, the lining membrane of the aorta, or from a thrombus formed in the pulmonary vein, and, entering the circulation, are swept onward through the carotid or vertebral arteries into a cerebral artery—generally the left middle cerebral—where they become impacted. Other large arteries are sometimes obstructed in this manner, as the internal carotid, the vertebral, the anterior cerebral, and the basilar.

Instead of a stoppage of one of the main cerebral arteries by a comparatively large mass, numerous small emboli may form from a quantity of fibrinous debris entering the circulation from an aneurismal sac, a pulmonary abscess, or a heart-clot. An interesting case of this kind occurred under my care, in Brown General Hospital, in 1864. Oscar M. Root, of Co. B, 107th N. Y. Vol., entered the hospital for gun-shot wound of the hand. After convalescence, he continued weak and unfit for duty, and so was allowed to remain in the hospital. One pleasant day in September I gave him a pass to go outside the hospital grounds, where he remained three or four hours, quietly walking about. On returning, about 5 P.M., he suddenly became unconscious, and was found to be paralyzed on the right side of the body. The next day consciousness returned, but he was unable to speak intelligently. Two days afterwards, at midnight, he suddenly died. A post-mortem examination showed a large, white heart-clot filling the left ventricle, and no less than six small emboli blocking the branches of the left middle cerebral artery. There was no organic disease of the heart, though the ventricular walls appeared somewhat thin and flabby.

Diagnosis.—When the symptoms of apoplexy are present, it may not be possible to distinguish the disease with certainty from cerebral hæmorrhage; but in many cases there is only sudden paralysis without loss of consciousness. Right hemiplegia with aphasia indicates, as we have seen, occlusion of the left middle cerebral artery; whilst embolism of the right middle cerebral produces left hemiplegia without aphasia. We have also seen that plugging of the ophthalmic artery gives rise to sudden amaurosis; whilst the sudden blocking of the basilar artery causes vomiting. These are diagnostic points of great value when other symptoms are found to correspond. When the symptoms of paralysis vanish suddenly, we may be sure the stroke was not caused by cerebral hæmorrhage; and if recovery takes place within two or three days after the attack, it can only be referred to an embolus. Moreover, the disease occurs without reference to age; there are no premonitory symptoms; the paralysis, in the great majority of cases, is on the right side, and is usually combined with aphasia; finally, the disease is almost always associated with organic disease of the heart.

Prognosis.—The tendency to softening of the brain is so great in every case of cerebral embolism, as to render the prognosis exceedingly grave. There can, of course, be no safety for the patient until the collateral circulation is fully established; still, if three or four days pass without any aggravation of the symptoms, and especially if they become gradually ameliorated, there will be some hope of a favorable issue. The degree of paralysis depends upon the extent of the lesion, and when this is considerable, death may take place within a few hours, but it is not always sudden, and is often preceded by pneumonia. In cases where the collateral circulation is quickly, but not perfectly restored, there is a corresponding improvement in the paralytic symptoms. Thus, the limbs may regain a certain degree of voluntary power, while the faculty of speech and the mental functions may remain more or less impaired.

Morbid Anatomy and Pathology.—Since the year 1847,

when Virchow* first described the manner in which the so-called "vegetations," or fibrinous deposits, are detached from the valves of the heart and transported to distant parts of the body, his observations and conclusions have been confirmed by many competent observers, especially by Cohnheim and Schützenberger,† who have shown that the cerebral blood-vessels may be plugged by fibrinous concretions derived from the heart or large vessels; that this occlusion causes anæmia of those portions of the brain to which the affected artery is distributed; that in most cases partial or complete hemiplegia is the immediate consequence of the lesion; and that if the obstruction is not speedily overcome, softening of the brain is sure to result.

The reason that the left middle cerebral artery is most frequently obstructed by emboli is, that the left carotid—arising as it does from the arch of the aorta more nearly in a line with the current of blood from the heart, than either the innominate or the left subclavian—receives the clot, which, after passing through the internal carotid, is swept with the more direct current into the middle cerebral artery. More than three-fourths of all the cases of cerebral embolism on record occurred in the left hemisphere, and a still larger proportion of these implicated the left middle cerebral artery.

For obvious reasons, the portions of the brain behind the clot are more or less congested, while those to which the occluded vessel is distributed are pale and anæmic. An important fact in the pathology of embolism is, that the artery itself is not diseased. If examined during the first stage, or previous to the setting in of cerebral softening, those parts of the brain supplied by the obliterated vessel will be found bordered by a zone of congested tissue, with perhaps a number of small extravasations of blood. The changes which take place subsequently belong to *cerebral softening* (q. v.).

Treatment.—The most that can be done in these cases, in the way of treatment, is, to favor the establishment of the

* *Archiv. für Pathol. Anatomie*, I, 272.

† *Gaz. des Hôp.*, 80, 1857.

collateral circulation by lowering or raising the head, according as the cerebral circulation is more or less embarrassed; by promoting the general circulation by friction, and wrapping the body and limbs in warm blankets, in case the patient is somnolent and the bodily temperature much reduced; and by the administration of such remedies as are best calculated to equalize the circulation and sustain the powers of the system; all of which have been fully considered under the heads of *apoplexy* and *cerebral hæmorrhage* (q. v.).

CHAPTER VII.

CEREBRAL SOFTENING.

SOFTENING OF THE BRAIN usually depends upon embolism or thrombosis of certain cerebral blood-vessels, especially of the middle cerebral artery. The disease was formerly regarded as an inflammatory affection, whereas it is now known to result, in most cases, from disturbances in the nutrition of the parts supplied by certain cerebral arteries, the plugging of which, by depriving them of nutritive material, eventually produces necro-biotic softening.

Symptoms.—The symptoms vary according as they are produced by a thrombus or an embolus. When caused by a thrombus, the disease is never so sudden in its invasion as when produced by an embolus; neither is it attended by the shock to the brain which usually accompanies the sudden entry of a foreign body, such as is met with in cerebral hæmorrhage and embolism. In whichever way produced, however, the symptoms peculiar to those diseases are the ones which first present themselves. Thus, we may have the premonitory symptoms of thrombosis, such as headache, vertigo, loss of memory, difficulties of speech, numbness and creeping chills in one side of the body, various ocular troubles, staggering gait, incontinence of urine, and other symptoms indicating the approach of paralysis; and finally, perhaps, hemiplegia, which may occur gradually or suddenly, according as the affected vessel is large or small, or according as it affects the cortical or basal sphere of nutrition. When, as in many cases of embolism, the initial symptoms are those of apoplexy, they are similar to those produced by cerebral hæmorrhage, being attended in some instances by coma, dilated or contracted

pupils, stertor, vomiting, convulsions, and paralysis, as described under that head. These apoplectic symptoms may vanish more or less suddenly, or they may continue with little or no remission until the death of the patient, which may occur within a few hours after the stroke.

The first stage in the process of softening is that of simple anæmia, and probably lasts only one or two days. If the collateral circulation is not fully established, we next have one of two conditions, namely, the appearance known as *red softening*, or the condition called *yellow* or *white softening*. The first is due to hyperæmia, with œdematous swelling and hæmorrhage, and the latter to the subsequent changes in the affected tissues, or else to simple necro-biosis of the parts, or what is called *primary yellow softening*, in which the characteristic degeneration occurs without any previous hyperæmia and hæmorrhage.

In cerebral softening, the variations of temperature are more frequent, but much less marked, than in cerebral hæmorrhage. Thus, in many cases, but not in all, the temperature suddenly rises soon after the attack to 102° – 104° F., and then falls again to about the normal average. Sometimes it remains stationary at this point for a day or two, or undergoes morning or evening fluctuations, oscillating back and forth with marked irregularity; but as the softening process advances, the temperature gradually begins to rise, and finally reaches a maximum of 103° or 104° F., which is much less than that of cerebral hæmorrhage.

The next stage, or that of yellow softening, does not usually set in until about the tenth day, though it may occur earlier, some cases being much more rapid in their progress than others. The mental symptoms now become more prominent. Delusions and hallucinations occasionally take possession of the patient's mind, and sometimes he is delirious, but these symptoms are generally of short duration. He is particularly apt to be what is called "notional," indicating weakness of mind. The mental debility also shows itself in other ways. Thus, although unable to execute any complicated intellectual operation, or even to concentrate his attention upon any partic-

ular matter, he may nevertheless deem himself fully capable of managing his business affairs, and that, too, notwithstanding the continuance of motor paralysis and the loss of sensibility on one side of the body. As a general rule, however, the memory is so much impaired, that if the patient attempts anything of the kind, he will make frequent, and often ludicrous mistakes, such as charging himself with articles he has sold, or imagines he has sold, to others, and *vice versa*. It is no uncommon thing for such patients to forget the names of the places where they reside, and even to forget their own names. At the same time, it is equally true that softening may occur without the patient exhibiting any signs of imbecility; or, what is more common, there may be a general loss of intelligence, and yet some of the mental faculties, such as the will, may be greatly increased in power.

Headache is a very common and persistent symptom of softening of the brain; is usually seated in the forehead; and is generally of a dull, gnawing character. Other troublesome head symptoms, such as a sense of constriction, vertigo, weight and fulness, are generally present. Drowsiness, also, is a prominent feature in these cases, especially in the later stages of the disease.

But the most marked phenomena are those connected with the functions of speech and motion. The former is almost always more or less affected, either in the form of aphasia, or from paralysis of the muscles concerned in articulation. When caused by cerebral embolism or hæmorrhage, the defect is apt to be of an amnesic character, words being either misplaced, or used in a wrong sense; but when thrombosis or capillary obstruction is the cause, the trouble is generally of a paralytic nature. Owing to paresis of the muscles of articulation, many patients omit the last letter or syllable of all but the shortest words, both in reading and speaking. Thus, a patient of mine called a "Manual of Materia Medica," "Manu of Mater Medic." The same patient when asked his name, replied, "Samu Wils." This clipping of words is sometimes one of the earliest manifestations of the disease.

As a general rule, however, the first evidence of paresis, in

softening of the brain, is manifested in the lower extremity. Sometimes the patient stumbles, or the leg suddenly gives way at the knee. In other cases, the muscles of the hand and arm are first affected. The patient's grasp is weakened, so that he frequently drops what he is holding, and if tested by the dynamometer, it will be found to be considerably less than normal.

In these cases of chronic softening, the paralysis generally goes on from bad to worse, with perhaps occasional intervals of improvement, until complete hemiplegia is produced, and all muscular power is lost. In cases attended with apparent amendment, the patient's friends are very liable to be deceived with the vain hope that he is recovering, especially if the mental condition is also ameliorated; but the physician should not allow himself to be deceived, as these cases are almost certain, sooner or later, to terminate fatally. So that, whether acute or chronic, the disease eventually is generally marked by the symptoms of aphasia, paralysis, coma, convulsions, and death.

The duration of the disease varies from a few days to several years. If, with Hammond and others, we limit the necrobiotic process to the stage of yellow or white softening, then the range is from ten or twelve days to about three years. Some cases, however, terminate by apoplexy in the course of three or four days, while others are protracted to as many years. The former are generally due to embolism, and the latter to thrombosis, of cerebral vessels.

The symptoms above described are those which belong to softening of the cortical substance, the optic thalamus, or the corpus striatum. But when the necrobiosis is seated in the pons Varolii, and limited to it, there is little or no intellectual derangement, but the symptoms are such as we would naturally refer to that ganglion, such as dyspnœa, cardiac disturbances, nausea, vomiting, difficulty of swallowing, glosso-labio-laryngeal paralysis,* etc., according as the lesion involves one or more of the nerves springing from that part of the brain.

* See *Nervous Diseases*, p. 168.

Softening of the cerebellum cannot be distinguished clinically from other structural lesions, such as hæmorrhage, tumor, or abscess, though the symptoms peculiar to diseases of this part, taken in connection with the history of the case, may furnish sufficient data on which to base a probable opinion.

Causes.—We have already considered the chief points in the etiology of cerebral softening, under the heads of *cerebral embolism* and *thrombosis* (q. v.). Other agencies, however, are regarded as influencing its occurrence, especially *age*; for although the disease has been met with at every period of life, it is chiefly a disease of old age. Hammond, who claims to have seen forty-five cases of cerebral softening which were not the result either of hæmorrhage, embolism, or thrombosis, says that eleven of them were clearly the result of intense and long-continued intellectual exertion. Rostan mentions, among other causes, blows upon the head, the excessive use of alcoholic liquors, and exposure to the action of severe cold, to the rays of the sun, or to intense heat. It is probable, indeed, that any cause capable of exciting cerebral inflammation, may occasionally act either as an exciting or a predisposing cause of the disease.

Diagnosis.—Softening of the brain, unless preceded by the symptoms of hæmorrhage, embolism, or thrombosis, is liable to be mistaken for chronic meningitis, meningeal hæmorrhage, and cerebral tumors. In chronic meningitis, the headache is usually more circumscribed, the paralysis more limited, and the spasms of the limbs more frequent; while there is an absence, in most cases, not only of well-marked febrile symptoms, but of that progressive intellectual impairment which characterizes most cases of *necro-biosis*. Hæmatoma of the dura mater may generally be distinguished by the early occurrence of coma. Cerebral tumors are characterized by intense pain and convulsions, the intellect and speech remaining, as a general rule, unaffected. In most cases, also, the history of the case will aid in the diagnosis.

Prognosis.—The prognosis is exceedingly grave, though not altogether hopeless. If, as stated by Hammond, the patient be young, of good constitution, and of temperate habits;

if the centre of softening be small, and not involving the more important parts of the brain, there is some encouragement to expect a favorable termination. There is no doubt that partial cerebral anæmia may occur from embolism of cerebral vessels, and yet, owing to the prompt establishment of the collateral circulation, never advance to the stage of yellow softening; and, on the other hand, the affected tissue may degenerate into what is called *white softening*, the history of which is decidedly chronic. But that the necro-biotic process, when once set up, can be effectually arrested, or that the paralysis and other consequences resulting from it can be permanently overcome, is not only highly improbable in itself, but is unsupported by any clinical evidence.

Morbid Anatomy and Pathology.—We are chiefly indebted to the investigations of Virchow, Heubner, Soulier and Cohnheim for our present knowledge of the necro-biotic process known as softening of the brain. When the obstruction in the cerebral vessels takes place on the far side of the circle of Willis, necro-biosis is quickly established, because there is no free vascular connection by which a collateral circulation can be speedily effected. Hence, the parts supplied by the vessel at once become anæmic, and, nutrition being cut off, soon undergo one or the other of the following changes:

In the first place, hyperæmia, with œdematous swelling and hæmorrhage, may be the speedy result. This is the condition known as *red softening*—a condition long held, both by the French and English schools, as being of inflammatory origin. In this state, the cerebral mass appears increased, whilst its consistency is diminished. The capillary hæmorrhage is so great as to change the color of the parts to a bright pink, and even to a deep red; but the color gradually fades, until within a few weeks it presents the appearance of *yellow softening*.

In red softening the color, as shown by the microscope, is due entirely to the extravasation of red corpuscles. At a later period the nervous elements undergo degeneration. The nuclei of the neuroglia and of the connective tissue of the perivascular lymphatic spaces, as well as of the muscular coat of the blood-vessels, and also the cells of both the cerebral substance

and the capillary vessels, are all metamorphosed into granular globules; and finally nothing remains but fatty detritus mixed with crystals of hæmatin.

Now, the explanation of this process is as follows: When an isolated terminal artery is obstructed, the blood flows backward from the proximal portion of the artery, which is still pervious, into the corresponding vein, producing hyperæmia and hæmorrhage by transudation of the red corpuscles from the entire vascular sphere of the obstructed vessel.

In case the patient survives a sufficient length of time, *white softening* is produced, the cerebral matter changing into a milk-like emulsion, part of which eventually becomes absorbed, leaving in some cases a cyst partially filled with liquid, resembling the cysts found after ordinary attacks of cerebral hæmorrhage.

But if no hyperæmia and hæmorrhage occur, then we have what is called *primary yellow softening* or simple necro-biosis, the parts immediately undergoing fatty degeneration, without the previous changes above mentioned. This result occurs, according to Cohnheim, in those cases where the blood coagulates so quickly in the sphere of the obliterated vessel, as to prevent any reflux of blood through the corresponding vein—an event which is found to occur chiefly where the propulsive power of the heart is perceptibly diminished.

Treatment.—It is evident from what has just been said, that the only chance for the patient lies in the early adoption and steady use of supporting measures, and that any treatment calculated to lower the tone of the system, no matter what it may be, must have a prejudicial effect. At the same time, it is equally evident that, as the symptoms vary according to the special cause that produces them, so the treatment must in an especial manner be directed against the latter, as affording the only chance of curing, or even of ameliorating, the condition of the patient.

As *embolism* and *thrombosis* are the two principal causes of the disease, the reader is referred to those heads for such treatment as relates especially thereto. We may also add, that all intellectual exertion, and every form of mental and bodily excitement, should be avoided. If the general circulation is

much embarrassed, the patient should be kept in a quiet, recumbent position, while the body and extremities should be kept warm by artificial heat or by additional clothing.

General Indications.—*When caused by arterial obstruction*, Abrotanum, Anacard., Arsen., Digit., Nux vom., Phos., Phos. ac., Picr. ac., Zinc phosphide, Zincum.

When recent, or due to inflammatory action, Bell., Gels., Glon., Merc., Nux vom., Plumb.

When there is active hyperæmia, Acon., Bell., Bry., Glon., Nux vom.

Where there is passive congestion, Gels., Opium.

For headache, Acon., Bell., Bryon., China, Gels., Glon., Igna., Nux vom., Phos. ac., Sulph.

For vertigo, Arn., Bell., Chin., Con., Digt., Iod., Lach., Nux vom., Puls., Sulph.

For insomnia, Cact., Cham., Coff., Gels., Hyosc., Nux vom.

For drowsiness, Bell., Digt., Opium, Phosp. ac., Zincum.

For loss of memory, Alum., Amm. c., Anac., Bell., Bovis., Cocc., Hyosc., Nat. m., Olean., Phosp. ac., Sulph.

For aphasia, Bell., Caust., Colch., Conium, Glonoin, Kali brom., Lycop., Oleand., Stram.

For imbecility, Ambra., Arn., Selen., Sepia.

For convulsions, Bell., Calc. c., Cupr., Nux vom., Strych.

For local paralysis, Acon., Bell., Caust., Gels., Igna.

For general paralysis, Cocc., Conium, Phosp., Rhus.

For hemiplegia, Arnica, Baryta c., Cocc., Nux vom., Strych.

Special Indications.—*Aconite.*—Headache, especially when caused by active cerebral hyperæmia; also for well-marked febrile symptoms, or when the bodily temperature is too high, especially at the beginning of the disease; local paralysis.

Belladonna.—When recent, or due to inflammatory action, especially if there is a fixed headache, vertigo, drowsiness, or loss of memory; absent-minded or forgetful; local paralysis; convulsions.

Digitalis.—Softening of the brain arising from arterial obstruction, and attended with vertigo, or cardiac weakness.

Gelsemium.—Recent inflammatory cases, or when there is headache from passive congestion; ocular troubles.

Nux vomica.—Softening of the brain arising from active congestion, cerebral inflammation, or arterial obstruction; headache; vertigo; sleeplessness; convulsions; hemiplegia.

Natrum mur.—Aphasic symptoms; making mistakes in writing; talking awkwardly, or in an absent-minded and distracted manner, saying things not intended.

Lycopodium.—Forgetful; omits letters and words in writing; uses wrong words to express his meaning; confusion of mind, especially about common things.

Phosphoric acid.—Cerebral softening attended with severe headache or drowsiness, with loss of memory; general paralysis.

Phosphide of Zinc.—Softening of the brain from vascular obstruction, especially when accompanied with severe headache, dizziness, insomnia, loss of memory, or drowsiness; cardiac weakness, with palpitation.

Strychnia.—Cerebral softening from arterial obstruction, especially when accompanied by general paralysis, or hemiplegia, or when *Nux vomica* is inefficient.

CHAPTER VIII.

ENCEPHALITIS.

ENCEPHALITIS, or, as it is sometimes called, *cerebritis*, is a partial inflammation of the substance of the brain; the disease being confined to certain foci, or centres. General inflammation of the brain seldom or never occurs without involving the cerebral membranes, and it is therefore described under the head of *meningitis* (q. v.).

Encephalitis is not only limited to comparatively small portions of the cerebral tissue, but is usually of a subacute or chronic character. It is, however, sometimes acute, especially if the inflammation involves a considerable portion of the cerebral substance, in which case the inflammation passes rapidly through its several stages, and may soon terminate in death. Even when the disease is limited to a very small portion of the brain, it may prove speedily fatal, owing to the particular part affected; as, for example, the corpora pyramidalia of the medulla oblongata, or the parts contiguous to the cerebral membranes.

Symptoms.—Although encephalitis is generally marked at different stages of its progress with more or less irregularity of function, delirium, and spasmodic action, the symptoms vary greatly in different cases, and are rarely sufficiently characteristic to entitle them to be regarded as pathognomonic. Thus, the disease sometimes runs its entire course without giving rise to any well-marked cerebral symptoms. In other cases, it begins in a very slow and insidious manner, and it is not, perhaps, until after the disease has made considerable progress that the diagnosis becomes at all clear. Again, it may set in suddenly, with symptoms of apoplexy, and afterwards run a very protracted course; or, as occasionally happens, the initial

symptoms may be of a high inflammatory character, in which case the cerebral membranes are apt to be more or less involved.

In most cases the patient is attacked with a dull, but sometimes severe, deep-seated pain in the head, commonly of a continuous, but occasionally of a paroxysmal character, which frequently precedes all other symptoms. Afterwards, and sometimes from the very commencement, other premonitory symptoms are experienced, such as vertigo, dimness of vision, buzzing in the ears, disposition to faint, nausea, loss of appetite, hesitancy of speech, wandering pains in the limbs, sensation of numbness or tingling in various parts of the body, with heaviness and cramps in the extremities, and an unsteadiness of gait, betokening the approach of paralysis.

These symptoms, however, are all common to other cerebral diseases, and although the general health is now more or less impaired, the ordinary absence of fever, and of any derangement of the intellect, prevents, as a general rule, all apprehensions of impending danger, until at last the patient is suddenly seized with stupor, insensibility, and paralysis. From this condition he may so far recover as to exhibit some signs of intelligence; but some degree of drowsiness, apathy, and mental weakness, as well as loss or impairment of the special senses, remains. As the disease advances, the flexor muscles of the paralyzed limbs become rigidly contracted. This condition of rigidity, or tonic spasm, is supposed to indicate the process of softening of the affected tissues.

If the patient survives this stage of the disease, the rigidity of the paralyzed muscles gradually gives way, and is succeeded by complete paralysis. Exacerbations and remissions frequently occur, but sooner or later the patient sinks into a state of profound coma, from which the system never rallies, and death at last closes the scene. This is a brief outline of the most common form of the disease; but, as before stated, there is no fixed type to the malady, nor any regular order of succession in the symptoms.

In almost every case the mental faculties are more or less impaired. As a general rule, symptoms of depression show themselves from the very beginning. The patient is drowsy,

indifferent, forgetful, thinks slowly, hesitates in his speech, and is easily confused. He is seldom attacked by mania, but is apt to be somewhat delirious at times. At the close he generally sinks into a state of dementia, followed by coma.

The nerves of special sensibility are generally affected, especially those of sight and hearing. Hyperæsthesia of the retina is not uncommon; and there is generally more or less ciliary neuralgia, accompanied with suffusion of the conjunctiva, and a contracted state of the pupils. The hearing in most cases is very acute at first, and accompanied by tinnitus aurium. As the disease advances, however, these two senses generally become more and more impaired, and are finally lost.

Common sensibility suffers in like manner; at first from hyperæsthesia, and afterwards from anæsthesia. Thus, we have pains in various parts of the body and limbs, often accompanied by cramps, or we may have formication and numbness. Headache, though generally present from the beginning, is not usually very severe, and when it is, it shows that the cerebral membranes are more or less affected.

Fever is seldom a prominent symptom unless the membranes are implicated, or the disease is complicated by pyæmia, otitis, or some other disturbing cause. The temperature rises but little above the natural standard, rarely exceeding 102° F. The pulse, which at first is generally somewhat accelerated, rising in some instances even as high as 120, becomes retarded as the disease advances, falling occasionally as low as 40 beats in the minute.

The respiration is not usually much affected in the earlier stages, but towards the close it becomes irregular and stertorous, and ends frequently in asphyxia.

The digestive organs are more or less deranged, the appetite being deficient, the tongue coated, and the bowels constipated. Nausea and vomiting are apt to prove troublesome, especially when the cerebellum is implicated.

The motor function is almost always impaired, there being at first increased excitability, followed sooner or later by paralysis. Thus, there is tremor of the flexor muscles, twitching of the muscles of the face, and clonic or tonic spasms.

General convulsions may also occur, especially towards the close, with or without loss of consciousness. Paralysis may take the form of hemiplegia, or it may be confined to a single limb. In most cases, however, it takes the form of paresis, causing an unsteadiness in the use of the hands, or a tottering gait. The ocular muscles are frequently involved; and we may have facial palsy, from implication of the portio dura. The action of the tongue and other muscles concerned in articulation are always more or less impaired, rendering the speech thick, hesitating and indistinct.

In the aged the disease generally pursues a very chronic course. There is headache, dizziness, general weakness, mental hebetude, disinclination to work, irritability of temper, depression of spirits, and restlessness, the latter more especially at night. The mental faculties are more or less impaired; and the patient suffers from tremor, epileptiform attacks, and incomplete paralysis with contraction. At last the system becomes completely broken down, and convulsions, paralysis, delirium, coma, and death, make up the subsequent history.

When encephalitis is complicated with inflammation of the meninges, as in cases arising from otitis, or from injury, the symptoms are mixed with those of meningitis. The onset in these cases may be gradual or sudden, according to the extent of the lesion and the particular parts affected. When the morbid phenomena are rapidly developed, the cerebral disturbance is usually very great, being attended with headache, vomiting, fever, convulsions, somnolence, and coma. In other cases, the disease is often protracted through many months, remissions or intermissions alternating from time to time with exacerbations.

If the patient survive long enough, the disease generally terminates in the formation of cerebral abscess, the chief symptoms of which are circumscribed and persistent headaches, usually accompanied with rigors, and, in many cases, with convulsions.

Causes.—Encephalitis is generally the result of traumatic injuries, such as blows, falls, etc. Hence it is found to occur chiefly in adult males, who are more exposed than females to this class of accidents. Erysipelas, ozæna, caries, syphilis, scarlet fever, glanders, variola, pyæmia, septicæmia, and

typhoid fever, may give rise to it by transmitting the morbid process to the cerebral tissues. It may also be caused by the development of foreign bodies in the brain, such as tumors and aneurisms. Among other causes are long-continued and severe intellectual exertion, mental anxiety, venereal excesses, exposure to extreme heat, and especially the inordinate use of alcoholic liquors.

Diagnosis.—Encephalitis is liable to be mistaken in some cases for acute meningitis, and in others for cerebral hæmorrhage, tumors, or the disease called general paralysis. In acute cerebral meningitis, the fever is always much greater than in encephalitis; the convulsive movements are also more general, the headache is more severe, and the delirium is more constant and marked. In cerebral hæmorrhage the symptoms, instead of becoming more and more pronounced as the disease progresses, as in encephalitis, generally become progressively ameliorated. The symptoms attending the formation of cerebral abscesses closely resemble those which accompany the growth of tumors in the brain; and the same is true of those which characterize the disease known as general paralysis.* Encephalitis is generally of shorter duration than general paralysis, and is not marked by the "mania de grandeur" peculiar to the latter affection; but our chief reliance in the diagnosis must be the history of the case.

Prognosis.—Idiopathic encephalitis is almost always fatal; the same is also true when the inflammation spreads from neighboring parts. When the disease results from injury there is some hope of recovery, but not after it has passed the stage of red softening. Occasionally, after the brain tissue has broken down and an abscess has formed, the pus escapes from the cranium through the nose or ear, or through some artificial opening; but however promising the first effect of the discharge may appear, the amelioration of the symptoms is found to result simply from the diminution of pressure, and to be of but temporary benefit; the patient gradually passes into a state of deep coma, which is soon followed by death.

Morbid Anatomy and Pathology.—The first change that

* See *Nervous Diseases*, p. 173.

occurs in the affected tissues is that of red softening, there being hyperæmia and capillary hæmorrhage, which renders the cerebral matter moister and softer than usual, and gives it a reddish appearance. The microscope shows an abundance of white corpuscles, disintegrated red corpuscles, and nerve-fibres, masses of nuclei, amyloid corpuscles, and pus. The arterial capillaries are dilated, and their thickened coats in a state of fatty degeneration.

After a time the blood corpuscles become entirely dissolved, forming with the disintegrated cerebral matter a jelly-like substance; or else a dirty yellowish matter is left, which becomes enclosed in a membranous capsule or cyst. Yellow bands of sclerosed connective tissue are found in the grey matter of the brain, closely connected with the pia mater, which is thickened and opaque.

The most frequent seat of the inflammatory process is the grey matter of the cortex, the corpora striata, the optic thalami, and the cerebellum. Although there may be several centres, the inflammation is never widely diffused. The cineritious matter is generally first attacked, and afterwards the inflammation spreads to the white substance. As a consequence, cerebral abscesses occur chiefly in the medullary matter. When multiple they are generally small, being sometimes not larger than a hazel-nut; in general, however, they vary in size from that of a cherry to that of a small orange.

In acute cases the abscess is irregular in shape, and being surrounded by no membranous capsule, encroaches more and more upon the adjacent cerebral substance, which is in the condition of red and grey softening. In this way the pus may ultimately reach the surface of the brain, or break through into the lateral ventricles; and if, as is generally the case in these instances, the disease is due to injury or caries of the cranial bones, the pus may eventually escape through the nose or ear.

But when the inflammatory process is more chronic, the abscess is generally of an oval form, and contained in a membranous capsule composed of connective tissue. If large the abscess will give rise to symptoms of compression, and if ruptured will prove speedily fatal.

Treatment.—The treatment of this disease is similar to that recommended for *cerebral hyperæmia*, *meningitis*, and *softening* (q. v.). The only curative stage, if such there be, is the first or congestive period. So long as there is neither hæmorrhage nor softening, we may reasonably hope, not only to relieve the symptoms, but to cure the inflammation. But when suppuration and abscess have occurred, we can only hope to palliate the symptoms, prolong life, and render the patient's condition more comfortable.

Kafka claims to have used *Glonoin* 1st to 2d, successfully, for a number of years, in this disease—even when the disorganizing process was progressing—so long as the symptoms of cerebral hyperæmia predominated. No doubt *Glonoin* will prove a valuable remedy in the initial and purely hyperæmic stage of the malady; but it is not likely to prove anything more than palliative after the suppurative process has set in.

Kafka also relates a case in which *Arsenicum* was used, apparently with success, even when cerebral softening, with progressive increase of the morbid phenomena, coexisted side by side with the symptoms of cerebral hyperæmia; the remedy having been employed after the hyperæmic condition had been relieved by the administration of *Glonoin* and *Belladonna*. If, as I have elsewhere stated, it be possible for complete recovery to take place in encephalitis after disorganization of the cerebral tissues has occurred, I have no doubt *Arsenicum* will prove an efficient remedy, not only because it is capable of producing decomposition of organic tissues, but because its pathogenesis, as exhibited in the cephalalgia, vertigo, wandering pains, impaired sensibility of the limbs, delirium, coma, lassitude, debility, trembling, tetanic spasms, and paralysis, presents a perfect picture of cerebritis, and is therefore truly homœopathic to that condition.

Other remedies, such as *Iodine* and *Plumbum*, have been recommended in this disease, but chiefly on theoretical grounds, there being but little clinical experience in their favor.

Cannabis indica and *Kali bromatum* have proved highly useful in some cases by lessening the irritability of the nervous system.

CHAPTER IX.

CEREBRAL HYPERTROPHY.

By *hypertrophy of the brain* is meant, not an excessive development of the cerebral substance itself, but an excessive growth of the neuroglia, or interstitial connective tissue, whereby the bulk of the organ is abnormally increased. The hypertrophy is mostly confined to the hemispheres, the pons Varolii, and the medulla oblongata; the cerebellum is scarcely ever affected.

Symptoms.—So long as the skull is yielding—*i. e.*, during infancy and childhood—there may be no observable symptoms; no disturbance of motion and sensation, nor even of the mental faculties, except such as arises from an undue enlargement of the head. At a later period, however, symptoms of pressure are likely to manifest themselves, giving rise at first to general muscular weakness, especially in the lower extremity. As a consequence, the patient's grasp is weak, and he is apt to stagger and stumble in his walk. Paralysis and convulsions are of rare occurrence, even in a mild form; but owing to the anæmic state of the brain, the convulsions, which, if present, are at first partial and of short duration, sometimes develop into well-marked epilepsy and eclampsia.

Sensibility is likewise impaired, though rarely to the extent of actual anæsthesia. Headache and vertigo are not uncommon, and we may also have tinnitus aurium, photophobia, and dilated pupils. The mind is generally more or less depressed, exhibiting, in some cases, a marked degree of mental torpor and vacuity, or even idiocy. Mental excitement, on the other hand, is rare; but owing to incidental circumstances, a condition of cerebral hyperæmia sometimes exists, attended with delirium, and occasionally with mania.

Causes.—Hypertrophy of the brain is sometimes congenital. The strumous constitution appears to form a predisposition to the disease, as it is frequently developed during infancy and early childhood, in connection with rachitis and enlarged lymphatic glands. In adults it is chiefly confined to males, especially those addicted to the excessive use of alcoholic liquors, which produces cerebral congestion.

Diagnosis.—In infancy, owing to the enlargement of the head, the disease is liable to be mistaken for hydrocephalus. The chief difference between them is, that children affected with cerebral hypertrophy are mentally brighter and more precocious than usual, while in hydrocephalus it is the reverse.

Prognosis.—In most cases the disease is extremely slow in its progress. In children death generally takes place from pressure caused by cerebral congestion, the result of incidental diseases which, under other circumstances, might have a different issue. In adults the anæmia caused by pressure gives rise to apoplectic attacks which often prove speedily fatal.

Morbid Anatomy and Pathology.—On removing the calvarium and opening the dura mater, the brain immediately expands to such a size as to overlap the bones. The convolutions are flattened, and the fissures hardly discernible. The ventricles are also narrowed by compression, and contain scarcely any serum. The cerebral tissue is pale, dry and anæmic; the membranes thin and bloodless; and even the skull-bones are thin and atrophied from pressure. A careful examination shows, that while there is no undue amount of cerebral matter present, there is an excessive development of the neuroglia, rendering the brain heavier, firmer, and more elastic than the normal organ.

Treatment.—The treatment, which is necessarily wholly palliative, consists chiefly in improving the general health, guarding against exposure to all injurious influences, relieving cerebral hyperæmia when present, and abstaining altogether from the use of alcoholic liquors. Remedies specially suited to the various conditions liable to be met with during the course of the malady, are those usually employed in *cerebral anæmia* and *hyperæmia*, *convulsions*, *epilepsy*, and *paralysis*, and therefore need not be repeated here.

CHAPTER X.

CEREBRAL ATROPHY.

ATROPHY OF THE BRAIN is, properly speaking, a simple wasting of the brain tissue, without its undergoing any degenerative changes; but, as commonly used, it also includes that form of atrophy which is sometimes associated with what is known as *diffuse cerebral sclerosis*.

Symptoms.—The disease when congenital constitutes the various grades of idiocy. Children subject to it are more or less idiotic, and suffer from epilepsy and paralysis. The symptoms are generally more severe in early life than they are at a later period. The mind is weak, and generally more or less depraved and revengeful. The special senses, if not entirely wanting, as in the deaf, dumb and blind, are usually very deficient. There is hemiplegia, generally incomplete, with anæsthesia and atrophy of the paralyzed parts, including both the muscles and the bones. Hence the limbs are thin, short, and often disproportioned to the size of the body; there is also a wasting of one side of the face. The deformity is often rendered still greater by an hypertrophy of the adipose tissue.

Cerebral atrophy also occurs during adult life; and may be either partial or general, stationary or progressive.

Partial atrophy of the brain is generally due to local lesions, such as hæmorrhage, softening, and encephalitis. In these cases the initial symptoms are usually those of apoplexy, encephalitis, etc., the motor paralysis being unilateral and more or less stationary. In the course of time, however, the atrophy, though partial, becomes sufficiently great to cause a gradual deterioration, not only of the mental faculties, but of all the functions of the nervous system.

General cerebral atrophy occurs mostly in the aged. The disease, which is symmetrical and progressive, is attended with a gradual loss of cerebral power. The mind is particularly weak and inactive, the patient having no mental energy or strength. The emotions are easily excited, the patient laughing or crying at the most trivial causes. In most cases there is imbecility, senile tremor, paralysis and anæsthesia of the cranial nerves, paralysis of the lower sphincters, and a slow, weak, and intermitting pulse. The last stage closely resembles that of the disease known as general paralysis of the insane, the patient falling a victim to decubitus, diarrhœa, pulmonary disease, or dropsy.

Causes.—Partial atrophy, unless congenital, is always the result of some local disease, such as cerebral hæmorrhage, softening, encephalitis, tumors, etc. In these cases the disease is confined to one hemisphere, and may affect any tissue or part of it. When general, it is often associated with chronic alcoholism, Bright's disease of the kidney, chronic blood poisoning, or some other form of cachexia.

Diagnosis.—The diagnosis of cerebral atrophy, whether simple, or complicated with diffuse cerebral sclerosis, must always be very uncertain, since the symptoms are not only common to both forms, but also to other diseases. Contractions are more common when sclerosis exists, but yet cases have occurred where, in addition to the other symptoms, there were marked muscular contractions, and yet no sclerosis could be detected on post-mortem examination.

The symptoms of thrombosis and softening often bear a striking resemblance to those of cerebral atrophy, especially to the sclerosed form; but in the latter disease the contractions are generally met with at an earlier period, and they are also more constant.

Prognosis.—Pure, uncomplicated atrophy of the brain, whether congenital or acquired, is undoubtedly incurable; but when the atrophy is progressive, there may be some prospect of ameliorating the condition of the patient, by causing an absorption of blood-clots, diminishing pressure from congestion, arresting or retarding the progress of the disease by im-

proving the nutrition of the atrophied cells, and by mitigating the severity of the symptoms, especially convulsions and muscular contractions. At the same time it must be admitted that, as a general rule, very little permanent good can be effected in these directions in this class of cases.

Morbid Anatomy and Pathology.—In congenital cases, the atrophy is generally limited to one hemisphere, usually the left, which is sometimes less than half the size of the right. The atrophy involves not only the cerebral ganglia, but extends to the corresponding crus, pyramid, and antero-lateral column of the cord. The ventricles are widely dilated, and contain a considerable amount of serum. The brain substance varies greatly in consistence, being sometimes soft, at others hard and elastic.

In partial atrophy, the aplasia is confined more particularly to the nerve-cells, though it may affect any of the cerebral tissues. In these cases the atrophy extends, until it reaches, as in the former case, the lateral column of the spinal cord. The degenerated tissues are found to contain numerous amylaceous and colloid corpuscles and granular cells.

General cerebral atrophy is symmetrical, and is primarily seated in the neuroglia, the nerve-cells becoming affected secondarily. The convolutions are shrunken, and in some places widely separated. The ventricles, subarachnoid space, and meshes of the pia mater, contain a large amount of serum; the blood vessels are abnormally twisted and enlarged; the membranes are thickened and hazy; and the cerebral tissues, though occasionally soft and moist, are generally hard and elastic.

Treatment.—The only remedies that I have found to be of any very great value in this disease, are *Baryta carb.*, *Baryta mur.*, and *Baryta iod.* Not only does the symptomatology of *Baryta* correspond closely with that of cerebral atrophy, but the clinical evidence in its favor is by no means inconsiderable. It has been found to be especially adapted to the physical, mental and nervous weakness experienced in these cases, and to be equally suited to the atrophy of children, the strumous dyscrasia associated with it, and the paralysis of old people, especially when produced by apoplexy. Other remedies which

may sometimes prove useful, are those usually employed in *cerebral hæmorrhage, encephalitis, hemiplegia, convulsions, and epilepsy.*

Electricity, in the form of *galvanism*, may also be employed in these cases with occasional benefit. Both the induced and primary currents may be required, the interrupted current being the best for the paralysis, and the constant current for the relaxation of contractions. Ten ordinary cells will generally furnish a current of sufficient intensity, the sponges being applied over the mastoid processes every second or third day, for a period not exceeding three or four minutes at a time.

That these measures increase the nutrition of the atrophied cells, in some cases, there is good reason to believe, since we have more than once seen the paralysis lessened, the contractions relaxed, the mind improved, the epileptic paroxysms arrested, and the wasted limbs considerably enlarged and strengthened, by their influence.

CHAPTER XI.

PRIMARY MULTIPLE SCLEROSIS.

I MAKE use of the term "primary" to distinguish this form of cerebral sclerosis, because multiple sclerosis may be limited to either the brain or spinal cord, or it may involve both. Charcot has shown* that cerebral lesions, locally considered, do not all equally tend to produce secondary sclerosis, some being almost always followed by descending sclerosis, while others never are. To the latter belong, more particularly, those lesions which are confined to the substance of the central grey masses, namely, the lenticulated and caudated ganglia and the optic thalami. The same is true of the grey cortical substance of the hemispheres, when very superficial, and, in certain cases, even when extensive and profound. We shall see hereafter, that in primary multiple sclerosis of the brain, the lesion consists of plates or nodules of sclerosed tissue scattered throughout the entire substance of the cerebrum.

Symptoms.—One of the first and most marked symptoms of this disease is *pain in the head*; not a constant, but a sharp, electric-like pain or shock. In other cases, the first symptom observed is an epileptic paroxysm. Shooting pains, of a similar nature to those in the head, are also experienced at times in other parts of the body. But the most common disorder of sensibility is a peculiar numbness of the extremities of the fingers or toes. The sensation, which is generally limited at first to one upper or lower extremity, is that of cushions, and is only experienced when objects are touched.

Disorders of motility are next experienced, but as the prog-

* *Localization in Diseases of the Brain*, 1878.

ress of the disease is generally slow, it is often many months before they make their appearance. Of these, the first and most characteristic is tremor. This symptom is generally gradual in its development, being sometimes confined for months to a single muscle of the hand or foot, and afterwards involving the extensors and flexors of the entire member or limb. The trembling generally begins in one of the limbs, and gradually extends to the other limb on the same side, and lastly to the head; but sometimes it commences in the head and afterwards invades the limbs, unilaterally, one after the other. At first, and for a considerable period after the beginning of the disease, the tremor is to some extent under control of the patient's will. Thus, he will sometimes stamp his foot upon the ground and arrest the trembling for a few seconds, but the respite grows shorter and shorter, and finally ceases altogether. The same is true of sleep, which usually has a quieting effect at first, but eventually it ceases to afford any relief whatever. The tremor is always increased by emotional excitement, and not unfrequently by the voluntary efforts of the patient to arrest it. The trembling is not confined to the muscles which move the head and limbs, but sooner or later involves those of the face. The eyeballs, the upper lid, the lips, the lower jaw and the tongue, are the parts principally affected.

Paralysis is the next symptom of importance, and, according to Hammond,* when the sclerosis is limited to the hemispheres, or begins in them, it always follows the tremor. This is doubtless true in the primary form of the affection, which we are now considering, and is an important point in the differential diagnosis. The same authority also claims, not only that the paralysis always succeeds the general appearance of tremor in these cases, but that it also follows the course of the trembling, no limb ever being paralyzed till it has for some time been affected with tremor. This, however, does not apply to the muscles of the face, the paralysis of which appears to be independent of the tremor.

* *Op. cit.*

But while paralysis appears to follow the appearance of tremor in the limbs, the same does not always seem to be true of paresis, which may exist prior to the occurrence of the trembling. This is best shown by the dynamograph, the patient being unable to maintain continuously an equally strong grasp, even for a short period.

Incoördination of muscular movements is closely connected with paresis. It is only by concentrating the volitional power upon the object by means of sight, that the muscles can be made to act in harmony, so as to successfully carry out the intended movement. Thus, I once had a patient affected with this disease, who was not able to carry food to his mouth without steadily looking at it during the performance of the act. Dr. Hammond mentions the case of a lady affected with this disease, who undertook to help her invalid husband to rise from his chair, and as she turned to look at a band of music which happened at that instant to pass the door, she involuntarily relaxed her hold, and let him fall to the floor.

Patients affected with this disease often manifest a great degree of haste in their movements, especially in walking. Sometimes the gait almost amounts to a trot. This peculiar walk doubtless arises from the greater ease with which such patients are able in this manner to carry out their intended movements and maintain their equilibrium.

Sensibility is variously affected in these cases. Thus, there may be, not only anæsthesia, but more or less hyperæsthesia, deafness, amblyopia, and, in some cases, complete amaurosis.

The disease, which is always progressive, may last from a few months to eight or ten years, or even longer. Slow as it may be in its progress, however, the patient sooner or later becomes bedfast, and finally dies, either of decubitus, coma, or convulsions.

Causes.—Age appears to act as a predisposing cause of primary multiple sclerosis, as the disease seldom affects young people, or those under fifty years of age. There is some doubt whether heredity has anything to do with its origin, though Hammond says, that of thirteen cases which have occurred in his practice, five had immediate ancestors who suffered from

some form of tremor and paralysis. The disease is much more common in males than females. Among the exciting causes may be mentioned, syphilis, rheumatism, scarlatina, typhoid fever, and inordinate mental and physical exercise.

Diagnosis.—The disease is most liable to be mistaken for paralysis agitans; indeed, it has heretofore been generally included under that head. But functional paralysis agitans, which is a very different affection, is more apt to occur before than after fifty years of age. Moreover, in the latter disease there are no head symptoms, no muscular incoördination, no inability to trace a straight line with the dynamograph, no muscular anæsthesia, and no abnormal states of sensibility. As to the secondary form of multiple sclerosis, it may generally be distinguished by the fact that the tremor precedes the paralysis, and also by the fact that the trembling is associated with voluntary as well as with involuntary muscular movements.

Chorea also bears considerable resemblance to this disease, but may be distinguished from it, not only by the history of the case, but by the facts that it generally occurs in young people, has no head symptoms, nor any actual tremor, but simply a more marked degree of incoördination, the disorderly movements being more irregular and extensive.

Prognosis.—The prognosis in this malady is bad, very bad; but if seen early and subjected to proper treatment, the disease, if not entirely arrested, may often be rendered lighter, and the patient's life prolonged and rendered more comfortable.

Morbid Anatomy.—The general condition of the brain is similar to that described under the head of cerebral hypertrophy, though less pronounced. Thus, the convolutions are somewhat flattened by pressure, the grey substance is atrophied and anæmic, while the membranes are more or less opaque, and contain an unusual quantity of serum.

But the chief morbid condition observable in these cases, consists in plates or nodules of indurated matter, found scattered throughout the tissue of the cerebral hemispheres. These masses of hardened tissue vary in size from that of a hazel-

nut to that of a small walnut. Their color is white, or nearly so, and their density varies from that of fresh cheese to that of cartilage.

The microscope shows them to consist mainly of the neuroglia, which has undergone hypertrophy at the expense of the nervous tissue, the *débris* of which are also present in the form of fibres, free nuclei, and nucleated cells. Amyloid corpuscles are sometimes present, but not always.

The patches vary greatly in number, being sometimes present in large numbers, while occasionally they are solitary. They are not confined to the hemispheres, though that is their usual seat; but they are occasionally found at the same time in the medulla, the pons, and the cerebellum. When the spinal cord is likewise involved, it is no longer a case of primary, but of *secondary* multiple sclerosis.

Pathology.—That numerous cases of multiple sclerosis have been observed in which the lesion was confined to the brain, cannot be questioned. But whether these cases are really different in their nature from those in which the spinal cord is also implicated, is not so certain. We know that multiple sclerosis is progressive, and we also know that in many cases the spinal form is secondary to that of the brain. But it does not follow, by any means, that it is always so; nor that the primary disease is not, in many cases at least, an independent affection. Certain it is, that when confined to the encephalon, it gives rise to symptoms sufficiently characteristic to entitle it to be regarded as a distinct affection.

Treatment.—The treatment of this disease does not differ essentially from that already given under the head of *cerebral atrophy* (q. v.). In addition, however, to the measures there recommended, I would suggest a trial of the following remedies, some of which I can recommend as useful from actual experience: *Argentum nitr.*, *Belladonna*, *Helleborus*, *Hyoscyamus*, *Stramonium*, *Tarantula*, and *Zincum*.

CHAPTER XII.

ATHETOSIS.

THE term *athetosis*, from *αθετος*, without fixed position, was first used by Dr. Hammond, to designate a comparatively new and peculiar nervous disease, the chief characteristics of which are, an inability to retain the fingers and toes in any fixed position, and by their constant motion.

Symptoms.—The disease usually sets in with one or more epileptic paroxysms, followed in some instances by loss of motion, sensation, and speech. As a general rule, however, there is no paralysis, but there is always more or less numbness on the affected side, which is generally the right. The intellect is always impaired, the memory enfeebled, and in most cases there is cephalalgia and vertigo. There may or may not be aphasia; but there is generally more or less tremulousness of the tongue, even when there is no paralysis. The characteristic symptoms, however, are the athetoid movements of the fingers and toes, with pains in the spasmodically affected muscles, and a tendency to distortion.

The movements of the affected member, though complex and involuntary, are to some extent under the control of the patient. Thus, one patient, when told to close his hand, seized the wrist with the other hand, and then, by exerting all his power, succeeded at last in closing his fingers, but they immediately opened again and renewed their movements. The movements are not those of simple flexion and extension, but complicated and grotesque. They occur both when awake and when asleep, and are only temporarily restrained by certain positions and by powerful exertions of the will, as when held in a vertical position, or when firmly grasped. During the continuance of the movements, the muscles of the affected limbs are in a state of tonic spasm, causing them to appear hard and rigid. The movements, which take place

slowly and with great force, are somewhat paroxysmal, being worse at one time than at another, but never cease altogether. When, by an extreme exertion of the will, the patient succeeds for a moment in quieting the movements of the fingers, they at once become strongly abducted, and remain so until the movements are resumed.

The contractions increase in severity as the disease progresses, and the numbness and pain in proportion to the increase in the contractions. For half an hour or so after sleep there is usually a period of comparative repose, the movements then being somewhat less severe; but sometimes the patient has great difficulty in getting to sleep, in consequence of the severity of the pain caused by the tonic contractions. The affected limbs become developed to a greater degree than the others, owing to the almost continuous action of their muscles.

Causes.—Nothing is positively known as to the cause of this singular malady. Dr. Ringer thinks that it is sometimes due to embolism of the left middle cerebral artery, as the symptoms in some cases appear to correspond with those produced by such a lesion. In other cases they resemble those of general cerebral atrophy.

Diagnosis.—The disease is liable to be confounded with post-hemiplegic chorea, as has actually been done by Charcot and others. In the latter disease, however, the movements are quick, irregular, jerky, and variable; while in athetosis they are slow, uniform, and systematic. Moreover, athetosis is not always preceded by hemiplegia; neither is it always confined to one side of the body, MM. Oulmont* and Brousset† having described cases of double athetosis without hemiplegia.

Prognosis.—There is little or no hope of ultimate recovery in these cases. The prognosis in any particular case will largely depend, of course, upon the nature of the cause; and as athetosis is in all probability the result of degenerative changes in the central ganglia of the brain, the final outcome must be bad.

Morbid Anatomy and Pathology.—The disease appears

* *Études Cliniques sur l'Athetose*, Paris, 1878.

† *Montpellier Médical*, t. xxxiv, 1877.

to be seated chiefly in, and just external to, the central cerebral ganglia—the corpus striatum and optic thalamus. In Dr. Ringer's case, the whole of the corpus striatum was much damaged, involving both the caudated and lenticular nuclei. There was not only much atrophy and slight degeneration of the intraventricular portion, but about one-fifth of the lenticular ganglion was destroyed, as well as a few of the fibres of the inner capsule, passing between the nuclei of the corpus striatum. The optic thalamus was also atrophied, and a small portion of the lower and outer part of this body was completely destroyed, while a considerable portion of the white matter external to the thalamus, embracing sensory fibres of the external capsule, was also destroyed. In the case reported by M. Landouzy,* there was found an old centre of softening occupying exclusively the lenticular portion of the corpus striatum. In a case reported by Dr. Sturges,† the whole of the anterior portion of the corpus striatum was destroyed.

Dr. Ringer sums up the pathology of his case—a patient who had mitral obstruction with regurgitation—as follows: "Dazzling before the eyes, dimness of sight, giddiness preceding loss of consciousness, and followed by loss of speech and sensation, and motion of the right side, point conclusively to the left hemisphere of the cerebrum as the seat of the disease. The giddiness indicates the mesencephale; the loss of speech, the posterior part of the third frontal convolution; the loss of sensation, the thalamus opticus; and the loss of motion, the corpus striatum, as the parts probably affected. As speech returned before sensation, and sensation before voluntary motion, the main stress of the disease must have fallen on the corpus striatum, and in a less degree on the thalamus opticus. It is probable, I think, that the cause of the disease in this case is an embolon set free from the diseased mitral valves blocking the middle cerebral artery."

Treatment.—The treatment, which should be based upon the symptoms, is similar to that given under the heads of *embolism*, *softening*, *epilepsy*, *hemiplegia*, and *cerebral atrophy* (q. v.).

* *Progrès Médicale*, 1878.

† *Lancet*, March, 1879.

CHAPTER XIII.

PROGRESSIVE FACIAL ATROPHY.

THIS disease was first described by Parry as early as 1825, but did not attract much attention until Lande, who collected a considerable number of cases, described the affection under the name of *progressive laminar aplasia*.

Symptoms.—The first symptom usually noticed in these cases is a white or pale spot on one of the cheeks. This spot is more or less irregular in outline, and exhibits a tendency to spread in one or several directions. At the same time, or shortly afterwards, a slight depression is observed in the same place, owing to atrophy of the skin and cellular tissue. Subsequently, the muscles themselves undergo atrophy, thereby causing a still greater depression in the cheek.

As the disease progresses, other points of atrophy make their appearance in the vicinity, the wasting process continuing until, in some cases, the muscles of the face, the lips, and, in some rare instances, even those of the neck, become involved. In many cases the tongue is atrophied on the side corresponding to the facial disease, and when protruded it points towards the affected side. The disease sometimes involves the veil and pillars of the palate, the uvula, and even the muscles of the larynx; nevertheless, the function of deglutition is not impaired, nor is that of phonation often interfered with.

The affected muscles, which, though weakened, are never completely paralyzed, retain their electro-excitability, but are sometimes affected by fibrillary contractions.

Sensibility is not generally disturbed, but neuralgic pains are sometimes felt in the vicinity of the parts, especially in the fronto-temporal region, and spasmodic movements occasionally occur in the muscles of the face or jaws.

The nutrition of the skin begins to suffer at an early period of the disease, as shown not only by the white spot in the trophic centre, but by the discoloration and falling out of the hair, the cilia, the supercilia, and the beard, as well as by the diminution of the sebaceous secretion on the affected side.

Causes.—The etiology of progressive facial atrophy is obscure. Although the disease is generally met with in early or adult life, and is more common in females than in males, Vulpian attributes its origin in a certain number of cases to traumatic violence inflicted on the head and face. In one case it is said to have followed an attack of scarlatina.

Diagnosis.—In its early stages, the disease might, in some cases, be mistaken for facial paralysis. The latter, however, comes on suddenly, while this is developed very gradually; moreover, the electro-excitability of the muscles is always diminished in facial paralysis, which is not the case in this disease.

Progressive muscular atrophy, when seated in the face, is not confined to that part, nor to one side, as in facial atrophy.

Morbid Anatomy and Pathology.—No post-mortem examination has yet been made in this disease of the nerves or nerve-centres. A microscopical examination of the affected muscles made by Dr. Hammond, shows no evidence of degenerative changes of any kind. The fibrillæ have been found reduced in diameter to about one-third of the natural size, and also diminished in length. The internal perimysium, or connective tissue of the muscles, is also considerably diminished in thickness. So far as the muscles are concerned, therefore, there is simply atrophy without degeneration—a condition essentially different from what exists in other amyotrophic diseases, such as infantile and adult spinal paralysis, pseudo-hypertrophic paralysis, and progressive muscular atrophy.

Vulpian refers the trophic disorder of the face to some intracranial lesion. He says: "This affection is produced in a certain number of cases as a consequence of traumatic violence inflicted on the head or face. Its development is accompanied, in the great majority of cases for several years, with pains of

greater or less violence seated in the head, ordinarily toward the fronto-temporal region. Sometimes there are spasmodic movements of the muscles of the face or of the jaws. In some rare cases there has been numbness in the superior extremity of the opposite side. These are the circumstances which seem to point to a cerebral lesion. But we cannot affirm that such lesions exist, while we have no post-mortem examination to enlighten us on this point, and while we are embarrassed to designate a seat for the lesion, which can reasonably explain all the phenomena of the disease.”*

Treatment.—Faradization of the affected parts appears to have slightly benefited a few cases, but in the great majority of cases neither this nor any other measure has appeared to do the least good.

The remedies which we think would be most likely to prove beneficial, are: *Argent. nitr.*, *Arsen.*, *Plumbum*, *Sulphur*.

* *Leçons sur l'Appareil Vaso-moteur*, ii, 1875.

CHAPTER XIV.

MYXŒDEMA.

THE term *myxœdema* was first applied by Dr. Ord* to a disease characterized by a peculiar form of œdema, or puffiness of the skin, over the entire surface of the body. The disease closely resembles anasarca, the chief difference being that the tissues, instead of pitting on pressure, as in œdema, return with prompt and firm resiliency after the pressure is removed.

Symptoms.—The surface of the body presents an appearance resembling that of anasarca. When pressed upon, however, the tissue is found to be resilient, leaving no indentation as in ordinary œdema.

The cheeks are red from capillary congestion, and the eyelids, nostrils, and lips are swollen and prominent. The swelling or puffiness may involve, not only the face, but the whole surface of the body, and is especially marked in the hands and fingers, giving to them a blunted or clubbed appearance; at the same time there is no distortion of the nails.

There is also well-marked anæsthesia of both the general and special senses. The sense of touch is greatly impaired, there being not only a feeling of numbness, but a cushioned or padded feeling, both of the fingers and feet. The numbness is also present in the face, the tip of the tongue, and the upper and lower extremities. Sight and hearing, as well as taste and smell, are all greatly diminished in acuteness, vision generally more or less deranged, and smell sometimes almost abolished.

The temperature of the body is always below normal; and the muscular and coördinating power decidedly weakened.

* *Medico-Chirurg. Trans.*, vol. lxi, p. 57.

Articulation is slow and indistinct, the grasp feeble, and the gait tottering. The patient, although able to stand with the eyes closed, requires the aid of sight to coördinate the movements, and even then they are performed in an awkward and uncertain manner.

The electro-excitability of the muscles is greatly diminished in all parts of the body; the response to both the galvanic and faradic currents becoming less and less as the disease progresses.

A characteristic feature of the disease is the mental condition, which bears a considerable resemblance to acute dementia, and is accompanied by hallucinations, illusions, and delusions.

The organic functions are all more or less imperfectly performed. The pulse is irregular, or slow and feeble, the temperature depressed, the appetite impaired, the bowels constipated, the urine loaded with urates, and the sleep disturbed, short, and unrefreshing.

Diagnosis.—The disease may be easily distinguished from ordinary œdema, by its never pitting upon pressure. Tricuspid regurgitation, and other cardiac affections interfering with the return of blood from the right side of the heart, are attended with a similar clubbing of the fingers, but the other symptoms will prevent any error in diagnosis. The same is true of scleroderma, which is liable to be confounded with this disease, unless we bear in mind that in the former the surface is hard, that there is a sense of constriction about the parts, that there are no mental symptoms, nor any permanent reduction of temperature, such as is met with in this disease. Moreover, myxœdema belongs to a much more advanced period of life.

Prognosis.—The prognosis could not be worse than what it is, as treatment has hitherto proved utterly unavailing, and several cases have terminated fatally.

Morbid Anatomy and Pathology.—The swelling is caused by a mucoid substance deposited throughout the body, but more particularly the skin. This mucoid deposit closely surrounds all the terminal nerves, blunting their sensibility and

interfering with their conducting power. Similar deposits are also found in the brain and other nerve-centres, and as these envelope the nerve-cells, they will serve to explain the impairment of the mental functions, which occurred in one case before there was any appearance of external swelling.

Treatment.—I am not aware that this disease has ever been subjected to homœopathic treatment. The old school, into whose hands nearly every case has heretofore fallen, has brought to bear upon it its most powerful remedies, such as electricity, phosphorus, strychnia, and arsenous acid, but without improving in the least the nutrition of the parts, or ameliorating the condition of the patient. As such treatment, however, is wholly empirical, it does not follow that the homœopathic administration of such remedies as *Arsenicum*, *Baryta*, *Carbo an.*, *Iodine*, *Lachesis*, and *Silicea*, would prove equally unavailing. At the same time, it must be confessed that, considering what we know of its pathology, it would be highly presumptuous to count upon any marked success in the treatment of this disease, even under the most favorable circumstances.

CHAPTER XV.

CEREBRAL TUMORS.

TUMORS of the brain differ greatly in size and character, some being peculiar to the organ, while others resemble tumors found in other parts of the body.

Varieties.—*Glioma* is the name given by Virchow to a tumor of the brain due to proliferation of the cerebral connective tissue, the neuroglia. These growths, which are found in the white substance of the hemispheres, and especially in the posterior lobes, sometimes grow to the size of an apple. They are of a white or pinkish color, translucent, and either hard or soft. The hard, which contain but few cells, resemble *fibroma*; the soft contain numerous cells and nuclei, and have nearly the consistence of the brain substance. They are of slow growth, and never contain any of the nervous elements.

Another tumor peculiar to the brain is called *psammoma*, or *sand-tumor*, so named from the resemblance of its constituents to grains of sand. This tumor, which is seldom larger than a small cherry, consists of isolated grains of chalky matter embedded in the neuroglia. It springs from the dura mater, and is mostly found at or near the base of the brain.

Cholesteatoma, so called because it contains, besides its other constituents, cholesterine and stearine, is also seated at the base of the brain. This tumor sometimes reaches the size of a walnut, but is generally much smaller. It is made up chiefly of epidermoid cells, concentrically arranged, which have undergone degeneration. It is entirely devoid of blood-vessels, has a pearly appearance, and arises sometimes from the brain itself, and at others from the cerebral membranes.

Neuroma, is a small tumor due to hyperplasia of the grey substance of the brain. It varies in size from that of a millet-

seed to that of a pea. It is found in all parts of the hemispheres—in the white substance, in the ventricles, and on the surface of the convolutions.

Mucous, lipomatous, cystic, melanoid, and other forms of cerebral tumors, are sometimes met with, but they are not of sufficient importance to merit a special description in this place.

The most important forms are those which owe their existence to a peculiar constitutional dyscrasia, namely, the *cancerous*, the *tuberculous*, and the *syphilitic*.

Cancer of the brain may be of an encephaloid, scirrhus, or colloid character, but it generally belongs to the encephaloid variety. It usually springs from the dura mater, though it may begin in any part or tissue of the cerebrum. When it arises from the external surface of the dura mater, it gradually destroys the skull-bones, and eventually bursts forth in the well-known form of *fungus hæmatodes*, or *fungus duræ matris*. When, on the other hand, it springs from the internal surface of the membrane, it invades the various structures of the brain, following especially the course of the olfactory and optic nerves. Finding a ready passage for itself through the bony foramina provided for the exit of these nerves, it is very apt to appear eventually in the orbit, or in the spheno-maxillary fossa. Primary cancer is generally single, and secondary, multiple. It is of rapid growth, and is frequently accompanied with similar deposits in other organs. Histologically, these tumors do not differ from cancerous growths in other parts of the body. In some cases the cerebral substance nearest the cancer undergoes softening, and in others, it remains unaltered.

Tuberculous tumors are mostly confined to children, and are generally seated in the hemispheres or cerebellum. When single, they often attain the size of a grape or cherry. They are generally associated with tuberculous deposits in other organs, and undergo similar changes.

Syphilitic tumors will be described in the next chapter (q. v.).

Symptoms.—The symptoms common to all cerebral tumors, are: headache, vomiting, and optic neuritis; though it is possible for a large tumor to exist in the brain without giving

rise to any symptoms. On the other hand, most cerebral tumors produce a variety of local and general disturbances, the character of which depends upon their nature, size, and seat.

The first symptom that generally attracts attention is headache. The pain is usually limited to a particular spot or region of the head, corresponding to the situation of the tumor. It varies greatly in different cases, being sometimes dull and continuous, at others, sharp, lancinating, and paroxysmal. As the disease progresses the pain generally becomes more and more severe, until in some cases the patient is unable to restrain his cries.

In other cases the patient suffers but little from pain, but is drowsy, low-spirited, and irritable. The memory is more or less impaired, and there is a general lack of both mental and bodily energy. These symptoms become more marked as the tremor develops, the mind either gradually sinking into a state of melancholy, and finally of complete imbecility, or else they give rise to delusions and hallucinations, accompanied with attacks of mania; the patient at last dying comatose.

Almost every patient suffers more or less from vertigo, and also from nausea and vomiting.

The special senses suffer to a greater or less degree, especially the sense of sight. Indeed, several eminent pathologists* assert that optic neuritis is an invariable accompaniment of cerebral tumors. Both optic nerves are implicated, though one may be less affected than the other. The ophthalmoscope also exhibits atrophy of the optic nerve, which may result primarily from the intracranial pressure, or secondarily from the neuritis. Hemipopia, diplopia, strabismus, and other ocular troubles, are also of frequent occurrence in these cases.

Paralysis, which is seldom entirely absent, generally takes a hemiplegic form, but is sometimes paraplegic. It is frequently limited to the muscles supplied by a particular nerve, as the third or sixth. It is generally slow in its progress, corresponding with the growth of the tumor.

* Annuske, *Graefe's Archiv.*, vol. xix, pt. 2, 165.

Epileptic attacks are common, and may occur either with or without loss of consciousness. In the latter case, the convulsive movements are usually confined to one side of the body, and occasionally to a single set of muscles, such as those of the eye or face. But spasms which commence locally, and ultimately become bilateral, are generally attended by loss of consciousness. In these cases, post-epileptic paralysis is generally observed.

Tonic spasms are much less frequently met with in cases of cerebral tumor than the clonic form. Their distribution is similar to that of clonic spasms. In some they are limited to the muscles of the head and neck; in others the muscles of the face and limbs are involved.

Various other symptoms are sometimes present in these cases, such as hyperæsthesia, anæsthesia, paresis, tremor, disturbances of equilibrium, disorders of digestion, assimilation, secretion, respiration, and circulation, most of which are plainly the result of the cerebral lesion.

Causes.—Age is one of the predisposing causes in some kinds of tumors. Thus, tuberculous tumors are most frequently met with in young children; while aneurismal tumors are most common in persons of advanced life. Sex also appears to have some influence in this respect, as males are more frequently affected than females, probably because they are more exposed to injury. Heredity is another cause, as shown by the various forms of diathetic tumors, which owe their existence to constitutional dyscrasiæ. The chief exciting causes are traumatic injuries, such as blows on the head, falls, etc. Other exciting causes are: various parasites, such as the cysticercus and echinococcus, great mental and physical exertion, cardiac hypertrophy, cerebral embolism, and calcareous degeneration.

Diagnosis.—When, in addition to headache, vomiting, and double optic neuritis, a case is attended with frequent epileptic attacks, some of which are slight, we are justified, in the absence of any symptoms or history pointing to some other form of cerebral lesion, in referring the morbid phenomena to intracranial tumor. Epileptic convulsions occurring late in life should always excite suspicion of such a cause, especially if

unilateral, or unattended with loss of consciousness. Very limited paralysis, also, points to this cause, especially if the other symptoms correspond.

The situation of the tumor may often be determined by the peculiar character of the symptoms. Thus, when seated in the convexity, there is severe headache and epileptic spasms, but no anæsthesia or paralysis. When the anterior lobes are affected, there is frontal headache, mental excitement, and anosmia. When the parietal lobe is involved, there is anæsthesia, with slight unilateral paralysis. When the occipital lobes are implicated, we have intense headache, vertigo, and melancholy, but no paralysis. Tumors of the corpus striatum produce hemiplegia; of the corpora quadrigemina, ocular paralysis, blindness, and hemiplegia; of the area near the optic chiasm, headache, hemiopia, anosmia, paralysis of the ocular muscles, and anæsthesia of the parts supplied by the fifth nerve. When the cerebellum is affected, the symptoms are occipital headache, vertigo, and tottering gait. Tumors of the pons *Vorolii* produce paralysis of the muscles supplied by the third, fifth, and sixth nerves, difficulty of swallowing, and crossed paralysis of the limbs. Tumors of the medulla oblongata produce convulsions, anæsthesia, defective articulation, difficulty of swallowing, paralysis of the bladder, and diabetes mellitus.

Prognosis.—There is perhaps no class of brain lesions more uniformly fatal than that of cerebral tumors. The only exception is the syphilitic, which is generally amenable to proper constitutional treatment.

Morbid Anatomy and Pathology.—We have already sufficiently described the morbid anatomy of all the principal kinds of cerebral tumors, except the aneurismal, which we will now consider.

Aneurismal dilatation of the large cerebral arteries is not a very uncommon occurrence, since more than one hundred and fifty cases have already been reported, and many more would no doubt have been recorded had they not been confounded with apoplexy, or some other form of brain lesion.

The arteries most liable to be affected are the sylvian and the basilar. These aneurismal tumors do not differ in struct-

ure from those found in other parts of the system. They vary in size from that of a cherry to that of a large plum, or even a walnut. They are more common on the left than on the right side, probably for the same reasons that embolism occurs more frequently on that side of the brain.

The symptoms of cerebral aneurisms are for the most part similar to those of other cerebral tumors producing pressure or irritation in the same localities, except that rupture and subsequent hæmorrhage, which has been observed in about one-half of the cases reported, gives rise to symptoms of apoplexy, and proves speedily fatal.

The pressure produced by cerebral tumors generally, on the brain substance, not only causes local symptoms, but in many cases leads to fatty degeneration and atrophy of distant parts. It also causes displacement of the parts in the immediate vicinity of the tumor, renders the cerebral tissue dry and anæmic, and causes more or less wasting of the nervous structure.

Treatment.—We have seen that several varieties of cerebral neoplasmata consist of hypertrophied connective tissue, producing a condition similar to that known as cerebral sclerosis. Now, as *Baryta carb.*, *Baryta mur.*, *Baryta iod.*, are of undoubted value in the treatment of the latter affection, it is highly probable that the same medicines will render good service in the former. These remedies may very properly be given in all cases in which we have reason to suspect the presence of a solid tumor in the brain, as being most likely to meet the pathological indications. At the same time, we may, by administering such remedies as cover the totality of the symptoms, best relieve the various functional disturbances produced by the adventitious growths, and thus contribute materially to the comfort and welfare of the patient. In this way the epileptic seizures may be rendered lighter, the pains less intense, and even the paralytic symptoms may be measurably modified and relieved. Whilst, therefore, there is but little room for encouragement in these cases, so far as ultimate recovery is concerned, they should not be looked upon in all cases as utterly hopeless, as some of our remedies have proven successful under

circumstances apparently no more favorable than these. Take *Silicea*, for example, which has not only removed diabetic symptoms in a number of instances, but relieved the pains of cancer, and caused the shrinkage of fibroid tumors. In addition, therefore, to the treatment recommended under *hemiplegia*, *epilepsy*, *convulsions*,* and *cerebral atrophy* (q. v.), a careful study should be made of the following

General Indications.—*Atheromata*.—Bell., Calc., Graph., Sil., Sulph., Thuja.

Cysts.—Apis., Arsen., Apocyn., Sil.

Hæmatomata.—Arn., Con., Iod., Sulph.

Lipomata.—Bar., Calc., Croc., Graph., Lapis alb., Phos., Phyt.

Fibrous.—Bar., Bell., Calc., Con., Sil.

Fibro-Scirrhus.—Ars., Ars. iod., Aur., Carb. an., Con., Cal., Lapis alb., Nit. ac., Sil.

Melanoid.—Phos., Sang., Sil., Thuja.

Colloid.—Carbol. ac., Hydr., Phos.

Fungoid.—Ars., Carb. an., Nit. ac., Phos., Sil., Staph., Sep., Thuja.

* See *Nervous Diseases*, p. 27.

CHAPTER XVI.

CEREBRAL SYPHILIS.

WHEN we consider the prompt effect which appropriate medical treatment has upon syphilitic diseases of the brain, we are not surprised to find that the characteristic lesions are not of an inflammatory character, as was formerly supposed, but are generally localized, the membranes and substance of the brain not being, as a rule, profoundly affected. Not only have numerous cases occurred in which no lesions could be discovered after death, but Heubner asserts that there is no case on record in which the existence of ordinary meningeal inflammation could be established by microscopical evidence; while Dr. Dowse,* one of the latest investigators of this subject, says that the share taken by the proper nervous elements in the pathological changes which affect the nervous system in these cases is extremely limited.

Varieties.—There are three principal forms or varieties of syphilitic lesions of the brain, namely, the *congestive*, the *vascular*, and the *syphilomatous*.

1. The *congestive form* of cerebral syphilis exhibits scarcely any anatomical changes, unless the disease has lasted for a considerable period, and even then they are not very marked, the membranes having simply lost their transparency, and the cerebral convolutions appearing to be slightly atrophied.

2. The *vascular form* affects the cerebral arteries, especially the carotids, and the arteries at the base of the brain. The vessel changes from a translucent, pinkish color, to a greyish-white; is reduced in diameter by a greyish deposit between

* *Syphilis of the Brain and Spinal Cord*, 1879.

the endothelium and the elastic coat of the vessel; and finally becomes completely occluded by the syphilitic thrombus, consisting of endothelial cells developed by proliferation into connective tissue.

3. The *syphiloma*, or *syphilitic tumor*, commonly called *gumma*, consists of two varieties, the *soft* and the *hard*.

The *soft gumma* has the appearance of greyish-red gelatin, and consists of round cells and nuclei, mixed with branched, stellate, and spindle-shaped cells, and enlarged capillary vessels.

The *hard gumma*, which is probably only an advanced stage of the soft, is of a cheesy consistency and well-defined outline. It is devoid of cells or of blood-vessels, being dry, yellow, and homogeneous, except near the border, where there are occasional oil-globules, interspersed with pigmentary granules and crystals. This tumor varies in size from that of a filbert to that of a walnut, or even larger; and not unfrequently appears to be moulded by the shape of the parts where it is located, as though originally in a soft condition.

Symptoms.—The symptoms of the *hyperæmic form* of cerebral syphilis are at first of a fleeting and somewhat indefinite character. The mind is either unduly excited or depressed; and although there is at first no marked mental unsoundness, there is more or less eccentricity of manner, confusion of thought, and delusion. The general health also suffers, passing gradually from a state of simple debility to one of paresis and nervous prostration, accompanied with trembling of the tongue when protruded, embarrassment of speech, unequal pupils, tottering gait, formication, and numbness. Fresh syphilitic outbreaks are apt to occur from time to time; and these are usually attended by an aggravation of all the symptoms, mental as well as physical. Paralytic attacks of aphasia, hemiplegia, and paraplegia, become more and more frequent and permanent; the general debility increases; and, unless the disease is speedily arrested by treatment, the patient dies within a few days, from the effects of cystitis, decubitus, and nervous exhaustion.

The symptoms of the *vascular form* differ according as the disease affects the cortical or the basal sphere of nutrition. In

the former case, there is generally a gradual narrowing of the affected arteries, giving rise to debility, impairment of the mental faculties, and, in many cases, to somnolency, which may deepen into the apoplectic seizure. But in the basal form, the symptoms are usually much more rapidly developed. Sometimes there is multiple thrombosis of one or more of the basal arteries, in which case the patient generally dies suddenly, with all the symptoms of cerebral apoplexy. In other cases, there are premonitory symptoms, especially ocular troubles, such as ptosis, diplopia, and amblyopia; or the irritation may involve other cranial nerves, producing spasm of the sixth and seventh nerves, or hyperæsthesia and anæsthesia in certain branches of the fifth nerve. Hemiplegia may afterwards gradually set in, attended or not with aphasia, but without loss of consciousness. The patient gradually grows worse, becomes somnolent, suffers from headache, confusion of mind, and other head symptoms, and, unless relieved by treatment, will finally die, notwithstanding temporary intervals of improvement.

The symptoms attending the development of *cerebral syphiloma* are somewhat peculiar. One of the most characteristic is an intolerable headache, which occurs in paroxysms, and is most intense at night. The paroxysms last for several weeks, when they remit for a while, and are again succeeded by a fresh attack; and thus it may continue, unless relieved by treatment, for several years. After a time epileptic seizures occur; or there may be unilateral attacks of convulsions, without loss of consciousness. In this case, the spasms are probably due to irritation of the surface of the opposite hemisphere. The patient now becomes more or less irritable, and either mentally excited or depressed. The mind gradually becomes impaired, the speech slow and embarrassed, and sometimes aphasic symptoms make their appearance. Unless relieved by treatment, symptoms of muscular paresis and incoördination set in; the grasp becomes weak and uncertain, and the gait irregular and tottering. Frequent epileptic attacks occur, which, becoming more and more severe, are at last followed by coma, exhaustion, and death.

Causes.—Cerebral syphilis, like every other form of the affection, is due to a specific poison affecting the constitution; and belongs for the most part to the tertiary stage, or to the latter part of the second stage. It is invariably preceded by a hard infecting chancre, the cerebral symptoms not manifesting themselves in many cases until after the lapse of several months or years. In some instances, however, they show themselves as early as the beginning of the second stage, or soon after the appearance of the rash or angina. All ages are subject to it, but it is most common between the ages of twenty and forty years. Males are more liable to it than females, constitutional syphilis being more common in men than in women.

The chief predisposing causes appear to be, an incomplete or unsuccessful medical treatment, and what is known as the neuropathic constitution. The latter may be either hereditary or acquired. In these cases, the ancestors or immediate relatives are found to have suffered more or less from epilepsy, chorea, neuralgia, and other nervous diseases. Whatever weakens the nervous system, such as severe mental labor, sexual excesses, or too free indulgence in the use of alcoholic liquors, will also act as an exciting cause. Dr. Dowse says, "I have clearly traced a cerebral syphilis when the exciting cause has been venereal excesses, over-study, mental anxiety, worry, and even fright."* Mechanical injuries of the brain, such as are produced by blows or falls upon the head, will also favor the development of cerebral syphilis.

Diagnosis.—The previous history of the patient constitutes one of the most important factors in the diagnosis. Age is also of great diagnostic importance, as paralysis occurring in youthful persons is, in the great majority of cases, of syphilitic origin. Violent proxysmal headache is another characteristic symptom of the disease. There is no form of headache so intense as that which results from syphiloma of the dura mater. The pain is not only very intense, but is localized, remittent, and increased by pressure. The reverse of this, however, is the case

* *Op. cit.*, p. 17.

when the pia mater is involved; the pain is never intense and is never localized, but is diffused over the forehead, and of a dull, aching, congestive sort. The temperature, on the contrary, is higher in these cases, and there is greater constitutional disturbance.

In case the patient has no clear syphilitic history, the difference between the real and apparent age, the facial expression, and especially ophthalmoscopic symptoms, are generally sufficient to clear up the case. These symptoms consist in swelling, hyperæmia and œdema of the papilla, varicosity of the veins, and a peculiar form of neuro-retinitis and choroiditis. There may also be optic atrophy, but this is the least certain of all the ocular changes which occur in syphilis, and should therefore not be relied upon as a diagnostic symptom.

Syphilitic thrombosis is perhaps the most difficult form of cerebral syphilis to diagnose. Dr. Dowse says: "It is peculiar to syphilis that the subsidence of the symptoms is rapid, whilst their invasion is comparatively slow. A man free from syphilis goes to bed, and overnight has felt quite well, but finds in the morning that he cannot move his arm or leg. This mode of attack is rarely the case where the lesion is due to syphilis. A syphilised patient, without premonitory warning of any especial kind, may have an epileptic fit, but he will not without warning fall in an apoplectic fit. This does not imply that he will not have a fit of apoplexy; but for some days, or it may be weeks, previous to this calamity, he will be heavy and lethargic, although he is not able to sleep; he is restless, and all his doings and movements are without any definite purpose; he may not eat unless requested to do so, or if he sits down to partake of a meal, he rises before he has finished, and his knife, fork or glass may suddenly fall from his hand, or his hand may shake so that he is unable to carry a glass to his mouth, or if he does so, it rattles against his teeth, and the fluid escapes at the corners of his mouth, of which he is, in a measure, unmindful; and, finally, he may neglect and appear to be regardless of, the calls of nature. It is after symptoms such as these that the man with syphilitic arterial changes is usually found breathing stertorously and in a comatose, apoplectic state.

There may be subsequent convulsions, or there may not, and the comatose state may be slight, or it may be profound; the comatose condition is the more usual, and it resembles a deep stupor, out of which the patient may be roused by pinching or pricking, to a state of apparent subjective consciousness, which is only a grade, however, beyond the mere automatic. He may continue in this state for one or two weeks, or, as I have seen cases, for three weeks; and then, with returning consciousness, the paralysis disappears, the intellect brightens, and he may even, for a time, so far recover as to be able to attend to his business or professional pursuits, but after this there is rarely a return of the evanescent forms of paralysis previously noted. After an attack of this nature, when paralysis supervenes (and it is very rarely that it does not, sooner or later), it is usually persistent and permanent, and death may take place during an attack similar to that just noticed, or it may be preceded by a series of epileptiform seizures, ending in profound coma.”*

Prognosis.—Syphilis generally yields more readily and rapidly to appropriate medical treatment than any other form of brain disease. Not that every case of cerebral disease that has syphilis for its origin may be rapidly and thoroughly cured, for there is many a cerebral paralysis due to syphilis, which will not readily yield to specific measures; but as a rule, syphilitic lesions of the brain, like those of other organs, are quite amenable to treatment. Much, however, depends upon the situation and degree of the disease, as well as upon the means adopted.

Morbid Anatomy and Pathology.—The morbid anatomy of syphilitic cerebral lesions has to some extent already been given. The anatomical features of syphiloma are thus given by Rindfleisch: “Its specific anatomical character does not reside in any marked deviation of the gummatous tissue from the familiar types of inflammatory growth, but rather in the circumscription of a more or less spheroidal nodule in the midst of a larger deposit of newly-formed embryonic tissue, a

* *Op. cit.*, p. 38.

nodule which differs from the embryonic tissues round it in the farther course of its metamorphoses. For while the latter undergo conversion into fibroid tissue, forming a cicatrix characterized by a tendency to extreme contraction, the former, retaining the circular form of its cells, and occasionally producing an anastomotic network of corpuscles, materially undergo a necroid transformation of its intercellular substance. The cells grow fatty, their place is taken by round or stellate aggregations of fat granules, which appear to be capable of lasting as such for long periods of time. The final result is a yellowish-white rounded nodule, of a soft and elastic consistency, embedded in a deposit of newly-formed connective tissue. This is the specific tumor of syphilis, the "Tophus or Gumma Syphiliticum."

Dr. Dowse* sums up the essential, gross pathological features of these lesions as follows: "They include (a) the inflammatory thickening of the membranes. This thickening may originate in the lining membrane of the osseous system with which the nervous structures come into contact. (b) The invasions of the neuroglia, or connective tissue, by a diffuse form of gummatous infiltration, which might be the result, primarily, of disease of the circulatory system, or alterations of the fluids circulating within the vascular channels of the nervous tissue. The latter condition gives rise to albuminofibroid changes, more especially in the white nerve substance, and is often associated with a low form of inflammation of the membranes. (c) The appearance of syphilomatous masses, which often occur singly, but may be numerous. Their seat may be over the surface of the hemispheres, and I have usually found them in the upper convolutions of the anterior lobes, or they may occur at the base. At any rate, they are to be seen almost invariably at the cortex, and closely united with the membranes. They extend into the surrounding tissue, which is generally found to be softened, hypervascular, and of a faint yellow color. When examined, they present the appearances which have been previously noted, the nerve-cells and vessels

* *Op. cit.*, p. 95.

giving evidence, under the microscope, of the usual degenerations consequent upon vascular occlusion." The same author, who caused a microscopic examination to be made of a longitudinal section through a capillary vessel of the second left frontal convolution, found the coats separated, and in some parts almost obliterated, by an aggregation of small cells or nucleor growths. This invasion involved the inner rather than the outer tunics of the vessel, a point upon which Heubner lays great stress as being especially diagnostic of their syphilitic origin.

Treatment.—The treatment of syphilitic affections of the brain is of two kinds, namely, *symptomatic* and *specific*.

The *symptomatic treatment* does not differ essentially from that given under the heads of *cerebral hyperæmia*, *thrombosis*, and *tumors* (q. v.).

The *specific treatment* consists mainly in the prompt and judicious administration of anti-syphilitic remedies, such as *Kali iodatum*, *Mercurius corrosivus*, *Arsenicum iod.*, *Aurum*, *Corydalis*, *Mezereum*, *Phytolacca*, *Stillingia*.

SECTION II.

MENINGEAL AFFECTIONS.

CHAPTER I.

SIMPLE ACUTE MENINGITIS.

THIS disease is a *lepto-meningitis cerebrealis*, or simple acute inflammation of the pia mater of the brain. It may be partial, general, or limited to either the convexity or base of the brain.

Symptoms.—Owing to the fact that the inflammation, instead of seizing at once upon the entire membrane, generally advances gradually from one point to another, different stages of the inflammatory process are apt to exist at the same time in different parts of the diseased membrane. Consequently, the two stages of irritation and depression are not, as a rule, so sharply defined as to serve as a reliable basis for description. Neither is it practicable to give all the groupings of symptoms met with in the various forms of the disease.

The symptoms are found to vary considerably in different cases, according as the disease is of primary or secondary origin; they are also greatly influenced by the seat, extent, and intensity of the inflammatory process, as well as by the age of the patient. When primary, the disease is generally ushered in by severe chills, intense headache, and high fever; and is attended by more or less delirium, convulsions, or maniacal excitement. In other cases it assumes a somewhat latent form, being accompanied with only slight symptoms, or at most with depression and paralysis.

In infancy the attack usually sets in after a period of restlessness, with convulsions, high temperature, and very quick pulse. The large fontanelle pulsates and is tense. The convulsive seizures follow each other with greater or less frequency, the child remaining weak and somnolent between them. At last the patient sinks into a state of coma, followed by paralysis. Older children often remain excited to the end, screaming, vomiting, and complaining of cephalalgia, intolerance of light, and other evidences of cerebral disturbance.

In adults, severe headache is one of the most constant symptoms, especially when the disease is confined strictly to the pia mater. The patient moans, screams, grasps the head with his hands, complains of stitches and lancinating pains through the head, and exhibits an expression of intense suffering. There is photophobia, tinnitus aurium, hyperæsthesia, and increased reflex excitability. If the skin be ever so lightly irritated, it is apt to break out into patches of erythematous redness. In other cases the symptoms are simply those of maniacal excitement, without any marked increase of temperature, or other evidence of fever. This is most likely to occur if the disease is complicated to any considerable extent with inflammation of the brain substance (*meningo-cerebritis*), in which case the patient is apt to be simply restless, sleepless, and subject to mental hallucinations, which may pass into muttering delirium. In either case, however, the patient sooner or later sinks into a state of stupor and indifference, accompanied or followed by muscular tremors, convulsions, paralysis, coma, and death.

Tonic contractions of certain muscles, especially those of the head and neck, occur in these cases, by which the parts are drawn backwards or to one side; the arms also are sometimes similarly affected; and there may be a condition of trismus. The limbs are always greatly weakened, but although they may become paralyzed, there is seldom hemiplegia or paralysis of the sphincters. Towards the last, however, it is not uncommon to have incontinence of urine and fæces. At this time, also, other typhoid symptoms predominate. The tongue is thickly coated, or brown and dry; deglutition is difficult, the

pulse is slow, or quick and irregular; the respiration is disturbed, sighing, and more or less uneven; the temperature is high and variable; and the skin is hot and dry, or else bathed in a copious perspiration.

The pupils vary greatly at different stages of the complaint, being sometimes contracted, at others dilated, and occasionally of unequal size. As a general rule they are either contracted or of a medium size during the stage of excitement, and dilated or unequal towards the close, or during the stage of depression. They may, however, be either dilated or contracted during the whole course of the disease.

The pulse and temperature also vary considerably, the former being at first large, hard, and frequent, reaching as high as 140 or 150 per minute, afterwards falling to 60 or less, but towards the close becoming frequent again, though small and irregular. The temperature, which at first is increased, afterwards becomes lowered, the mercury indicating a range of from 94° to 104° F.

Thirst, anorexia, and vomiting, which are nearly always present at the beginning, sometimes continue throughout the disease, or reappear from time to time during its course.

Morbid Anatomy.—At first, the only morbid appearance that presents itself is the redness of hyperæmia, resulting from a more or less uniform injection of the capillary vessels of the pia mater. At a later period, there is congestion of the larger vessels, together with an effusion of fibrine, white blood-corpuscles, and serum into the subarachnoidal space, which soon becomes turbid or yellowish, and finally changes into pus. The effusion is greatest in the vicinity of the larger blood-vessels, lines of pus being especially conspicuous along the course of the parietal veins, or spread out in the form of thin membranous patches beneath the arachnoid. The inflammatory products may be limited to the convexity and lateral portions of the hemispheres; or they may be confined to the base of the brain; or they may involve the entire surface of both regions. When the inflammation is general, and also when limited to the basal region, the ventricles usually contain more or less fluid, and the central parts of the brain are generally softened;

but when the convexity alone is affected, the ventricles are apt to be dry and empty, even though the cerebral cortex should be involved in the inflammatory process.

Pathology.—It is generally conceded that the symptoms of irritation, or those that belong to the initiatory stage, are due to congestion; and that those of depression, met with in the later stages of the complaint, are caused mainly by effusion and the resulting pressure.

As to the starting point of the disease, it doubtless lies in the vascular system, but whether excited by the presence of minute emboli, thromboses, or capillary ruptures, is an unsettled question. When we consider the prevalence of the disease among cachetic subjects, and its frequency in cases of rheumatism, endocarditis, and erysipelas of the head and face, we cannot doubt that it often originates in one or the other of these modes, even though the primary histological changes have as yet escaped detection.

Causes.—As a primary affection, the disease is most frequently due to cold and dampness, or to prolonged exposure to furnace-fires, or to the heat of the sun. The disease is most apt, however, to occur in connection with, or immediately after, some other acute affection, such as the various exanthematic fevers, small-pox, rheumatism, pleurisy, pneumonia, etc. It is frequently associated with erysipelas of the head and face, especially in its later stages. It is also sometimes met with in Bright's disease of the kidney, in typhoid fever, and in broken-down states of the system, whether arising from dyscrasia, or from the decrepitude of old age.

Sex appears to exercise considerable influence in its production, as it occurs much more frequently in males than in females, probably in consequence of the former being more exposed to the influence of syphilis and other exciting causes. While not confined to the period of infancy and childhood, it is much more rarely met with after the age of twenty than before.

Diagnosis.—Simple meningitis is most liable to be confounded with the tubercular variety of the disease. The presence or absence of a tubercular constitution, the general

history of the case, and the conditions under which the disease is developed, will often throw much light upon the case. The temperature frequently rises higher in simple meningitis than it does in the tubercular form, which latter seldom exceeds 100° or 101° F. Other symptoms, also, are usually less prominent in the tubercular form, such as delirium, retraction of the head, etc. On the other hand, tubercular meningitis is of much greater frequency than the simple form, though the proportion of males to females is considerably greater in the latter.

Prognosis.—The prognosis is always unfavorable, at least nine out of every ten cases proving fatal within the first three weeks, and the great majority succumbing within the first ten days of the disease. Patients, however, sometimes make good recoveries from it, as shown by the subsequent post-mortem appearances of persons dying from other diseases.

Treatment.—The treatment required in the initial stage of simple cerebral meningitis is identical with that of *hyperæmia of the brain* (q. v.). After this brief period has passed, and the period of depression has set in, the chances of recovery are indeed small, but the treatment, if strictly homœopathic, may yet be crowned with success.

General Indications.—Acon., Æsc. gl., Apis, Bell., Bry., Camph., Canth., Cimicif., Cin., Cocc., Cup., Dig., Gels., Glon., Hell., Hyos., Lach., Merc., Op., Stram., Sulph., Tart. em., Verat. vir.

In Infants.—Acon., Apis, Bell., Cin., Glon., Hell., Lach., Merc.

In Erysipelas Cases.—Apis, Bell., Lach., Merc., Phos., Rhus, Verat. vir.

Heat or Sunstroke.—Arn., Bell., Camph., Gels., Glon., Lach., Scutel., Therid.

Exposure to Cold.—Acon., Bell., Bry., Dulc., Gels., Rhus.

Exanthematic Fevers.—Acon., Apis, Bell., Lach., Merc., Rhus, Sulph., Verat. vir.

Special Indications.—*Aconite.*—Inflammatory fever, with dry, burning heat of the skin; red and inflamed eyes; burning, throbbing, or lancinating pains through the whole head; pulse

full and hard; anxiety and fear of death, or delirium with great anguish; vomiting of bile; convulsions, or tonic contractions, with tendency to paralysis; pupils contracted or dilated. Especially indicated at the commencement of the disease, and also in erysipelas cases.

Ethusa cyn.—Stinging, lancinating pains through the head; obstinate vomiting; tetanic convulsions; staring eyes; pupils dilated and insensible; drawing in the nape of the neck; face pale and collapsed; coma; pulse small and frequent, with cold skin.

Apis mel.—Infantile cases, with delirium, loss of consciousness, and occasional shrill screams; bending back and rolling of the head; squinting of the eyes; dilated pupils; child puts its hand to its head while it screams, even when unconscious; face pale, or marked with red streaks and spots; scanty or suppressed urine; stool thin and scanty, or suppressed; very frequent and weak pulse, or else slow and irregular; convulsions, trembling of the limbs, and paralysis. *Apis* is not only suitable to infantile cases, but also to those preceded by, or complicated with erysipelas.

Arsenicum.—Stinging and lacerating pains in the head; staring eyes, with dimness of vision and altered pupils; burning and swollen skin, with or without moisture; rapid, feeble, and intermitting pulse; vertigo, delirium and insensibility; tonic spasms, followed by paralysis. Especially suited to the last stage.

Belladonna.—Burning, stinging, or lancinating headache; red and sparkling eyes, with distorted orbs; face and skin red, burning, and swollen; violent delirium; frequent vomiting; small and quick, or intermitting pulse; loss of consciousness, spasms, paralysis, and relaxation of sphincters. Especially suited to children, and to cases complicated with erysipelas.

Bryonia.—During the first stage, with sharp and violent pains in the head, red and inflamed eyes, quick and hard pulse, hot and burning skin, vertigo, delirium, cramps, and convulsions; or else at a later period, with sopor, dim and glossy eyes, slow and irregular pulse, cold, pale, moist skin, dry lips, and dry and brownish tongue; other symptoms are,

bending of the head backward, constant motion of the jaws, and constipation.

Cantharides.—Sharp, lancinating pains in the head; great heat of skin, with fiery, sparkling and distorted eyes, and full and hard pulse; vertigo, delirium, or insensibility; tonic spasms and convulsions. This remedy is especially indicated in cases following the retrocession of erysipelas of the head and face.

Cina.—Violent headache in the forehead and occiput; burning heat, especially in the face, or with red cheeks contrasting strongly with pallor about the nose and mouth; child cross and peevish; quick and irritable pulse; screams and startings in sleep; vertigo; vomiting; white, milky-looking urine; delirium, cramps, and convulsive movements. Suited to either real or pseudo-meningitis when attended with worm symptoms.

Cuprum.—Head hot, with sharp, lancinating pains shooting through it; consciousness with vertigo, or delirium with stupor; tonic spasms and convulsions; red and inflamed eyes with rolling orbs; quick and strong pulse, together with more or less vomiting; but the remedy is better suited to the last stage, attended with slow, small and weak pulse, blue, shrunken face, suffocative breathing, dimness of vision, moist hands, and paralysis.

Digitalis.—Stupor, gradually deepening into coma; small and slow pulse; dilated pupils, with insensibility of vision; general or partial convulsions; labored breathing; irregular action of the heart, sometimes very weak, at others strong; particularly adapted to the last stage.

Gelsemium.—Intense congestion of the brain, especially in teething children; severe pain in the occiput; head hot, with redness of the face; nausea, with blindness; child drowsy, and wants to be let alone; frequent startings in sleep; constant internal fever, though without thirst, and the feet and hands cool and moist.

Glonoïn.—Extreme cerebral congestion, attended by the most intense headache, flushed face, full and rapid pulse, red, hot and staring eyes, photophobia, ringing in the ears, beating of the temporal arteries, nausea and vomiting; stupor, with

sunken eyes, slow, irregular pulse, and cool and moist skin. This remedy is suited to every stage of the complaint, provided it is used sufficiently high.

Helleborus.—Violent headache, especially in the occiput; head drawn back, with stiffness of the cervical muscles; eyes staring and oblique; face pale and œdematous; forehead contracted, and covered with cold perspiration; frequent starting and screaming during sleep; working of the jaws, the lower one depressed; breathing irregular, sometimes quick, at others slow and deep, or sighing; jerking of the limbs, with convulsive movement of individual muscles.

Hyoscyamus.—Delirium, gradually passing into stupor and coma; sticking pains in the head, with red, burning face, red and sparkling eyes, contracted pupils, and full, strong, and quick pulse; or else loss of consciousness, cold and pale face, dilated pupils, weak and intermitting pulse, and paralysis.

Mercurius.—Drowsiness with great restlessness; frequent vomiting; starting and screaming in sleep; pupils dilated or uneven; pale and shrunken countenance; skin covered with perspiration; respiration irregular and difficult; retention or inconstancy of stool and urine.

Opium.—Stupor and insensibility; stertorous breathing; pulse small, weak, and irregular; frequent vomiting; pupils dilated; eyes half open; when aroused, patient immediately relapses into a state of insensibility; urine suppressed.

Rhus tox.—Sticking pains in the head; inflamed and swollen eyes; red and burning face; wild delirium, or slow and indistinct muttering; cramps, numbness, and paralysis. Especially suited to cases complicated with erysipelas of the head and face.

Siramonium.—Violent delirium accompanied by frightful screams; head drawn backward; convulsive movements of the limbs; conjunctiva injected; face red; great dryness of the mouth; vomiting, constipation, and retention of urine; sleep almost natural, but on being aroused the patient does not recognize his friends.

Sulphur.—Often indicated as an intercurrent remedy, especially after *Bryonia*, *Cuprum* and *Rhus*.

CHAPTER II.

TUBERCULAR MENINGITIS.

SYN.: *Acute Hydrocephalus.*

TUBERCULAR MENINGITIS is a peculiar and very fatal form of *lepto-meningitis*, due to a deposit of tubercular granules in the pia mater at the base of the brain. For many years it was supposed to be peculiar to infancy and childhood, but it is now known to manifest itself occasionally as a complication of chronic phthisis in adult life. Nevertheless, the affection occurs with such special frequency during infancy and childhood, as to fully entitle it to be still regarded as a disease of early life.

Symptoms.—Although somewhat arbitrary, the symptoms of tubercular meningitis may be most usefully and conveniently arranged in four periods, or stages: 1. The prodromic or formative stage; 2. The stage of irritation or excitement; 3. The stage of depression; and 4. The stage of paralysis.

1. *The Prodromic Stage.*—The symptoms belonging to this stage may be very slight or altogether wanting, but generally they are sufficiently well marked to attract attention, and in some cases, especially in very young children, they are so pronounced as to exhibit the characteristic features of the full-formed disease at the very outset. As a general rule, during this stage the child appears listless and drooping; is more or less feverish and irritable; suffers from occasional headache; looses flesh; is dizzy, sleepless, pale, and occasionally has a dry cough. The appetite is capricious and irregular, and there is occasional vomiting. Sometimes the abdomen is tumid, and the patient suffers from alternate attacks of diarrhoea and constipation. The alvine discharges are seldom of a perfectly

healthy character. The tongue is moderately furred and quite moist. The skin is almost always preternaturally dry; and although there is seldom any well-marked febrile movement, flashes of heat alternating with chills are apt to occur from time to time. The pulse sometimes slackens or intermits, and this is found to occur most frequently at the seventh, ninth, and sixteenth beats. This irregularity of the pulse is a highly characteristic symptom of the disease, and is met with in every stage. The face, which is generally of an unhealthy color, is sometimes red and sometimes pale. The eyes are more or less dim, and frequently look anxious and amazed, especially after waking. The gait is generally awkward and heavy; and the muscular system having lost its tone, the patient soon becomes exhausted. These symptoms are seldom all present in the same case, or at the same time, and those which are, often intermit, coming on at about the same hour every day, so as frequently to be mistaken for those of hydrocephaloid, or of ordinary infantile fever. Very young children are apt to be exceedingly restless, sensitive to light and noise, frequently scream out suddenly, refuse the breast, bend the head and trunk backward, or grasp at the head as if in pain, exhibiting, as before stated, the symptoms of the second, or full-formed stage, at the very outset. This stage varies greatly in duration in different cases, sometimes lasting only a few days, but occasionally protracted over a period of several weeks, or even months.

2. *The Stage of Excitement.*—After a longer or shorter period, the stage of high irritation or excitement sets in. There is great restlessness and anxiety, with undue heat of the head; and if the child is old enough, he complains of violent headache, and frequently cries out, "Oh, my head!" The carotids are now seen to throb violently; the eyes, which are turned up, are painfully sensitive to the light; and the pupils, though generally contracted, are sometimes exceedingly variable. The tongue is usually covered with a dirtyish-white or brown coat; the appetite is lost; vomiting, generally of bile, occurs from time to time; and there is unquenchable thirst. At the same time, there is marked emaciation, with pain in the limbs

and abdomen, and the latter is retracted. The stools are generally green or dark-colored, and constipated. The urine is greatly diminished in quantity, and either high-colored, or turbid, with whitish sediment. The skin is more or less relaxed, especially about the forehead, and of a dingy-white color; and the face, which is pale, is either sunken or swelled. The pulse is generally slow and intermitting, but occasionally regular. The breathing is frequently hurried, irregular, and interrupted by moans. Patients usually have a wandering look during this stage, cry out from time to time, and occasionally grate their teeth. The decubitus is on the side, with hand to the head. Convulsions sometimes occur, and may be repeated several times in succession. The temperature is considerably elevated, ranging from 101° to 103° F. The symptoms still continue to vary in violence at times, and are sometimes greatly abated. This is especially apt to be the case just previous to passing into the third stage. The duration of this stage is from a few hours to a week or more.

3. *The Stage of Depression.*—As soon as this stage is fully entered upon, the senses become greatly blunted, and sopor sets in, which is followed by stupor and insensibility. The pulse is now feeble and irregular; the eyes are turned in various directions, inward, outward, or downward; the pupils are dilated, and the irides are more or less insensible to the stimulus of light. The eyelids are half closed, the cornea dim and blurred, and vision either double or otherwise perverted. The patient generally lies grasping and picking with the hands, moaning and groaning, with an irregular and feeble pulse, cool and somewhat moist skin, foul breath, and moist tongue. Paroxysmal flushes of the face sometimes occur, notwithstanding the great emaciation and debility. The alvine and urinary discharges are suppressed. The temperature is now almost always below the normal standard, especially in young subjects. Consciousness sometimes momentarily returns at the close of this period, but the patient soon relapses again into complete insensibility. The “hydrocephalic cry” is heard during this stage, but whether caused by pain or by reflex irritation is uncertain. Convulsions are such a marked feature as

not unfrequently to occupy the greater portion of the period. The decubitus is on the back; and the duration of the stage is from one to two weeks.

4. *The Closing Stage.*—This stage is characterized by paralysis, which is generally confined to the right side, and is usually immediately preceded by convulsions. The head is drawn back, with great distortion of the face and limbs. The patient generally lies in a state of complete unconsciousness, but sometimes raves. The face and head, on one side of the body, is usually drenched in sweat, while the other is cold and dry. The face is of a bluish or violaceous hue, the respiration hurried, and the breath cold. The pupils are almost always widely dilated, but occasionally they are contracted. The discharges are voided involuntarily, the urine being of a deep yellow color. The temperature generally sinks several degrees below the normal standard, but in some cases it gradually and steadily rises until it reaches 105° or 106° F. before the patient expires. The duration of this stage is from a few hours to one or two weeks, and that of the whole disease is from two to three weeks.

Morbid Anatomy.—The characteristic anatomical feature of this disease is the presence in the pia mater of numerous miliary tubercles, or, as they are sometimes called, granules. These granulations are of a greyish or yellowish-white color, similar in appearance, and doubtless also in character, to those which occur in pulmonary miliary tuberculosis. They are located chiefly at the base of the brain, and it is only in a small proportion of cases that they occur to any considerable extent elsewhere. They are generally very numerous along the course of the great vessels, especially in the fissure of Sylvius. There is also to be found in the subarachnoid space adjoining the blood-vessels, a jelly-like substance, similar to the exudation which occurs in simple meningitis. The ventricles generally contain from two to six ounces of turbid serum, and the fornix and adjacent tissues are often much softened, and are sometimes even diffuent. This softened tissue exhibits under the microscope the presence of numerous granulation corpuscles. The substance of the brain is everywhere abnormally

vascular. The pia mater is always more or less inflamed, thickened by infiltration of plastic matter, and unduly adherent to the cerebral surface.

Pathology.—As before stated, miliary tubercles and tubercular deposits are generally present in these cases in other portions of the body, particularly in the lungs, bronchial glands, and peritonæum, proving conclusively, I think, that acute hydrocephalus is nothing more nor less than a true tubercular form of meningitis.

The granulations appear first at the base of the brain, probably in consequence of the greater vascularity of that part of the organ. These adventitious deposits excite a common inflammation in the neighboring tissues, and thus give rise to the morbid phenomena characteristic of the affection. These facts not only throw a flood of light upon the pathology of the disease, but are of the greatest consequence so far as the prognosis and treatment are concerned.

Etiology.—While there can be no doubt of the fact that tubercular meningitis, instead of being an independent affection, is but an expression of that general state of the system known as acute tuberculosis, there are nevertheless a number of determining causes that are worthy of consideration. Thus, age appears to be an important factor, since the disease occurs with special frequency in children between the ages of two and seven, is less common between eight and ten, still less between ten and twenty, and is rarely met with beyond these extremes, though it has been known to occur in very young infants, and also in advanced life. In children it is apparently often inherited, while in adults it occurs generally as a complication in the course of chronic phthisis. Males appear to be more subject to the disease than females, and this is said to be the case at all ages.

As to other exciting causes, although they probably exert but little if any independent influence upon the disease, yet, owing to the strong predisposition existing in these cases, and the constant irritation caused by the presence of foreign matter within the cranium, there is a constant tendency to relapse upon exposure to extremes of cold and heat, blows,

falls, rapid jolting or exercise, the irritation produced by worms or teething, the repercussions of cutaneous eruptions, ordinary attacks of fever and inflammation, and in fact anything calculated to accelerate the circulation, or cause a determination of blood to the brain. The same is true, also, of hygienic deficiencies, especially those which favor mal-nutrition, such as seclusion from air and sunlight, an insufficient quantity, or a poor quality of food, or a diet that induces functional derangements of the digestive organs; to which may be added, neglect of cleanliness, improper or insufficient clothing, and, in the case of adults, unhealthy occupations.

Diagnosis.—The importance of making an early and correct diagnosis in these cases cannot be overestimated. Unhappily, this is often a very difficult thing to accomplish, especially in the earlier stages, as the symptoms of the first two stages of tubercular meningitis are frequently far from distinctive. It is true, the symptoms may be caused by the development of this disease, but, on the other hand, they may also represent simply some form of gastro-intestinal irritation, or at most the setting in of a specific fever. Under these circumstances, it is but natural to infer, that a careful examination of the general condition of the patient will materially assist in clearing up the diagnosis; but the fact is, this general condition sometimes only serves to still further complicate the case. For not only is it extremely difficult, at times, to recognize acute tuberculosis when it actually exists, but it not unfrequently happens that the state in question gives rise, not only to the same kind of constitutional symptoms, but apparently to the same form of cerebral disturbance; and that, too, when, as the subsequent history of the case may demonstrate, no tubercular meningitis is present. Such symptoms, however, should always put us upon our guard; and if the general condition of the patient and the history of the case are such as to establish the existence of acute tuberculosis, the cerebral symptoms may safely be regarded as an expression of the meningeal affection.

Trousseau insists upon the great importance of the so-called “*tâche cérébrale*” as a diagnostic sign of tubercular menin-

gitis. This is a peculiar form of vaso-motor irritability exhibited when the nail of the finger, for example, is drawn across the abdomen or other portion of the body; in which case, if tubercular meningitis is present, a red line is almost certain to be slowly developed, and to remain a long time. But as this symptom is sometimes met with in other diseases, Trousseau justly regards the irregularity of the respiration as a still more important diagnostic sign of tubercular meningitis; as in no other disease, he says, do we meet with this singular anomaly. If, then, along with these characteristic symptoms, together with those of the premonitory and initial stages above enumerated, the patient becomes more and more drowsy; if the pulse falls much below the natural standard and at the same time becomes irregular; if there is also a feverish condition existing, with but little if any thirst; and especially if there is retraction of the abdomen and obstinate constipation present, we may safely conclude that tubercular meningitis is the only intracranial disease with which we have to do.

Prognosis.—Whether complete and permanent recoveries ever take place after the disease is fully developed, may well be doubted. Although apparent recoveries have occasionally been reported, most authors regard all such cases as instances of mistaken diagnosis, believing it to be irrational to expect radical cures in cases where the cause cannot be removed. There is reason to believe, however, that such cures have, in some rare instances, been effected, especially under homœopathic treatment; unless, indeed, we choose to regard such apparent recoveries as nothing more than a long and complete remission in the intensity of the symptoms. While, however, death is almost certain within three or four weeks from the full development of the disease, I am strongly inclined to think, in common with some others, that, if taken in hand early and judiciously treated, the farther development of the disease may be prevented. But, of course, such a result cannot, from the very nature of the case, be counted upon with any degree of certainty; and therefore the practitioner should be prepared to find his efforts in this direction, if not wholly

thwarted, at least attended with but a very indifferent measure of success.

Treatment.—It is evident from what has been said, that if any permanent good is to be accomplished in this disease by medical treatment, the case must be taken in hand at a comparatively early period, before any well-marked organic changes have taken place in the diseased membrane. During the purely premonitory stage there is hope, as at that time the symptoms of irritation predominate; and as the condition is one of simple hyperæmia, such remedies as *Belladonna*, *Cina*, *Gelsemium*, and *Glonoin*, are not only specially indicated, but are found to be highly serviceable in allaying the morbid action. Even at a later period, after the tubercular process has set in and the disorganizing metamorphosis is progressing, we have found good results to follow the administration of these and other indicated remedies, though of course the case will then need to be very closely watched and carefully treated.

As regards hygienic measures, which should on no account be neglected, reference may be made to the therapeutic hints given under this head in the above section on *etiology*.

General Indications.—*Prodromic Stage.*—Bell., Bry., Cham., Gels., Glon., Ign., Ipec., Puls., Verat. vir.

First Stage.—Acon., Bell., Gels., Glon., Hyosc., Hell., Stram., Zinc.

Second Stage.—Apis, Apoc., Artem., Bell., Cin., Dig., Hell., Hyosc., Merc., Stram.

Third Stage.—Apis, Arg. nit., Cupr., Ign., Indigo, Ipec., Mosch., Op., Plumb., Rhus tox., Sulph.

General Condition.—Baryta carb., Calc. carb., Calc. phcs., Lycop., Phos., Silic., Sulph.

Special Indications.—In addition to the *special indications* given under the heads of Simple Meningitis and Cerebral Hyperæmia (q. v.), the following closely-related remedies should receive particular attention:

Baryta carb.—Glandular enlargements; stiffness of the neck;

eruption upon or behind the ears; wasting of the flesh; vertigo; drowsiness; stitches in the head, commencing immediately on entering a warm room. This remedy is called for in all cases where the above symptoms show themselves, and especially if there are suspicious hereditary proclivities.

Calcarea carb.—Lively, precocious, large-headed children, with tender constitutions, a swollen abdomen, and irregular bowels, which are inclined to looseness; profuse perspiration about the head and neck during sleep; child screams out unexpectedly or without cause. Especially suited to children of scrofulous habit, and as an intercurrent remedy.

Calc. phos.—Children with retarded dentition, scrofulous, and greatly emaciated; stools loose, green, and occasionally slimy; child always wanting to nurse; muscles shrunken and flabby; slow in learning to walk; craves potatoes and other forms of starchy food. This remedy is also suited to the scrofulous dyscrasia, especially when it threatens to run into acute tuberculosis, or is complicated therewith.

Kali iod.—This is Kafka's specific for this affection. He advises the remedy to be used early, before the tubercular exudation has taken place as well as afterward, the remedy having acted favorably at both periods. The special indications are: stinging, darting pains in the head, preventing sleep; pain and heat in the head, with burning and redness of the face; hæmorrhage from the nose; drowsiness; dry and hacking cough; spasmodic contraction of the muscles; chilliness alternating with flashes of heat; paralysis, especially when hemiplegic.

Lycopodium.—Somnolency, gradually deepening into coma; convulsions, either partial or general; child throws its head from side to side, moans, and screams out in sleep; child sleeps with its eyes only half closed; face pale and cold; neck stiff; body greatly emaciated; bowels costive. This is a highly important remedy in this disease, on account of its relationship to anæmia and tuberculosis.

Silicea.—Children with enlarged heads and slowly-closing fontanelles; great drowsiness, with determination of blood to the head, especially when the head is low; heat and redness

of the face, with cold hands and feet; disposition to sweat about the head and face; sudden starting in sleep; violent stitching headache; sour eructations, frequently associated with nausea and vomiting; obstinate constipation.

Spongia.—This is Hering's great remedy for scrofulous and tuberculous subjects. The special indications are: Redness of face, with anxious expression of countenance; determination of blood to the head; heat in the head; bending of the head backwards; face alternately red and pale; eyes staring, lids wide open; vision double. Child frequently wakes with a start; muscular twitchings accompany the fever; somnolency and stupor.

CHAPTER III.

TRAUMATIC MENINGITIS.

THERE are three distinct forms of traumatic cerebral meningitis, namely: 1. *pachymeningitis*, in which the inflammation is limited chiefly to the external surface of the dura mater; 2. *arachnitis*, in which the inflammatory process is confined to the arachnoid membrane; and 3. *leptomeningitis*, or, as it is sometimes called, *subarachnoid meningitis*, in which the pia mater and subarachnoidean areolar tissue are involved.

1. PACHYMENINGITIS.

Traumatic cerebral pachymeningitis, or inflammation of the outer surface of the dura mater of the brain, is always a surgical disease. It is secondary to all those forms of head injuries by which the skull-bones are fractured or penetrated, such as gun-shot wounds, bayonet-thrusts, sabre-cuts, etc. In most cases the bone itself is contused and more or less of the pericranium about the wound separated.

Symptoms.—For several days after the accident the patient appears to do well, and the surgeon, if inexperienced, is apt to imagine that, notwithstanding the severity of the wound, the parts have escaped serious injury. In the course of a week or ten days, however, the patient begins to suffer from pains in his head, loses his appetite, feels chilly, and becomes more or less restless and anxious. As these symptoms increase, the patient becomes dull and drowsy, and may sink into a state of stupor or insensibility. Other symptoms, also, may present themselves, such as rigors, delirium, convulsions, vomiting, constipation, coma, metastatic inflammation of the

lungs and other organs; but most of these symptoms are due to the setting in of pyæmia, a condition which needs to be carefully distinguished from the meningitis itself. The pyæmia, which is a very common complication in these cases, is due, not to the pachymeningitis, but to inflammation of the bone, and this may be the cause of either, or of both, of the former diseases. If the diseased bone be examined, it will be found discolored, the diploe of a greenish color, and below it, probably, a small collection of pus. The pus itself is generally discolored, and is surrounded by a layer of viscid lymph, which separates the membrane from the bone. In most cases, the inflammation extends to the arachnoid membrane, which is separated from the hemispheres by a layer of puro-lymph. This gives rise to other symptoms, the most important and characteristic of which is crossed hemiplegia.

In interpreting the symptoms above given, we should remember that rigors seldom occur in these cases except as a result of pyæmic infection, the decomposing material finding its way into the circulation through the veins of the diploe, which become inflamed in conjunction with the gangrenous osteitis. We may be quite certain that this is the case if the rigor be repeated. This complication is as common as it is fatal; and even when pyæmia is not present, arachnitis generally is, so that the surgeon has but little chance of saving his patient, whether he trephines him or not.

Treatment.—As will be seen, these are purely surgical cases, and require surgical treatment. This, however, should be strictly homœopathic, as well as preventive, in its character, for if either of the complications above mentioned should set in, recovery would be scarcely possible. Hence, after carefully cleaning the wound, if the surgeon finds that a depressed fracture is present, he should at once trephine, so as to prevent the supervention of meningitis, by elevating the depressed bone, removing the detached fragments, if any, and allowing a free escape of the secretions. He should then apply a dressing of charpie, or of borated cotton, saturated with *Calendula lotion*, and this should be kept diligently moistened. At the same time the indicated remedy should be given internally,

which in most cases will be either *Aconite* or *Belladonna*. This is far better than what is called the Lister's plan of treatment, which furnishes little or no protection against contagion, and scarcely ever succeeds in preventing inflammation, with all its direful consequences.

2. ARACHNITIS.

Although this form of traumatic meningitis is of common occurrence, Althaus denies the possibility of its existence as a distinct disease, on the grounds that Kölliker and other histologists have shown that the so-called parietal layer of the arachnoid does not exist, while inflammation of the visceral layer never occurs without simultaneous inflammation of the pia mater. But it is a sufficient answer to this reasoning to say, that the anatomical characters of arachnitis are unmistakable, and that the distinction between this disease and inflammation of the subarachnoidean areolar tissue and pia mater is easily made, especially upon post-mortem examination, as we shall presently show.

Morbid Anatomy.—The leading anatomical peculiarity of arachnitis consists in this, that an even layer of purulent lymph covers the cerebral convolutions, but does not dip into the sulci, owing to the intervention of the arachnoid membrane, which stretches across instead of entering the cerebral depressions; but when, on the contrary, the subarachnoid spaces are involved, the sulci are filled with lymph, and the internal surface of the arachnoid remains free and unaffected.

Symptoms.—The leading symptoms of acute diffuse arachnitis are: more or less delirium, generally of a mild, wandering character, elevation of temperature, and hemiplegia; the latter attended by incontinence of fæces and urine, and occasionally by unilateral sweating. The hemiplegia, which is the most important and characteristic symptom, is seldom complete, its degree being proportionate to the extent of the arachnitis. In cases where the inflammation involves the membrane of both hemispheres, all the limbs are liable to become paretic, in which case the hemiplegia is not so easily distinguishable.

Etiology.—Many cases of arachnitis result from compound fracture of the skull, with laceration of the dura mater. In these cases the arachnitis is secondary to osteitis. Sometimes the brain substance is also punctured, and then the case is liable to become complicated with diffuse encephalitis. As to the accompanying hemiplegia, it can hardly be due to the effused fluid, for this is generally inconsiderable in quantity. Most likely it results from some change in the cortical substance of the brain, as the latter is generally found to be more or less discolored, and of a greenish-grey appearance.

Diagnosis.—We have already hinted at the fact that diffuse encephalitis may complicate the case, and thus obscure the symptoms. But as encephalitis is not likely to follow in these cases unless there has been a direct injury of the brain, if the evidences of arachnitis are widely diffused over one of the hemispheres, and at the same time accompanied by hemiplegia of the opposite limbs, we may safely conclude that the case is one of true arachnitis. This inference may not, it is true, always turn out to be correct, but the exceptions, if such there be, are probably more apparent than real; since it is only when, in consequence of the extreme illness of the patient, the hemiplegia should happen to be overlooked, that there would be any liability of making a mistake. It should be remembered, also, that the hemiplegia involves both sensation and motion; although, as the hemiplegia is incomplete, the defect in sensation is liable to escape detection. In all well-marked cases, however, no such ambiguity exists.

Prognosis.—The prognosis is of the gravest possible character, since it is even doubtful whether recovery has ever occurred after the disease has once become fully established.

Treatment.—As in cases of traumatic pachymeningitis, the chances of success will depend much more upon the prevention of the inflammation, than they will upon curing it after it has once become established; hence measures similar to those recommended under that head (q. v.) should be adopted. After the inflammation has once set in, however, the chief reliance will have to be upon such remedies as *Acon.*, *Apis*, *Ars.*, *Bry.*, *Kali iod.*, *Merc.*, and *Sulph.*

3. LEPTOMENINGITIS.

Traumatic leptomeningitis is, as the name implies, a form of inflammation which involves primarily the areolar tissue of the subarachnoidean spaces, and, it may be, also the structure of the pia mater. It may follow any form of injury to the skull-bones which involves perforation or laceration of the visceral layer of the arachnoid; but as its most common and interesting form is met with after fracture of the base of the skull, or through the petrous portion of the temporal bone, we shall confine our description of the disease to that class of cases.

Symptoms.—The symptoms of basal subarachnoid inflammation are often very obscure, but the condition may be reasonably inferred to exist when, after an injury to the base of the skull, vague cerebral symptoms, such as complete insomnia, with mild delirium, but without paralysis, set in; and especially so if these symptoms have been preceded by deafness, facial paralysis, and bleeding from the ear—symptoms which denote fracture of the petrous portion of the temporal bone. Other important symptoms, such as optic neuritis, variations of temperature, etc., have not yet been clearly identified as belonging to this disease. Patients affected with traumatic leptomeningitis may die very quickly, but as a general rule they live several days after the injury, and in some cases appear to make good recoveries.

Morbid Anatomy.—The inflammatory process is generally principally confined to the subarachnoid spaces at the base of the brain and medulla oblongata. Serous lymph is found investing these parts beneath the arachnoid membrane, and adhering closely to them, as well as to the nerve-roots springing from them. The lymph is closely bound down by the superimposed layer of the arachnoid, which is itself perfectly transparent and unaffected. The lymph cannot be wiped away, or otherwise removed, unless the arachnoid membrane is either lacerated or cut, proving conclusively that it is situated beneath it.

Pathology.—It is probable that the inflammation gains access to the subarachnoid spaces, by traveling along the trunks

of the seventh nerve, affecting first the parts adjacent to the roots of this nerve, and afterwards spreading upwards through the posterior fissures to the ventricles, or over the surface of the hemispheres, or else downwards on the medulla oblongata and its adnexa.

One of the peculiarities of this form of meningitis is, that the fracture associated with it, instead of being a simple one, as it appears, is actually compound, air reaching the sub-arachnoidean spaces through the fracture, either by the way of the external meatus or the Eustachian tube. Whether the inflammation of the subarachnoidean areolar tissue ever results from this admission of air or not, is a question which we have no means of deciding. It is highly probable, however, that such is the fact, as we know that the admission of atmospheric air into wounds, and especially into suppurating cavities, is not only highly prejudicial, but determines to a great extent the character of the inflammation.

Prognosis.—The most that can be positively asserted under this head is, that while many of those that recover from fractured base are doubtless cases of simple though severe contusion, others, especially those attended by the above symptoms, and in which more or less serous fluid has escaped from the ear, are probably cases of basal meningitis. Such recoveries are, of course, very rare; so rare, indeed, as to call for an unfavorable prognosis in all cases.

Treatment.—There is nothing peculiar about the treatment of these cases, the symptoms in every instance clearly pointing out the appropriate remedies. Hence, in addition to the necessary surgical measures, should any be required, the practitioner will do well to study the special indications given under the head of *Simple Cerebral Meningitis* (q. v.).

CHAPTER IV.

CHRONIC MENINGITIS.

CHRONIC CEREBRAL MENINGITIS may be most conveniently and profitably considered under two heads, according as it involves either the membranes of the convexity, constituting what we shall call *Chronic Convexital Meningitis*, or as it affects the membranes at the base of the brain, generally known as *Chronic Basal Meningitis*.

1. CHRONIC CONVEXITAL MENINGITIS.

This is sometimes the sequela of the acute form of the disease, but more frequently it comes on without a previous acute attack.

Symptoms.—The symptoms of chronic convexital meningitis resemble for the most part those belonging to the disease commonly known as general paralysis of the insane;* they also resemble to some extent those produced by softening of the convexity. When, however, the disease follows an acute attack of meningitis, the symptoms are similar to those of that affection, but are less violent, and pursue a much less rapid course. Generally the first symptom to attract the attention of the patient is headache. The pain, which though persistent is not very intense, is usually situated either in the forehead or at the top of the head. It is aggravated by heat, by mental exertion, and by bending the head forward. More or less vertigo and drowsiness are also generally present in these cases. But the leading feature of the disease is paralysis, which may show itself by impaired articulation, trembling of

* See "Nervous Diseases," p. 173.

the muscles, weakness of the limbs, paralysis of the lower sphincters, defective memory, and a general impairment of mental vigor. Muscular spasms, involving both single muscles and groups, are not uncommon; and occasionally there are epileptic and epileptiform convulsions.

Hemiplegia, involving one whole side of the body, may set in, or the paralysis may affect only a single limb, or a particular group of muscles. The ocular muscles generally escape altogether, and so do the special senses, with the exception of general sensibility, which is usually more or less elevated or depressed. Thus, there may be either local or general anæsthesia; or there may be hyperæsthesia of the skin and of the sensory nerves generally, giving rise to neuralgic pains in various parts of the body.

The mental faculties, though weakened, are not, as a rule, greatly disturbed, unless the cortical substance of the brain is also involved in the inflammation, and then we have the disease known as general paralysis of the insane.

In these cases, and also when the disease follows an acute attack, or when it is subacute, the symptoms are more violent, being attended by more or less delirium, vomiting, scanty and high-colored urine, constipation, defective vision, convulsions, paralysis, coma, and even death. Such cases, however, can scarcely be regarded as cases of simple chronic meningitis, although described as such by many of the older authors, but rather as a complication of the disease with cortical inflammation of the brain, such as is met with in some cases of chronic mania, and also in general paralysis.

Morbid Anatomy and Pathology.—Although the thickening and opacity of the arachnoid, so frequently met with in chronic cerebral diseases, and which was formerly regarded as due to chronic inflammation, is now looked upon by many as a mere result of degenerative overgrowth—the consequence, chiefly, of frequent and long-continued congestions—there can be but little doubt, I think, that, as a general rule, the condition in question does result from chronic inflammation, rather than from simple irritation or congestion. For, in addition to the hyperæmia and thickening, we have, in the majority of

cases, adhesions of the membranes to each other and to the cerebrum, as well as deposits of exudation on the surface of the brain which are distinct from the alterations of the membranes. Thus we may have, not only injection, opacity, and thickening of the membranes, but serous and gelatiform exudations beneath the arachnoid, discolored fluids and puriform matter in the same situation, and adherent and non-adherent false membranes. Syphilitic gummata and tubercular granules are also sometimes found in the membranes of the convexity, but these neoplasms are much more common in the membranes at the base.

Causes.—There are numerous causes capable of exciting chronic convexital meningitis, though many cases occur in which the etiology is more or less obscure. It is generally admitted that the disease is sometimes the result of an acute attack of convexital meningitis. It may also originate in the same way as the acute affection, namely, by prolonged exposure to extreme heat, both natural and artificial, by blows and falls upon the head, and by the excessive use of alcoholic liquors. It may also be caused by any severe mental strain, especially when long continued. Cerebral syphilis and tuberculosis are likewise occasional causes, but when produced by the last-named condition, it should not be confounded with acute hydrocephalus, which is an entirely different affection.

Diagnosis.—The comparative mildness of the symptoms, as well as the chronicity of its course, will serve to distinguish the disease from the acute form of the affection; and when originating in the latter, the previous history of the case will be sufficient to establish its true nature. The case is different, however, when we come to compare the symptoms of this disease with those of inflammation and softening of the cortex, and particularly when the two diseases are combined, as the symptoms of the two conditions are almost identical. Here the intensity of the symptoms, and the nature of the cause producing them, are about the only means we have of differentiating between them. Thus, while the pain is less in softening than it is in inflammation of the membranes, the mental symptoms are more severe, and *vice versa*.

Prognosis.—The prognosis, as in every other form of cerebral inflammation, is unfavorable. The only exception is where the disease is of a syphilitic nature, in which case the chances of recovery are good, provided the case is taken in hand early and properly treated. Non-syphilitic cases, however, are not always fatal, as is proved by the fact that post-mortem appearances have established the previous existence of the disease in individuals who have died of other affections.

Treatment.—The treatment of chronic convexital meningitis differs in no essential respect from that of the acute form already given under the head of *Simple Meningitis* (q. v.). Should there be reason, however, to suspect the existence of a tubercular complication, or if there are evidences of any form of tuberculosis, the practitioner should not fail to consult the indications given under the head of *Tubercular Meningitis*. Syphilitic cases will, of course, demand anti-syphilitic treatment; and whenever the dyscrasia can be satisfactorily made out, the practitioner can pretty safely rely on *Kali iodatum* and *Mercurius corr.* as being effective remedies in the case.

2. CHRONIC BASILAR MENINGITIS.

Those cases of chronic basilar meningitis which result from injuries, have already been considered under the head of *Traumatic Leptomeningitis* (q. v.).

Symptoms.—Tonic and clonic spasms, affecting the muscles of the neck and limbs, are generally among the earliest symptoms of the disease. Sometimes the patient is seized at the outset with general convulsions of an epileptiform character, but without losing consciousness. At others, the spasmodic action is confined to particular muscles or sets of muscles, especially those of the upper extremity.

Pain is also a prominent symptom, and sometimes it is about the only one that attracts the attention of the patient. It is generally located in some part of the head or face, and is remarkable both for its intensity and its obstinacy. Vertigo is another marked symptom, and is so great in some cases as to compel the patient to constantly maintain the recumbent position.

But the most important symptom belonging to these cases is paralysis. As the disease is seated at the base of the brain, the paralysis may implicate any of the parts supplied by the motor branches of either of the cranial nerves. This gives rise to a great variety of symptoms, according to the particular nerves affected. Thus, if the seventh cranial nerve be implicated, we shall not only have facial paralysis, but we are also liable to have more or less impairment of articulation and deglutition, in consequence of the paralysis involving some of its branches of communication with other nerves. If the third be involved, then there may be paralysis of the levator palpebræ muscle, causing a dropping of the upper lid; or there may be external strabismus and double vision, owing to paralysis of the internal rectus muscle; or, if the implication of the nerve is incomplete, there may be simple dilatation of the pupil, with or without deficient accommodative power. In this case, also, the vision is more or less injured, owing chiefly to paralysis of the ciliary muscle, and consequent weakness of the accommodation. Defective vision may also result from an extension of the morbid process from the affected membrane to the optic nerve, giving rise to hyperæmia of the optic nerve and retina, and even to optic neuritis, in which case vision may be entirely lost. The sense of hearing may also be greatly impaired, or even lost, by the auditory nerve becoming implicated in the inflammation.

Anæsthesia is common, and this symptom may exist either with or without paralysis. The anæsthesia may be limited to a small portion of the surface of the body, as the face, trunk, upper or lower extremities, or it may involve the whole of one side.

The mind is not usually affected to any considerable extent, at least at the outset, nor, indeed, so long as the inflammation is strictly limited to the basilar membranes. It is only when the inflammatory process involves more or less of the membranes of the convexity that the mental faculties are apt to suffer any permanent weakness or derangement.

Morbid Anatomy.—The anatomical changes met with in chronic basilar meningitis, do not differ in their nature from

those we have already described as belonging to the convexitai form. The only peculiarity worthy of note, is the fact that here the morbid changes are generally much more limited in extent than they are in the former situation, the altered patches being sometimes less than half an inch in diameter. Syphilitic and tubercular deposits are more common in this position than they are in the membranes of the convexity, probably for the same reason that the inflammatory process itself is more frequent in this portion of the cerebral membranes.

Pathology.—It is only necessary to bear in mind the distribution of the cranial nerves, in order to correctly interpret the symptoms arising from one or another of them becoming involved in the inflammatory process. The disturbances thus produced furnish us a ready means of determining, in most instances, the precise seat of the disease; and this is still further facilitated by the circumscribed character of the inflammation. It is only, however, when the inflammatory process affects the substance of the brain itself, that the functions of motility and sensibility are disturbed in the trunk and limbs. Aphasia points to the third left frontal convolution of the brain, the morbid process reaching it through the fissure of Sylvius. Whenever, as not unfrequently happens, there is an alteration in the locality of the symptoms, the change indicates a transference or extension of the disease to a new region. Thus, the disease has been known to involve the third, fourth, fifth, sixth, and seventh nerves, in regular succession.

Causes.—Hammond* regards syphilis as the most common cause of chronic basilar meningitis; next, the abuse of alcoholic liquors; and next, excessive emotional disturbance. According to my experience, however, alcoholic beverages take the first rank in this disease as causative agents, though this may not be the case in our metropolitan cities, where syphilis is of comparatively greater prevalence. This disease has also been known to follow blows upon the head, atmospheric changes, and certain diseases, especially scarlet fever, diphtheria, suppurative otitis, and epidemic cerebro-spinal meningitis.

* Loc. cit.

Diagnosis.—This disease is not liable to be mistaken for any other affection of the brain, provided sufficient attention is given to the history of the case, and the extent and character of the symptoms. This is not the case, however, with thrombosis of the arteries at the base of the brain, the symptoms of which are scarcely distinguishable from those of chronic basilar meningitis. Generally, the best clue in these cases is the exciting cause, which, in connection with the history of the case, may be sufficient for all practicable purposes, since the treatment of thrombosis is not likely to be followed with any permanently good results.

Prognosis.—The prognosis of simple chronic basilar meningitis is more or less favorable or otherwise, according to the nature of the cause. When produced by syphilis, the disease, if promptly and correctly treated, may almost always be subdued. The same is true when the disease is due to severe moral perturbations, anxiety, or too close confinement to business, provided the patient can be induced to submit to the requisite hygienic treatment. On the other hand, those cases which result from the abuse of alcoholic stimulants, as well as those which supervene upon purulent otitis, diphtheria, and epidemic cerebro-spinal meningitis, are generally fatal.

Treatment.—The therapeutic measures already laid down in previous articles for the treatment of various forms of *meningitis* (q. v.), furnish all the directions and indications necessary for the successful management of every curable case of this disease, and therefore need not be repeated here. As for the resulting paralysis, we have the following

General and Special Indications.—*For Paralysis of the Facial Muscles.*—Bar., Bell., Cadm., Caust., Cocc., Gels., Kali chlo., Nux vom., Op., Stram.

For Paralysis of the Tongue and Organs of Speech.—Bar., Bell., Cocc., Dule., Gels.

For Paralysis of the Muscles of the Eye.—*Argentum nitricum.*—Weakness or paralysis of the ciliary muscles.

Causticum.—Paralysis of any or all of the ocular muscles, especially when resulting from exposure to cold.

Cuprum acet.—Paralysis of the nervus abducentis.

Euphrasia.—Paralysis of the oculo-motor nerve, especially when caused by cold, or a catarrhal condition of the eye exists at the same time.

Gelsemium.—Paralysis of the oculo-motor and abducens nerves, or when it gives rise to double vision.

Kali iod.—When the paralysis is of a syphilitic origin.

Mercurius.—Same indication as for Kali iod.

Nux vom.—When aggravated by the use of tobacco or stimulants.

Opium.—Paralysis of the ciliary muscle.

Paris quad.—Paralysis of the iris and ciliary muscle, especially when there is pain in the eyes as if they were being pulled into the head.

Phosphorus.—Paralysis associated with weakness of the sexual organs, and especially with spermatorrhœa.

Rhus tox.—When resulting from exposure to cold and damp, or from changes in the weather.

Senega.—Weakness of the superior rectus or superior oblique, in which the diplopia is relieved by bending the head forward.

Spigelia.—When the paralysis is associated with sharp stabbing pains through the head.

Stramonium.—Paralysis from brain troubles, or when associated with facial paralysis.

CHAPTER V.

EPIDEMIC MENINGITIS.

SYN.: *Cerebro-spinal Meningitis.*

THIS is an epidemic, acute, diffusive inflammation of the membranes of the brain and spinal cord, resulting in a deposit of puro-lymph upon the surface of the arachnoid, and an effusion of serum into the ventricles and subarachnoid space.

Symptoms.—The attack, which is usually very sudden, is generally ushered in by vomiting, faintness, and severe headache; the latter being especially marked in the back of the head and neck. In many cases there are distinct chills, followed speedily by fever; but as a general rule reaction does not occur until a later period, being preceded by cold extremities, insensibility, and sometimes convulsions. These symptoms are followed by tonic spasms of all the extensor muscles of the limbs.

If the patient survive this state of collapse, which is not always the case, he complains of severe pains in the back of the head and neck and along the spine; and as these symptoms increase in severity, the tonic rigidity becomes more and more developed, until opisthotonos, and a general tetanic condition, is induced. Accompanying this muscular spasm is a hyperæsthetic state of the skin; and neuralgic pains also appear in different parts of the body.

On or about the second day of the disease, and sometimes at an earlier period, there generally appear upon the surface, in severe cases, irregular purplish spots, varying in size from a pin's head to large patches. The eruption usually shows itself first upon the lower extremities, and feels like small,

hard pebbles under the skin. In some cases the eruption is entirely absent, or is confined to only a small area; in others, it becomes so general as to cover nearly the whole surface of the body. In addition to this characteristic eruption, which has conferred upon the disease the popular name of spotted fever, other skin eruptions frequently make their appearance, such as herpes, ecthyma, and pemphigus; the latter being confined, for the the most part, to the advanced stages of the malady. The vesicular eruptions, which are as common in mild as in severe cases, are most frequent on the face, neck, and shoulders.

Both the temperature and the pulse are very irregular. The former generally rises from 100° F. to about 104° F., but is subject to very marked variations above and below these points; whilst not unfrequently it remains for a considerable period nearly at the normal standard, without any abatement of the other symptoms. On the other hand, as already stated, the temperature sometimes never rises, the patient dying in a state of collapse. The pulse, which does not always correspond to the temperature, generally rises to about 120, and has a peculiar jerking character. It is very irregular, sometimes varying twenty, thirty, and even forty beats within a few hours.

The symptoms taken as a whole are decidedly typhoid from the beginning. The tongue, which at first is heavily coated and moist, generally becomes black, dry, and sometimes cracked, by the fourth or fifth day of the disease, especially in comatose cases. The stools are sometimes loose and offensive, and at others the reverse. In unfavorable cases, the stupor deepens into coma, fæces and urine pass off involuntarily, the vital powers become more and more depressed, and finally death closes the scene. In favorable cases, on the other hand, the symptoms are generally less severe, especially those of depression, which are not only milder but less permanent, and in some cases do not appear at all; the remaining symptoms gradually abate, and convalescence begins in from one to three weeks from the commencement of the disease.

Complications and Sequelæ.—Of those belonging to the

nervous system, paralysis is the most frequent, and is generally confined to one of the upper extremities. The eye is often irreparably injured by the setting in of a low form of purulent ophthalmitis, attacking either a part or the whole of the organ, and generally resulting in its entire destruction. In other cases the inflammation is limited to the cornea or iris, which, though not destroying the organs, may nevertheless permanently impair the sight. The sense of hearing is not often destroyed, but a few cases of permanent deafness have been met with, doubtless arising from injury to the auditory nerve, the external origin of which is frequently imbedded, so to speak, in the fibroid deposit on the surface of the medulla. Hæmorrhages are not uncommon, especially in malignant cases. These generally occur from the nose, bowels, kidneys, and uterus; sometimes, also, from the ears. Acute inflammation, terminating in purulent effusion, sometimes attacks the larger joints, and is a frequent complication in some epidemics. Chronic meningitis, with its train of sequelæ, has also been observed in these cases.

Morbid Anatomy.—The most marked and characteristic alteration met with in epidemic meningitis, is the yellowish-white or greenish-yellow deposit of puro-lymph found at the base of the brain. This deposit, however, is not confined to the base, but in fatal cases is also met with on the convexity, along the sulci, in the fissure of Sylvius, between the chiasma and pons, on the pons and cerebellum, and on the posterior surface of the cord. Serum is found in the ventricles and subarachnoid space; the cerebral membranes are all more or less injected; and the arachnoid is not only extremely vascular, but is rendered opaque by the puruloid deposits before mentioned, which vary in consistence from a thin, milk-like lymph to thick and dense fibrino-purulent deposits. The brain substance itself is more or less injected, and sometimes small spots of secondary softening occur, but in other respects the organ generally exhibits a normal appearance.

Pathology.—Epidemic meningitis is an infectious disease, but what the real nature of the infective element consists in, is unknown. It has, like all other so-called zymotic diseases,

been attributed to certain disease-germs introduced into the system from without, and more especially through the several mediums of the air, the water, and unwholesome food; but as yet nothing definite has been discovered in these directions. Admitting that it is produced or propagated by a disease-germ, it appears to flourish best in damp, overcrowded, and badly ventilated habitations, in camps, jails, and other unhealthy situations; yet it is not confined to such localities, nor to the lower walks of life. Besides, there is no known reason why it has such a special affinity for the central nervous system. The mystery doubtless belongs to the same category that determines the chief pathological changes of diphtheria to the mucous membrane of the fauces and neighboring parts, of variola and other allied diseases to the skin, and of syphilis to the periosteal and other tissues.

Causes.—Age appears to be an important factor in these cases, as the disease is most common during early life. It is especially frequent just before the period of adolescence, is not uncommon in early childhood, but is seldom met with after thirty-five or forty years of age. Sex also seems to have considerable influence, the disease being much more common in males than females. Whether occupation is a predisposing or exciting cause of the malady is not definitely known. The disease frequently appears among young army recruits, but this is probably due more to the sanitary surroundings than to the occupation itself. Physical exhaustion, however, in whatever way induced, is undoubtedly a predisposing cause. The disease appears more frequently in winter and spring than it does in hot weather; and in cold and temperate climates rather than in the tropical regions. Its epidemic and infectious nature has already been considered.

Diagnosis.—The disease is liable to be confounded with typhus fever, purpura hæmorrhagica, and malignant scarlatina. It may be distinguished from ordinary typhus by the nervous symptoms, and by the sudden appearance of the characteristic rash, which is not preceded by petechiæ. Purpura hæmorrhagica is not attended by such high constitutional disturbances, nor by the peculiar nervous symptoms

which characterize epidemic meningitis. Malignant scarlet fever may generally be distinguished by the rash, sore throat, and nervous symptoms, as well as by the prevailing character of the epidemic; but when the two diseases prevail together, the diagnosis will often be extremely difficult.

Prognosis.—The prognosis varies greatly in different cases, depending chiefly upon the grade or intensity of the symptoms. When very mild, the disease usually terminates in recovery within two or three weeks. On the other hand, very severe cases, occurring suddenly, and accompanied by great depression of the vital powers, the characteristic eruption, hæmorrhage, and coma, generally terminate fatally within a few hours, or at farthest within two or three days. Cases of medium severity, however, though often protracted, usually recover under homœopathic treatment, the duration of the disease being from two to six or eight weeks. Occasionally a case assumes the chronic form, but in these instances the patient generally sinks into a state of marasmus, and dies in the course of a few months. The disease is most fatal about the age of puberty, probably for the same reason that it is most frequently met with at this period of life. The mortality in different countries varies from about forty to eighty per cent., and averages about sixty per cent., being highest, it is said,* among the Irish constabulary.

Treatment.—Ice to the head and spine often has the effect of allaying the pain, but there is no evidence of its having been of any permanent benefit to the patient. Other local applications are equally valueless; and the practitioner will succeed best by confining himself strictly to the homœopathic treatment, as given in the following

Special Indications.—*Aconite*.—In cases where there is well-marked reactionary fever, attended by chilliness, thirst, restlessness, dryness of the skin, and anxiety of mind.

Agaricus.—Drawing pains in the back of the head; violent pains all along the spine; stiffness and soreness of the nape of

* Dr. Grimshaw in *Quain's Dic. of Med.*, p. 228.

the neck and spine; great weight in the forehead and temples, with delirium and coma.

Apis mel.—Burning and throbbing in the head, with pain and stiffness in the back of the neck; great prostration, both physical and mental; brain feels tired; stabbing pains in the occiput; swelling of the face, giving it an œdematous appearance; hyperæsthesia of the skin, with stinging pains all over the surface; sense of suffocation, with great oppression of breathing; dulness of vision; urine scanty or suppressed; pulse variable and intermitting.

Argentum nitr.—Intense headache; vertigo; photophobia; ringing in the ears; chilliness; clouds before the eyes; diplopia; deafness; cutting pains extending from occiput to forehead, increasing and diminishing frequently; face pale and emaciated; tongue coated white, or else black, hard, and dry; sordes upon the teeth; lips and nails blue; breathing greatly oppressed; incontinence of fæces and urine; jerking and trembling of the limbs; epileptiform convulsions.

Arnica.—Great general prostration, with a sore, bruised feeling everywhere; back of the neck extremely sensitive to the touch; diuresis; formication and cramps in the extremities.

Arsenicum.—Great restlessness and prostration; the characteristic thirst for but little water frequently repeated; tongue dry and trembling; stiff, sore feeling in the back of the neck; scalp sensitive and painful; vertigo, with humming in the ears; face pale and corpse-like; dulness of vision; diarrhœa; anxious respiration; tetanic rigidity; spasmodic grinding of the teeth; comatose state.

Baptisia.—Typhoid symptoms, accompanied by a bruised and painful feeling in the back of the head and neck; wandering pains in all the limbs; body feels universally stiff and sore; great restlessness, especially of the head and limbs, which are in constant motion; dark, livid spots on the skin; constipation; stomach sore and sensitive to pressure; vertigo; weakness and trembling of the limbs.

Belladonna.—Violent, stupefying headache, worse in the back of the head, and extending to the neck; ameliorated by bending the head backward; convulsive movements, especially of the muscles of the face and neck; grinding of the teeth;

hyperæsthesia of the senses; upper part of the body hot, extremities cold; retention or inconstancy of the urine; pupils dilated; coma, either with or without delirium.

Bryonia.—Intense headache, with stiffness of the neck, and great pain and soreness in all the limbs and joints; symptoms greatly aggravated by motion.

Camphor.—Throbbing pain in the back of the head, which is drawn backwards or to one side; death-like paleness of the face; tetanic spasms; violent cramps in the stomach and limbs; general surface of the body blue and cold; cold, clammy perspiration; great oppression of the chest, with difficult breathing; no reaction from the initiatory chills.

Cannabis ind.—Vertigo on rising, with stunning pain in the back of the head; pain across the shoulders and spine; fixed, staring eyes, with dilated pupils; hearing acute; face cold, with drowsy and stupid expression of countenance; great oppression of the chest; convulsions; emprostotonos or opisthotonos, with loss of consciousness; collapse, with pale, clammy, and insensible skin; pulse feeble and irregular.

Cantharides.—Violent, lancinating pains in the occiput, extending deep into the head; priapism, with amorous frenzy; eyes staring, or dull and sunken; face pale, with terror-stricken expression of countenance; spasmodic constriction of the throat; retention and suppression of urine; tetanic spasms; fainting, trembling, and general coldness.

Chininum.—Violent throbbing headache, with vertigo, heat in the face, and extreme weakness; symptoms intermitting.

Cicuta.—Head retracted; muscles of the neck sore and stiff; vertigo, with moaning delirium; anxious expression of countenance; double vision; dilated pupils; spasmodic action of the muscles of the face and limbs; tonic contraction of the cervical muscles; opisthotonos; convulsions, attended with cries, working of the jaws, distortion of the limbs, painful distention of the abdomen, and spasm of the muscles of the chest, followed by insensibility and immobility; general paralysis; diarrhœa or constipation; ashy hue of the skin; pain in the stomach with vomiting.

Cimicifuga.—General headache, but not very violent, except it may be in the vertex and occiput; pain in the neck, shoul-

ders, and spine ; low, restless, excitable delirium, like that of delirium tremens ; eyes painful and sensitive to pressure ; pupils dilated ; general prostration, accompanied by more or less nausea and vomiting ; profuse cold sweat all over the body, with very quick pulse ; tongue swollen and throat dry, causing a constant desire to swallow ; muscular twitchings in various parts of the body.

Cocculus.—Severe headache, with vertigo, vomiting, and feeling as if the eyes would be torn out ; face pale and bloated ; painful stiffness of the muscles of the neck ; convulsive trembling of the head ; epileptiform convulsions ; constriction of the chest, with heavy and laborious respiration ; fainting fits ; miliary eruptions.

Crotalus.—Extremely violent headache ; pains in all the limbs ; staring eyes, with delirium ; burning, unquenchable thirst ; nausea and vomiting, preceded or accompanied by faintness ; anxious breathing ; purplish spots on the skin ; diarrhœa, with faintness ; pallid face ; painful heaviness of the limbs ; feeble pulse.

Cuprum.—Convulsive symptoms predominate ; nausea and vomiting from cerebral congestion ; nervous trembling, with hyperæsthesia of the senses ; sad, depressed features, with dim, lustreless, sunken eyes, surrounded with blue rings ; somnolency or coma ; general paralysis.

Digitalis.—Sharp stitches and severe cutting pains in the nape of the neck ; stiffness in the back and side of the neck ; violent, lancinating pains in the head, especially in the occiput ; head tends to fall backward when sitting or walking ; delirium resembling that of delirium tremens ; heart's action slow, irregular, and labored ; depression, accompanied by faintness and vomiting ; convulsions, with retraction of the head ; syncope, with coldness and tendency to collapse.

Gelsemium.—Severe chill, followed by cerebral and spinal congestion ; great depression, with dilated pupils, livid cheeks, dulness of speech, icy coldness of hands and feet, extreme weakness, very weak pulse, and laborious respiration ; nausea and vomiting ; general muscular paresis, without any impairment of the mental power ; somnolency and coma ; sweating relieves.

Glonoïn.—Violent, throbbing headache, accompanied by a bursting sensation ; face pale, or else deeply congested ; blindness, with nausea and faintness ; pain throughout the central nervous system ; labored action of the heart.

Hydrocyanic acid.—Malignant cases, attended with immediate collapse ; protruded, half-open eyes ; dilated and stationary pupils ; blindness ; bloated and bluish face ; tongue protruded and paralyzed ; general coldness ; feeble, irregular pulse and respiration ; incontinency of fæces and urine.

Hyoscyamus.—Violent headache, alternating with pains in the back of the neck ; throbbing sensation in the brain ; drawing in the nape when turning the head ; heaviness of the head, with dimness of vision, palsy of the tongue, and small, intermitting, and quick pulse ; convulsions, with spasms of the chest, and temporary arrest of breathing ; stiffness of cervical muscles and trismus ; constant grinding of the teeth ; epileptiform convulsions ; jerking of the limbs ; brown spots and large pustules on the skin, also gangrenous vesicles ; involuntary stool and urine.

Lycopodium.—Congestive headache, with pain extending down the neck ; hyperæsthesia of the special senses ; oppression of the chest, with fan-like movement of the nostrils ; sense of constriction in the chest and abdomen, as though bound with a hoop ; melancholy and irritable ; dreads solitude ; numbness and twitching of the limbs.

Nux vom.—Hyperæsthesia of the cerebro-spinal system of nerves ; shocks in the brain ; scalp sensitive to the touch ; loud, reverberating sounds in the ear ; oversensitive to odors ; stitches through the body ; conscious opisthotonos ; convulsions renewed by the least touch ; numbness and paralytic drawing in the limbs ; bruised sensation in the head, limbs, and body, with feeling of heaviness.

Opium.—Stupor, or tendency thereto, with or without delirium ; head and limbs feel cold, numb, and heavy ; eyes fixed and half closed ; pupils dilated and immovable ; face bloated and muscles relaxed ; opisthotonos, with constrictive feeling in the chest, and dyspnœa ; vomiting and colic ; abdomen hard and swollen ; bowels loose or constipated ; convul-

sions, with spasmodic jerkings of the limbs; painless paralysis; anæsthesia; hot or cold perspiration; worse while sweating; coma.

Phosphorus.—Congestive headache, with burning and stinging pains in the occiput; petechial and purpuric eruptions on the surface of the limbs or body; dulness of hearing; dyspnoea; frequent fainting; great prostration; tingling and tearing pains in the limbs; laming pains in the spine.

Plumbum.—Early paralytic symptoms; heavy feeling in the back of the head; retraction of the abdomen; obstinate constipation; somnolency; emaciation; contraction of the limbs; colic; limbs feel too heavy to be moved.

Rhus tox.—Vertigo, with heavy, bruised feeling in the brain, extending to the ears and back of the neck; vesicular eruptions on the face and upper part of the body; great restlessness, with aching pains in the limbs; bruised feeling in the back and limbs; somnolency; bleeding at the nose; dry cough, with perhaps bloody sputa.

Veratrum alb.—Violent headache, with delirium; vomiting, with convulsive shocks in the head as soon as the latter is raised; stiffness of the neck, with bursting sensation in the head, and choking in the throat; face pale, cold, and cadaverous looking; head thrown back, and rolling from side to side; convulsions, with loss of sense and motion; coldness and numbness in the limbs; watery diarrhœa, attended with collapse.

Veratrum vir.—Loss of consciousness, with coldness of the surface, slow, irregular and feeble pulse, and general prostration of the vital power; vertigo, with dimness of vision, dilated pupils, and vomiting; severe pain in the neck and shoulders; sudden spasmodic action of the muscles of the face and limbs; convulsive twitchings, as from electric shocks; opisthotonos, with trismus; trembling of the whole body; pulse frequent and feeble.

Zinc.—Retarded convalescence; coldness of the body; prostration of the vital power, with profuse and easy sweating; trembling and twitching of the hands and feet; priapism; dysuria; flatulent colic; constipation; weak, watery eyes; flushes of heat in head and face; weak memory.

CHAPTER VI.

HÆMORRHAGIC PACHYMENINGITIS.

SYN.: *Hæmatoma of the Dura Mater.*

THIS is a peculiar form of chronic inflammation of the internal layer of the cerebral dura mater, resulting in the formation of false membranes from which originate repeated attacks of hæmorrhage, the latter constituting what is called *hæmatoma duræ matris*.

Symptoms.—There are two stages in the history of this disease. The first is characterized by an intense headache, generally most severe at one particular point, which is frequently the vertex. Other less distinctive symptoms belonging to this stage are: more or less vertigo, mental confusion, uncertainty of movement, restlessness at night, contraction of the pupils, and occasionally, fever and convulsions, the latter especially in the case of children, in whom the disease generally pursues a far less chronic course than it does in adults. The second stage, which includes the whole period from the first effusion of blood until the termination of the case, is characterized at first by a more or less rapid increase of mental hebetude, which gradually, but in an intermitting manner, passes from a state of somnolency to that of coma; the rapidity depending, of course, on the rapidity of the effusion. The headache continues permanently fixed, the pupils contracted, and, whilst the patient is conscious, the vertigo and other brain symptoms more marked and troublesome. Thus we may have facial palsy, stammering, loss of voice, aphasia, unsteady gait, a voracious appetite, and constipation. When the hæmatoma is unilateral we may have hemiplegia, more or less complete. At last, when the sac gives way, and the

hæmorrhage from the ruptured cyst spreads into the surrounding tissues, the symptoms of apoplexy, if not already fully developed by the previous pressure of the hæmatoma, now show themselves, producing complete loss of consciousness, hemiplegia or general paralysis, distortion of the face, difficulty of swallowing, great oppression of breathing, and finally death, which may or may not be preceded by delirium and convulsions. The duration of this stage, in the case of children, is usually only a few days; whilst in adults it may continue for weeks and months.

Morbid Anatomy and Pathology.—The first thing observed in these cases, according to Virchow, who made a special study of the disease, is hyperæmia of the dura mater of the brain, especially of that portion of it which corresponds to the convexity. This leads to the formation of a false membrane on the internal surface of the dura, which at first is extremely thin, soft, and delicate, resembling somewhat the appearance of a spider's web. This membrane afterwards varies in consistence according to age, and is separable into two or more layers, sometimes even as many as twenty, each traversed by numerous fine blood-vessels. Owing to the great number and extreme delicacy of these newly-formed vessels, they are especially liable to become ruptured, and the effused blood, pressing upon the several layers of which the false membrane is composed, forms with it an organized sac, into which the subsequent effusions of blood are poured; or the blood may be effused between the layers in one or more places, thus forming one or more simple or loculated cysts. The cysts adhere externally to the dura mater; internally they rest upon the arachnoid, covering the convolutions, which they compress and atrophy. They are generally situated near the middle line of the convexity, the general membrane of the hæmatoma often extending symmetrically on both sides. The contained blood is either in a liquid or a coagulated condition, and exhibits in different cases every stage of degeneration, according to the age of the hæmatoma.

These views of Virchow, though generally received by pathologists, have been recently opposed by Huguenin and

others, who contend that the older doctrine, namely, that the hæmorrhage precedes the formation of the false membrane, is the correct one, and that the dura mater is not primarily inflamed, as Virchow asserts. At present, therefore, the pathology of the disease cannot be considered as definitely settled; one party regarding the disease as a chronic pachymeningitis, and the other as a truly hæmorrhagic affection.

Causes.—Hæmatoma generally occurs after fifty years of age, and is much more common in men than in women. It is, however, met with at all ages, especially in early childhood, when it is almost as frequent as in advanced life.

The disease is seldom, if ever, met with in healthy individuals, but chiefly in those whose constitutions have become impaired by intemperance or old age, or weakened by such debilitating diseases as scurvy, delirium tremens, Bright's disease of the kidneys, anæmia, hæmophilia, diseases of the chest, etc. It also occurs in the subjects of insanity, and in persons who have suffered from a previous injury to the head.

Diagnosis.—The diagnosis of hæmorrhagic pachymeningitis, or hæmatoma of the dura mater, is a matter of great difficulty, and can seldom amount to more than a mere probability, as the symptoms are common to the various forms of cerebral and meningeal hæmorrhage, as well as to other varieties of head trouble. Moreover, the disease is frequently associated with other cerebral disorders, the symptoms of which, occurring as they do simultaneously with those of the hæmatoma, often so modify or overshadow the latter as greatly to obscure the secondary affection. Those cases, however, where, after a period of headache, the symptoms of coma slowly supervene, and where at the same time there are no symptoms of any other form of localized injury to the brain or its membranes, we may reasonably refer to this category, especially if they occur in the aged, and are associated with a broken-down state of the system. Infantile hæmatoma is liable to be mistaken for tubercular meningitis, but the history of the case, and a careful comparison of all the symptoms of the two diseases, will generally lead to a correct diagnosis.

Prognosis.—The prognosis, though extremely unfavorable,

is not altogether hopeless, at least in the case of adults, as a number of cases are on record in which the symptoms of hæmatoma were present, and yet the patients recovered.

Treatment.—Rest, cold to the head, and the homœopathically indicated remedy, constitute the *summum bonum* in every case. We can therefore add nothing to the therapeutic measures already given under the head of *Cerebral Hæmorrhage* (q. v.).

CHAPTER VII.

CHRONIC HYDROCEPHALUS.

SYN.: *Dropsy of the Brain.*

THIS disease may be defined to be, a gradual effusion of serous fluid into the ventricles of the brain in such quantity as to distend them, and thereby enlarge the head. This definition purposely excludes those cases where the fluid has been found within the so-called cavity of the arachnoid, and which have probably resulted from an accidental rupture of the ventricular walls; and also those cases where serum has accumulated beneath the arachnoid as a sequence of cerebral atrophy or wasting—secondary affections which will be considered in the next chapter.

Symptoms.—The disease is both congenital and acquired. Extra-uterine cases generally begin to manifest themselves during infancy, or soon after birth, before the cranial bones have become permanently united. In certain rare instances, however, the head commences to enlarge after the sutures have united; up to, and even beyond, the period of middle life.

The earlier symptoms may precede the beginning of the enlargement, and *vice versa*. In the former case, symptoms more or less resembling those of acute hydrocephalus set in, and are soon followed by a perceptible enlargement of the head; or, the irritative symptoms abate and become more or less chronic before the head commences to enlarge, so that for a time the practitioner may be in doubt as to the real nature of the disease. Sooner or later, however, the enlargement begins to manifest itself; and as this continues gradually to increase—even though, as sometimes occurs, no other symptom may show itself for a considerable period—there can no longer be

any room for doubt. The disease is now not only quite manifest to the eye, but the patient has a somewhat uncertain and tottering gait, which is often characteristic of the affection, especially in the case of children. As the disease advances, the child becomes dull and peevish; tremors of the limbs set in, so that he can no longer walk; the senses gradually fail; there is more or less insensibility of the skin; taste becomes perverted and weak; the sense of smell is diminished; dimness of vision follows; and finally hearing itself fails. The digestive functions generally remain longer unimpaired, but they, too, at last become involved; vomiting occurs, and emaciation, notwithstanding an increase in the amount of food, is likewise produced. Costiveness and scanty urine are also attendant symptoms. At last, symptoms of paralysis set in, the eyes are turned to one side, the pupils are dilated, and vision is either greatly impaired or becomes extinct. The rectum and bladder become implicated, so as to lose all control over their contents. Finally, after successive attacks of spasms and convulsions, the paralysis becomes complete; suffocative fits occur, during which the breathing becomes labored and stertorous; insensibility follows; the pulse becomes small, feeble, and intermitting; and death finally closes the scene.

Such is the general history of most cases; but sometimes, owing to a fall or blow upon the head, or some other cause, convulsions occur at a much earlier period; or it may be that apoplectic symptoms, such as coma and paralysis, take precedence of all other phenomena. This is especially apt to be the case in adults, owing to the unyielding condition of the cranium. Moreover, complications are liable to occur, resulting perhaps from the presence of a cerebral tumor, or some other primary intracranial affection, and then the symptoms will be correspondingly modified. Thus, if under these circumstances we make an ophthalmoscopic examination of the fundus of the eye, we may find, even at a comparatively early period of the disease, a well-developed optic neuritis; a condition which in these cases will sooner or later terminate in amaurosis or true blindness.

Morbid Anatomy and Pathology.—The bones of the cra-

nium are found in one of two conditions, either with the fontanelles open and the sutures widely separated, or else with the sutures, and perhaps the fontanelles also, completely closed. The latter may represent cases which have become stationary, or more than usually chronic; but of this we have no certain evidence. The bones of the cranial vault are generally more or less thinned or atrophied from pressure, but this is not always the case; on the contrary, they are sometimes thickened, and that, too, even in children. As the bones of the face usually remain firmly united, whilst those of the vault are widely separated from each other, the head generally presents a peculiar wedge-shaped appearance, especially when the enlargement is extreme. In these cases the forehead is so prominent as to overhang the face, whilst the eyeballs are deeply sunk in their sockets; and as the face is either unchanged or more or less emaciated, the disproportion between them is so remarkable as to make the expression highly characteristic of the disease (*facies hydrocephalica*).

The amount of fluid contained within the cranium is sometimes enormous, amounting in one case, it is said, to twenty-seven pounds. In this case, although the child was only sixteen months old, the head measured fifty-two inches in circumference. Where the head is so large as to be greatly disproportioned to the size or age of the child, of course it cannot be maintained in an upright position without the aid of the hands or of some artificial support. Generally, this is not attempted, but the child is kept in a horizontal or recumbent position.

As the ventricles become more and more distended by the gradually accumulating fluid, the hemispheres slowly expand, the convolutions unfold, and the whole cerebral mass becomes thinned and distended, until at last it resembles a mere bag of brain-matter filled by the expanded ventricular membranes and their fluid contents. At the same time, both the membranes and the brain substance, instead of becoming softer and less compact, are rendered tougher and more dense, the lining membrane of the ventricles thicker and more resisting, the brain-matter tougher than natural. Possibly this may be

due in some cases, in part at least, to previous inflammatory action, but numerous post-mortem examinations prove conclusively that this cannot always, nor even generally, be the case; for whilst the brain substance rarely shows signs of atrophy, there is apparently an overgrowth of the neuroglia—the result probably of the long-continued mechanical congestion of the tissues. That this explanation is the true one, appears evident also from the fact that no other signs of inflammation are to be found in these cases, except in a few rare instances, where the presence of a tumor or some other intracranial affection affords a sufficient explanation of its existence.

Causes.—We have just referred to one of the supposed causes of chronic hydrocephalus, namely, inflammation of the lining membrane of the ventricles. The disease may also be an occasional sequela of acute hydrocephalus (*tubercular meningitis*), but as there is no absolute proof of this, we can only regard it as a probable supposition. A third and doubtless much more frequent cause of the dropsy, is to be found in the mechanical congestion of the great veins of Galen by the pressure of tumors and other morbid growths upon the straight sinus, as this would have a direct tendency to produce the congestion in question. The disease, though generally confined to children, is occasionally met with in adult, middle, and more advanced life. Congenital cases are comparatively rare; and owing partly to mechanical violence, and, in some cases, to defective development of the cerebral mass, generally prove fatal at the time of birth.

Diagnosis.—After the head begins to enlarge there can generally be no difficulty in recognizing the disease at once, but previous to this period it can only be a matter of conjecture. When the enlargement is inconsiderable the practitioner, in forming a diagnosis, should take into consideration the shape of the head, as well as the general character of the symptoms, since the heads of healthy children often vary considerably in point of size, and what might justly be regarded as a large head in the offspring of some parents, would only be of natural, or even small dimensions in that of others.

Prognosis.—Although chronic hydrocephalus is generally

fatal, sooner or later, it is not always so. A considerable number of cases live a good many years after the setting in of the disease; whilst a few even appear to have recovered. As a general rule, however, death takes place within one or two years. Sometimes the disease is stationary for a considerable period, and then perhaps it will make rapid progress again, so that it is difficult to say, in any instance, whether medicine has had any curative influence over it or not. Death commonly occurs from exhaustion; but sometimes the patient is carried off by convulsions, or by some intercurrent disease, as pneumonia or pleurisy.

Treatment.—This may be either general or local. Local treatment has in the great majority of instances been productive of more harm than good. Tapping is claimed to have permanently relieved a few cases, but the ordinary result of the measure, as might have been anticipated, has been to hasten, and sometimes to cause a fatal termination, by exciting inflammation of the brain and its membranes. Compression has also for the most part either proved entirely nugatory, or else has been attended with dangerous consequences from compression from both the brain and the pericranial vessels.

Special Indications.—*Arsenicum*.—Swelling, particularly of the head and face; vomiting on being raised up in bed; impairment of the special senses; emaciation and muscular weakness; constipation; retention, or involuntary discharge of urine; anxious and oppressed breathing at night, or when in bed; thirst; the child strikes its head, as though for temporary relief.

Calcareo carb.—Scrofulous swellings; old, pale, and haggard expression of countenance; face swollen or puffed; great weakness of the limbs; spasms and convulsions; small, feeble pulse; suppression of urine; paralysis; anterior fontanelle wide open; head very large; copious perspiration on the head and shoulders, especially when sleeping.

Calcareo phos.—Head greatly enlarged; face pale, sallow, or yellowish; look stupid; eyes turned to one side; ears and nose cold; posterior fontanelle fails to close; child unable to

hold up its head; takes no interest in anything; always worse about sundown.

Helleborus.—Dulness of the senses; somnolency; face pale and sallow; limbs tremble from weakness; tottering gait; spasms and convulsions; suppression of the urine; paralysis; strabismus; forehead covered with a cold sweat; dilated pupils; passive congestion of the brain and its membranes, with serous effusion.

Kali iod.—Scrofulous constitutions; dilated pupils; blindness; pains in the head, especially in the occiput; stupor, with labored and irregular respiration; emaciation and prostration; urine suppressed; paralysis; intercurrent pneumonia; cerebral congestion, with serous effusion; symptoms aggravated at night.

Lachesis.—Symptoms of apoplexy, attended with paralysis; head enlarged, heavy, and painful; pain worse about the occiput; vertigo; dulness of sight; mental hebetude; tendency to fainting; convulsions, with coldness of the feet; face sunken; moaning during coma; difficult deglutition.

Mercurius.—Great restlessness; enlargement of the head; impairment of the special senses; spasms and convulsions; paralysis; dilated pupils; collapse of the system.

Plumbum.—Heaviness of the head from dropsy of the brain, with pressure as though the skull was too full; emaciation, with trembling of the limbs; restlessness and sleeplessness, or somnolence with dulness of the senses; weariness and increasing debility; nausea and vomiting; obstinate constipation; retention, or involuntary emission of urine; spasms, convulsions, and paralysis; pulse small and frequent, or slow and feeble.

Phosphorus.—Dull and inclined to somnolency; coldness of the extremities; child vomits as soon as the drink becomes warm in the stomach; stool voided with difficulty; convulsions, followed by collapse; pneumonic symptoms; very restless, and always worse after sleep; great weakness, so that he has to lie down; emaciation; paralysis, with difficult respiration and fear of suffocation.

Psorinum.—Stuporfaction and mental dulness from cerebral

congestion; aversion to having the head uncovered; anxious dyspnœa, worse when sitting up; painful pressure in the occiput; profuse sweating when asleep or on making the least exertion; vertigo with headache; ulcers on the legs; extreme prostration; trembling of the limbs from weakness; scrofulous subjects.

Silicea.—Head enlarged, and feeling as if it was filled with living things; dulness of the senses; face pale; stool and urine suppressed; suffocative breathing; great prostration and muscular weakness; convulsions; numbness, with paralytic weakness of the limbs; scrofulous constitution.

Sulphur.—Especially valuable as an intercurrent remedy, especially in scrofulous subjects; head enlarged; gait tottering; dulness of the senses; face pale and emaciated; constipation; retention of urine; paralysis.

Zincum met.—Head enlarged, with great outward pressure; stupefying headache, with dulness of the senses; restlessness, especially at night, with frightful dreams; vertigo, with sudden obscuration of sight; sudden loss of consciousness, with coldness of the body, small, weak pulse, oppression of breathing, and great prostration; tremor of the limbs, with sense of heaviness in them; constipation; nausea with trembling; cerebral paralysis; symptoms worse in the afternoon and evening.

CHAPTER VIII.

FOREIGN PRODUCTS.

HAVING in the respective chapters on *cerebral tumors* and *syphilis* (q. v.) treated in detail of the various *new growths*, not only of the cerebrum itself, but also of its membranes—including the important subjects of *cancer*, *tubercle*, and *syphilis*—it only remains for us here to discuss certain adventitious products belonging more especially to the cerebral membranes.

1. **Serum.**—This fluid, as we have just seen, is present in the greatest quantity in chronic hydrocephalus. We also meet with it in excess in two other conditions. First, within the so-called cavity of the arachnoid (*external hydrocephalus*), or, what is the same thing, between that membrane and the epithelial lining of the dura mater. It is difficult to account for its presence in this situation, unless we regard it either as the result of a previous chronic inflammation of the inclosing membranes, or else as having escaped in some manner from the ventricles during an attack of internal hydrocephalus. The latter supposition is the more probable, at least in the majority of instances. (See *Chronic Hydrocephalus*.)

Secondly, the fluid is met with beneath the arachnoid, or between that membrane and the pia mater, in cases where the cerebral convolutions have become atrophied from pressure or senile degeneration. To this class, also, belong those cases sometimes met with in old people who have died suddenly from what is called “serous apoplexy”—a misnomer arising from mistaking the effect for the cause. For the excess of serum beneath the arachnoid in these cases doubtless results, not from vascular congestion, but from an exosmosis caused by the shrinkage of the cerebral convolutions in senile atrophy.

2. **Thrombi.**—Thrombosis of the cerebral sinuses occurs for the most part in two situations, namely, in the longitudinal sinus, and in the lateral sinuses.

a. The symptoms of *thrombosis of the longitudinal sinus* are extremely variable and uncertain; for whilst œdema of the frontal veins, exophthalmus, epistaxis, and even insanity, have been attributed to this cause, instances are on record where the longitudinal sinus has been found entirely blocked by a thrombus, without having given rise to any recognizable symptoms during life. In other cases, on the other hand, in addition to the symptoms already mentioned, abscesses have been formed in different parts of the body. This is explained by the fact that the thrombus sometimes sets up an inflammatory action in the sinus, in consequence of which pus gains access to the general circulation, and thereby leads to the formation of abscesses in remote parts.

b. The symptoms attending the formation of a thrombus in one of the lateral sinuses, are just as indefinite and unreliable as in the case of the longitudinal sinus. Thus, Gerhard* attributes to this cause a difference in the size of the external jugular veins, that of the affected size being smaller than the other; whilst Prichard† and others have reported cases of the kind attended by delirium, convulsions, coma and paralysis. It appears, therefore, that thrombus of the cerebral sinuses is not accompanied by any such characteristic symptoms as will identify the disease, or lead to anything more than a mere suspicion of its existence.

It sometimes happens that a thrombus of the longitudinal sinus becomes prolonged through the straight sinus to the torcular Herophili, and thence into one or both of the lateral sinuses. In these cases more or less extensive softenings of the brain are apt to be produced. These sometimes consist of small superficial patches, of a reddish color, in the cerebral cortex; but occasionally they embrace considerable portions of the brain substance. Ventricular and subarachnoidean

* *Deutsche Klinik*, 1857, No. 45.

† *Treat. on Dis. of Nerv. Sys.*, London, p. 176.

effusions of serum also occur, as well as capillary hæmorrhages; the latter are likewise occasionally found in the grey matter of the hemispheres.

Thrombosis of the lateral sinuses is generally secondary to caries of the cranial bones, or to the extension of inflammation from the cerebral tissues to the sinuses. Suppurative otitis is a prolific cause of the affection, no less than three-fourths of the recorded cases being referred to this origin. Thrombosis of the longitudinal sinus, however, may result from any cause capable of retarding the general circulation, or of rendering it slow, feeble, and irregular, as this favors the coagulation of the blood in the veins and sinuses. This is especially true of those diseases which obstruct the flow of blood from the head, such as tumors of the neck, or excessively developed Pacchionian bodies, which have been known to project into the sinus. Old age appears to favor the production of meningeal thrombi, especially the primary form; they are not, however, by any means confined to the aged, but are also met with in the early as well as in the middle periods of life.

3. **Parasites.**—These are known as *cysticerci* and *hydatids*. They are both larval forms of different species of tape-worm.

(a) *Cysticercus* is the larval state of *Tenia solium*. It has the appearance of a small bladder, and is about the size of a pea or bean. It is situated for the most part in the grey or cortical substance of the brain, but is sometimes found in the meninges. Griesinger, who examined upwards of fifty cases, found the symptoms exceedingly variable, and occasionally entirely wanting. In the former class, the leading symptom is epilepsy, either with or without mental disturbance; but sometimes the mental disorder may exist without giving rise to epilepsy. But since there is nothing peculiar about either the epilepsy or the psychical phenomena in these cases, it is scarcely possible to found a diagnosis upon them. This is of less importance, however, since they are comparatively short-lived, calcareous degeneration setting in within eight months or less from the time of their first appearance. Infection is probably due to the eating of "measly" pork in a raw or in-

sufficiently cooked condition—the so-called pork-measle being specifically identical, according to most authorities, with the form usually found in man. Dr. Giacomini, however, says that the human measles commonly carries thirty-two cephalic hooks, whilst the pork-measle displays only twenty-four.

(β) *Hydatids* are larval states of *Tenia echinococcus*, a minute tape-worm infesting the alimentary canal of the dog and wolf. As met with in the brain, they are always in the aborted or sexually immature condition (*acephalocysts*). They vary in size from that of a small grape up to a large apple or orange. Usually they are solitary; but sometimes several exist in the same brain. Out of seven hundred cases in the human subject collected by Devaine and Cobbold, six per cent. were intracranial. Out of twenty-four recorded cases in which the age was stated, Bastian found that no less than eighteen of them were persons between the ages of ten and thirty years; of the remainder, three were above and three below these extremes.* The fondling of dogs is doubtless a fruitful means of infection; and so, also, is the drinking of water or the eating of salad contaminated by the ova voided by these animals. When we remember that nearly one-sixth of all the inhabitants dying in Iceland fall victims to hydatids, and that the disease is rapidly on the increase in our own and other countries, it becomes a serious question whether any one is justified in making a household pet even of so noble an animal as the dog.

Prognosis.—The peculiar circumstances attending each case must be considered in forming a prognosis; for, as we have seen, some of these adventitious products are not always accompanied by grave symptoms, whilst others sometimes exist without giving rise to any serious or even recognizable disturbances. Moreover, in the case of hydatids, it is not impossible for a spontaneous cure to take place. Nevertheless, as a general rule, foreign products within the cerebral membranes are attended with the most serious consequences to the health, and eventually, also, to the life, of the patient.

Treatment.—Medical treatment, in these cases, generally

* Quain's *Dic. of Med.*, p. 755.

resolves itself into the relief of individual symptoms, that is to say, it is merely palliative. There can be no specific curative treatment, homœopathic or otherwise, for those suffering from the existence of intracranial parasites, or from the occurrence of thrombi in the longitudinal or lateral sinuses. We may be able to mitigate to some extent the severity of convulsions, relieve headache, and promote sleep in such cases, but more than this we are not likely to accomplish. The proper remedies to meet these several indications, will readily suggest themselves to every practitioner.

SECTION III.

SYMPTOMATIC AFFECTIONS.

CHAPTER I.

CEPHALALGIA, OR HEADACHE.

HEADACHE is a symptomatic affection in every sense of the word. It may or it may not be associated with structural changes in the head or elsewhere, but it is nevertheless a functional disturbance, dependent upon some physical or mental condition of which it is a *symptom*, and not the disease itself. Such, however, is its prominence in many cases, coupled with the fact that it oftentimes constitutes the only symptom of which the patient complains, that it even takes high rank as a distinct affection, and is justly entitled to receive special consideration at our hands.

Varieties.—Headache presents numerous varieties, which may be classified as follows :

1. *Accession.*—Sudden, gradual, etc.
2. *Intensity.*—Slight, moderate, severe, etc.
3. *Character.*—Dull, sharp, stinging, shooting, cutting, stupefying, etc. The headache may be simple, or associated with other symptoms, such as vertigo, disorders of vision, derangement of the stomach, etc.
4. *Duration.*—Continual or periodic; intermitting, remitting, weekly, monthly, etc. It may be momentary, or it may last many hours, days, or months.
5. *Location.*—Superficial or deep-seated; general, more or less

diffused, or confined to particular parts of the head, as the forehead, temples, vertex, occiput, etc.

6. *Nature*.—Congestive, anæmic, nervous, toxæmic, etc.

(*a*) *Species*.—Rheumatic, syphilitic, menstrual, hysterical, neuralgic, etc.

(*β*) *Clavus*.—Limited to a particular spot, with the sensation as of a nail being driven into the head at that point.

(*γ*) *Hemicrania*.—Limited chiefly to one side of the head, and of a nervous character.

For convenience of reference, we shall treat of the several kinds of headache under their respective names.

1. CONGESTIVE HEADACHE.

Many forms of headache are attended with a greater or less degree of cerebral hyperæmia, but only those are entitled to be regarded as congestive, that depend upon an increased fulness of the vessels of the brain. They are of two kinds. In one the congestion is active; in the other, passive.

In the active form, the pain is of a throbbing, pulsative character, and may be either sharp or obtuse. It may be general, involving the whole brain, or it may affect only a part of the head, as the forehead, vertex, occiput, etc. There is in these cases usually more or less flushing of the face, ringing and throbbing in the ears, glistening of the eyes, sensitiveness to noise and light, and vertigo or giddiness, especially on stooping. The condition may be caused by a plethoric state of the system, menstrual irregularities, emotional excitement, excessive mental exertion, hypertrophy of the left ventricle, and many other influences.

In the passive form of congestive headache, the pain is usually of a dull, oppressive character, and is attended by a sense of fulness or distention, and by a tendency to stupor. Vertigo is generally present, and not unfrequently there are slight mental irregularities, such as illusions, delusions, and hallucinations. But the tendency to somnolency is the most marked and characteristic symptom. Sleep, even when most natural, is apt to be accompanied by frightful dreams. When

caused, as it frequently is, by debility or exhaustion, the pain is usually in the top of the head, or across the forehead. When produced by leucorrhœa, diseases of the uterus, etc., the pain is generally in the vertex or occiput. Congestive headaches of a passive character may also be caused by any condition or affection which impedes the return of blood from the head, such as tight collars, tumors in the neck, valvular defects of the heart, dilatation of the right ventricle, dyspnœa, deficient action of the liver, constipation, drunkenness, a dependent position of the head, etc.

Special Indications.—*Aconite*.—Cerebral congestion in sanguine or plethoric persons, especially when characterized by violent, unbearable, or stupefying pains, chiefly in the temples and forehead; also when there is fever, with nausea and vomiting; excessive sensibility and fearfulness; intolerance of light, noise, or touch; burning headache, as if the brain were too hot; throbbing and piercing pains in the forehead, temples, and top of the head.

Agaricus.—Headache with fever and delirium: dull oppressive pains, chiefly in the forehead, causing the patient to close his eyes; disposition to constantly move the head to and fro; vertigo, especially when brought on by excessive mental exertion; nervous twitchings about the face and head.

Ailanthus.—Headaches characterized by fulness of the head, with burning pains, heat, darting in the temples and occiput, vertigo, and nausea; severe headache, with dizziness, and hot, red face; darting pains through the temples and occiput, with mental confusion; vertigo when stooping.

Aluminum.—Headache attended by congestion of blood to the head and face, heavy, oppressive feeling in the forehead, rush of blood to the eyes and nose, or with nausea and epistaxis; throbbing frontal pains, worse on movement, especially on going up stairs; amelioration from pressure.

Ammonium carb.—Congestive headache characterized by beating, pulsating, and pressing pains in the forehead and top of the head, feeling as though it would burst; nausea, especially in the morning before rising; rush of blood to the head; aggra-

vated by eating, or by walking in the open air; ameliorated by pressure; fat persons who lead sedentary lives.

Amyl nitrite.—Congestive headache attended with heat and violent throbbing in the head, and accompanied with a feeling of intense fulness, as though it must burst; flushing of the face, with visible pulsation in the carotids, which extends to the head and temples; aggravated by motion, and by being in a warm room.

Apis mel.—Headache attended by congestion to the head and face; sense of fulness in the head, accompanied by vertigo and heaviness; burning, throbbing headache, aggravated by motion, and ameliorated by temporarily pressing the head with the hands, or with a tight bandage.

Arnica.—Congestive headache in sanguine plethoric subjects; aching, darting, and pressive pains, mostly in the forehead; pressive headache, feeling as though the head were being distended; burning on top of the head and in the brain; vertigo, especially when walking; headache aggravated by motion and by mental exertion.

Asclepias syrica.—Congestive headache, with vertigo, dullness, and somnolency; violent headache accompanied by extreme nausea; urine scanty. Adapted to cases of passive congestion, especially where the headache has been caused by suppressed perspiration.

Atropine.—Headache attended by flushing of the face, rush of blood to the head, and tendency to bleeding at the nose; aggravated by motion, especially walking or stepping. This remedy is especially valuable in cases where Belladonna has been tried and failed, or only afforded temporary benefit, though apparently indicated by the symptoms.

Belladonna.—Congestive headache accompanied by red, bloated face, injected eyes, vertigo, sensitiveness to light, noise, or contact, and with tendency to stupor; pressive frontal headache almost closing the eyes, and feeling as if the brain would be pressed out; violent throbbing in the head, with pains extending in every direction; great fulness, and violent expansive pains, feeling as though the head would split open, or as if the contents would be forced through the head, espe-

cially the forehead; carotids throb violently and the jugular veins are swollen; loss of consciousness; pain aggravated by stooping, or rising from a stooping position.

Bryonia.—Headache attended by rush of blood to the head, vertigo, pressure and great heaviness in the head, especially when caused by derangement of the stomach; heat in the head, with burning pains in the forehead; vertigo and mental confusion on the least motion; nausea and vomiting; worse after eating, in the evening, and on stooping.

Cactus grand.—Headache from congestion to the brain, especially when accompanied by, or dependent on, cardiac disturbances; eyes red and injected, face flushed, and sensitive to light and noise; sense of constriction about the heart, as if held by an iron hand; palpitations of the heart, attended by headache, and aggravated by mental emotion; pulsations in the head, especially in the temples, and accompanied by a bursting feeling, as though the skull would give way.

Caladium.—Headache, with heat in the head, which ascends from below and becomes an internal, burning heat; pressive headache after dinner; bursting headache, especially in the forehead; stupefying pressure in the right temple on waking; vertigo, with confusion and whirling sensation in the head.

Calcarea carb.—Congestive headache, associated with an impoverished condition of the blood; the pains are chiefly felt in the forehead, vertex, and sides of the head; throbbing pains in the middle of the brain, lasting all day; stupefying, oppressive headache in the forehead; pains, accompanied by nausea, vomiting, anxiety, difficulty in thinking, and dimness of vision; worse from mental exertion, talking, walking, or going up stairs; ameliorated by tight bandaging, vomiting, lying down, and from cold applications to the head.

Camphor.—Congestive headache, characterized by throbbing, which beats like a hammer in the occiput; head hot, face red, but limbs cool; anxiety, with great restlessness; frontal headache, pressing outward; vertigo, with heaviness in the head; pains excited and aggravated by motion.

Capsicum.—Headache, accompanied by a sensation of fullness in the head; throbbing, pressing, and tearing pains;

pains chiefly in the forehead and temples ; sensation as if the head would burst ; vertigo, with nausea and vomiting ; confusion of the head, and mental dulness ; burning in the eyes, with redness and lachrymation ; amelioration from warmth, and from lying with the head elevated.

Carbo an..—Headache of a congestive character, attended by heat in the head, vertigo, confusion of thought, and throbbing, bursting, or pressing pains, chiefly in the forehead and top of the head ; vertigo, with nausea, dimness of vision, and prostration ; ameliorated by pressing the hands upon the vertex, or going into the open air.

Carbo veg..—Pressing, throbbing pains in the head, especially over the eyes ; beating headache in the afternoon ; heat and pain in the forehead, with confused feeling in the head, relieved by epistaxis ; vertigo, especially on stooping. Suitable to weak, cachetic, and aged people, and also children, especially after exhausting diseases.

Causticum..—Headache, with sensation of heat and fulness in the head ; throbbing, tearing pains, chiefly in the vertex, spreading to the forehead and sides ; pain occurs in paroxysms, moving forward ; accompanied with nausea, palpitation of the heart, and hurried respiration ; rush of blood to the head, with vertigo and anxiety ; aggravated by stooping, reading, shaking the head, and in the evening ; ameliorated in the open air, and by applying cold water to the head.

Chamomilla..—Headache of a pressive character, the pressure extending from the top of the head to the forehead and temples ; pressure increasing and decreasing, especially in the right half of the brain ; pressing headache as from a stone in the head, worse in the evening ; vertigo, with a tendency to faintness ; pains aggravated by mental exertion and by sudden stooping.

China.—Congestive headache in anæmic individuals, or from loss of animal fluids ; violent pressive headache deep in the brain ; pressure from within outward, especially over the eyes ; intense throbbing headache coming on after the loss of blood ; headache following sexual excesses or onanism ; ameliorated by hard pressure and by lying down.

Cimicifuga.—Congestive headache, especially of a passive character; constant dull pain in the head, beginning in the occiput and extending to the vertex; dull frontal headache, relieved by pressure; severe pain in the eyeballs, extending into the forehead, and increased by any movement of the head or eyes; intense throbbing pain, as if a ball were driven from the neck to the vertex with every throb of the heart; rush of blood to the head, with vertigo, impaired vision, dulness, and aching fulness in the vertex; aggravated by movement; ameliorated in the open air and by pressure.

Cocculus.—Tearing, throbbing headache, especially in the evening; a violent headache which compels the patient to sit up, aggravated by talking, laughing, noise, or a bright light; noise excites vomiting; ameliorated by quiet and warmth.

Cuprum.—Headache with fulness, heaviness, and dulness; congestion to the head, with convulsions; face purplish-red; vertigo when looking upward, with vanishing of sight, as though a mist was before the eyes; delirium, fearfulness, coldness of the limbs; aggravated by motion, pressure, and even contact.

Digitalis.—Throbbing headache in the forehead; pressure in the forehead and temples, or in the whole head, disappearing and reappearing periodically in different parts; headache, pressure and weight, as if caused by congestion of blood to the head; fainting fits with inclination to vomit; vertigo, with anxious sensation, as if fainting would occur; pulse irregular or intermitting, and excited by the least movement or emotion; worse also when exerting the mind, or when in a warm room. Especially suited to cardiac complications.

Dulcamara.—Dull, heavy, stupefying headache, aggravated by the least movement, or by speaking; congestion to the head, with buzzing in the ears, and dulness of hearing; condition aggravated by cold and damp weather, and especially by getting the feet wet; ameliorated by lying down.

Ferrum acet.—Congestive headache in anæmic persons, or those who have lost much blood, or other animal fluids; hammering and throbbing headache, especially in the frontal region; feeling as if the head would burst; rush of blood to

the head, with swelling of the veins of the head, and slight flushes of heat; severe frontal headache, with cold feet.

Fluoric acid.—Congestion of blood to the head, especially the forehead; severe pressing pain in both temples from within outward; vertigo with nausea, heat and pain in the head; sensation of numbness in the head, with heaviness and compressive pains; heaviness above the eyes, with nausea, aggravated by motion.

Gelsemium.—Headache associated with stupor and heaviness; sense of weight and pressure in the head; excruciating headache, accompanied by slight nausea; pain most frequently in the occiput, or else in the forehead and temples; heaviness of the head, alleviated on profuse emission of urine; intense congestion of the brain in children during dentition; great heaviness of the eyelids; disposition to sleep, with great prostration of the whole muscular system; aggravated by lying down, or by bandaging; ameliorated by bending the head forward or backward, or by shaking it.

Glonoin.—Great heat and throbbing in the whole head, especially in the temples and over the eyes; pressive pain from within outward in both temples; extreme congestion in the head, with red face, and violent beating in the temporal arteries; brain feels as if moving in waves and expanding itself; vertigo during and after stooping, lasting several minutes, with nausea; congestion to the head and face, with redness of the eyes, and roaring in the ears; aggravated by shaking or jarring the head, stooping, mental exertion, or wine; ameliorated in the open air and by pressure:

Gratiola.—Congestive headache, with fulness and heaviness in the forehead, throbbing in the temples, burning in the face, and vertigo with nausea; rush of blood to the head, with throbbing in the forehead; vertigo, with black before the eyes, aggravated by motion; heat in the head after rising from a stooping posture.

Gymnocladus.—Feeling of fulness in the head, with throbbing in the forehead and temples, and accompanied with heat in the face, pain in the eyes, and vertigo; face swollen and hot, with burning sensation, as in erysipelas; fulness and

pressure in and over the eyes, extending to the vertex; general tired feeling, with numbness of the body; worse in the evening.

Hamamelis.—Headaches resulting from passive congestion of the venous system generally, especially in the lungs and portal system; flushing of the face, with throbbing, aching, and sense of fulness in the head, which feels as though it would burst; bursting headache, aggravated by bending forward; passive congestion of brain, accompanied by vertigo, nausea, and tendency to epistaxis; bleeding hæmorrhoids.

Iodine.—Violent, almost unbearable headache, with confusion of mind; throbbing pains in the head at every motion; violent aching in the occiput; rush of blood to the head, with vertigo; palpitation of the heart; bluish lips, with swelling of the superficial veins; glandular swellings. Adapted to cases of passive congestive headaches; also to chronic cases, especially in old people.

Kali carb.—Congestive headache, with violent throbbing and hammering; aching, pressing pain in the back of the head; determination of blood to the head, producing a sense of intoxication; sensitive to noise, irritable, and peevish; giddiness with nausea; constipation; aggravated by stooping, moving the head, eyes, or jaw. Especially suited to aged people, particularly if inclined to obesity.

Kali iod.—Violent beating, hammering pains in the forehead, with a sensation as though the head were greatly enlarged; pain in the vertex as though it would burst; vertigo after meals; flushes of heat, with dulness of the mind; throbbing and burning pains in the nasal and frontal bones; swelling of the cervical glands; pains worse in the afternoon and at night. Adapted to cases arising from suppression of long-standing nasal discharge, especially in scrofulous subjects.

Lachesis.—Headache characterized by throbbing or beating in the temples, drowsiness, and nausea, especially when accompanying menstrual irregularities; severe pressing pain in the forehead, feeling as though it would give way, especially when stooping; pressure in the forehead which increases to a violent beating in the evening, with nausea and inclination to vomit;

worse in the evening or after sleeping; also from motion or from stooping.

Lachnanthes.—Congestive headache, accompanied by burning heat, with redness of the face, drowsiness, and ill-humor; head feels greatly enlarged, the head hot, and the body cold; vertigo, with sensation of heat in the chest; burning of the palms of the hands and soles of the feet; great thirst; circumscribed redness of the cheeks, especially on the right side.

Lilium tig.—Fulness in the head, especially in the temples, with outward pressure, ameliorated by compression; blinding pain in the forehead, aggravated in the evening, with strange, muddled feeling in the head, general weakness, and desire to lie down; dull frontal headache; vertigo, with confusion of mind, or wild feeling; aggravated by blowing the nose, or walking in the open air. Especially adapted to cases arising from, or accompanied by, mental irregularities.

Lycopodium.—Headache, as if the brain were loose and vacillating, and as if the bones of the head were being driven asunder; throbbing pain near the orbits, from within outward; rush of blood to the head early in the morning before rising, followed by headache; aggravated by stooping, walking, and by mental exertion; ameliorated by lying down, or by being in the open air.

Magnesia carb.—Congestive headache, with throbbing in the forehead; rush of blood to the head, especially when smoking; heat in the head and hands, with redness of the face, alternating with paleness; mental dulness; vertigo; worse towards evening, or when smoking.

Mercurius cor.—Violent rush of blood to the head, severe pain in the forehead and temples, and burning of the cheeks; face flushed, with burning in the eyes; heaviness of the head, with depression of spirits; profuse perspiration on the forehead; unquenchable thirst; aggravation at night, and also when stooping.

Natrum sulph.—Headache characterized by cerebral congestion, with sense of fulness; pressure in and through the head; heat in the top of the head; heaviness of the head, with epistaxis, not relieved by the bleeding; vertigo, with heat extend-

ing from the body to the head, relieved on the appearance of perspiration; headache, causing heat and sweat, the latter relieved by motion, but not the headache; eyes sensitive to light; dulness of the mind, and depression of spirits; headache aggravated by motion, stooping, and mental exertion. The attacks are periodical, occurring during the menses; menses late and scanty.

Naja.—Dull pains in the head, especially in the forehead and temples; heaviness over the eyes; dryness of the throat; aching, throbbing pain about the orbit, followed by vomiting; pain extending from sinciput to back of the head; congestive headache arising from organic disease of the heart; cardiac hypertrophy.

Nitric acid.—Headache caused by cerebral congestion; heat in the head, with throbbing in the temples; heaviness and dulness of the head, with nausea; sensitive to noise; worse at night, better on lying down.

Nux vom.—Heaviness of the head, especially when moving the eyes or thinking, with sensation as if the skull would split; congestive headache with nausea and vomiting, worse from coughing and stooping; headache caused or aggravated by thinking or studying, feeling as if the head would burst open; vertigo, with pain in the forehead, heat and redness of the face, determination of blood to the head, and constipation; aggravated by motion, stooping, coughing, thinking, light, noise, eating, or drinking coffee. Especially suitable for the sedentary, the intemperate, and those troubled with piles.

Opium.—Extreme drowsiness, with great heaviness of the head; tendency of blood to the head with constipation, especially in elderly persons; throbbing, beating pains in the head, especially in the temples; headache, worse on moving the eyes; vertigo, with dulness of the head and drowsiness; red, bloated face, with red, glistening, and projecting eyeballs. Especially suited to recent cases in old people, or where the symptoms have set in suddenly, with great depression of the vital power.

Phosphorus.—Chronic congestive headache, attended with burning and throbbing pains, especially in the occiput; burn-

ing pain in the forehead, with throbbing in the temples; dull, aching pain in the forehead, better in the open air; headache accompanying softening of the brain, and attended by weakness, numbness and formication of the limbs, vertigo, and slow answering of questions; head dizzy, heavy, and painful, with confusion of mind; general debility resulting from sexual abuse, or loss of animal fluids; aggravated by music, violent motion, mental exercise, and by washing in cold water.

Phosphoric acid.—Violent pressive headache, especially in the forehead; stupefying headache with somnolency; school-girls' headache, resulting from brain-fag; aggravated by the least noise, even music; also by shaking the head, and by grief. Particularly suited to those persons who have become debilitated by acute diseases, loss of animal fluids, or protracted sorrow.

Psorinum.—Rush of blood to the head, with redness and heat of the face; pressive pain in the forehead, as if the brain was too large for the skull; throbbing, hammering pain in the head, caused by mental labor; fulness in the top of the head, as if the brain would burst out; headache, with the sensation as if the eyes were being pressed out of their orbits; headaches caused by repelled eruptions; also chronic headaches which have resisted other indicated remedies, or where there is a psoric taint of the system.

Pulsatilla.—Throbbing, pressing headache, especially when caused by anæmia, or by mental exertion, and relieved by pressure; also where there are menstrual irregularities, or where the headache is the result of excessive study, rich, fat food, abuse of coffee, chamomile tea, quinine, alcoholic stimulants, or mercury; worse in the evening, or in a close, warm room; better in the open air, or by bandaging the head.

Sanguinaria.—Headache attended by rush of blood to the head, whizzing in the ears, and transitory feeling of heat, followed by nausea or vomiting; headache as if the head would burst, or as though the eyes would be pressed out; pain most severe in the forehead and temples; pain begins in the morning, increases during the day, and lasts until evening, passing off with a free flow of light-colored urine; aggravated by

motion, light, noise, and touch; ameliorated by hard pressure, quiet, and sleep.

Sepia.—Pulsating headache in the back of the head, worse from the least motion; violent pressive headache, as though the head would burst; surging sensation in the forehead, like waves of pain welling up and beating against the frontal bone; headache caused by portal congestion, or by derangement of the digestive or female sexual system; chronic congestive headache, with sensitiveness to light, and dropping of the upper lids; aggravated by motion; ameliorated by rest, darkness, and sleep.

Silicea.—Determination of blood to the head, with hot cheeks, and slight burning in the soles of the feet; pulsating, beating headache, most violent in the forehead and top of the head, with chilliness; severe pressive headache, extending from the occiput to the forehead, causing an aching in the eyeballs, which are sore and painful when revolving; worse from noise, motion, and light; better from heat, but not from pressure; better also from rest, darkness, and sleep.

Spongia.—Headache as if the head would burst, especially in the forehead and vertex; rush of blood to the head, with throbbing and pressure in the forehead; vertigo at night, or when awaking, with nausea; anxious oppression in the region of the heart; dull headache, caused by entering a warm room from the open air; aggravated by lying with the head low.

Stramonium.—Congestive headache, beginning in the morning, increasing until noon, and gradually decreasing until evening; headache accompanied by heat, face bloated and turgid, with pulsations in the vertex; sensation of heat in the head, especially in the vertex, with great dulness; vertigo, especially when walking in the dark; ameliorated by warmth, and by lying quiet.

Sulphur.—Headache caused by rush of blood to the head, and attended by roaring in the ears, heat and redness of the face, and cold feet; throbbing headache, especially at night; dull, pressive, stupefying headache, with tired and tight feeling in the brain, especially after severe mental exertion; headache from abdominal plethora, or when caused by suppressed

eruptions, abuse of spirits, or hæmorrhoids; aggravated by motion, coughing, stooping, eating, cold weather, and the open air; ameliorated by warmth and pressure.

Theridion.—Violent throbbing headache, extending from the forehead to the occiput; throbbing pain in the forehead, with nausea; worse on rising, from lying, and from the least noise; vertigo, with flickering before the eyes; disposition to faint after every exertion.

Veratrum vir.—Headache, with fulness of the head, and throbbing of the arteries; face flushed, burning in the head, and feeling as though the head would burst open; severe frontal headache, with vomiting; headache causing mental confusion and loss of memory; vertigo, with cold sweat on the forehead, sudden fainting, and collapse; anguish and fear of death; amelioration toward evening.

2. NERVOUS HEADACHE.

We shall include under this head every form of headache of nervous origin, instead of simply confining it, as is generally done, to that particular variety known as hemicrania, or megrim. The term "sick headache," by which nervous headaches are commonly known, though more expressive, is perhaps too general and comprehensive, as it is sometimes made to include several secondary affections, such as the headache associated with so-called bilious attacks, the headache which follows a debauch, and that which accompanies acute diseases, such as fevers, albuminuria, apoplexy, etc. Nervous headaches, therefore, it will be seen, are not only of nervous origin, but they are primary, not secondary affections, and are due, probably, to nervous exhaustion, or to the idiosyncrasy of the patient.

Nervous headaches generally set in early in the morning, on rising. The attack is characterized by a severe, deep-seated headache, often limited to one side of the head (*hemicrania*), or to one spot, as the temple, forehead, over the eyes, etc. The pain is generally increased by movement, strong light, noise, or any kind of mental exercise or perturbation. The patient

usually suffers more or less from glimmering before the eyes, giddiness, swimming in the head, and throbbing in the temples; and is generally greatly depressed, pale, dark around the eyes, and looks and feels very ill. The attack is usually complicated with certain gastric symptoms, such as a coated tongue, clammy mouth, anorexia, nausea and vomiting, or rather retching, which is often very severe and persistent. These symptoms are not necessarily, nor even ordinarily, connected with a disordered state of the digestive apparatus, but are secondary to the nervous trouble, whatever it may be, that causes the headache.

The chief *predisposing cause* of this form of headache, is the age, sex, and idiosyncrasy of the patient, especially the latter. This disease belongs emphatically to the nervous temperament, which is often hereditary, or runs in families. It occurs most frequently in females, and between the ages of ten and twenty-five. As age advances, the attacks usually become less and less frequent until the age of fifty or sixty, when they die out. In women they commonly cease at the change of life.

Whatever weakens or deranges the nervous system may also act as a predisposing cause, as the excessive use of tea and coffee, unhealthy occupations, malaria, a sedentary life, etc.

The *exciting causes* are equally numerous and varied. The predisposed are very liable to have an attack whenever a powerful impression is made upon the nervous system by fright, sudden or loud noises, storms of wind, thunder and lightning, and even extremes of temperature. Nervous exhaustion, also, —whether produced by fatigue, worry, family matters, the pressure of business, grief, over-nursing, loss of animal fluids, self-abuse, deprivation of food or of sleep, or in any other way —is a very common exciting cause, producing what is sometimes termed “asthenic headache,” which is but another name for this protean disorder.

Special Indications.—*Acetic acid.*—Nervous headaches resulting from nervous excitement, chronic gastric irritation, or the abuse of narcotic stimulants; giddiness, with or without symptoms of cerebral congestion; heaviness of the head, with sense

of intoxication; severe paroxysmal headache, attended with dull, aching pains in the frontal regions and vertex; distention of the temporal blood-vessels; confusion of mind; vomiting soon after eating; aggravated by nervous excitement.

Aconite.—Nervous headache, with violent pain over the left eye, and attended by nausea and vomiting; giddiness when stooping, looking up, or rising from a seat, with nausea; fear and anxiety, with great nervous excitability; gets desperate and says she cannot bear the pains; bitter, greenish vomiting, with anxiety; aggravation by motion, light, noise, and rising from a recumbent position.

Agaricus.—Nervous headaches with semilateral pains; dull headache in the frontal region; must move the head constantly to and fro, and close the eyes; twitching in the skin of the forehead above the right eye; vertigo and confusion of the head, as if intoxicated; sensation of coldness on right side of forehead, though warm to the touch; aggravated in the morning, and by the heat of the sun; ameliorated by gentle movements of head or body.

Agnus cast.—Nervous headaches characterized by tearing pains above the right eye and temple, attended with soreness to the touch, increased by motion, aggravated in the evening, and lasting two or three days; tearing and chilliness in the scalp, which, however, is warm to the touch; headache in the vertex which is relieved by looking to one point; food disagrees, and causes a feeling of nausea in the pit of the stomach; worse from motion, and in the evening. Especially suited to nervous headaches caused by sexual excesses, spermatorrhœa, or nervous debility.

Ailanthus.—Nervous headache characterized by darting pains in the temples and occiput, with vertigo and nausea; severe headache, with confusion of ideas, and giddiness; wild looking eyes, with intolerance of light; suitable for nervous, sensitive people, especially those troubled with vertigo when stooping.

Anacardium.—Constrictive nervous headache in the frontal region, with very irritable mood; pain increases hourly; momentarily relieved by hard pressure, finally whole head affected; pains from without inward, spreading from the fore-

head over the whole head; vertigo when stooping; nausea with retching soon after drinking cold water; internal chilliness even in a warm room; aggravated by motion, bending the head backward, and after eating; ameliorated in the evening, in bed.

Apis mel.—Constant pressive pain around and above the eyes, with dizziness, and confusion of the head; dull, heavy, tensive headache over the eyes, with pain through the orbits; neuralgic pain in the left temple; nervous, restless, and irritable disposition; aggravated by motion or stooping, and only temporarily benefited by hard pressure.

Argentum met.—Deep left-sided headache, at first slightly drawing, gradually becoming more violent, and at last culminating in a raging pain as if a nerve was being torn, ceasing suddenly; feels suddenly giddy, with a mist before the eyes; anxious, restless, and irritable mood; aggravation at noon, also from pressure and contact.

Argentum nit.—Hemicrania, with pressive, screwing, throbbing pain in one frontal protuberance and temple; violent pressive pain in the forehead, commencing over the eyes, and spreading upward to the vertex; almost constant boring-cutting pains in the forehead, vertex, temples, and face; headache accompanied by chilliness, or by an increased heat of the body; giddiness as if intoxicated; ameliorated by bandaging the head.

Arnica.—Nervous headaches characterized by pressive-drawing pains over the eyes and towards the temples, with a feeling as though the skin of the forehead was spasmodically contracted; pains over one eye, with compression in the forehead, and greenish vomiting; pain as if a knife was drawn through the head from the left side, immediately followed by internal coldness of the head; sensation of a nail being thrust into the temple, followed by faintness; vertigo, with nausea and obscuration of sight; moving the head causes stitches in it; worse in the morning, and on rising or sitting up.

Arsenicum.—Periodical semilateral headaches, characterized by beating pains with nausea, buzzing in the ears, and vomiting; worse after eating, in the morning, or in the evening, or

at night in bed; patient weeps and moans with the pain, which sometimes becomes maddening; severe and exhausting pain over the left eye, ameliorated by warm applications, or by wrapping the head warmly; burning intermittent pains, having a tendency to periodicity, with small pulse and cold skin, worse from continuous applications of cold water; paroxysms of very severe hemicrania, with great weakness and icy-cold feeling in the scalp; oedema of the head or face, the parts having a natural color; excessive thirst, nausea, and vomiting or retching; great anxiety, restlessness, and weakness; aggravated by eating, motion, rising up in bed, light, and noise; ameliorated by warmth, and by wrapping up the head warmly.

Asafœtida.—Nervous headaches occurring in weak, nervous, and very sensitive persons, especially women; semilateral headaches on either side, particularly the left; crampy pain in the forehead, above the eyebrows; pain as if a nail was being driven into the head; involuntary muscular twitchings; hysterical restlessness and anxiety.

Asarum.—Pain of a contractive nature in the forehead and temples, with watering and burning of the eyes; headache in the left side of the forehead, with dizziness; vomiting of a small quantity of a greenish, somewhat sour fluid, with great straining; after vomiting, relief of the headache symptoms; great nervous irritation, with alternate flashes of heat and coldness; aggravated by motion or shaking the head; ameliorated by sitting, vomiting, or walking in the open air.

Asclepias syr.—Violent headache between the eyes, with a sense of constriction across the forehead; sharp, cutting pain from one temple to the other, with weak pulse and cool skin; nervous headache followed by profuse diuresis; violent headache attended by excessive nausea.

Atropine.—Periodical nervous headaches, coming on suddenly, increasing rapidly, and finally causing blindness and delirium; sharp neuralgic pains in and about the eyes; vertigo on rising in the morning; sticking pains over the eyes on every motion, especially on stepping; right side most frequently affected; a valuable substitute for Belladonna, especially when the latter has been used unsuccessfully in cases where it is indicated.

Aurum.—Hemicrania returning every three or four days, with burning, beating, and stitching pains in one side of the forehead, with nausea and vomiting; very despondent, and disposed to commit suicide; easily angered and disposed to quarrel; pains worse from motion, and on being touched.

Belladonna.—Nervous headaches, of a semilateral character, affecting especially the right side; the pains are of a boring, cutting, tearing, and shooting character, worse on the right side and in the forehead; aggravated by movement, especially of the eyes, and by currents of air, the recumbent posture, and warmth of the bed; aggravated also by light, shock, noise, or contact; ameliorated by lying down, and by strong pressure on the forehead.

Calcarea carb.—Hemicrania, with inclination to vomit; tearing pains on the right side of the forehead; frequent one-sided headache, with eructations; icy-coldness of the scalp, which is nevertheless sensitive to the touch; aggravated by movement, and by mental exertion; ameliorated by tight bandaging, closing the eyes, vomiting, or by lying down.

Caulophyllum.—Neuralgic headaches dependent on uterine irritation or disturbance; sensation of pressure over or behind the eyes, especially the left, with dimness of vision; aggravated by stooping, light, noise, and fright; worse also in the afternoon.

Causticum.—Nervous headache, with tension of the scalp across the forehead and temples; pains moving forward from the vertex in paroxysms, with vertigo and nausea; headache associated with neuralgia of the left side of the face; vertigo with loss of consciousness on looking up; sudden blindness, with a sensation of a film before the eyes; giddiness, with a feeling of intoxication; aggravated by shaking the head, stooping, looking up, reading, and in the evening.

Chamomilla.—Headache increasing and decreasing, especially on the right side of the head, with dull, sticking pains, which sometimes extend from the temples and forehead to the occiput like electric sparks; the pains are of a pressing, stinging, tearing, or sticking character, frequently recurring, and affect especially the left temple and forehead, or the region in

and around the eye; one-sided drawing headache; wandering pains in the temples, worse at the commencement; worse in the evening, from stooping, and from mental exertion.

Chloralum.—Headache over both eyes, extending to the eyes, left side worse, with feeling as if the eyes were constricted; feeling as if a hot band was drawn across the forehead directly over the eyes, with sensation of a burning ring around each eye; severe pain in frontal region over supraorbital ridge, aggravated by motion; dull, heavy, aching pain in the forehead and occiput, aggravated by motion.

China.—Violent pressive headache, with sense of constriction, especially in the right side of the forehead and in the occiput; compressive headache, followed by a bruised sensation in the sides of the head, aggravated by motion; jerking, tearing pains in several parts of the head, worse from motion; whole head feels sore and bruised; aggravated by the slightest movement, touch, or mental exertion. Especially suited to anæmic patients, and those who have become debilitated by sexual excesses, loss of animal fluids, or intermittent fever.

Cicuta.—Semilateral headache, of a pressive character externally; rending, cutting pain in one side of the head; stupefying headache in the forehead and then in the occiput; vertigo on rising from bed, as if everything was moving from side to side; violent shocks through the head, causing it to jerk suddenly; head sinks forward when looking steadily at anything.

Cimicifuga.—Periodical and remittent headaches; severe pains over the left or right eye, extending from the eye and base of the brain to the occiput; headache, with severe pain in the eyeballs, extending into the forehead, and increased by the slightest movement of the head or eyes; aching pains in the eyes, extending to different parts of the head; headache, with eructations, nausea, and vomiting; dizziness, impaired vision, and sensation as if a heavy cloud enveloped the head, producing darkness and confusion; aggravation from movement; amelioration from pressure.

Coca.—Headache in the morning, in the right temple, sharp on first rising, and all day when looking up; the pain darts from the temple to the top of the head, leaving a sore feeling

behind; headache just above the eyebrows, increased by elevating the head and turning the eyes up; dull feeling over the whole brow; nervous, restless, and confused; worse in the morning, when coughing or blowing the nose, and on looking up; better in the evening, and after eating.

Cocculus.—Violent headache, in which the patient is unable to lie on the back of the head, but is forced to lie on the side; unable to bear the least noise; noise excites vomiting; violent headache, which compels the patient to sit up, aggravated by talking, laughing, noise, or a bright light; sick headache from riding or sailing; headache with vertigo, nausea, and inclination to vomit; vertigo as if from intoxication; aggravated by eating, drinking, talking, smoking, noises, bright light, and cold air; ameliorated by quiet and warmth.

Coffea.—Semilateral headache, as if a nail were driven into the parietal bones, or as if the whole brain were torn and bruised; great sensitiveness, with general excitability; worse from motion, noise, light, and mental exertion; ameliorated in the open air.

Colocynthis.—Hemicrania, with nausea and vomiting; painful tearing through the brain, becoming unbearable when moving the upper eyelids; pressing, burning pains in the left orbit, temple and nose, and in the upper teeth; severe burning, boring pain in the right side of the head; violent pressure in the left temple; aching, compressive pains in the forehead, with great anguish and restlessness, obliging one to leave the bed; aggravated by moving, stooping, lying, moving the upper lids, and being in the open air; ameliorated by pressure and touch.

Crotalus hor.—Headache in the forehead above the eyes, and in the temples, worse in the night, with nausea and bilious vomiting; is obliged to lie down; severe frontal headache, with delirium and coma; tremulous weakness all over, as if from some apprehended evil; ameliorated by walking in the open air.

Formica.—Nervous, sick headache, with shooting, neuralgic pains in the forehead and temple; headache in the left forepart of the head and temples, extending back to the occiput, every

day earlier, with a sore pain over the eye, beginning gradually, increasing and extending with a cutting pain into the ear; headache with crackling in the left ear, followed by pain in left temple, then in vertex, with nausea, and abating of pain in the forehead; worse in the afternoon, when stooping, when washing in cold water, and from coffee; better from combing the hair.

Gelsemium.—Nervous, remittent, and intermittent headaches, with pain over the eyes, across the forehead, and in the temples, accompanied by a slight nausea, and slightly mitigated by shaking the head; periodic orbital neuralgia, commencing every day at the same hour; double vision, dimness of sight, and vertigo; aggravated by having anything around the head; ameliorated by bending the head forward, and by shaking it.

Glonoïn.—Hemicrania attended by hemiopia, sees half light and half dark; severe pain in the forehead, with throbbing in the temples; headache beginning with the warm weather, lasting all summer, and increasing and decreasing every day with the sun; nausea, retching, and vomiting, with great nervous prostration; pale face, faintness, and loss of consciousness; aggravated by moving, stooping, shaking the head, mental exertion, and atmospheric heat; ameliorated in the open air, by fanning, and by uncovering.

Graphites.—Semilateral headache early in the morning, with inclination to vomit; violent headache, with eructations and nausea; vertigo during and after stooping, lasting several minutes, with nausea; headache early in the morning on waking, also after eating, or when moving the head.

Hydrastis.—Headache of a nervous, gastric character, with sharp, cutting pains in the temples and over the eyes, more over the left, better from pressing with the hand; severe frontal headache, with soreness of the scalp; face pale, worn, and weary looking; fainting turns, with loss of appetite.

Hyoscyamus.—Nervous headache, with pressing, stupefying pain in the forehead; pressure in the left side of the forehead, changing to shooting; constrictive, stupefying pain in the upper part of the forehead, and general malaise, alternating

with freedom from all pain; sleeplessness from nervous irritation; twitching of the muscles of the eyes, eyelids, and face; worse after eating, and after becoming cold; better from motion, heat, and bending the head forward.

Ignatia.—Semilateral headache, with nausea, but without vomiting; pain frequently begins behind the mastoid process or in the ear, and runs up the side of the head, or back to the occipital region, leaving a stiffness in the back of the neck; pressive-drawing pain above the right orbit, and at the root of the nose, renewed by stooping low down; jerking headache, aggravated by raising the eyes; pain in the centre of the forehead, ameliorated by bending the head forward; dull headache, confined to the right half of the forehead, involving the right eye, which is very sensitive to the light; aggravated by smoking, coffee, stooping, moving or raising the eyes, mental exertion, noise, light, and walking in the open air; ameliorated by lying on the back, or on the painful side.

Ipecacuanha.—Semilateral headache, with nausea and vomiting; short attacks of fine stinging pains in the head, increasing to aching; stinging headache, with heaviness and drowsiness; headache as if the brain was bruised, extending to the scalp and nose, with nausea and vomiting; aggravated by moving the head, and by stooping; ameliorated out of doors.

Iris vers.—Sick headaches, beginning with a mist before the eyes, the pains being of a dull, heavy, or shooting character, in the forehead, accompanied with nausea, vomiting, and depression of spirits; tired, aching headache, with violent pains over the eyes, in the supraorbital ridge, occurring on either side, but only on one side at a time; paroxysms of pain followed by copious emissions of limpid urine and by vomiting, with great distress in the epigastrium; aggravated by violent motion, coughing, sneezing, and cold air; ameliorated by continuous gentle movements.

Natrum mur.—Right-sided headache, coming on at 10 A.M., with dizziness, dull, heavy pains, glimmering before the eyes, fainting and sinking at the pit of the stomach, better in the open air; headache beginning in the morning, increasing till noon, and going off with the sun; pains in and over the right

eye, lasting until sundown; cannot bear any kind of light; pain like a nail driven into the left side of the head; stitching, pressing, and throbbing pains in various parts of the head, attended with nausea and vomiting; periodic vertigo, with eructations and nausea; constant chilliness and coldness; aggravated by moving the head and eyes, by mental exertion, natural or artificial light, and warmth; ameliorated by gentle exercise, compression, and lying down.

Nux vom.—Hemicrania beginning in the morning, increasing through the day, and growing milder or going off in the evening; sick headache, brought on by coffee, wine, sedentary habits, or severe mental exercise; accompanied by dimness of vision, sour bitter vomiting, and constipation; aggravated by noise, light, eating, and the open air; ameliorated toward evening, by covering the head up warmly, and by keeping quiet.

Petroleum.—Frontal headache, worse while the nausea continues; pain extending from the back to the front of the head and the eyes, with transitory blindness; stitches in the head, accompanied by pressure and nausea; scalp very sore to the touch, followed by numbness, worse mornings and on becoming heated; rapid appearance and disappearance of the symptoms; aggravated by mental exertion, nausea, and rising from a recumbent position, which is attended with vertigo.

Phosphorus.—Sick headache, with pulsations and burning, mostly in the forehead, accompanied by nausea and vomiting; headache over the left eye, with burning in the forehead; dull pain in the whole forehead, with vertigo; hemicrania, with pain and swelling in the forehead, which is greatly aggravated by being touched; headache every other day; aggravated by turning the head, stooping, eating, mental exertion, violent motion, or being in a warm room; ameliorated by cold washing, and the open air.

Platina.—Neuralgic headaches, occurring in sensitive, nervous women, with violent pressing, or cramp-like, constrictive pains in the forehead, commencing light, increasing till violent, and ending as they began; cramping pain from without inward, with heat and redness of the face, restlessness,

roaring in the head, worse from resting, or when stooping; numb feeling in the brain; vertigo when sitting, or when going down stairs; better from motion, or when in the fresh air.

Pulsatilla.—Semilateral sick headache, with tearing pains, stitches, shocks, vertigo, and desire to vomit; stupefying headache, with running chills, and humming in the head, worse lying or sitting quietly, or in the cold; vertigo especially while sitting, as if intoxicated; aggravated in the evening, from raising the eyes, and when in a close, warm room; ameliorated in the open air, and by bandaging the head.

Rhus rad.—Semilateral pain in the temples; dull and continued pain in the forehead and above the eyes; quotidian periodical headache; vertigo and confusion of head, with momentary loss of consciousness; wandering pains in various parts of the body; pains and headache are sharper when lying down; relieved when in the open air.

Rhus tox.—Headache, with tearing, stitching pains extending to the ears, nose, face, and jaws; scalp sensitive, better on the side laid upon, worse from warmth of bed, touch, and combing the hair; vertigo and dulness, as though intoxicated; stupefaction, with tingling in the head and pains in the limbs, better from motion; aggravated by chagrin, warmth of bed, and lying down; ameliorated by bending the head forward, and by motion.

Sanguinaria.—Sick headache, the attacks occurring periodically; begins in the occiput, spreads upward, and settles over the right eye, with nausea and vomiting; has to be in the dark and lie perfectly quiet; violent pain over the upper portion of the whole left side of the head, especially in the eye; pains begin in the morning, increase during the day, and last until evening; soreness of the scalp in spots, especially in the temporal regions; lancinating, throbbing pains through the brain, involving the forehead and top of the head in particular, but most severe in the right side, followed by chills, nausea, and vomiting of food or bile, forcing the patient to lie down and remain perfectly quiet; aggravated by motion, and only relieved by sleep; neuralgia in and over the right eye; vertigo,

headache, and long-continued nausea and vomiting; aggravated by motion, noise, light, and touch; ameliorated by darkness, quiet, pressure, and sleep.

Scutellaria.—Nervous headache, caused by mental emotion; hemicrania, worse over the right eye, relieved by walking in the open air; tremulousness and muscular twitchings in various parts of the body; vertigo, with lightness of head; wakefulness and restlessness at night, with frightful dreams; urine scanty before, and clear and profuse after the headache.

Sepia.—Hemicrania, with stinging, stitching, or pressive pains in the forehead, just over the eyes, worse in the left side, with nausea, vomiting, and perspiration; following the perspiration, headache in the right side of the head and face, but not so severe, with a sensation in the forehead as of waves of pain welling up and beating against the frontal bone; stitching, boring, hammering headaches over the right eye, or in one temple, of such severity as to make her scream, with nausea and vomiting; better from sleep and darkness; aggravated by motion and in the evening.

Silicea.—Hemicrania, with loud cries, nausea, and vomiting, followed by obscuration of sight; severe pain ascending from the nape of the neck to the vertex, thence to the supraorbital region; also from the occiput to the eyeball, especially the right one; pains sharp and darting, with a steady aching in the eyes, which are sore and painful when revolving; worse from noise, motion, even jarring of the room by a footstep, and from light; relief from heat, but not from pressure; obstinate morning headache, with chilliness and nausea; sensitiveness of the scalp; frequent sweat about the head; headache ameliorated by hot compresses, and by wrapping up the head warmly.

Spigelia.—Headache commencing with the rising of the sun, reaching its height at noon, and gradually declining until the sun sets, appearing thus even in cloudy weather; pains darting from behind forward through the eyeball, with pulsating pains in the left temple and over the left eye; headache, especially on the left side, extending to the eyes, face, and teeth; worse from motion, stooping, wind, and fresh air; better from press-

ure, and raising the head; vertigo, worse in the morning, with headache, depriving him of his senses; eyes look dim, upper lid droops; neuralgic pains involving the eyes, and accompanied with a pale face, anxious breathing, palpitation, nausea, and vomiting; patient restless, anxious, and gloomy.

Sticta.—Sick headache, worse from light and noise, accompanied by nausea and vomiting nearly to fainting; darting pain in the temporal region.

Stramonium.—Nervous headache, with tearing pain in the neck and over the head, shunning the light; better from warmth; worse on getting up in the morning; spasmodic drawing in the head and eyes, with grinding of the teeth; vertigo when walking in the dark, both day and night; staring, glistening eyes, with swollen face; ameliorated by warmth, and by lying still.

Sulphur.—Periodical sick headache, very weakening, occurring every one or two weeks; pains lacerating, stupefying, and benumbing; sticking or tearing pains in the forehead or temples, worse from eating or stooping, better when moving about, or when compressed; scalp painful to the touch; patient peevish, irritable and quarrelsome; aggravated by violent motion, eating, stooping, sneezing, changes in the weather, and mental exertion.

Tarantula.—Nervous headache, with sharp, penetrating pains; intense headache, with sensation as though thousands of needles were pricking into the brain, better from rubbing the head; hyperæsthesia of the special senses; ameliorated by rubbing and pressure.

Theridion.—Very severe sick headache, with nausea and vomiting, like sea-sickness, and with shaking chills; violent frontal headache, extending into the occiput; headache in the region of the eyes, with starting in the right eye; throbbing over the left eye and across the forehead, with sick stomach, worse on rising, or from the least noise, even footsteps over the floor; vertigo, with nausea even to vomiting, also with blindness; faintness, and flickering before the eyes.

Thuja.—Nervous headache, with tearing pain in the forehead, temples, and back of the head, worse at night; headache

in the vertex and on the left side, as if something hard, like a button or nail, were pressed upon the part; scalp sensitive to the touch, and even to the pressure of the pillow, better if rubbed; violent, burning, tearing, sticking pains, worse in bed; vertigo on shutting the eyes, or moving them upward or sideways; aggravated by sexual excesses, overeating, and at night.

Veratrum alb.—Nervous, neuralgic, and ordinary sick headache, with indigestion, nausea, vomiting, pale face, sunken features, and stiff neck; violent pains, driving the patient to despair, with great prostration, fainting, and cold sweat, with thirst; vertigo, with cold sweat on the forehead; scalp very sensitive to the touch; chronic cases, coming on in the afternoon, and lasting through the night; ameliorated towards morning.

Veratrum vir.—Severe frontal headache, with vomiting; dull frontal headache, with sharp neuralgic pains in the right temple, near the eye; vertigo, with dilated pupils, and dimness of vision; mental confusion, loss of memory, and double vision; headache, caused by intense cerebral hyperæmia.

Zincum.—Semilateral headache, with cramp-like or tearing pain in the right or left temple; headache in the forehead and occiput, worse in a warm room, after eating, or from drinking even a small quantity of wine; chronic sick headache, with weakness of sight; vertigo, dizziness, nausea, and vomiting of bile. Suited to cases arising from brain-fag, anæmia, and mental and physical exhaustion.

3. SYMPATHETIC HEADACHE.

Under this head we include all secondary forms of headache, or those caused by external conditions of which the headache is symptomatic. We shall only treat, however, of the more common varieties, such as the arthritic, catarrhal, gastric, hysterical, malarial, menstrual, and rheumatic. These headaches are always associated with the special conditions denoted by their respective names, and are therefore easily recognized by the symptoms belonging to the primary affections. As the headache is purely symptomatic, the disease on which it de-

pends should, of course, receive special attention. At the same time, it should be remembered that the primary disease is frequently aggravated, through sympathy, with the cerebral disorder. This is especially the case with gastric and hysterical headaches. Hence, in many cases the headache should be treated as though it were the primary disease, and the latter the secondary. Happily, homœopathy, by covering the totality of the symptoms, often renders the distinction referred to of but little practical importance. It is always well to bear it in mind, however, in very stubborn cases.

General Indications.—*Arthritic headache.*—Am., Ars., Arn., Bell., Bry., Caps., Caust., Cina, Coloc., Ign., Magn., Nit. ac., Nux v., Petr., Phos., Puls., Sabin., Sep., Spig., Verat., Zinc.

Catarrhal headache.—Acon., All. cep., Alu., Am. mur., Ars., Bell., Bry., Caul., Cham., China, Cina, Cimicif., Dule., Euphras., Gels., Gym., Hepar, Ign., Kali bic., Kali carb., Kali iod., Lach., Lyc., Merc., Mez., Natr. ars., Nat. mur., Nux v., Puls., Ran., Samb., Sang., Stil., Stic., Sulph.

Gastric headache.—Act. ac., Acon., Ail., Alu., Am. carb., Anac., Ant. crud., Apis, Arn., Ars., Asar., Atrop., Bell., Berb., Bism., Bry., Calc. carb., Calc. phos., Caps., Caust., Caul., Carbo veg., Cham., Cimicif., Cina, Cocc., Coloc., Eupt., Form., Gamb., Gels., Glon., Hyd., Ign., Ip., Ind., Iris, Kali bic., Lach., Lept., Lyc., Naj., Nux v., Opi., Paris, Phos., Phyt., Plat., Puls., Robin., Sang., Sep., Sil., Stic., Sulph., Tabac., Tarant., Verat.

Hysterical headache.—Arn., Asaf., Bell., Cann. sat., Caps., Cham., Cimicif., Cocc., Coff., Gels., Hel., Hepar, Hyos., Ign., Iris, Lach., Lact., Magn. carb., Magn. mur., Nit. ac., Nux v., Phos., Phos. ac., Plat., Rhus tox., Ruta, Scutel., Sep., Stic., Stram., Tarant., Valer., Verat., Zinc. valer.

Malarial headache.—Ars., Chin., Cedron, Chinin. ars., Chinin. sulph., Eucalyp., Eupat. perf., Eupat. purp., Gels., Kali ferro-cyan., Rhus., Verat.

Menstrual headache.—Agnus, Apis, Ars., Bell., Berb., Borax, Bov., Brom., Bry., Cact., Calc. carb., Carbo an., Caul., Cham., Cimicif., Cocc., Coff., Col., Croc., Gels., Goss, Ham., Hel., Hyos., Ign., Kali carb., Lach., Lil., Lyc., Natr. mur., Nux mosch., Nux

v., Plat., Puls., Sang., Sep., Sil., Stram., Sulph., Thuj., Ust., Verat., Zinc.

Rheumatic headache.—Acon., Act. spic., Am. mur., Asclep., Bell., Berb., Bry., Calc. phos., Caul., Caust. Cham., China, Cimicif., Coloc., Dule., Gua., Ign., Kali bic., Kalm., Lach., Led., Lye., Magn. mur., Merc., Nit. ac., Nux v., Phos., Phyt., Pod., Puls., Rhus rad., Rhus tox., Sep., Sil., Spig., Stic., Stram., Sulph.

Special Indications.—*Aconite.*—Headache with fever, especially when caused by exposure to cold, suppression of perspiration, or currents of air; headache accompanied by coryza, fever, roaring in the ears, chilliness, restlessness, and wakefulness; pains of a piercing, throbbing, or stupefying character, aggravated by noise, light, or motion. Suitable for catarrhal and menstrual headaches, especially at the beginning.

Allium cepa.—Severe catarrhal headache, with coryza; copious watery discharge from the nose and eyes; symptoms worse in the evening; better in the open air.

Aluminum.—Chronic catarrhal headache, especially in scrofulous subjects; head feels heavy, with oppression in the forehead; pressive, stupefying pain in the frontal region; aggravated by being in a warm room, or by going up stairs, or stepping; ameliorated by pressure.

Anacardium.—Gastric headache caused by indigestion; nausea with retching soon after drinking cold water; weak digestion with fulness and distention of the abdomen; symptoms disappear after dinner, and reappear two hours afterwards.

Antimonium crud.—Gastric headache, with aversion to food; tongue coated white; aching of the limbs, nausea, and vomiting; anorexia, risings, and inclination to vomit; symptoms relieved in the open air.

Asafoetida.—Hysterical headache in the hypersensitive; pains of a darting, stitching, jerking character, which sometimes disappear by the touch, or are transformed into other pains; hypochondriacal and hysterical restlessness, with anxiety; ameliorated by walking in the fresh air.

Argentum nit.—Gastric headache in nervous persons; head-

ache is usually attended with chilliness and trembling of the body, intense nausea, and vomiting; patient giddy and very restless; headache worse in the open air, but better from bandaging the head.

Arsenicum alb.—Catarrhal, gastric, and malarial headaches, especially when they are of an intermittent or periodical character, and attended with a burning nausea and the arsenic thirst; pains are of a burning, beating, pressive, drawing, or throbbing character, and are relieved by warmth, or wrapping up the head, or by rubbing; cold water only relieves temporarily; sometimes associated with a fluent, burning and exco-riating coryza.

Belladonna.—Catarrhal, gastric, and rheumatic headaches, especially in lymphatic or scrofulous subjects; pains are sudden in their appearance and disappearance, but last indefinitely; are often accompanied by stupefaction and vertigo, with redness and swelling of the face; aggravated by noise, light, shock, or contact; symptoms caused by cerebral congestion.

Berberis.—Arthritic, menstrual, and rheumatic headaches, especially when complicated with hepatic trouble; pains are of a lacerating, darting, tensive, or aching character; face pale, with sunken cheeks, and eyes surrounded by a dark bluish or blackish circle; worse from motion, stooping, and in the afternoon; better in the open air.

Bismuth.—Gastric headache complicated with gastralgia; pain comes on immediately after eating, and is relieved by vomiting; pains chiefly frontal, and aggravated by motion.

Bovista.—Menstrual headache, characterized by deep-seated stupefying pains; putrid, bitter taste, with nausea and empty eructations; morning sickness, relieved by eating breakfast; aggravated by pressure, and by sitting up.

Bryonia.—Gastric and rheumatic headaches, especially when associated with indigestion, nausea, and vomiting; pains are of a throbbing, digging, sticking, burning, or pressing character, and may affect any portion of the head; the pain is usually associated with soreness, and is aggravated by stooping, or by quick motion.

Calcarea phos.—Gastric and rheumatic headaches, with ful-

ness and pressure in the head, and characterized by vertigo when walking or moving; patient is dull, peevish, quarrelsome, and forgetful; aggravated by every change in the weather, eating, and mental and bodily exertion; ameliorated by cold washing.

Carbo an.—Menstrual headache, chiefly in the forehead and vertex; the pains are of a throbbing, pressing, or tearing character, accompanied by vertigo, confusion of the senses, and sometimes by nausea; sensation in the forehead as if something lay above the eyes, on account of which she could not look up; dimness or blackness of sight, with vertigo and nausea when raising the head after stooping; menses too early and too long, but not too great, followed by debility and prostration.

Caulophyllum.—Menstrual and rheumatic headaches, characterized by pressure behind the eyes and dimness of sight; the pains, which are of a contractive, pressive character, are paroxysmal or intermitting; menstrual irregularities, with "moth" spots on the forehead; aggravated by stooping, light, and noise.

Causticum.—Arthritic and rheumatic headaches, especially where there is a tendency to scrofula; pains are of a throbbing, tearing, and stitching character; chiefly in the top of the head, and spreading to the forehead and temples, moving forwards in paroxysms; accompanied by nausea and vertigo; aggravated by stooping, reading, looking up, and shaking the head; ameliorated in the open air.

Cedron.—Malarial headaches coming on with clock-like regularity; pains are of a shooting character, and are located chiefly in the frontal region, often extending to the orbits; when the pains are very severe, they are often accompanied by palpitation and quickened respiration.

Chamomilla.—Arthritic and rheumatic headaches, especially when attended by vertigo, nausea, and vomiting; headache in sensitive, nervous organizations; especially suited to children, women, and aged people; pains of a stinging, stitching, tearing, and pressing character; chiefly in the forehead, temples, and vertex; aggravated by mental exertion; ameliorated by motion.

Chelidonium.—Bilious headaches, affecting especially the right side of the forehead, and the right temple, and accompanied by nausea and bilious vomiting; pain is of a heavy, drawing, and pressing character; aggravated by motion; ameliorated by rest, pressure, and closing the eyes.

Cocculus.—Gastric and menstrual headaches, with a feeling of emptiness in the head; violent headache which compels the patient to sit up, and is aggravated by talking, laughing, noise, and bright lights.

Colocynthis.—Arthritic and rheumatic headaches of an intermitting type; pains are of a tearing, aching, drawing, and compressive character; are often semilateral, affecting chiefly the left side of the head; and are accompanied with more or less restlessness and anguish; vertigo, with nausea or vomiting of bitter, yellowish fluid; aggravated by motion, stooping, and bending the head forward; ameliorated by pressure.

Crocus.—Menstrual headache, of a pressive, burning, and throbbing character, affecting chiefly the forehead, temples, and top of the head; excitable and variable disposition; vertigo, with confusion, and webs before the eyes; headache at the change of life, most severe at the time corresponding to the monthly periods, lasting two or three days, and even during the night.

Eupatorium perf.—Bilious and malarial headaches, with violent shooting and throbbing pains, chiefly in the vertex, temples, and occiput; vomiting of bile, and of whatever has been taken into the stomach; tongue coated white or yellow; attacks generally occur in the morning, between 7 and 9 A.M.; aggravated by heat; ameliorated by pressure.

Euphrasia.—Catarrhal headache, accompanied by profuse watery coryza; profuse, fluent coryza, with smarting of the eyes, lachrymation, and photophobia, or with sneezing and discharge of mucus; headache from cold in the head, with running from the eyes and nose.

Gamboge.—Gastric headache, with compressive and heavy pains in the forehead and temples; and accompanied with vomiting, purging, and fainting; drowsy, heavy feeling in the whole head, with pain in the small of the back; watery

diarrhoea, with colic and tenesmus; headache relieved in the open air.

Gelsemium.—Catarrhal and hysterical headaches, appearing suddenly with vertigo, dimness of sight and double vision; head feels enlarged, and either too heavy or too light; headache accompanied by slight nausea, slightly mitigated by shaking the head; pain in the occiput and back of the neck, extending to the shoulders; also across the forehead and temples; headache relieved by profuse urination.

Gossypium.—Menstrual headache, with drawing and stinging pains extending from the temples to the centre of the forehead; nausea, with inclination to vomit; menses last only about twenty-four hours, and are scanty and painful.

Gymnocladus.—Catarrhal headache, especially during the early stage, characterized by fulness, throbbing in the forehead and temples, vertigo, numbness, heat of face, and exhaustion; frequent violent sneezing, originating high up in the nose; dizziness, with dimness of sight, nausea, and eructation.

Hydrastis.—Catarrhal headache, especially in debilitated subjects, with mucous discharges; myalgic headache in the integument of the scalp and muscles of the neck; pale face, with worn and weary appearance; constant discharge of thick white mucus from the nose; cachetic condition, with loss of appetite and fainting turns; subacute and chronic cases.

Ipecacuanha.—Gastric headache, commencing with nausea and vomiting, or in which the gastric irritation is persistent; stinging, throbbing, lacerating headache, accompanied by nausea and vomiting, heaviness of the head, and drowsiness; aggravated by stooping or moving the head; ameliorated out of doors.

Iris vers.—Bilious and gastric headaches, always beginning with a blur before the eyes, with dull, heavy, or shooting and throbbing pains in the forehead, accompanied by nausea and vomiting, first of watery, sour fluid, then of bile; paroxysms of pain, followed by copious emissions of urine and vomiting, with great burning and distress in the stomach.

Kali bich.—Catarrhal and rheumatic headaches, the former

accompanied by ozæna; frontal headache, complicated by a chronic catarrhal condition of the nasal and other mucous surfaces; aggravated by moving, stooping, or mental exertion; ameliorated by hard pressure.

Kali carb.—Catarrhal headache, especially in aged people inclined to obesity; pains are of a sticking character, worse when stooping, or moving the head; better from raising the head, and from warmth; constipation.

Kali iod.—Catarrhal headache, especially in scrofulous and syphilitic subjects; tensive, stinging, shooting, and tearing pains in every part of the head, especially the forehead; headache accompanied with inflammation of the frontal sinuses, nose, eyes and throat; swelling of the cervical glands; violent sneezing, with running of acrid water from the nose, excoriating the skin.

Lachesis.—Catarrhal, hysterical, menstrual, and rheumatic headaches, characterized by throbbing, beating, and lacerating pains in the temples, with pressure in the forehead, and accompanied by nausea and vomiting; beating headache with heat, worse on the vertex and over the eyes; giddiness, with headache, just before the menses; pain in the left ovarian region; ameliorated by lying down.

Lilium tig.—Menstrual headache, especially in those cases where the menstrual irregularity arises from prolapsus or malposition of the uterus, and causing stranguary and ineffectual urging to stool; pains in the forehead and temples, with vertigo, and depression of spirits; constant bearing down in the lower part of the abdomen, with severe pressure in the ovaries, rectum, and anus, with constant desire for stool; bearing down pressure in the vagina, as if everything would be pressed out; symptoms worse from rising up, and from standing.

Lycopodium.—Gastric, bilious, and rheumatic headaches, characterized by great restlessness and disposition to faint; pains chiefly of a pressive and lacerating character, affecting especially the forehead and temples, and worse in the afternoon.

Mercurius.—Catarrhal and rheumatic headaches, especially when occurring in syphilitic subjects; pains of a burning,

stitching, tearing, and pressing character, accompanied by catarrhal affections of the head and throat, and disposed to sweat easily; chronic cases complicated with ozæna, the pain extending to the root of the nose and frontal sinuses.

Mezereum.—Catarrhal headache in scrofulous and syphilitic patients; headache extending from the root of the nose into the forehead, as if everything would press asunder, with pain in the temples when touched; heat and perspiration on the head, with chilliness and coldness of the rest of the body.

Natrum mur.—Menstrual headache occurring before, during, and after the menses, which are either too soon and profuse, or scanty and delayed; disposition sad and gloomy; awakes every morning with a violent headache; almost constant dull headache, especially in the forehead and top of the head.

Natrum sulph.—Menstrual headache occurring periodically, during the menses, every spring, and characterized by fullness, heat in the vertex, pressure, vertigo, nausea, and vomiting; menses late and scanty; sad and depressed mood; worse in the forenoon.

Nux mosch.—Hysterical headache, especially when complicated with gastric troubles; throbbing and tearing pains, chiefly in the forehead and temples, worse in bad weather, before the menses, and during pregnancy; throbbing, pressing pain, confined to small spots, worse in left supraorbital region; menses too early and too profuse; bloating of the stomach and abdomen, worse after every unpleasant emotion; aggravated by eating, emotional excitement, menstrual congestion, and changes in weather.

Nux vomica.—Gastric and bilious headaches, attended by constipation, and brought on by a debauch, wine, coffee, sedentary habits, or too close mental application; intense pressing, drawing, stupefying headache, affecting the whole or any part of the head, but especially the forehead, with more or less dizziness, nausea, and inclination to vomit; aggravated by motion, stooping, moving the eyes, noise, light, and mental exertion.

Phosphorus.—Hysterical headache, excited or aggravated by anger, chagrin, grief, abuse of stimulants, or excessive mental

exertion; dull, burning, or throbbing pains in the forehead or temples, often semilateral, and accompanied by nausea or vomiting, vertigo, with a tendency to fainting, especially in the morning, on rising; sudden changes of mood, from grave to gay, laughing to weeping; aggravated by stooping, music, mental and moral disturbances.

Phosphoric acid.—Hysterical headache, especially in school girls, and those debilitated from sexual and other excesses; pressive, stupefying pains in the forehead and top of the head, aggravated by the least noise or jar; headache from cerebral exhaustion, with mental cloudiness; great physical weakness and prostration, accompanied by night-sweats and emaciation; ameliorated by the recumbent position.

Phytolacca.—Gastric and rheumatic headaches, especially in syphilitic subjects; pains of a sharp, shooting, or dull, heavy character, affecting especially the forehead and temples; often accompanied with vertigo, dimness of vision, and nausea; generally aggravated by damp weather.

Platina.—Hysterical headache, especially in young girls with erotic desires, or who are suffering from amenorrhœa, or from profuse menstruation; pains are of a drawing, crampy character, and affect chiefly the forehead; face generally red and hot; numb feeling in the brain; mood variable, sometimes cheerful, at others depressed; aggravated by stooping, and by being in a warm room; ameliorated by going into the fresh air.

Podophyllum.—Gastric, bilious, and rheumatic headaches, especially when produced by torpidity of the liver; headache alternating with diarrhœa; headache accompanied by bitter taste and risings, giddiness, glimmering before the eyes, nausea, tendency to bilious vomiting and purging; symptoms worse in the morning; better from pressure, and from lying quiet in the dark.

Pulsatilla.—Gastric, menstrual, and rheumatic headaches, especially when caused by menstrual irregularities, mental exertion, fat food, the abuse of coffee or spirits, or from exposure to damp, cold weather; pains may be of almost every variety, and are often semilateral; are generally accompanied by more or less vertigo, nausea, and bad taste in the mouth, but with-

out thirst; worse in bad weather; better from pressure or bandaging the head, also in the open air.

Rumex.—Catarrhal headache, with great irritation of the larynx, and soreness behind the sternum; pains generally dull, but sometimes sharp and piercing; aggravated by motion.

Sanguinaria.—Gastric and rheumatic headaches, most severe on the right side, affecting especially the frontal region and temples, and accompanied by nausea and vomiting; the attacks are generally paroxysmal, with more or less chilliness and burning in the stomach; aggravated by motion, light, and noise; ameliorated by darkness, quiet, and sleep.

Scutellaria.—Hysterical headache, especially when excited by mental emotion; pain worse over the right eye; ameliorated by moving about in the open air; urine scanty before, and profuse after the headache.

Sepia.—Gastric, hysterical, and rheumatic headaches, especially when depending on derangement of the digestive or sexual systems; pains generally of a pressive or stinging, stitching character, and often one-sided, usually the right; nausea and vomiting, with aversion to all food; aggravated by motion and noise; ameliorated by rest, darkness, and sleep.

Silicea.—Gastric and rheumatic headaches, especially in lymphatic constitutions; pains pulsating, pressing, or tearing, and frequently one-sided; vibratory sensations in the head, accompanied by nausea and vomiting, frequent cold sweat about the head; aggravated by noise, light, and motion, even the slightest jar; ameliorated by warmth, darkness, and sleep.

Stillingia.—Catarrhal headache in syphilitic and scrofulous constitutions; dull, heavy, stupefying pains in the frontal region; dizziness, with throbbing in the head; pains in the head, with inflamed and watery eyes, and general soreness of the muscles; chronic headache which has been aggravated by mercurial treatment.

Stramonium.—Hysterical and rheumatic headaches, especially in young and plethoric persons; swollen face with glistening eyes; vertigo when walking in the dark; heat and pulsations about the vertex, accompanied by faintness and loss of sight and hearing; aggravated by cold; ameliorated by warmth and quiet.

Sulphur.—Catarrhal and gastric headaches, especially in scrofulous patients; headache associated with constipation, morning diarrhœa, or hæmorrhoids; headache from abdominal plethora, suppressed eruptions, or mental exertion; headache beginning, increasing, and ending, with the daily course of sun; aggravated by motion, stooping, wet and cold weather, heat of the bed, or mental exercise; ameliorated by pressure and moderate warmth.

CHAPTER II.

VERTIGO.

PERHAPS the best definition we have of vertigo is that given by Hughlings Jackson, namely, the consciousness of disordered locomotor coördination.

It has long been known that the cerebellum is the chief organ concerned in the normal equilibration of the body. But numerous experiments upon the optic lobes and pons Varolii establish the fact that they, also, are concerned in this function; electrical stimulation of these bodies causing complex movements of nearly all the muscles of the body, and especially of those concerned in progression, and in preservation of the normal attitude. These three parts, therefore, may be considered as forming the general nervous centre from which the power of muscular coördination is derived. For it is by means of this combined mechanism that the eyes, the head, and the limbs are made to act in harmony, whenever a compensatory movement is required to counteract the tendency to displacement which occurs whenever the body is in the erect position, whether standing or progressing. This is well shown by experiments on the cerebellum. For if the anterior part of the middle lobe of this organ be destroyed, it causes a tendency in the animal to fall forwards; but it is plain that this tendency may be neutralized or prevented by stimulating, instead of destroying, this centre, as this induces just such muscular movements as would counteract that tendency. So, also, destruction of the posterior part of the middle lobe produces a tendency to fall backwards, and of the lateral lobes to fall sideways, whilst stimulation or excitation of these parts excites precisely those muscular actions which are needed to

counteract the tendency to fall in these particular directions. But the afferent or sensory part of this coördinating mechanism does not consist alone of the visual apparatus, but also includes the auditory and tactile. Experimental researches have established the fact that the semicircular canals are concerned in the function of locomotor coördination; injury and disease of these parts producing a marked and peculiar disturbance of normal equilibration. The disorder is temporary when one side only is injured, but permanent when both sides are affected. Flourens has shown, that injury of each canal is followed by its own peculiar disturbance, causing the body to fall, or to tend to fall, as the case may be, forwards, backwards, or to either side, according to the particular canal involved.

Now, the derangement of any part of the senso-motor apparatus we have described, may produce vertigo by interrupting its power of adjustment. This adjustment, as we have shown, is generally effected by contrary or counteracting movements to those which give rise to the vertigo. When the movement is continued too long to be effectually compensated in this manner, as in dancing, whirling, etc., vertigo is the inevitable result, and can only subside gradually, as the unequal labyrinthine tension becomes equalized by rest.

But vertigo is not always, nor even generally, the result of exaggerated and prolonged locomotive disturbances. It is usually a purely subjective symptom, being, as already defined, the consciousness of disturbed locomotor coördination. It is often associated with the compensatory movement itself, and hence is often confounded with it. This movement, namely, reeling and staggering, is not directly caused by the vertigo, but is simply the result of the effort made to counteract the tendency to fall; the motion being rendered more or less irregular by the disturbance of the coördinating power. That this is the true nature of vertigo, is shown by the fact that when a movement actually follows a previous sensation of a movement which is only apparent, the actual movement is always in the direction in which the person felt that he was moving before it took place.

Etiology and Pathology.—It is not always easy to determine with precision which of the sensory impressions is concerned in this or that particular case of vertigo. Sometimes the impressions are labyrinthine when they appear to be ocular, and *vice versa*. Doubtless in some cases the two causes are combined. This is the more probable from the fact that variations in labyrinthine tension may be caused by differences in the vascular tension of the labyrinthine blood-vessels, and a similar case may, and often does, operate in the case of visual disturbances. Not only do labyrinthine, visual, and tactile disturbances give rise to vertigo, but, as is well known, the latter is often caused by derangement of the stomach and other viscera. This is easily explained by the close and important nervous relations which the labyrinth sustains to these organs. For example, the nucleus of the vestibular nerve, which supplies the semicircular canals, and which is a branch of the auditory nerve, is in close relation to the nucleus or internal origin of the pneumogastric. Those diseases, also, as well as those medicines which cause variations in the labyrinthine tension, may give rise to vertigo.

Varieties.—The principal varieties of vertigo are: 1. The Labyrinthine or Auditory; 2. The Ocular; 3. The Gastric; 4. The Nervous; and 5. The Intracranial.

1. **Labyrinthine or Auditory Vertigo.**—This form of vertigo is generally known as *Ménière's Disease*, having been first described by Ménière, in 1861.

Symptoms.—The disease is generally confined to those whose organs of hearing were previously in a sound condition. The first symptom to attract the patient's attention is a loud noise in the ear. Similar noises, and noises of various kinds, may be heard from time to time in the ear, or they may be continuous, but the first attack is usually the loudest, or at least seems so to the patient. This symptom, which is always confined to one ear, is quickly followed by a sense of giddiness, in which both the patient's body and all surrounding objects appear to be moving in one and the same direction, namely, *from* the affected side. This is generally the case, also, in subsequent attacks. Not that the movement is always lateral, as

respects the patient's body, for it may be from behind forward, or toward either side, or it may be rotatory; but whatever course the body may take, or may appear to take, such will be the apparent movement of all other visible objects. The same sensation may occur when the patient is lying down; the bed, room, and everything in it appearing to rise, sink, or revolve, as the case may be. If the patient is standing or walking, he at once begins to reel or stagger, and unless he is so situated that he can immediately lay hold of some support, he may be thrown violently to the ground. In this case, however, there is no loss of consciousness, as when a person falls in a fit. In some cases an oscillatory movement of the eyes occurs, but authorities differ as to whether it corresponds to the apparent movement of the surrounding objects, or the reverse. It is highly probable, however, that the relative movement is different in different cases. These symptoms are soon followed by nausea, and in most cases by vomiting. Almost always the attack is attended by more or less shock to the system, manifested by pallor of the face, and by a cold skin, which is bedewed by a clammy perspiration. As the attack passes off, which generally occurs in a few minutes, the tinnitus aurium abates, leaving more or less deafness behind. The symptoms of shock also subside, but vomiting and vertigo are more persistent, lasting in some cases several days. Indeed, occasionally the vertigo continues, but in a milder form, from one attack to another, which in such cases is marked by paroxysmal exacerbations. This condition of constant vertigo, however, is not generally reached until after several distinct attacks, the intervals between which gradually lessen until a permanent state of vertigo and deafness is induced. This is a truly distressing condition, but yet cures, both therapeutic and spontaneous, sometimes occur, especially when the labyrinthine disturbance is secondary to catarrh of the middle ear, or to some other remediable affection of the auditory apparatus.

Diagnosis.—This is not difficult, provided we bear in mind that the coexistence of vertigo, tinnitus, and deafness, establish the fact that the labyrinth is involved. This may be also confirmed by testing the hearing with a tuning-fork and watch.

To determine whether the disease is primary or secondary, we have to consider the presence or absence of certain symptoms. Thus, tinnitus and deafness without vertigo indicate an affection of the middle ear; the same is true of tinnitus and vertigo without deafness. But in order to clear up the diagnosis in these cases, it will generally be necessary to test the condition of the conducting apparatus, ascertain the permeability of the Eustachian tube, and make an otoscopic examination of the membrani tympani, since it is not until this is done that we are prepared to estimate the significance of the syncope, nausea, vomiting, and other like indefinite symptoms.

Prognosis.—The prognosis should be governed by the nature of the cause. If this is found to be of a temporary and remediable nature, such as altered cerumen, catarrh of the middle ear, etc., it will, of course, be favorable; but if the vertigo arises from disease of the labyrinth, the attack is not only liable to be repeated, but to leave behind it a greater or less degree of permanent vertigo and deafness.

2. Ocular Vertigo.—Ocular vertigo is that form of dizziness, confusion of sight, and swimming in the head; which results from certain kinds of ocular disorders. Any disease of the eye which causes the patient to see double will give rise to this form of vertigo, and even to reeling. This is occasioned, not by the diplopia or double vision, but by the erroneous projection, as it is called, which the squinting or paralyzed eye forms of external objects. This causes confusion of sight; and if the effort at rectification is not successful, or is long-continued, it is liable to produce well-marked vertigo, and even nausea. Moreover, the strain which this constant effort at optical adjustment produces, leads to exhaustion of the ocular muscles, nervous irritation, and vascular congestion—in short, the condition known as asthenopia. This condition of the eye may be brought about in various ways. One of the most frequent is met with in myopia, or short-sightedness. In this case, owing to the extreme convergence of the optic axes necessary for distinct vision, there is actual insufficiency of the internal recti muscles. The constant forcible strain to which they are subjected in the attempt to direct the axes of vision

upon very near objects, which is the only position in which the conformation of the eye will permit of their being distinctly seen, soon fatigues, and finally exhausts them, producing what is called "muscular asthenopia." Another frequent cause of ocular vertigo is an absolute or relative deficiency of energy in the ciliary muscle, or muscle of accommodation. As the fatigued muscle gradually relaxes, after having been unduly exercised, objects become less and less distinct, the effort at accommodation is proportionably increased, the retina itself soon becomes more or less exhausted by the steady contest with indistinct images, and thenceforth objects appear to swim before the eyes. This form of ocular vertigo is known as "accommodative asthenopia." Muscular and accommodative asthenopia are not confined to myopia; on the contrary, the greater number of cases are associated with hypermetropia. But while the immediate cause of ocular vertigo is overburdening of one or more of the ocular muscles, the muscular insufficiency is often congenital, and sometimes hereditary. Moreover, it is very often acquired, and then it generally results from exhausting diseases, such as fevers, diphtheria, anæmia, etc.

3. **Gastric Vertigo.**—Gastric vertigo is not an uncommon affection, being met with in various kinds of stomach trouble, both functional and organic. It is sometimes caused by indigestion, or by overloading the stomach; but it also occurs when the stomach is empty. In these cases we usually have a variety of gastric symptoms, such as pain in the stomach, heartburn, a feeling of distention, eructations, and even vomiting. Pains may also be felt in the chest, the hypochondria, or the epigastric region. The bowels may or may not be disturbed. The vertigo generally sets in suddenly, with swimming in the head, reeling, and a disposition to faint. The patient, without losing consciousness, sees everything turning black and apparently revolving around him; his gait becomes tottering, and, unless he is promptly supported, will probably fall to the ground. Vomiting now occurs, and is often troublesome, especially if it has been preceded by headache, nausea, palpitations, and other evidences of a more general nervous derangement. Occasionally the gastric symptoms are less

pronounced, being masked, as it were, by the cerebral symptoms; but as treatment directed to the stomach relieves the vertigo, we may safely conclude that the trouble is of gastric origin. If strongly predisposed to gastric derangement, very slight causes may be sufficient to excite an attack, such as looking at bright objects, or rapidly moving ones; but such cases may also occur spontaneously, and, moreover, are not strictly cases of gastric vertigo, although the gastric symptoms predominate.

Diagnosis.—As gastric symptoms are sometimes associated with auditory vertigo, and may even be so prominent as to mask the aural affection, it is important, in case there is any doubt about the nature of the affection, to institute a thorough examination of the ears. The presence or absence of deafness, and of the physical signs of aural disease, will speedily settle the question as to whether the case is one of auditory, or some other form of vertigo.

4. **Nervous Vertigo.**—We include under this head not only the vertigo frequently met with in people of weak nerves; the vertigo sometimes caused by the immoderate use of tea, alcohol, tobacco, and other narcotic stimulants; and the vertigo associated with nervous exhaustion and depression, but that also which occurs in connection with hemicrania, which, though sometimes apparently of gastric origin, is nevertheless predominately and essentially nervous. The vertigo is generally slight in degree, though it may be severe. It usually manifests itself by dizziness, or a sensation of confusion in the head, of objects apparently moving or revolving, and of a tendency, it may be, to fall. It is not often that the patient actually reels, but he feels insecure upon his feet, and if standing upon an elevated position, experiences a dread of falling. It is caused, as well as intensified, by emotional excitement, by the presence of a large company, or the reception of disagreeable news. It bears some resemblance to the "aura" of epilepsy and some other nervous affections, and the resemblance is heightened by the gastric disturbance, flatulency, and palpitation of the heart, which sometimes accompany it. Hence the subjects of it are apt to imagine that they are in danger of

falling victims to some serious intracranial disorder. But the fact that there is neither deafness nor loss of consciousness, is sufficient to distinguish it from both auditory vertigo and epilepsy. When associated with hemicrania, its intimate relation to the other symptoms of that complaint is amply sufficient to identify it.

5. **Intracranial Vertigo.**—Vertigo is sometimes associated with epilepsy, apoplexy, cerebral tumors, and other forms of intracranial disease. It is an invariable symptom of ataxy, whether of cerebral or of spinal origin; and its connection with epilepsy, and other cortical diseases of the brain, renders it highly probable that it may be due in some cases to cortical lesions. It may coexist with epilepsy, or it may take the place of the epileptic fit. It is sometimes difficult to distinguish this form of vertigo from that of Ménière's disease, but the latter is more apt to be followed by vomiting, and besides, is not usually accompanied by loss of consciousness.

Treatment.—**General Indications.**—*Labyrinthine or Auditory Vertigo.*—Acon., China, Chin. sulph., Cicuta, Con., Colch., Kalmia, Natrum salicyl., Rosa damas., Salic. ac.

Ocular Vertigo.—Arn., Argent. nit., Caust., Cuprum acet., Euphras., Gels., Kali iod., Merc., Nux vom., Opium, Paris quad., Phos., Physost. ven., Rhus tox., Senega, Spig.

Gastric Vertigo.—Apomorph., Ars., Bry., Calc., Carbo veg., China, Ipec., Igna., Natr. mur., Nux vom., Phos., Puls., Sep., Sulph., Tarant., Verat.

Nervous Vertigo.—Ars., China, Chin. sulph., Fer., Igna., Nux vom., Phos., Phos. ac., Puls., Silic., Zinc.

Epileptic Vertigo.—Ars., Amyl. nit., Bell., Calc. carb., Cocc., Glonoin, Hyosc., Laches., Stram., Tarant.

Special Indications.—*Aconite.*—Auditory vertigo, with reeling; worse when bending forward or going down stairs; vertigo on raising the head, or on rising from a recumbent position; vertigo with sensation of intoxication, the patient staggering like a drunken man; great fear of falling; nausea.

Amyl nitrite.—Auditory vertigo, with a bursting sensation

in the ears, as if the drum of each ear would be forced out with each beat of the heart; great throbbing in the ears and head, with confusion; vertigo, with sensation as if a vapor spread from her, through her head, and renders her powerless; slight nausea, with uncomfortable feeling of the stomach; precordial anxiety; she turned deadly pale, felt very giddy, then became partially unconscious, remaining so for ten minutes; mental confusion and a dream-like state.

Apomorphia.—Labyrinthine or gastric vertigo, attended with giddiness, singing in the ears and slight deafness; nausea, with vomiting and retching; nausea coming on at intervals; sudden vomiting, almost without nausea; syncope, with lessening of blood pressure.

Argentum nit.—Ocular vertigo caused by weakness or paralysis of the ciliary muscle; transitory blindness, nausea, and confusion of the senses; sensation of expansion when looking high up in the street; trembling weakness when walking with shut eyes, or when walking in streets with high houses, as though they would fall upon him.

Arsenicum.—Gastric, nervous, or epileptic vertigo, with reeling, as if intoxicated; vertigo as if one would fall, especially when closing the eyes; nausea and disposition to vomit in a recumbent position, less when sitting up; burning in the stomach, with vomiting; vertigo coming on periodically, with coldness, followed by fever, loss of appetite, and vomiting.

Belladonna.—Epileptic vertigo, caused by rush of blood to the head, with heat and redness of the face, buzzing in the ears, dimness of vision, and loss of consciousness; vertigo accompanied by luminous vibrations before the eyes, especially when stooping or bending the head; vertigo, with vanishing of sight, and a tendency to fall backward or to the left side; aggravated in a warm room; ameliorated in the open air.

Bryonia.—Gastric vertigo, with nausea and disposition to faint; weakness and distention of the stomach, flatulence, and constipation; burning in the stomach and vomiting; aggravated by rising from a recumbent position and by motion; ameliorated by rest and by lying down.

Calcarea carb.—Gastric or epileptic vertigo; distention of the stomach and bowels, flatulence, and constipation; stupefaction of the head, with vertigo; sensation of coldness in the brain; vertigo with roaring in the ears and nausea, especially when stooping or rising up suddenly; vertigo caused by congestion of blood to the head.

Causticum.—Ocular vertigo caused by paralysis of any of the ocular muscles; congestion of blood to the head, with heat; vertigo brought on by taking cold; sudden and frequent loss of sight, with a sensation of a film before the eyes; inclination on stooping to fall backward, on looking up to fall towards the left side.

China.—Auditory, gastric, or nervous vertigo, especially when caused by debility from loss of animal fluids; vertigo, nausea, and fainting, with pale face and ringing in the ears, from anæmia; vertigo, with nervous weakness and debility; vertigo, with an empty stomach.

Chininum sulph.—Auditory vertigo, with hammering and humming in the ears, and partial deafness; vertigo, with headache, cerebral congestion, and deafness; vertigo occurring periodically, with chills and fever, especially when of malarious origin.

Cicuta.—Auditory vertigo, associated with aural disease, discharge of blood from the ears, loud sounds when swallowing, and hardness of hearing; tinnitus aurium, worse in the room than in the open air.

Cocculus.—Epileptic vertigo, with reeling, nausea, loss of consciousness, and sudden falling to the ground; vertigo-aggravated by motion, noise, smoking, coffee, sitting up in bed, and riding in a carriage.

Colchicum.—Auditory vertigo, with chronic discharge from the ears, and hardness of hearing; vertigo, with roaring and stoppage of the ears; ameliorated by rest.

Conium.—Ocular or auditory vertigo, with sensation as if turning in a circle; vertigo caused by looking steadily at an object; vertigo on rising up or going down stairs; also when lying down or turning over in bed; great debility and inclination to sleep.

Cuprum.—Ocular vertigo caused by paralysis of the nervus abducentis; vertigo when looking up, with loss of sight, as if gauze were before the eyes; vertigo, with sensation of turning round, or revolving vertigo; vertigo from cerebral congestion; vertigo with extreme weakness, especially of the lower extremities.

Euphrasia.—Ocular vertigo from paralysis of the ocular muscles, especially when caused by taking cold, or when associated with coryza; blurring of the eyes, relieved by winking.

Gelsemium.—Ocular or nervous vertigo; vertigo from paralysis of the ocular muscles; vertigo with reeling and staggering, even unto falling; heaviness of the head, with imperfection of sight and dulness of mind; aggravated by smoking.

Hyoscyamus.—Epileptic or ocular vertigo, with reeling, loss of sight, hearing, and consciousness; diplopia, or double vision; red, sparkling, staring, and distorted eyes.

Ipecacuanha.—Gastric vertigo, with nausea and vomiting; abdominal distention, with flatulency, colic, and diarrhœa; vertigo, with loss of appetite, empty retching, and qualmishness.

Ignatia.—Gastric, nervous, or epileptic vertigo; vertigo followed by nausea, and vomiting of slimy, sourish fluid; burning in the stomach; abdominal distention, with flatulency, and constipation; restless, changeable disposition; vertigo caused by mental emotion; worse from stooping or moving the head.

Kali iod.—Ocular vertigo in syphilitic individuals; dimness of vision, with twitching of the eyeballs; burning in the eyes, with sensation of a film before the sight, relieved by winking.

Kalmia.—Auditory vertigo, with sensation when turning as of something loose in the head; vertigo while stooping or looking downward; palpitation of the heart.

Lachesis.—Epileptic vertigo, with reeling, falling, and loss of consciousness; frequent momentary vertigo, particularly on closing the eyes, sometimes with paleness, nausea, and vomiting; vertigo with headache, congestion of blood to the head, and cold extremities.

Natrum mur.—Gastric vertigo, with reeling, and obscuration of sight; sensation of everything turning in a circle when

walking; nausea and sudden sinking of strength; burning and feeling of pressure in the stomach; want of appetite and aversion to food; vertigo, with nausea and heartburn after eating.

Natrum salicyl.—Labyrinthine vertigo, with tendency to fall to the affected side, whilst surrounding objects appear to move in the opposite direction; noises in the affected ear, with defective hearing; vertigo, with inclination to fall towards the left side.

Nux vom.—Ocular, gastric, or nervous vertigo; vertigo from paresis of the ocular muscles, especially when aggravated by stimulants or tobacco; vertigo, with tendency to faint, worse during and after meals; vertigo associated with dyspepsia and constipation; vertigo brought on by mental exertion, sedentary habits, high living, or hæmorrhoids; vertigo in hysterical and nervous subjects.

Opium.—Ocular vertigo depending on paralysis of the accommodation; vertigo with stupefaction of the senses, or after fright; apoplectic symptoms with vertigo; pale or bloated face, with dimness of sight, and tendency to faint; ameliorated by rest.

Phosphorus.—Ocular, gastric, or nervous vertigo, especially when caused by nervous debility, sexual abuse, spermatorrhœa, hæmorrhoids, etc.; vertigo accompanied by reeling, nausea, and vomiting; vertigo occurring in the morning, with an empty stomach, after eating or sleeping, during or after the menses, or with fainting and trembling.

Phosphoric acid.—Nervous vertigo, especially when caused by cerebral or nervous exhaustion; vertigo, with great disposition to sweat during the day; night-sweats, with vertigo; vertigo from onanism, loss of animal fluids, or mental exertion, anxiety, or overwork.

Physostigma.—Ocular vertigo from partial or complete paralysis of the ciliary muscle; has been applied with benefit as a local application.

Pulsatilla.—Gastric or nervous vertigo, with reeling, especially in the evening, when walking, when lying down, or before the menses; vertigo followed by vomiting or a ten-

dency thereto; worse stooping, or rising up quickly from a recumbent position.

Senega.—Ocular vertigo, especially when caused by paresis or paralysis of the superior rectus or superior oblique muscle of the eye, or when the vertigo and double vision are relieved by bending the head backward.

Sepia.—Gastric or nervous vertigo, especially when caused by a dyspeptic condition; vertigo, with flatulency and constipation; worse when drinking, while looking upwards, or while looking from a great height, a large assemblage of people, or an extended plain.

Silicea.—Nervous or ocular vertigo, especially when brought on by severe physical or mental labor, reading, writing, or sewing; vertigo accompanied by nausea, and aggravated by motion or by looking upwards; vertigo during sleep, or when rising from a recumbent position.

Spigelia.—Ocular or epileptic vertigo, especially when associated with sharp, stabbing pains through the eyes and head; vertigo, with reeling or staggering, followed by loss of consciousness.

Stramonium.—Epileptic vertigo, especially when walking in the dark, day or night; vertigo followed by stupefaction of all the senses and complete insensibility; vertigo accompanied by strange fancies.

Sulphur.—Gastric vertigo, especially in the morning after breakfast, with nausea; dimness of vision, with inclination to fall to the left; chronic vertigo, especially if preceded by a suppressed eruption.

Tarantula.—Gastric, nervous, or epileptic vertigo, so severe as to cause him to fall, but without losing consciousness; nausea, bloating of the stomach, and disposition to vomit; vertigo after breakfast, with a bad taste in the mouth; vertigo from fixing the sight on any object.

Veratrum.—Gastric vertigo, with cold perspiration on the forehead; vertigo, with sensation as if everything in the head was loose; loss of appetite, with burning stomach, distended abdomen, flatulency, vomiting, and diarrhoea.

CHAPTER III.

INSOMNIA.

SLEEP may be defined to be, a normal suspension of the functions of the cerebral hemispheres. True sleep is just as much a normal condition of the organ of the mind as its opposite, the state of true consciousness, or voluntary mental activity. These two conditions alternate with each other at regular periods during a state of health, and cannot be greatly disturbed without causing disease. If the former state is prolonged much beyond its natural duration, it constitutes sopor or stupor; if the latter, wakefulness or insomnia.

Insomnia may be either partial or complete. Partial insomnia is when the patient is able to obtain only a portion of his usual allowance of sleep. He either lies awake one or more hours before he can get to sleep, or he awakes some hours earlier than is his natural habit, so that he obtains considerably less than the normal quantity of sleep. In this respect, however, every individual is a law unto himself. The amount of sleep that is normal for one person may be abnormal for another, and *vice versa*. On the other hand, the patient may not be able to obtain any sleep whatever, for several successive nights, as in acute mania, violent fevers, or when suffering from severe pain, profound grief, or great mental disturbances. This constitutes complete insomnia, and always indicates a dangerous degree of mental activity.

Disturbed or restless sleep is a defect in quality, rather than in quantity, of sleep, though the two conditions frequently coexist. This state, as well as that of insomnia, may be caused by fatigue of the body or mind; by anxiety or mental excitement; by indigestible food, food taken in undue quan-

tity, or at unreasonable hours; uncomfortable conditions of the body induced by exposure to cold, heat, etc.; loud or continuous noises; pain of any kind; and anæmia and hyperæmia of the brain, both of which conditions of the cerebral circulation are obnoxious to healthy and quiet sleep. It is true there is a less active circulation in the brain during healthy sleep than during the waking periods, but this is not the condition known as cerebral anæmia, where the blood is either deficient in quality or quantity, and which is as unfriendly to sleep as is the opposite state of hyperæmia.

Treatment.—The removal or avoidance of the cause is a matter of the highest importance in the treatment of insomnia; one, the neglect of which will, in the majority of cases, result in failure, notwithstanding the greatest care in the selection of indicated remedies. Moreover, sleeplessness is generally a symptom of some other disease, the removal or relief of which is necessary for the cure of the secondary affection. Hence, we do not deem it necessary to give many remedies or symptomatic indications for this disorder, which is often best treated on physiological principles.

General Indications.—*Sleeplessness before Midnight:* Ars., Bell., Bry., Calc. carb., Carbo an., Carbo veg., Chin., Con., Cycl., Graph., Ign., Kali carb., Laches., Lyc., Merc., Natr., Nitric ac., Phos., Puls., Rhus tox., Selen., Sep., Sil., Spig., Staph., Sulph., Valer.

Sleeplessness after Midnight: Ars., Asafoet., Aur., Caps., Coff., Hep., Hyosc., Kali carb., Laches., Lyc., Merc., Natrum, Nitric ac., Nux vom., Plat., Puls., Rhodod., Rhus tox., Samb., Sep., Sil., Sulph. ac., Thuja.

Waking too early: Ars., Asafoet., Bry., Calc. carb., Coff., Croc., Dulc., Hep., Ign., Kali carb., Lyc., Magn., Mur. ac., Natr. carb., Nux vom., Phos. ac., Ran. bulb., Rhod., Sep., Sil.

Waking frequently: Ant. crud., Arn., Ars., Bell., Bism., Calc. carb., Cann., Carbo. an., Caust., Cham., Chin., Cic., Coff., Digit., Fluor. ac., Graph., Hep., Kali carb., Lyc., Mang., Merc., Nitric ac., Nux vom., Phell., Phos., Puls., Rhus tox., Ruta, Samb., Selen., Sep., Sil., Staph., Sulph., Sulph. ac., Tereb., Teuc., Zinc.

Retarded Sleep: Alum., Anac., Ant. tart., Ars., Bell., Bry.,

Calad., Carbo an., Carbo veg., Caust., Chin., Creos., Gels., Graph., Guaj., Ign., Lach., Led., Lye., Merc., Natr. carb., Natr. mur., Nux vom., Petr., Phos., Puls., Rhus tox., Selen., Sep., Sil., Spig., Stann., Sulph.

Special Indications.—*Aconite*. Sleeplessness from anxiety; sleeplessness of infants and aged people; sleeplessness in consequence of febrile symptoms; great restlessness and tossing about.

Belladonna.—Insomnia with drowsiness; congestion of blood to the head.

Cocculus.—Sleepless from mental activity or from night-watching; sleep retarded, restless, and frequently interrupted by wakings and startings.

Coffea.—Sleeplessness of infants; sleepless from joy, long watching, overexcitement of mind.

Gelseminum.—Drowsy and sleepless, or else wide-awake and unable to get to sleep; insomnia from cerebral irritation and congestion.

Hyoscyamus.—Sleepless from nervous excitement; wild, staring eyes; tendency to delirium.

Ignatia.—Sleepless from grief or depressing emotions; sleeplessness from nervous exhaustion.

Moschus.—Nervous excitement preventing sleep; is awakened by sense of heat, rendering the covering uncomfortable; relieved by throwing off the covering.

Nux vom.—Sleepless from overwork, mental or bodily; too close study at night; abuse of narcotic stimulants.

Opium.—Great wakefulness or drowsiness, with inability to get to sleep; insomnia with acuteness of hearing, the ticking and striking of the clock, cock crowing, and other noises, keeping the patient awake.

Phosphorus.—Gets to sleep too late; insomnia from nervous debility, especially when brought on by onanism or sexual abuse.

Pulsatilla.—Sleeplessness after late suppers, or from indigestion; determination of blood, especially to the head and surface of the body, rendering the patient extremely restless, sleepless, and uncomfortable.

Stramonium.—Sleepless from nervous excitement; sleep interrupted by frightful screams; restless sleep full of dreams; tendency to delirium.

Sulphur.—Sleepless from nervous excitement, cutaneous irritation, and external heat.

Veratrum vir.—Sleeplessness from determination of blood to the brain, or from a general febrile condition.

Zinc. valer.—Sleeplessness with pains in the head, especially in children; frequent waking in the night; drowsy, with pale and tired expression of the countenance.

CHAPTER IV.

COMA.

COMA is often regarded as a profound state of sleep, or the opposite of insomnia, and in one sense this definition is true; for as insomnia is a state of extreme wakefulness (*pervigilium*), so coma, a term derived from a Greek word signifying "deep sleep," is a state of profound insensibility, somewhat allied to sleep, but in which the loss of consciousness is more complete and absolute than in any form of true sleep. Hence the terms *sopor*, *lethargy*, and *stupor* are employed to designate the lesser degrees of insensibility, from that of *sleep*, properly so called, up to that of profound *anæsthesia*, in which there is complete loss of consciousness, that is to say, true *coma*. And as there are different degrees of stupor, so there are different degrees of coma, namely, what is known as the comatose state, coma, and profound coma, the last of which was called by the older writers *carus*, the gravest of the graver states of unconsciousness and insensibility. In this condition the breathing is very slow and stertorous, accompanied by puffing of the cheeks; the pulse, which at first is strong and regular, becomes feeble and irregular; there is often lividity; and the pupils, which are generally excessively dilated, are immovable and totally insensible to light. But in the lighter forms of coma there is usually more or less delirium; the patient mutters slightly, and grasps feebly, but unconsciously and without purpose, at any object in his way. This is the form of coma met with in many low fevers, whilst the former is the coma of apoplexy.

Diagnosis.—The symptoms of coma above given are sufficiently characteristic, in most cases, to distinguish this affection from every other. It is important, however, to remember that

even complete insensibility is not always coma. Thus, in *syncope* we have insensibility or unconsciousness resulting from a cutting off of a due supply of blood to the brain; whilst in *asphyxia* we have a similar result from an interference with the function of respiration. Again, we may have a condition of profound *narcosis*, resulting from the poisonous effects upon the brain of opium, alcohol, and other drugs, or of certain urinary products which the kidneys have failed to eliminate (*uræmia*). In all these cases we have, in addition to the comatose state, certain characteristic symptoms belonging to each affection, the presence of which will always serve to distinguish the condition from that of simple coma. Thus, in *syncope* there is fainting; in *asphyxia*, deficient respiration; in *narcosis*, the peculiar effects of the agent or drug producing it; and in *uræmia*, convulsive movements, vomiting, etc.

Causes.—The most common cause of coma is cerebral hæmorrhage (*apoplexy*). Coma may also result from sunstroke, long exposure to severe cold, typhoid and other low fevers, epilepsy, erysipelas of the head and face, inflammation of the cerebral meninges, and various organic diseases of the brain and its membranes, such as tumors, multiple embolisms, etc.

Prognosis.—Coma, in whatever way it may be produced, is always an extremely dangerous condition; for if the patient cannot be roused at all within one or two days at farthest, or if the coma does not gradually diminish in intensity by passing into the state of simple stupor, it will probably soon terminate in death.

Treatment.—One of the most important matters relating to the treatment of coma is that of food or nourishment. Nothing should be allowed to the patient, in the way of aliment, except water and the juice of oranges and grapes. Anything more than this is certain to do harm. It is folly to suppose that coma can be relieved by medicine, or in any other way, while the blood-vessels are kept in a state of repletion by the ingestion of any form of nutriment. I should not deem it necessary to mention so obvious a matter, were it not that I have more than once seen the lives of patients placed in the greatest jeopardy by this senseless course on the part of nurses, and, I am sorry to say, of intelligent physicians also.

Special Indications.—*Belladonna*.—Stupor with snoring, dark red face, swelling of the cheeks, and congestion of blood to the head; deep sleep, attended by screaming, singing, muttering, or frequent startings; eyes half open, but insensible to light.

Bryonia.—Great drowsiness or heavy stupor, with or without delirium; moanings and startings in sleep, with fever, and sometimes with loud cries.

Camphora.—Sopor and delirium, with chilliness and coldness of the body; talking and snoring in the sleep; congestion of blood to the head; face red, but sometimes pale.

Chamomilla.—Soporose condition, with feverish restlessness, especially in children; snoring and starting in the sleep; delirium, with moaning, talking, or screaming; comatose condition of children during dentition, especially when caused by diarrhœa.

Helleborus.—Sopor, especially when resulting from an attack of acute or chronic hydrocephalus; fever, with hot head and cold hands and feet; urine scanty or suppressed.

Lachesis.—Comatose symptoms, especially when resulting from erysipelas of the head and face; constant sopor after the cessation of the pains; tossing about, particularly in children, with moaning.

Phosphoric acid.—Sopor, especially in the daytime; being roused, he answers correctly, but immediately falls asleep again; typhoid fever, particularly when accompanied by profuse sweating.

Pulsatilla.—Deep sleep, with snoring inspirations; valuable in cases complicated with erysipelas.

Rhus tox.—Especially valuable in the coma of typhoid fever and erysipelas; sopor, with snoring, muttering, and grasping at flocks.

Nux moschata.—Sopor, with or without delirium; valuable in low forms of fever, especially when accompanied by putrid or colliquative diarrhœa; also in children during the diarrhœa of teething.

Opium.—Profound coma, such as occurs in apoplexy, with stertorous breathing, dilated pupils, dark red and bloated face, and feeble, irregular pulse; mouth open, eyes half closed, and insensible to light.

Secale cor.—Long-continued stupor, with delirium and startings; cold, viscid sweat; face red or pale; foetid and colliquative diarrhoea; suppression of urine.

Stramonium.—Deep sleep, with stertorous respiration, and a bloody froth at the mouth; epileptic coma.

Tartar emet.—Coma with constant yawning and stretching, especially when arising from irritation or congestion of the brain; great prostration, with trembling of the limbs; coma of delirium tremens.

Veratrum alb.—Protracted stupor, especially when accompanying the collapse of diarrhoea or cholera; coldness of the whole body.

CHAPTER V.

SUNSTROKE.

SYN.: *Coup de Soleil*; *Insolatio*; *Thermic Fever*.

SUNSTROKE and thermic fever are certain forms of cerebral exhaustion resulting from prolonged exposure to solar or artificial heat. They are accompanied by one or another of the three primary forms of insensibility and unconsciousness, namely, syncope, asphyxia, or coma.

Varieties.—The differences above noted give rise to three well-marked varieties of insolation, namely: 1. The syncopal form, from exhaustion and failure of the heart's action; 2. The asphyxial form, from shock communicated chiefly to the respiratory centre, and interfering with the action of the lungs; and 3. The hyperpyrexial form, from shock communicated chiefly to the heat centre, causing vaso-motor paralysis and intense fever.

1. **The Syncopal Form.**—This form of sunstroke, sometimes called "heat-exhaustion," is the kind of nervous depression resulting from exposure to a high temperature, and causing syncope. The muscular and nervous systems are completely prostrated; the skin is moist, pale, and cold; the pulse, feeble and quick. This form of the disease is most apt to occur in fatigued, overworked, and delicate persons, especially those who faint easily, or who have previously suffered from sunstroke. The nervous exhaustion may be so great that the system can never rally from the collapse produced by the failure of the heart's action, but on the other hand complete recovery is more common in this form than in either of the others.

2. **The Asphyxial Form.**—This is the form to which the term

sunstroke is commonly applied. The symptoms are those of extreme depression following exposure of the head and spine to the direct rays of the sun, at a time when the body is greatly fatigued and overheated, and the atmospheric temperature is very high. The attack may or may not be preceded by premonitory symptoms, such as extreme thirst, giddiness, faintness, frequent disposition to urinate, stupidity, and drowsiness. Unless relieved, the patient either gradually or suddenly, but generally suddenly, sinks into a state of unconsciousness and insensibility, with cold skin, feeble pulse, stertorous breathing, and a more or less rapid failure of the respiration and circulation. Death may take place speedily, or reaction may set in, and life be preserved, but at the expense, in many cases, of various injuries to the cerebro-spinal system, such as chronic headache, weakness of memory, great nervous prostration and irritability, partial or complete blindness, paralysis, meningitis, insanity, or dementia. But the most common sequela of the disease is an extreme intolerance of the sun's heat, or indeed any form of heat, and this intolerance may endure for years, and even for life.

3. **The Hyperpyrexial Form.**—This form of insolation, sometimes called "heat-fever" or "thermic fever," is an intense fever resulting from the influence of heat upon the nerve-centres, thereby causing vaso-motor paralysis, and consequent overheating of the body generally. Although the attack is caused, primarily, by exposure to undue heat, either solar or artificial, it does not necessarily depend upon the immediate action of the sun's rays, as it frequently occurs at night, or in the shade. The nerve-centres generally, but especially the respiratory centre, are overstimulated by the heat, and this is soon followed by exhaustion. The vaso-motor paralysis thus induced causes the temperature of the body to rise to 108°, 109°, and, in some cases, to 110° F., and even higher. This gives rise to intense fever, extreme thirst, and frequent micturition; there is a burning skin, which may be either dry or moist; dyspnœa, with quick, gasping, and irregular respiration, and great restlessness; a strong determination of blood to the head, attended by visible pulsations of the carotids, and

dark, livid appearance of the face and neck. The pupils, which are at first contracted, sometimes become widely dilated. The pulse also varies, being in some cases rapid and jerking, in others, full, slow, and labored. Unless relief is soon obtained, convulsions, delirium, paralysis, with relaxation of the sphincters and suppression of urine, set in, followed by death from asphyxia and coma.

Like the other forms of sunstroke, this variety of insolation is often attended by premonitory symptoms, such as headache, giddiness, thirst, loss of appetite, nausea, vomiting, frequent micturition, hurried respiration, precordial anxiety, and a general feverish state of the system, but differs from the first two forms in the length of time that the prodromata may manifest themselves before the attack culminates, which is often several hours, and in some cases days.

Morbid Anatomy.—In rapidly fatal cases of sunstroke, neither the brain, lungs, nor heart are apt to exhibit any very marked morbid appearances after death. The brain and its membranes are sometimes slightly congested, and the same may be said of the lungs. The greatest changes, however, are observed in the venous trunks, especially those of the abdomen, the right side of the heart, and the pulmonary vessels, all of which are sometimes overloaded with dark, grumous blood; patches of ecchymoses are also scattered over the surface of the body, rendering it more or less livid. These appearances are chiefly the effect of nervous shock, which, by paralyzing the heart and lungs, leaves the venous system in an engorged condition.

In thermic cases a similar condition often exists, but usually in a more pronounced form, together with a more or less congested state of the brain and its membranes. Cerebral hæmorrhage and serious ventricular effusions may also exist, but the real cause of death in these cases is asphyxia, and not apoplexy, as was once thought. This is forcibly illustrated by the post-mortem appearances in the three fatal cases observed by surgeon Russel at Madras. "The brain," he says, "was, in all, healthy; no congestion or accumulation of blood was observable; a very small quantity of serum was effused

under the base of one, but in all three the lungs were congested even to blackness through their whole extent; and so densely loaded were they, that complete obstruction must have taken place. There was also an accumulation in the right side of the heart, and the great vessels approaching it."*

Causes.—A hot, close and moist atmosphere, overexercise, tight and unseasonable clothing, the breathing of vitiated air, and whatever tends to produce suffocation, all conspire to produce an attack; especially if there be superadded, great bodily fatigue, a heated atmosphere, or prolonged exposure to the direct rays of the sun. Hence soldiers, especially those serving in hot climates, often suffer from sunstroke, their warm, tight-fitting uniforms, heavy accoutrements, and long, weary marches, predisposing to, and frequently precipitating, such attacks. Certain classes of out-door laborers are also liable to become sunstruck in very hot weather, especially harvest hands, common laborers upon our railroads and in our large cities, very few of whom take the precaution to properly guard themselves against the effects of the sun's rays.

Prognosis.—Statistics show that sunstroke proves fatal to nearly one-half of those attacked; but even of those who recover a large proportion are permanently injured by it, whilst some of them, as we have seen, are rendered complete wrecks, both in body and mind.

Treatment.—The syncopal form of sunstroke generally requires but little active treatment, further than removing the patient to a cool and shady place, loosening the clothing, and administering by inhalation a few drops of *Amyl nitrite*. But in ordinary cases of sunstroke, where the patient has long been exposed to the direct rays of the sun, or where the temperature of the body is greatly elevated above the normal standard, the burning temperature of the surface should be reduced as quickly as possible by the free application of the cold water douche, ice and ice-water to the head and neck, cool air, fanning, etc., at the same time endeavoring to overcome the great nervous depression and consequent embarrass-

* Graves' *Clinical Medicine*, 3d Am. ed., p. 118.

ment of the circulation, by the cautious administration of stimulants, especially *Camphor*, which is homœopathically indicated. Whenever practicable, the cold effusion to the head, neck, and shoulders, continued until the temperature sinks to 98° or 100° F., is the most speedy and effective way of rescuing the patient from the impending danger. At the same time, care should be taken not to continue cold applications too long, as danger may result from reducing the temperature below the normal standard.

After the patient has recovered from the immediate effects of the stroke, the nervous depression and other sequelæ of the disease will be best met by time, which is always an essential element of cure in these cases, aided by proper medication. These after-results, as before stated, are often extremely persistent, and give rise to great physical prostration, which often lasts for years—a condition which, aside from mere medical treatment, calls for the exercise of sound discrimination and judgement as to clothing, climate, and other hygienic influences. The clothing in particular should be carefully adapted to the season and the sensibility of the patient, being neither too thick and warm, nor too thin, since both heat and cold are oppressive and injurious. For this reason, whenever practicable, the patient should go north in summer and south in winter, and this should be repeated, if necessary, from year to year, until such time as the patient can safely bear the varying temperature of his own home. Where a change of climate cannot be had, underclothing made of soft buckskin, fur, or other warm material, may be worn in winter, and such other precautions taken to guard against the injurious effects of cold and heat, as the peculiar circumstances of the patient may render necessary. Finally, in those cases where nervous exhaustion is the chief difficulty to be overcome, the patient should be encouraged by the assurance that time, which, as already stated, is an essential element of cure, will, in conjunction with suitable remedial measures, finally restore him to perfect health.

General Indications.—*Premonitory Symptoms.*—*Acon.*, *Ant. crud.*, *Ars.*, *Bry.*, *Carbo veg.*, *Gels.*, *Laches.*, *Verat. vir.*

During the Attack.—Amyl nit., Bell., Camph., Glonoin, Opium, Verat. alb.

For the Sequelæ.—Agar., Anac., Ars., Baryta carb., Bell., Gels., Glon., Laches., Nat., Stram.

Special Indications.—*Aconite.*—Thermic form, accompanied by burning heat, especially in the head and face, dryness of the skin, redness of the eyes and cheeks, thirst, headache, restlessness, anxiety, nausea, vomiting.

Amyl nit.—Violent determination of blood to the head and face; head feels as though it would burst; violent beating of the carotids; vertigo, with sense of intoxication; anxiety; dyspnœa; prostration.

Antimonium crud.—Syncopal form, with fainting, loss of appetite, furred tongue, nausea, vomiting; aggravated by exposure to the sun.

Antimonium tart.—Thermic fever, with much gastric disturbance, great prostration, tendency to fainting, convulsions, paralysis.

Arsenicum.—Excessive thirst, burning skin, fainting, nausea and vomiting, great prostration, diarrhœa.

Belladonna.—Indicated when the brain symptoms predominate, such as headache, giddiness, delirium, sensitiveness to light and sound, great anguish, etc.; also apoplectic symptoms, such as coma, stertorous breathing, lividity, etc.

Bryonia.—Tendency to syncope, thirst, gastric disturbances, weakness of the limbs, great uneasiness and apprehension.

Cactus.—Violent determination of blood to the brain, with pulsations in the temples, bloodshot eyes, stupor, flushed face, epistaxis, cold sweat, fainting, oppression of the chest, great prostration.

Carbo veg.—Extreme prostration of the vital power; vertigo, with heaviness of the head; pulsative pains and pressure above the eyes; heat-exhaustion.

Camphora.—Great depression of both the nervous and circulatory systems; oppression of breathing; coldness of the body; tremors, cramps, and diarrhœa.

Glonoin.—Intense headache, with throbbing in all parts of

the head and vertigo, especially when followed by loss of consciousness; painful constriction of the heart; sensation as if all the blood had gone to the head, which feels as though it would burst; fainty feeling, with complete muscular relaxation; convulsions; numbness in the limbs; oppression of breathing; precordial anxiety.

Veratrum vir.—Thermic fever, with congestion to the head and chest, gastric disturbances, coldness of the limbs; faintness; convulsions; paralysis.

CHAPTER VI.

CONCUSSION OF THE BRAIN.

CONCUSSION of the brain is usually regarded as a surgical disease, but it is so only when complicated with cerebral or other injuries. The symptoms are in the main the same, whether traumatic lesions exist or not; and as the treatment is medical rather than surgical, we think it is fully entitled to a place among intracranial disorders.

Cerebral concussion may be defined to be a shock communicated to the brain and nervous system by some external violence, such as a fall or blow, whereby their functions are temporarily suspended, and the vital power more or less depressed.

Symptoms. — The leading symptoms of concussion are: unconsciousness and insensibility, accompanied by a greater or less degree of pallor, coldness, and flaccidity of the voluntary muscles. Sometimes the depression is very slight, and the patient quickly recovers; at others, the shock is so severe as greatly to depress the system and retard recovery; whilst at other times the depression continues and the patient sinks. In the more severe cases all power of motion is lost; and if the patient is capable of being partially aroused, he immediately relapses again into the former state of insensibility and unconsciousness. In this, the *first stage* of concussion, the pulse is slow and feeble, the pupils dilated or uneven, and the surface pale and cold. The *second stage* is characterized by the symptoms of reaction; warmth and color gradually return, consciousness and the power of motion are restored, and the circulation is reëstablished. This stage is usually accompanied by more or less vomiting, depending upon the severity of the

concussion. This vomiting is a favorable symptom, as it tends, by equalizing the circulation, to promote recovery. The *third stage* is marked by extreme physical prostration, a cold, clammy, semi-moribund condition, which sometimes continues for hours, and at last gradually yields to recovery, or terminates in death.

Morbid Anatomy.—As might be inferred, every degree of injury has been observed in fatal cases, and the instances are comparatively few in which no intracranial lesion is to be found. Sometimes actual rupture occurs; at others, a soft or semi-diffuent state of the cerebral tissue is produced, whilst occasionally, even in those cases in which the shock and consequent depression are the greatest, no lesion whatever can be discovered. The visible lesions may be equally visible, from a contused, ecchymosed, or lacerated wound, with or without a broken skull, to a mere abrasion, or even a total absence of external injury.

Pathology.—In those cases in which no lesion can be discovered after death, it is probable that the patient dies from the effect of shock alone; but of course this cannot be proven, because it cannot be shown that the cerebral tissue has entirely escaped injury. A minute hæmorrhage or other injury at the internal origin of the pneumogastric nerve would be sufficient, no doubt, to produce speedy death, and the same may be true of other parts of the great nervous centre. Nevertheless, it is more reasonable to refer the fatal issue in these cases to shock alone, than to causes which may have no existence. In other cases, the injury to the brain interferes with the circulation through it, and though the effects of the concussion upon the general system may be no greater in these than in the former cases, the character of the injury is such as to permanently depress the vital power, and death sooner or later is the inevitable consequence.

Prognosis.—The prognosis differs greatly in different cases. As we have said, some cases quickly recover; others rally slowly, the paralyzed brain gradually regaining its power and functions; and the patient, after remaining, it may be, for hours in a cold and semi-moribund condition, gradually re-

covering his activity and senses, but suffering for a longer or shorter period from headache, confusion of thought, giddiness, and impairment of the mental powers. In other cases, again, should the patient survive the immediate effects of the injury, an irritable state of the brain may remain, or such an impairment of its functions, as to render it liable to inflammation under the operation of almost any exciting cause, such as excesses in eating and drinking, mental excitement, etc. On the other hand, if paralysis ensues, or if there is incontinence or retention of fæces and urine, it is highly probable that the case is complicated with cerebral laceration or contusion, and that the final result will be fatal.

Treatment.—This should be similar to that recommended for the syncopal form of sunstroke (q. v.). *Amyl nitrite* by inhalation furnishes the speediest way of overcoming the depression of the vital powers, but care should be taken not to overstimulate the circulation by this or any other method, the aim being simply to reëstablish the normal condition. In most cases it is not only safest, but sufficient, to wrap the patient in warm blankets, apply friction to the surface, and use dry heat to the extremities. In the case of young children, however, the warm bath may be employed with great advantage, care being taken to prevent their getting chilled during its administration. In the case of adults, on the contrary, dry heat is the handiest mode of applying heat to the surface, the patient being surrounded by hot bottles, Chapman's bags, or some other equivalent substitute. As soon as the patient is able to swallow, he may, if his friends so desire, be allowed to drink moderately of simple warm teas; but alcoholic stimulants should be carefully avoided, as they are apt to have a highly prejudicial effect. So far as the concussion is concerned, the case is now one for medical treatment only, no other form of stimulation being required.

General Indications.—*First Stage.*—*Amyl nit.*, *Arn.*, *Ars.*, *Cic.*, *Cocc.*, *Camph.*, *Con.*, *Lauroc.*, *Verat.*

Second Stage.—*Arn.*, *Bry.*, *Camph.*, *Chin.*, *Euphra.*, *Hep.*, *Hyos.*, *Ign.*, *Nux vom.*, *Phos.*, *Rhus tox.*, *Sulph.*, *Verat.*

Third Stage.—Cic., Cocc., Con., Dig., Ignat., Merc., Phos. ac., Rhus tox., Sulph.

Muscular System.—Angus., Euphra., Phos. ac., Puls., Sulph. ac.: *trembling*—Angus., Cic., Cin., Hep., Ign., Nux vom.: *convulsions*—Arn., Ars., Cocc., Con., Lauroc., Rhus tox., Sulph., Verat.: *paralysis*:

Sensorium.—Dig., Euphra., Hep., Ign., Phos. ac., Ruta, Sulph., Verat.: *giddiness*—Angus., Cin., Con., Puls., Rhus tox., Sulph. ac.: *drowsiness*—Arn., Ars., Cic., Cocc., Laches., Lauroc., Merc., Opium: *insensibility and unconsciousness*.

Special Indications.—*Arnica.*—Concussion from traumatic injury to the brain, attended with insensibility and unconsciousness; if fever ensues, alternate with *Aconite*.

Belladonna.—Second stage, when accompanied by excessive reaction; delirium, convulsions, flushed face, intense headache; if high fever ensues, alternate with *Aconite*.

Cicuta.—First stage of cerebral concussion, attended by insensibility and unconsciousness; lies in a state of complete insensibility, like a dead person; face cold and deadly pale, with cold hands; inability to swallow; delirium; profound depression of the vital power; convulsions.

Conium.—Apoplectic symptoms, with trembling of the limbs; want of animal heat; delirium; convulsions; paralysis; numbness; slow, weak pulse; dilatation of the pupils; collapse.

Euphrasia.—Second stage, with great weakness of the whole body; soreness from falls or blows; body is very cold and cannot get warm; headache, with sensation as if the brain were bruised; numbness and cramps in the limbs.

Gelsemium.—Stupid, drowsy condition, with pain in the back of the head, dilated pupils, and paralysis of the lower sphincters.

Hyoscyamus.—Second stage, attended with violent reaction, and low or furious delirium.

Lachesis.—Apoplectic symptoms, with low, muttering delirium, pale face, cold extremities, and paralysis of the left side.

Laurocerasus.—Loss of consciousness, loss of speech, and loss of motion; sunken countenance; slow, feeble pulse; moaning

and rattling breathing; skin cold and blue; trembling of the limbs; paralysis of the sphincter ani, with unconscious discharge of fæces.

Phosphoric acid.—The best remedy, in most cases, for the nervous debility remaining after concussion of the brain; frequent cold spells, with general chilliness; pulse irregular; weakness of memory, with confusion of mind; bruised sensation in all the limbs; dull headache, especially in the forehead and temples; restlessness, with pain in the back, and great despondency; profuse sweating.

Veratrum alb.—Cold, pale, disfigured face, as of a dead person; limbs cold and trembling from weakness; speechlessness, with unperceived discharge of loose fæces; palpitation of the heart, with anxiety, and arrested breathing; loss of sensation and motion; tendency to collapse.

Vipera redi.—Sopor, with loss of sight and difficult breathing; pulse slow, feeble, and irregular, with coldness and sweat; constant disposition to faint; delirium; convulsions; paralysis of single limbs, or of one-half of the body; difficulty of swallowing; vomiting and diarrhœa.

CHAPTER VII.

HYDROCEPHALOID.

THIS is the name given by Sir Marshall Hall to a group of symptoms closely resembling those of acute hydrocephalus. The symptoms are not peculiar to any one disease, though most frequently met with in infants that have fallen into an anæmic state, in consequence of an exhausting diarrhœa. It is but justice to this eminent author to describe the condition referred to in his own language:

“Hydrocephaloid may be divided into two stages: the first, that of irritability; the second, that of torpor. In the former there appears to be a feeble attempt at reaction; in the latter the powers appear to be more prostrate. These two stages resemble, in many of their symptoms, the first and second stages of hydrocephalus respectively.

“In the first stage the infant becomes irritable, restless, and feverish; the face flushed, the surface hot, and the pulse frequent; there is an undue sensitiveness of the nerves of feeling, and the little patient starts on being touched, or on hearing any sudden noise; there are sighing and moaning during sleep, and screaming; the bowels are flatulent and loose, and the evacuations are mucous and disordered.

“If through an erroneous notion as to the nature of this affection, nourishment and cordials be not given, or if the diarrhœa continue, either spontaneously or from the administration of medicine, the exhaustion which ensues is apt to lead to a very different train of symptoms. The countenance becomes pale, and the cheeks cool or cold; the eyelids are half closed, the eyes are unfixed and unattracted by any object placed before them, the pupils unmoved on the approach of light; the

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

If it is important to distinguish this condition as met with in anæmic children suffering from summer complaint, it is equally so to recognize and properly estimate it when met with under other forms. We frequently observe precisely this train of symptoms during the initial stage of pneumonia in infants, and also in helminthiasis. In fact the irritation caused in children by intestinal worms, crude ingesta, and sometimes even by cold alone, is not only of the same nature, but apparently identical with that of hydrocephaloid. This, however, is not to be wondered at, since the symptoms mentioned are of a purely reflex character. The important point to remember is, that symptoms resembling those of acute hydrocephalus may present themselves in the course of almost any exhausting disease, especially in the case of children, and that in most instances they simply denote cerebral irritation, and not meningeal inflammation. The point is one of great practical importance, since the removal of the cause, though far distant from the seat of irritation, will generally put an immediate stop to the symptoms, as we very often see in the case of infantile remittent fever.

Treatment.—It follows from what has just been said, that whenever the physician meets with the symptoms of hydrocephaloid, he should, first of all, be careful to make a correct diagnosis, with a view to ascertain, and prescribe for, the *cause*, which in the great majority of cases will be found to be seated somewhere in the intestinal or respiratory tract. If, as very frequently happens, the symptoms are due to verminous irritation, *Cina* or *Santonine* will be found to be a very effective remedy; if due to cold, *Gelsemium* will generally relieve; and if summer complaint be the cause, *Mercurius*, either with or without the more specifically indicated remedy, as the case may require, will often allay the intestinal, and with it the cerebral irritation.

Special Indications.—*Æthusa cyn.*—Great debility and prostration, with drowsiness; greenish watery stools in the morning, during dentition, with much pain and tenesmus; vomiting of white, frothy matter, or of coagulated milk; eyes turned up, or fixed and staring; face pale, with a painful facial expression, especially about the mouth; child dozes and cries alternately; or utters piteous moans from time to time; spasms and convulsions.

Apis mel.—Thin yellow, or offensive watery diarrhœa in teething infants, accompanied by great prostration; hands and feet blue and cold; tenderness of the abdomen on pressure; stools frequent but odorless, generally worse in the morning; urine very scanty or suppressed; child very feeble and drowsy, frequently uttering shrieks or plaintive cries.

Arsenicum.—Greenish or yellowish stools, often watery, with extreme prostration, frequent sinking spells, and violent vomiting; child wants to lie with the head low; great thirst, but drinks little at a time, and generally vomits as soon as the water becomes warm in the stomach; rapid emaciation; rapid and feeble pulse; dilated pupils; sunken abdomen; involuntary stool and urine.

Belladonna.—Green stool, voluntary or involuntary, followed by tenesmus; head hot and feet cold; drowsy with frequent startings; tongue with red tip and edges; mouth and lips dry; spasms and convulsions.

Borax ven.—Stools variously colored; painful or painless; odorless or cadaverous-smelling; constant vomiting, gagging, and retching; abdomen soft or flabby and sunken; very drowsy and emaciated; child starts as if frightened on being lowered into the crib or cradle.

Bryonia.—Offensive diarrhœa, especially in the morning, or after nursing, which the child constantly wants; lips dry and parched; child turns pale on being disturbed or raised up; very feverish and fretful, especially when disturbed.

Calcareo phos.—Poor, scrawny-looking children, with dry, dirty-white skin, and aged countenance; thin greenish stools, with a great deal of offensive flatulence; pus-like stools, which have a cadaverous odor.

Camphora.—Involuntary watery diarrhœa, with frequent vomiting; skin cold and clammy; child appears to be in a collapsed state, stupid, senseless, and almost without life; lies with its mouth open and the eyes half closed.

Chamomilla.—Stools watery, green, or like chopped eggs; child very restless and wants to be continually carried about in the nurse's arms; symptoms produced by cold or teething.

China.—Painless diarrhœa, worse in the morning; great debility, with disposition to faint after every stool; diarrhœa increased by frequent nursing; child cries and bends double with colic; body alternately hot and cold.

Cina.—Constipation or diarrhœa in young children, during or after dentition, accompanied by a broad white circle or space around the mouth and nose, in strong contrast with the deep-red cheeks; high fever, worse towards evening, better in the morning; loss of appetite; frequent picking at the nose; bloated abdomen; bad breath; starting in the sleep; diarrhœa, with greenish, slimy, or white mucous stools; first stage of hydrocephaloid.

Cuprum.—Violent diarrhœa, with vomiting and cramps; collapsed condition with sunken features, cold sweat, and weak, small pulse; stools watery, copious, with greenish flakes, often accompanied by flatulence; spasms and convulsions.

Ferri phos.—Frequent green, watery or hashed stools, mixed with mucus, and scanty; tenesmus; retching; child moans and rolls its head; starts in sleep; face pinched; eyes half open; urine scanty; pulse and respiration quickened.

Helleborus.—Watery or jelly-like stools, with colic and tenesmus; urine scanty and high colored; pale and puffed appearance of the face; tenesmus; vomiting of mucus, mixed with a greenish or blackish watery fluid; great drowsiness, with cold sweat; incontinency of urine; swelling of the feet.

Ignatia.—Sudden development of hydrocephaloid symptoms during dentition; child moans and rolls its head, or screams violently, with convulsive action of eyes and lips; face pale; great difficulty in swallowing; spasms and convulsions.

Kreosotum.—Stools greyish-white, chopped, and very offensive; great thirst, with constant vomiting; face cold, with a

pale border around the nose and mouth; child moans and starts in sleep; emaciation and great prostration; rapid and weak pulse; hurried and feeble respiration.

Lachesis.—Undigested watery stools, which are very offensive, accompanied with rumbling in the bowels and violent straining; abdomen hot and bloated; stools sometimes mixed with pus.

Lycopodium.—Loose, brown, or thin, pale stools, also mucous stools, green, stringy, and odorless; abdomen distended with gases; pale, wretched complexion; cold feet; drowsy, with frequent startings and jerkings of the limbs; eructations and hiccough.

Phosphorus.—Hydrocephaloid symptoms, with great depression of the vital power; violent watery diarrhœa, with constant straining; anus constantly remains open; stools excessively foetid; cold drinks ejected from the stomach as soon as they become warm; emaciation and sudden loss of strength.

Podophyllum.—Frequent, violent, watery stools, ejected with a gush; painless diarrhœa, with cramps in the legs or feet; stools followed by tenesmus and prolapsus ani; child moans and rolls its head from side to side; disposed to faint after every evacuation of the bowels; frequent retching and vomiting; worse in the morning, at night, and after taking nourishment.

Sulphur.—Scrofulous children with hydrocephaloid symptoms; stools extremely offensive, slimy, watery, frothy, and putrid; constant thirst, with frequent vomiting; white tongue, with red tip and borders; abdomen distended with flatus; great debility and prostration, with difficult breathing, and involuntary stools.

Veratrum alb.—Frequent, profuse, greenish, watery stools, with flakes; violent vomiting, followed by coldness and great prostration, with cold sweat on the forehead, and cold tongue; extreme thirst, but drinking increases the nausea and diarrhœa; collapse, with cold breath and suppression of urine.

Zincum.—Hydrocephaloid symptoms, with great nervous depression; stools frothy, with or without tenesmus; during sleep the child cries out, starts, and jumps; on awaking it appears frightened, and rolls its head from side to side.

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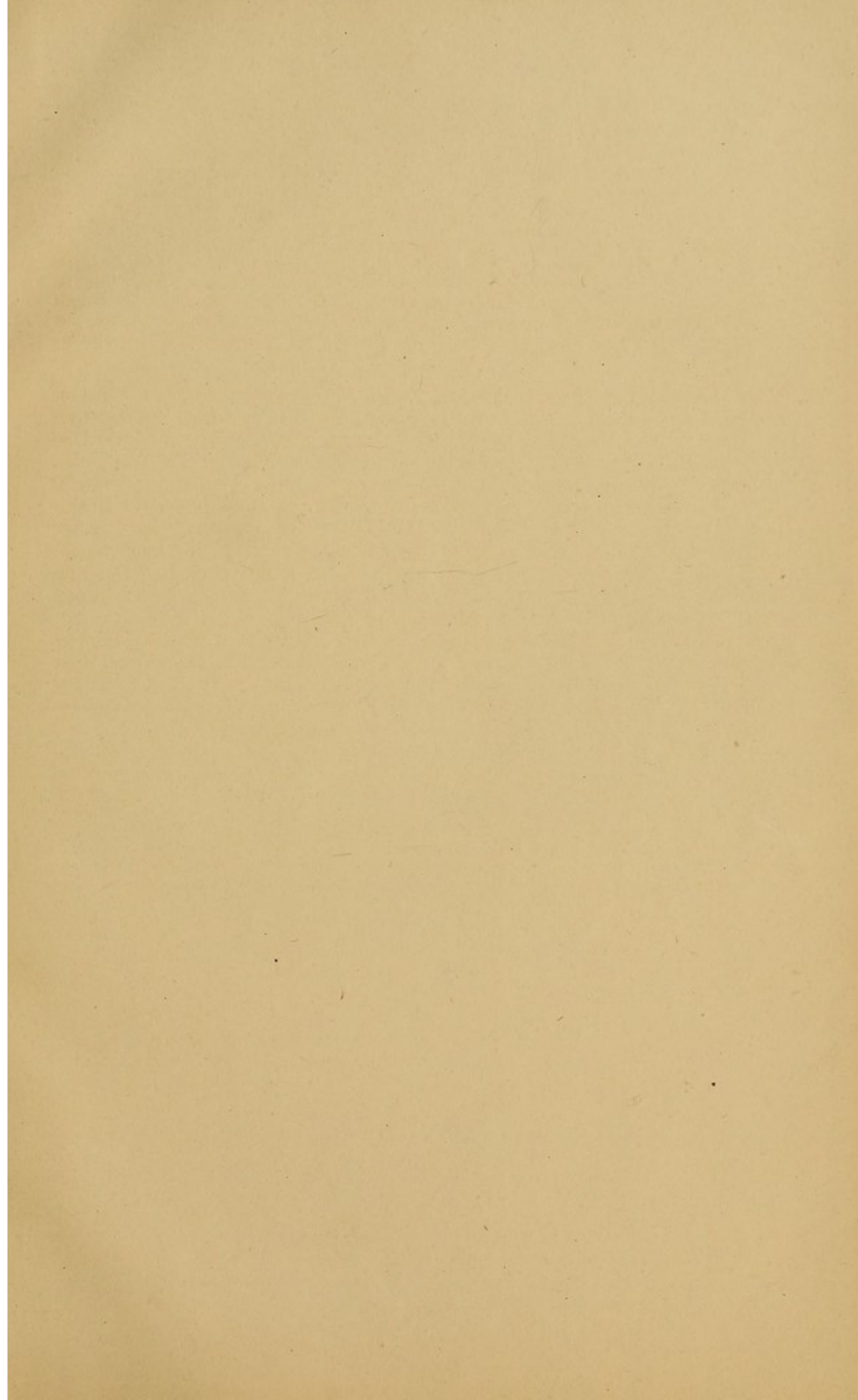
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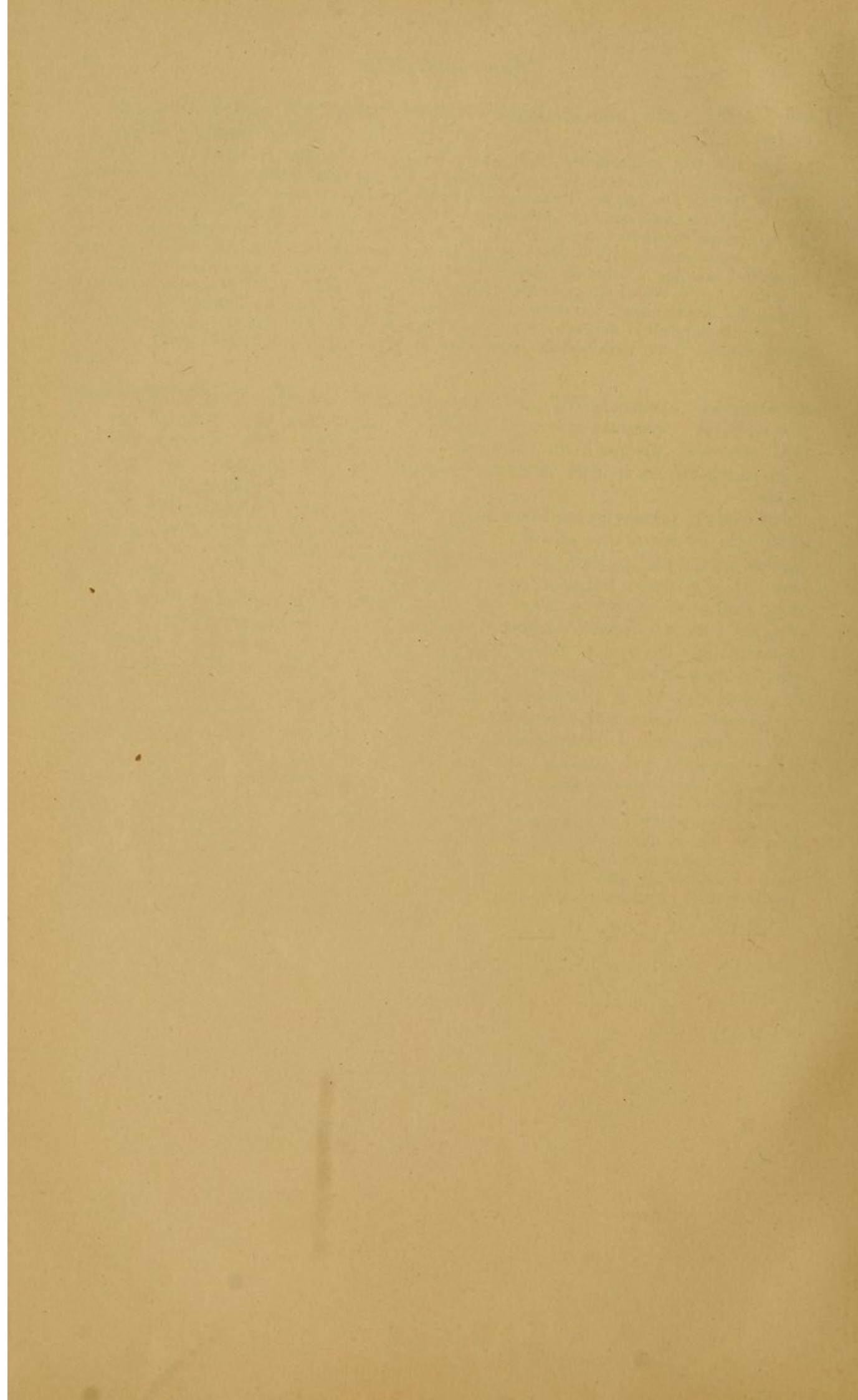
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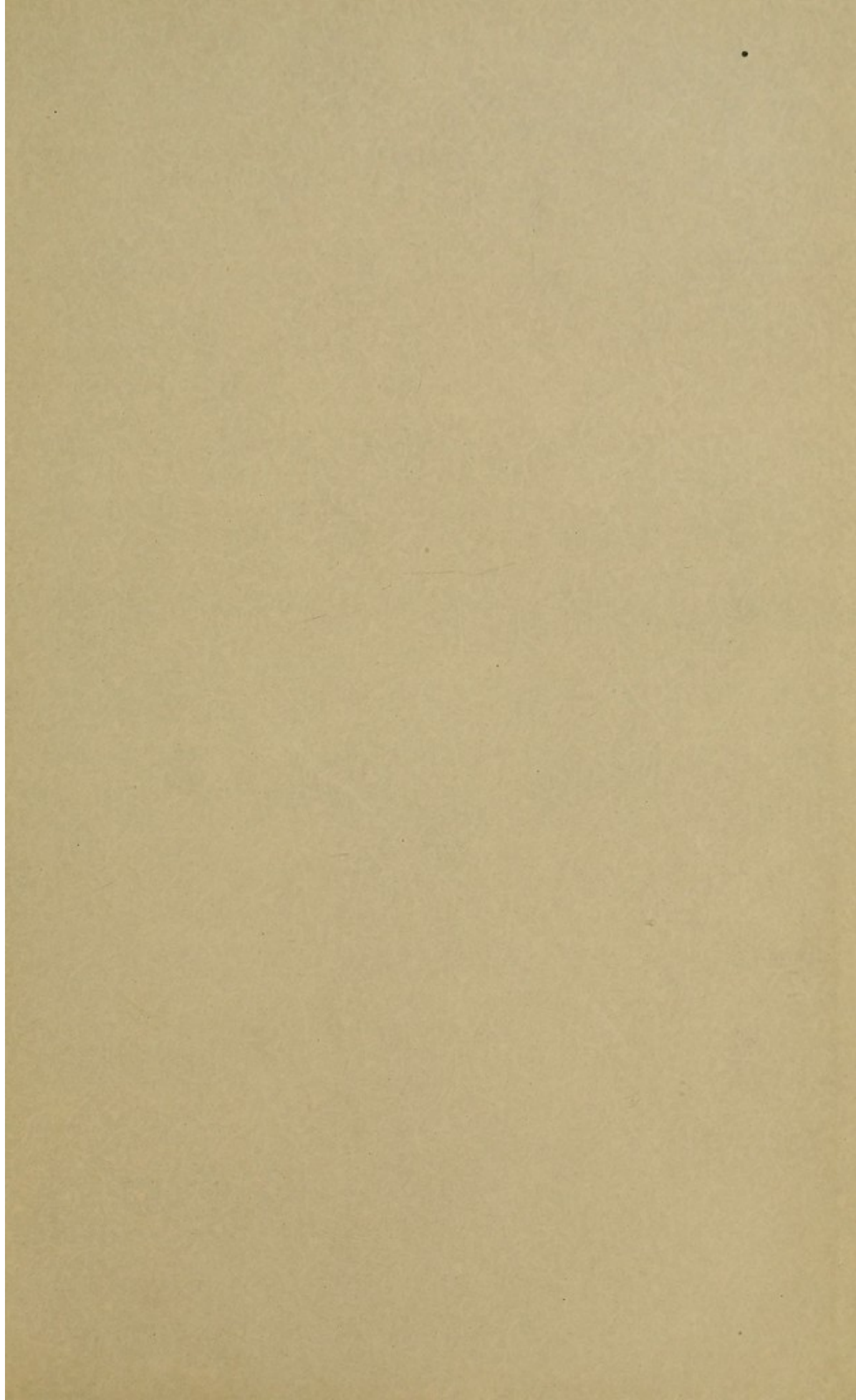
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