Box 10 PETERS (J.C)

ON NEUROTICS.

BY

JOHN C. PETERS, M.D.,

President of Medical Library and Journal Association; First Vice-President of the Neurological Society; Member of American Medical Association, of the Medical Societies of the State and County of New York, of the Academy of Medicine, of the Pathological Society, Etc., Etc.

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By JOHN C. PETERS, M.D.

READ BEFORE THE NEW YORK NEUROLOGICAL SOCIETY, NOV. 2, 1874.

Mr. President and Gentlemen:

In obedience to command I will endeavor to fulfil a portion of the task allotted to me; for to complete the whole will be impossible within the limit of our short meetings. At first it was suggested that I should confine my remarks to the *vegetable* neurotics, and this certainly was of compass vast enough to tax the ingenuity of any one. But I was slightly staggered when at a late moment I found the cards announced a paper on neurotics in general, and that I might be expected to speak on all neurotics, both vegetable, animal, and mineral. As this is manifestly impracticable, I have concluded to confine my attention to those of one class only, viz., the so-called motor-depressors. In further excuse, I must state that although abundance of time was granted me for my first commission, and I was frequently reminded of it, yet very numerous and greatly varied occupations have prevented me from seriously engaging in the work until a very few days since.

Hence, gentlemen, I shall have to crave your indulgence for manifold shortcomings, although I will endeavor to disappoint you as little as may be.

In the earlier part of my medical studies and practice I made many experiments with drugs upon healthy men and animals and upon myself, and I have very generally followed the plan of thus trying almost every new medicine before giving it to sick people. Many of these trials were slight; some of them were quite the contrary. Thus I have become personally acquainted with some at least of the principal effects of the medicines in most common use. But of late years I have contented myself with studying the experiments of others. Experimental physiologists have now supplied themselves with such complete laboratories and appliances, that no even moderately busy practical physician can expect to cope with them; in fact his results would prove so crude and imperfect that the time thus employed would

comparatively be lost. On the other hand, the great experimental physiologists have rarely had leisure or inclination to become skilled therapeutists; although John Harley, Horatio Wood, Herman Nothnagel, and our Dr. Hammond are marked exceptions to this assumption. Again, distinguished clinical teachers are only too apt to pay more attention to pathology and diagnosis than to therapeutics; while noisy empirics, sectarians, and enthusiasts combine to bewilder the practitioner. Even enthusiastic and dazzling therapeutists like Ringer often mislead the profession, and inflict many injuries upon sick people. It is in the endeavor to counteract all this that we so much miss Anstie: bold, scientific, thoroughly rational, controlled by no authority except that of truth, he will long be missed by the conscientious therapeutist and by the busy practitioner. But we yet have Alfred Stillé and Edward J. Waring with us. Still, the practical application of therapeutics should be made more facile than it has been left even by these industrious and capable men. Therapeutics are still treated as mere appendages to the materia medica, or as still smaller fragments of the theory and practice of medicine. The few independent works on therapeutics, like that of Domett Stone, are insignificant in proportion to the greatness of the subject; and in them we can most readily see how crudely this, the most important department of medicine, is neglected by the so-called leading British and Continental physicians. The principal merit of this little work is its arrangement according to diseases, which is the only correct and convenient one for the practitioner. Ringer's so-called Handbook of Therapeutics is entirely misnamed; it is a most brilliant, somewhat scientific, but also rather visionary treatise on the materia medica, with a predominating inclination towards fascinating and fanciful therapeutics. Waring's so-called Practical Therapeutics is also a materia medica, but with an enormous collection of reliable therapeutic points and hints; still, as it is arranged according to remedies, and not according to diseases, its consultation in studying the treatment of any disease is very tedious and laborious. Stillé's method, in his magnificent and truly philosophical work, deprives it of the greatest part of its value, not only for ready reference, but even for the

thorough study of therapeutics; for although it is styled a Systematic Treatise on Therapeutics and Materia Medica, it is arranged as a materia medica and not as a materia therapeutica. All these otherwise most commendable works are far better calculated for the wants of the learning and learned student of the materia medica than for those of the busy therapeutist. One of the most important, and in fact now absolutely necessary, works which can be undertaken by any industrious and scientific young medical man, is the rearrangement of the enormous mass of trustworthy practical points in therapeutics which have been collected in these and other monumental works; so that they may not only be properly placed for ready reference by the every-day practitioner, but most conveniently for the thoughtful study of the treatment of disease. This task is too great for any one man, unless he have nothing else to do; and as it will be largely clerical and mechanical, it cannot be expected that any of the older men will undertake it. But as some judgment and great familiarity with the comparative value of the physiological and therapeutical effects of drugs will be required, it had best be undertaken by an association of some of the younger and a few of the older members of the profession. With the aid of such a treatise scientific therapeutis would quickly become the rule rather than the exception, and might soon extend to the whole arena of medical men of all languages and sects. I feel thoroughly convinced that enough is known of the action of remedies, both in health and disease, to commend itself powerfully to all minds, however prejudiced. A work of the kind of which I speak would prove so satisfactory that it would be in daily and hourly study by even careless and somewhat illiterate doctors,—and some of them could not well avoid becoming better therapeutists,—while the scientifically inclined man would be kept thoroughly *en rapport* both with the present and the past of his profession.

The works above alluded to, have been, with Frank's Magazine,[1] my almost constant study for many years, and I have

[1] This work, in four large volumes, is devoted entirely to the study of the pure effects of drugs upon the healthy subject, and to the relation of cases cured by the use of one remedy only.

always felt and daily feel more acutely the deficiency in the records of our art which I have endeavored clearly to point out to you. I am very sure, but for it, I would have learned far more of therapeutics in very much shorter space of time, and at the cost of greatly less expenditure of labor than I have devoted to it.

Without further preface, gentlemen, I will proceed to the examination of the so-called Motor-depressor, or real Antispasmodic Remedies, of which calabar bean, the bromides, chloral, croton chloral, curare, nitrate of amyl, conium, lobelia, andlead are said to be the principal.

I will commence with Conium maculatum, because it is among the oldest known neurotics, and one which is now perhaps best understood; doubtless because it has been very carefully experimented with by Christison, Schroff, Kölliker, Guttman, Bennet, Harley and many others almost equally distinguished; and because it is noted for the remarkable uniformity and simplicity of the effects which it produces. Although very large doses may be given with safety, it was used against those who were condemned to death by the tribunal of Areopagus, and, among other facts, the fate of Phocion and Socrates has conferred, as you well know, a fame upon conium which time will never efface. The story runs:

"The executioner who was to administer the drug brought it ready bruised in a cup: when Socrates said, 'Good friend, what is to be done?' 'Nothing,' replied the man, 'but to drink it; walk about until a heaviness is felt in your legs; then lie down.' Socrates, taking the cup, said calmly, 'Is it lawful to sprinkle any of this upon the earth, as a libation?' 'We only bruise,' was the answer, 'as much as is barely sufficient for the purpose.' 'I understand,' said Socrates; 'but it is certainly lawful to pray the gods that my departure may be peaceful, which I beseech them to grant.' So saying he drank. When we saw that he was drinking, we could no longer restrain our loud lamentations. But Socrates observing us, exclaimed, 'What is this you do, excellent friends; we have sent the women away to avoid such scenes. It is our duty to die manfully and with expressions of joy. Be silent, therefore, and let your re-

signation be seen.' Soon he told us that his legs were beginning to grow heavy, and laid down, as he had been directed. The man examined his feet and legs from time to time, till finally he pressed violently upon his foot, and asked him if he felt it. Socrates replied that he did not. Next, his legs becoming cold and stiff, he assured us that he would soon be gone: and now the middle of his body growing cold, he said, 'Crito, we owe a sacrifice to Esculapius for this easy taking off. Discharge this, and neglect it not.' His eyes became fixed; he no longer heard, and Crito closed his eyelids.'" [1]

Stillé says: "Many doubts have been entertained whether the Athenian state poison was in reality hemlock, from the frequent failure of conium and its preparations to produce poisoning of any kind, or, indeed, any sensible phenomena. But there is little doubt upon the matter, for even Dioscorides knew that the power of the plant differed very much, according to the locality where it grew, and he mentions Athens as one of the places where it is most efficient; while a modern writer, Dr. Sibthorp, found conium maculatum growing most abundantly near Athens, but neither cicuta virosa nor any other analogous plant whose effects might be mistaken for those of the spotted hemlock."

Similar facts are well known about hemp. Stillé says the resin, or the peculiar product in which the active properties of the plant reside, is not found in the hemp of temperate or cold climates, and scarcely exists beyond the regions which lie within or border upon the tropics. Even in Persia, it is asserted by Koempfer that only the hemp which grows near Ispahan and some other places possesses the intoxicating qualities which have rendered it so famous; and that the seed obtained from these localities and sown elsewhere will not produce a plant of

[1] This relation accords perfectly with one given by Dr. H. Bennett, of a man who ate hemlock in mistake for salad. "Weakness of his legs, so that his gait was faltering, was first noticed; as the weakness increased, he staggered, and his arms became powerless. Perfect loss of all voluntary movement followed, till he was unable even to swallow. Lastly, the muscles of respiration were slowly paralyzed, and he died of paralytic asphyxia. Up to his death his intelligence was unaffected."

equal powers; and according to Jameson, the resin is not found even in the hemp which grows upon the plains of India.

It has been seen from the story of Socrates that the effects of conium in very large doses are those of a rapidly increasing *paralysis;* first of the voluntary muscles, then of the respiratory muscles of the chest and abdomen; and finally death by asphyxia, from paralysis of the spinal marrow. The brain remains clear; the external senses retain their activity almost perfectly, and even volition is preserved till the last breath. Its active principle, conia, thus appears to be almost the direct antagonist of that great motor-excitor, strychnia; for while the latter destroys life by inducing universal muscular spasm, and produces asphyxia by absolutely compressing the breath out of the body; the latter brings on a different form of asphyxia by so paralyzing the respiratory, as well as the purely voluntary muscles, that the chest cannot be lifted, the diaphragm moved, nor the lungs expanded sufficiently to allow fresh air to enter them. Here we find a striking instance of the fact that symptoms, and even diseases bearing the same name, not only arise from different causes, but are absolutely antagonistic to each other. An asphyxia from spasm is certainly very different from one from paralysis, and one may counteract the other; at least conium relieves the asphyxia produced by strychnia; and the latter removes that induced by the former.

We will find several other of these apparent contradictions in the actions and uses of conium. Thus it was regarded as an anaphrodisiac by Aretæus and others among the ancients; and St. Jerome (quoted by Stillé) states that the Egyptian priests controlled their passions by drinking every day a potion, of which hemlock was an ingredient. Bergius, on the other hand, relates a case in which it restored one who was impotent; and Stoerck cites a like instance. Nux vomica, which is far more frequently useful in these cases, helps those in whom there is an almost paralytic debility of the parts; conium, those whom arise from morbid irritability or absolute disease of the testes or ovaries.

Similar remarks hold true of that very common disorder,

ordinary constipation; which may arise from a dry and contracted condition of the colon, or from a very weak and dilated state of it, so that, like a distended bladder, it cannot force out its contents. Ordinary purgatives, which merely irritate the mucous membrane and temporarily excite the muscular coat of the bowel, of course are only of transient effect. While calabar bean, nux vomica, iron, and even lead and alum, may prove curative if aided by the palliative use of aloes, colocynth, etc. In another class of cases, opium, belladonna, conium, and other antispasmodics may be required. Again, just as opium checks all the secretions, except that of the skin, Horatio Wood says: "A large number of important drugs exert antagonistic actions in the system; both calabar bean and conium are motor-depressors, but both excite active movement of the intestines. Other remedies may stimulate the spinal cord, but destroy the conductory power of the nerve-trunks; and it is evident that as one or the other of these influences predominate, there will be convulsions or paralysis. Now, if for any reason one subject be exceedingly sensitive to the spinal action of the remedy, it may become convulsed; while its fellow, which is chiefly affected by the nerve action of the drug, may become paralyzed. Here the mere clinician, with his superficial knowledge, seeing the paralyzed and convulsed lying side by side, may regard the whole as a hopeless muddle; while a large class of empirical therapeutists, who claim to exert extraordinary nicety in the selection of their remedies, will only too often succeed, as some bright victims state, in performing only one-half of their promises, viz., that of aggravating the disease, but will look in vain for the improvement which they blindly expect to follow."

To return to the action of conium. As Harley tersely and graphically says: "Its first effect is a depression of the motor function, and its last is the complete obliteration of all muscular movements derived from the cerebro-spinal motor tract." There is no doubt of this, not only from numerous well-conducted experiments, but from other cases of poisoning besides that of Socrates. Hence, one of the great therapeutic applications of conium will always be found among the *spasmodic and convulsive disor-*

ders; we must not say of all kinds, for we shall soon see that the power of the drug is so direct and simple, and at the same time so exclusive, that it will leave untouched one portion of the nervous system, while it will depress, or altogether suspend, the action of others. Deprived of all voluntary movement, the conium-subject resembles one who has been suddenly stricken with ordinary general paralysis; but the remedy is commonly so harmless with all, unless it be given in very excessive doses, in a few hours the power of motion will return, and no injurious trace of this threatening influence will remain.

Harley claims to have used it with success in about twenty cases of epilepsy; but he selects them somewhat erroneously, I believe; for he rather hastily assumes that conium exerts its power chiefly, if not exclusively, on the motor centres within the cranium, and selects the corpora striata for the special arena of its exploits.

The favorite spheres of the action of conium have been narrowed down very closely. Guttman, quoted by Ringer, says: "The conium paralysis is certainly not due to its action on the *muscles*, for an animal so completely paralyzed by it that galvanic irritation through the nerves entirely fails to excite contractions, will have energetic movements excited if the current is made to pass through the muscles themselves."

By ingenious experiments Guttman proved that hemlock neither paralyzes the spinal cord nor the motor centres in the brain; and finally showed that it affects the periphery of the motor nerves earlier than it does their trunks. Hence we must disagree with Harley when he assumes that conium is most useful in those cases of epilepsy which are due to morbid excitement of the cerebral motor centres; and less so in those in which the primary irritation is located in terminal parts.

Even he is obliged to make exceptions in favor of epilepsies which arise from ovarian and testicular irritation, and those dependent upon the excitement of dentition. It probably will not relieve those springing from intestinal irritation, for in rabbits killed by it the peristaltic contractions of the intestine continue active after death. The same holds true of calabar

bean. But in many other reflex epilepsies, from peripheral irritations even in the liver, kidneys, gall-ducts, ureters, etc., conium may prove most useful. Again, as the vaso-motor nerves are also paralyzed by conium—for the arteries of a frog's foot will not contract on irritation when the animal is under the full influence of conium—it doubtless will relieve epilepsies which depend upon vaso-motor spasm at the base of the brain more quickly than those which arise from original excitement of the corpora striata.

These inferences bring conium in close relation with the bromides, which are so reliable in similar cases; and I have long been in the habit of supplementing them with conium, when the latter commence to drag in their action. The especial action of conium in ovarian epilepsies is inferred from the facts that when its use is continued for a long time, wasting of the mammæ and testes, and probably also of the ovaries, with loss of venereal desire, has been observed in the experience of several modern writers, and was well known to the ancients.

I think conium more safe and useful than belladonna in epilepsy, upon which Trousseau so confidently relied; for it produces less irritation of the brain. But they are often well given in combination.

Harley also was successful with it in St. Vitus's dance, even in some very intractable cases. He disbelieves that the disorderly and involuntary movements of chorea are due to a derangement of the so-called co-ordinating function, if we assume such a power to exist independent of will, sensation, and motion; although chorea furnishes more plausible demonstration of this theory than those cases of incomplete paraplegia in which a man can only walk with the aid of his eyes. He thinks chorea is due to a morbid excitation of the motor centres; not to loss of co-ordinating power.

Harley also advises it in nocturnal cramps of the limbs, in writer's cramp, in spasm of the œsophagus, spasmodic contractions of the stomach and œsophagus when associated with crampy pain in the stomach, eructations of large quantities of wind, and the globus hystericus; in all of which he found it very serviceable.

Also in spasmodic cough, laryngismus stridulus, and pertussis. In spasmodic asthma it may prove more useful than belladonna or stramonium, especially when combined with the iodide or bromide of potassium.

He thinks it also a most suitable remedy in organic disease or functional derangements of the spinal cord, attended with excessive irritability of the reflex function.

In paraplegia it is said often to act most beneficially in allaying the reflex jerkings of the limbs which are occasionally so distressing in this disease; also in concussion of the spine, when attended with incessant erections, restlessness, exhaustion, weakness and tremulousness of the legs.

It has lately been assumed that some cases of melancholia are dependent upon chronic spasm of the vaso-motor nerves. The late Dr. Woodward (of the Massachusetts Insane Hospital), as early as 1845, introduced conium in some forms of *melancholy*, especially in chronic diseases of the stomach and digestive organs attended with uneasiness, restlessness, watchfulness, and nervous pains. In one case a lady was in the deepest melancholy, imagining that she had a hole in her stomach, and that all the food she took remained impacted in her abdomen, especially as she had a uterine tumor as large as a quart bowl, and her menses were suppressed. In some months, conium with carbonate of iron drove away her delusion, restored her menses, and not only diminished the tumor, but seemed to make it disappear.

I feel reasonably sure that there is a class of cases of melancholia, with vaso-motor paralysis of the vessels of the brain, with congestion, benumbing, and stupefying of that organ, relievable with nux vomica, which causes vaso-motor spasm, contracts the blood-vessels, and lessens the fulness and congestion. I think nux vomica, and perhaps ignatia, which acts nearly in the same way, are more useful than electricity.

Harley thinks conium worthy of trial in acute mania, when associated with an exaggerated development of muscular power; and Pliny Earle and Crichton Browne have found it so: and in the irritable condition of the brain that often exists when an attack of cerebral hemorrhage is impending, especi-

ally when the irritation and congestion lie in the corpus striatum; for by arresting the generation of nerve force and irritation in this part, we will, he thinks, be trying the best means of relieving the excitement and congestion. I have often given it with benefit in paralytic and apoplectic attacks, to aid possibly, in the absorption of the effused blood before it becomes coagulated; but more especially to soothe the irritation produced by clots, even if paralysis be present. If there be much congestion or inflammatory irritation, I give aconite with the conium. I cannot leave the subject of conium without allusion to another allied remedy, which is much neglected in obstinate and chronic nervous affections, especially of the spasmodic and convulsive kind, viz., *lead*.

This should be used more frequently than it is in rebellious and tedious epilepsies, especially those springing from reflex irritation from the abdominal nerves. It is certainly a far safer and more generally applicable remedy than nitrate of silver, which is supposed to be an excellent medicine in some epilepsies arising from gastric irritations; and is more active and reliable than the oxides of zinc or iron. Lead has been styled the mineral opium, but it may much more justly be called the mineral conium.

In the chronic constipation of flushed and plethoric persons, with large, relaxed, yet perhaps congested colons, lead may be used just as iron is in the costiveness of anæmic and feeble persons with distended, relaxed, and bloodless large bowels. Of course the palliative combination of a laxative like aloes or colocynth is always required at first, for temporary relief. Thorowgood (see Materia Medica, page 124) goes still further and says: "In cases of obstinate obstruction of the bowels, due to spasm and *invagination* of the intestine, he has more than once employed the acetate of lead [in order to relax the spasm]. In one case the bowels had been obstinately confined for eight days, and neither opium nor injections thrown up with a long tube produced any effect. Belladonna alone was useless, but on combining it with acetate of lead, after five grains of the latter had been taken, copious relief from the bowels was obtained. Soon after he related this case before the Medical Society of London,

Mr Harvey Hall met with a similar one, and he gave belladonna and lead with like satisfactory result."

As lead produces atrophy of nerve-structures, it may be used in hypertrophies of the brain, in neuromas, and even in intractable neuralgias arising from congestion, inflammation, or other obstinate hypertrophic irritations of nerve-structures. It certainly should be tried before section of nerves is resorted to. The changes produced by lead in nerve-structures are profound in some cases. In many of the nerve-tubules the medulla has been found replaced by fat granules, showing that nerve-nutrition had ceased and fatty degeneration had taken place. In others, every trace of the tubules had disappeared, and the nerves were reduced to mere cords.

As lead causes induration of some nerve-structures, it may be thought of in some of the varieties of softening of the brain or spinal marrow. Such are some of the more modern teachings of the uses of conium and lead; the ancient, were quite different, for conium was regarded principally as an *alterative* remedy. To induce its alterative action, it was given for a long time in doses which occasioned few or no sensible phenomena. After a while, according to Stillé, the urine becomes increased and viscid, and the perspiration augmented; the bowels, after having been constipated, become relaxed; and then wasting of the mammæ and testes, and of various glandular tumors, with loss of venereal desire, occurred. Baron Stoerck, who used an excellent preparation, claims to have cured thirteen cases resembling cancer, and improved two. Velpeau thought with it he could mitigate pain and prolong life. Fothergill supposed he had cured one case, and not only mitigated the pains in several others, but checked their progress and improved the discharge. Trousseau had seen one case, pronounced cancer of the breast by Cloquet and Berard, entirely removed by conium poultices. Walshe alleviated pain and irritability, especially in cases of cancer of the stomach. Devay resolved engorgements of the mammæ with one-sixth of a grain doses of the powdered seeds. Reil relieved the pain of induration of the mamma from injury. Vogt and Neumann were successful with it in the scrofula of vascular organs. Baude-

locque cured five cases of enlarged and ulcerated glands with fistulous sinuses and abscesses. Trousseau cured a case of abdominal dropsy, with several tumors of the abdomen, in three months. Dr. S. W. Williams, of Deerfield, Mass., cured five cases out of six of severe chronic mammary disease. He used the extract from the seeds, which is among the most reliable. The majority of the extracts of conium, except Squibb's Fluid Extract, are almost worthless. Thus, Pliny Earle, in 1845, in experiments upon himself, took twenty-five grains three times a day with no very severe effects; and could bear forty-five grains three times a day without being very uncomfortable; while he gave some of his patients ninety grains three times a day.

It is probable that conium will relieve spasms of the œsophagus, stomach, gall-ducts, ureters, bladder, etc. Also, many of the spasmodic pains caused by the irritation of organic disease, especially of the stomach.

Among these so-called depresso-motor remedies, we must not forget the PHYSOSTIGMA, or *Calabar Bean.* Stillé says, when an animal receives a full dose, it soon lies down in a state of perfect muscular flaccidity; the respirations become slow; all the reflex actions are diminished; and this goes on until it ends in their complete abolition; but evidences of sensibility are manifested whenever the animal is injured, and consciousness is preserved.

Stillé asks, to what is the paralysis which is so prominent an effect of calabar bean due? It is evident that the suspension of reflex action can only have three sources, viz.: paralysis of the spinal cord, of the nerve-trunks, or of the muscles. As the muscles remain contractile after death, although calabar bean does have some direct influence upon them, yet the paralysis produced by it is in no sense the result of this influence. Wood infers from the experiments of Lashkewich, Vintschgau, and Fraser that the paralysis caused by the physostigma is *not* due to an action on the nerve-trunks, because these remain sensitive to the galvanic current, and contractions are freely induced in the tributary muscles in animals rapidly killed with calabar bean. He assumes: Since this abolition of reflex

activity, has its origin neither in the muscular system nor in the nerve-trunks, it must be spinal; and informs us that the truth of this conclusion, arrived at by exclusion, has been abundantly demonstrated by direct experiments. It seems completely established by good evidence that the most prominent effect of calabar bean is *a depressant action upon the spinal centres.*

Its influence upon the sympathetic nerve seems to be the opposite of that on the spinal marrow, for intestinal peristalsis is very much increased; first, there are exceedingly active movements of the bowels; then spasmodic and tetanic contractions of the intestines, so that their calibre is very much diminished. These physiological actions have suggested its use in atony of the muscular coats of the bowels; and there are many reasons for believing that the addition of extract of calabar bean to purgatives like aloes and colocynth will do more to overcome chronic constipation than the combination with nux vomica, which is so much relied upon; although there is no reason why both should not be used.

Its specific action, as above said, upon the unstriped intestinal muscular fibres, has led to its employment not only in atony of the muscular coat of the bowels, but of other similar organs. Thus Sabbotin, quoted by Wood, has used the extract with the happiest results in chronic bronchial catarrh with intense dyspnœa, supposed to be due to weakness of the bronchial muscular fibres, as well as constipation dependent upon relaxation and debility of the colon.

Its action upon the spinal cord, says Wood, led very early to its use in spasmodic affections of the severer kind, especially in tetanus, in which it has been freely employed during the last few years with more or less success—in fifty-seven cases with thirty-one recoveries and twenty-six deaths. The same holds good in trismus neonatorun and in chorea.

It is, of course, one of the antidotes to strychnia poisoning; although Wood prefers the bromides both in this, and in tetanus; and even goes so far as to say that he has been unable to find a recorded death from lockjaw after the free exhibition of the bromide; not less than one ounce of the salt

being used in the day, and chloral given as a hypnotic at night.

All the depressor-motor remedies which have yet been mentioned have no special hypnotic action upon the brain, except the bromides. Harley says, upon the cerebrum hemlock is powerless; he has induced its full physiological action again and again, hundreds of times, and has never been able to recognize the least narcotic, nor directly hypnotic effects. If sleep followed complete repose of the muscular system as a necessary consequence, then there would be no more powerful or direct hypnotic than hemlock. For, excepting the reflex action of the cord, the whole motor function of an individual under the full influence of conium is actually asleep. And this, he thinks, is the simplest view that we can take of the regular action of hemlock. It is to the corpora striata, to the smaller centres of motion, and to the whole motor tract, precisely what opium is to the cerebrum. And just as opium tranquillizes and refreshes the over-excited and weary brain, so does conium rest, and soothe, and strengthen the unduly excited and exhausted centres of motor activity. In reducing the motor centres to a state of perfect repose, hemlock powerfully predisposes the brain for sleep; brings it within its reach, so to speak; but there leaves it. Indeed, under the influence of an effectual dose, a child often presents the aspect of sleep. Compelled by overspreading muscular lethargy to lie down, the lids droop over the dull eyes, and he is content to lie tranquil and speechless. To a superficial observer he appears to be asleep, and he may readily become so. But his mind will continue calm and active; he feels a strong desire to keep the eyes closed and to remain quiet and undisturbed. And here a small dose of bromide, opium, or chloral will easily induce sleep.

Harley has pushed his inquiries still farther into some of the peculiar and almost local actions of conium. He says, the earliest indications of the operation of the medicine are invariably those which arise from depression of the motor function of the third pair, or oculo-motor nerve. These are giddiness, heavy weight depressing the eyelids, dull expressionless stare, haziness, as if a thin film of vapor were floating before the eye

like that which rises over a hot stove, from imperfect adjustment of the refracting media of the eye from partial paralysis of the ciliary branches of the third pair. Harley says it is through these minute ciliary branches that the individual first becomes conscious of the effect of hemlock. The eyes suddenly become fatigued, etc. This loss of the power of accommodation, from weakness of the muscles of the eye, is quite peculiar. On raising the eyes to a more distant object, vision becomes confused, and giddiness suddenly supervenes, as in sea-sickness. Harley infers that these symptoms were due to impairment of power in the motor muscles of the eye, for as long as his eyes were fixed on a given object the giddiness disappeared, and the definition and capacity of vision for the minutest objects were unimpaired. The instant he directed his eyes to another object, all was haze and confusion, and he felt giddy; and in order to recover his vision and dispel the sense of giddiness, he had to fasten his sight securely upon some one object. It was clear that the adjusting muscular apparatus of the eye was enfeebled, and its contractions so sluggishly performed that they could no longer keep pace with the more active movements of the head and of the external muscles of the eyeball.

It is evident from the above that conium must be useful against many spasmodic affections about the eyes and eyelids; and that the muscular weakness caused by it may be relieved by strychnia and other allied remedies, which may also prove useful when loss of the power of accommodation occurs from other causes. Harley has already suggested it in some inflammatory diseases of the eye attended with pain and tension, by producing complete muscular relaxation. The speedy relief from photophobia, lachrymation, and spasm of the orbicularis, in strumous ophthalmia, has often surprised him.

The loss of the power of accommodation used to be called by the ancient Germans "amaurosis paralytica rheumatica," and it was decreed that pulsatilla was the specific against it. Lowenhardt affirmed that it possessed more rapidly curative virtues against the false vertigo of Marcus Herz, in which there was a sudden feeling of tension of the eyelids, with a glim-

mering, as if all objects whose rays fell upon the outer angle of the eye were in very quick vibratory motion; or, according to Hufeland, as if one were looking through water, or heated and quivering air; and as if a quantity of bright-colored, circular or serpentine, or lightning-like figures were in the most violent commotion; without there being absolutely vertiginous accompaniments, such as confusion of consciousness, checking of thought, the apparent cross-movement of objects, or absolute danger of falling down. A few grains of pulsatilla will cure this condition, while large quantities of belladonna, hyoscyamus, and opium have no effect.

Another remedy which apparently acts upon the third pair of nerves, and is a vascular as well as a motor-depressor, is the gelseminum or jessamine. According to Wood & Bache, it appears to be a nervous and arterial sedative, without nauseating or purgative properties. In moderate doses it produces agreeable sensations of languor, with muscular relaxation, so that the patient finds some difficulty in moving the eyelids and keeping the jaws closed; it may cause dizziness, dimness of vision, general muscular debility, universal prostration, reducing the force and frequency of the pulse, and the frequency of respiration, with insensibility to pain, without stupor or delirium. After a short time these symptoms pass off, leaving no unpleasant effects, although the patient may have had complete loss of muscular power, inability to move a limb, or raise his eyelids, yet he could hear, and was cognizant of all around him. Thus ptosis and other affections of the eye mark the action of jessamine, just as ringing in the ears does that of quinine, salivation that of mercury, or nausea that of ipecac. It, like conium, belladonna, and pulsatilla, has been used successfully against many neuralgic, spasmodic, and congestive affections about the head and eyes; also in nervous and neuralgic headaches in which the eyes are much implicated, and even seem the starting-point of the disorder. A regular nightly dose of jessamine, followed by repeated doses every hour or two, when attacks of sick or nervous headache commence, will often mitigate them pleasantly.

In some respects spigelia seems to be an antagonist of conium

and jessamine. One of its most frequent effects is spasmodic twitchings of the eyelids, followed by muscular spasms, and even convulsions. Wood & Bache say: "In overdoses it excites the circulation and determines to the brain, giving rise to vertigo, dimness of vision, dilated pupils, *spasms* of the facial muscles, and sometimes even to general convulsions. *Spasmodic* movements of the eyelids have been observed among the most common attendants of its narcotic action. Its effects upon the nervous system have been erroneously conjectured to depend on other roots, sometimes mixed with the genuine; but there seems no doubt about the above facts. In fact, Horatio Wood says: "Although there is sufficient testimony to show that pink-root possesses decided narcotic powers, yet its action has been scarcely at all investigated. It may cause acceleration of the pulse, dilatation of the pupils, heat and dryness of the skin, flushing and swolien appearance of the face, and talkative delirium." Hence it is indicated in some cases of ptosis, or paralysis of the eyelids, paralysis of some of the facial muscles, and even in general paralysis. It may be used in combination or alternation with nux vomica and strychnine. It has obtained some celebrity in anæmia, hemicrania, and other anæmic neuralgic headaches, when one or both eyes are involved in the disorder. But one-half or one-drop doses of nitrate of amyl internally is much more prompt, although a nightly dose of spigelia may prevent the attacks. It has been recommended in rheumatic sclerotitis, but colchicum is far better; also in some heart affections, but aconite and digitalis are more generally useful.

We are here naturally led to think of nux vomica, strychnia, and ignatia, which are almost the only excitor-motor remedies, or those which increase the reflex activity of the spinal centres, that are generally relied upon. The action of these remedies is so well understood that we need merely allude to one or two points. Although they act upon the voluntary muscles, it has only lately been proven that they also act upon the involuntary. Mayer, quoted by Wood, confirms the observation of Richter, that the small arteries can be seen to contract under the influence of strychnia, and concludes that it causes general vaso-mo-

tor spasm and great rise of arterial pressure. The centric origin of this vaso-motor spasm is said to be demonstrated by the fact, that after section of the spinal cord high up, that is, after separation of the blood-vessels from the vaso-motor centres, strychnia produces no rise in the blood pressure, or a very slight one. Wood says, if these experiments of Mayer be confirmed, he has proven that strychnia acts on the vaso-motor centres as upon the other motor centres. This suggests its use in failing powers of the heart and arteries, in long-continued or severe acute diseases, whenever the pulse becomes small and weak, and the action of the heart feeble, be it quick or slow. Here it will be more useful and permanent than alcohol or ammonia, and may well be used in conjunction with them; also in many passive congestions from debility of the walls of the arteries, in vaso-motor paralysis with great enlargement of the blood-vessels, even in diabetes from vaso-motor paralysis of the minute arteries and capillaries of the liver.

There is much testimony that strychnia acts differently upon the capillaries of the spinal marrow than on other parts. Thus Harley says its effect on the spinal cord appears to be two-fold: "It *dilates* the vessels, and thus increasing the supply of blood augments the activity of the functions of the cord. But, apart from this property of dilating the vessels, it is more than supposed that strychnia exerts a direct stimulating and irritating influence upon the spinal cord, although, as Harley has shown, it can act only through the blood, and does not, as was formerly believed, exalt the functions of the cord when divested of all its vessels, and when a solution of strychnia is brought into direct contact with its cells and fibres." I feel perfectly convinced that strychnia causes first irritation and then active congestion of the cord, and that while it will increase active congestion and subacute or acute inflammation, it will also relieve passive congestion from vaso-motor paralysis of the vessels of the spinal cord.

Ignatia has an empirical use in melancholia; it may possibly, like nux vomica, so excite and invigorate the nervous system as to lead to more hopeful views of life.

Nux vomica has been used with tannin in debility and dis-

tension of the bronchial muscles; in paralytic emphysema; or in debility and expansion of the walls of the chest from pleurisy; in relaxation and debility of the abdominal walls, and pendulous belly.

It is supposed to improve the appetite and digestion, not only by its tonic effect upon the mucous membrane of the stomach, but by increasing its vermicular motion, by which the food is prevented from lying inert in the stomach; it increases intestinal peristaltic action when the fæcal discharges are infrequent from debility and dilatation of the colon, and checks them when their frequency depends upon an atonic condition of the bowel. It increases the muscular tone of the gall-ducts as well as that of the bowels and bladder; and seems not only to augment the secretion of the liver, but to facilitate its escape along the gall-ducts into the bowels. Stillé also says that its action on the bladder is shown by its disposing to frequent urination; it is reported to excite uterine contraction, and has cured cases of impotency from utter muscular relaxation.

From muscle- or motor-tonics we are easily led to the consideration of those three great tonics, viz., iron, quinine, and phosphorus, which are so much used in nervous affections.

It should always be recollected in giving quinine that gastric juice is a solvent of it, and if given when none is there, it will lie inert, or merely irritate the stomach, or escape into the alkaline bowels and be precipitated by their alkaline juices and by the bile, which form insoluble salts with it, and may thus pass off from the bowels without ever being absorbed. Hence acids should be used while quinine is given, especialy phosphoric and lactic acids, even vinegar and lemon-juice. The occasional use of bilious purgatives is also required. According to the views of Bence Jones, some persons require quinine almost like food. He suggests or proves this from the following facts: Quinine and its salts have the remarkable power of converting rays of heat into light, or of rendering visible the ordinary invisible rays of the solar or other spectrum. So delicate is this test that electric light discovers 1 grain of quinine in 1,450,000 grains of water. Bence Jones thinks he has discovered that men and animals are pervaded by a substance

which, by its reactive influence on light and many chemical reactions, very closely resembles quinine, and accordingly calls it animal-quinoidine. Rhoads and Pepper found in malarial fevers the fluorescence of the blood was reduced to 0 or 1½, while the normal standard is 3 to 6. Hence it has been inferred that those persons are more subject to malarial influences in which this natural fluorescence is deficient, and that they are more subject to relapses.

In giving iron we must recollect that the red globules convert oxygen into ozone, and that oxide of iron possesses an ozonizing power like that of the red disks. When iron fails to be absorbed, oxygen gas may be administered, although it will cure anæmia without the aid of iron. Trousseau used inhalations of oxygen with great success in cases of extreme anæmia and bloodlessness when tonics and chalybeates seemed powerless. One girl, in an extreme state of exhaustion and debility, inhaled five or six litres, of thirty-five and one-quarter ounces each, in the course of the day. The pulse, which had been 130, fell to 80, and in a few days she was able to leave her bed. Oxygen is slightly soluble in water, about 3 volumes in 100 at common temperatures; but under pressure water will absorb a larger proportion of the gas, and thus, says Thorowgood, is prepared the beverage known as oxygen water. Chlorate of potash readily parts with its oxygen, and may be given to increase the effect of iron, as may some of the preparations of manganese.

In like manner iron, which is not only a food to the blood, but which should act as a veritable stimulant to the blood-making organs, becomes inoperative when it enters the blood, unless it is decomposed by the alkalies of the blood. Hence it may be necessary to give alkalies when the blood ceases to assimilate it and it passes off rapidly by the kidneys.

Phosphorus is a constituent of the more important tissues, and is especially abundant in the nerve-centres. Some physicians believe that we can improve the nutrition of the brain and nerves with it almost as certainly as we can that of the bones—Wegner, quoted by Wood: When it has been taken freely the spongy tissue of the long and short bones becomes

thickened, and the compact tissue rendered more dense; new tissue is formed on the inside of the shafts of long bones until the marrow cavity becomes almost obliterated. It is decreed to be a nutrient tonic to the nervous system, like iron to the blood; and is used in all cases of nervous exhaustion, whether cerebral or spinal. In myelitic paraplegia Wood says it is the only drug which appears really to affect the nerve-centres. In neuralgia, which is often simply an expression of exhausted nerve-nutrition and power, it is said to be commended both by reason and experience.

If iron, phosphorus, and quinoidine are normal constituents of the body, it seems that alcohol may be also. Ford has suggested that hepatic sugar is converted into alcohol in the body before its final destruction. And Dupré and Duchamp say that they have found a substance exactly resembling alcohol in the urine of teetotallers in minute quantity. If this natural formation of alcohol within the body does not take place, it may have to be substituted artificially.

I had forgotten to mention that Wood prefers 3 grains of phosphorus dissolved in 5 drachms of olive or almond oil. Of this 1 minim represents $\frac{1}{100}$ of a grain of phosphorus. Of this olei phosphorati he puts ʒ ss., and a like quantity of ol. gaultheria in 3½ ounces of mucilage of acacia, and gives a teaspoonful after meals. It passes into the blood as phosphorus, and not as phosphoric acid, for it is dissolved in the various fatty matters which are found in the alimentary canal. To render phosphorus still more efficacious, more butter, cream, olive oil, and other fatty matters should be used than usual, while it is being taken. I believe Dr. Hammond has a still more efficacious preparation of phosphorus.

Thus, Mr. President and gentlemen, I have endeavored to fulfil the task as well as possible in the short time which I was able to allow myself. We cannot all be original workers in discovery, but we all can be careful students of the labors of others, submit them to the test of experience, and exert our reason and ingenuity in selecting the true from the false, and the practically useful from the theoretically pleasant.