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ERGOT IN GENERAL PRACTICE.*

ALFRED T. LIVINGSTON, M.D.

JAMESTOWN, N. Y.

The chief object of this paper is to demonstrate that inefficient tone of unstriated muscular fiber is a common and serious element of disease; and that it is important to guard against, or to correct, such abnormal state of that tissue.

The secondary object is to show that a drug which has been used therapeutically for three centuries for a single purpose, and for three decades for but one additional purpose, is the best medicinal agent at our command with which to tone the weak, relaxed, or paralyzed unstriated fiber, and, therefore, deserves, without exception, the first place, the place of honor and trust, in the physician's emergency case.

The most common manifestation of atony of the unstriated fiber is an abnormal disturbance of the equable distribution of blood throughout the body. The relation of the blood supply to the several organs or regions of the body varies normally (physiologically), dependent on their special functional activities at any given time, but such variations are included in what I term "the equable distribution of blood," and they do not imply any degree of atony of the muscular coat of any blood vessels.

It is well recognized that a supreme activity in one region determines a more rapid or abundant flow of blood through that region and a lessened blood supply to other parts; witness the mental apathy or somnolency accompanying the good digestion of a full meal.

The abnormal (pathologic) disturbance of blood distribution is quite another thing, and depends on a relaxed state of the muscular coat of the blood vessels of some region or regions. The location, degree and persistence of such vascular relaxation, alone or together with the influence of bacteria, autotoxins or other irritants, or of cold, heat, moisture, altitude, fatigue, traumatism or other etiologic factors, determine a great variety of diseases, most of which would not occur if there were a good degree of tone in all vascular walls.

A relaxed state of unstriated fiber, elsewhere than in blood vessels and lymphatics, as in the bowel and other hollow organs, produces other disorders which indicate the same object in therapy, namely, a stimulating or toning of unstriated muscular fiber.

A very small percentage of humanity is absolutely well, which is practically equivalent to saying that as

small a percentage has a good state of tone of all the unstriated fiber of the body, which is again equivalent to saying that disease in general depends on atonic unstriated fiber. You are probably now thinking of bacteria, but of that bugbear later.

One of the most common illustrations of abnormal blood distribution is "poor circulation," which is the passive form of too much blood in one region and too little elsewhere, and chiefly serious because it is a good soil on which to sow the seeds of disease. The commonest active form is in "a cold," which ordinarily is evidenced in a simple catarrhal inflammation. I am not aware that a bacillus has yet been caught in the act of producing "a cold."

It will be more convenient to make some classification in treating this subject, and I will begin with disorders of blood vessels.

DISORDERS OF BLOOD VESSELS.

Inflammation of arteries, veins and lymphatics implies an abnormal disturbance of equable blood distribution, in that the minuter vessels of the inflamed or congested vascular walls are relaxed; dilated, and contain too much blood.

Endarteritis.—An interesting illustration in this department is a series of cases of endarteritis which I have encountered, involving a portion or portions of the abdominal aorta or its principal branches, the common iliacs, or their branches, the external iliacs. The chief subjective symptoms were pain and shock, the patient sometimes fainting, but more frequently only reaching the verge of that crisis. Palpation disclosed one or more localized sensitive spots in the artery, and firm pressure usually produced pain in the back, opposite the inflamed spot. In one instance a chronic, intense pain at the *vertex capitis*, which had begun after an extreme exertion, was markedly increased by pressure on the inflamed spot of the abdominal artery.

Auscultation demonstrated a distinct friction sound at the spot or spots previously found to be sensitive to palpation, but not apparent elsewhere. The paroxysms of shock, or shock and pain, followed exertion, such as lifting a heavy article, or sometimes the mere effort of rising from a prolonged recumbent posture. Recovery occurred only in those cases that accepted the extreme course I prescribed, namely, long-continued absolute rest for from two to five months, and daily injections of ergot.

The heart's pulsations were thus markedly slowed and softened, which gave longer intervals of rest from, and less friction of, the blood current over the inflamed surface. I detail these cases because I have not found them clearly described in the books, nor could I get light on them from prominent physicians who examined some of the cases.

Septic Conditions.—Septic inflammation of veins and

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lymphatics has repeatedly yielded to the ergot treatment. This does not imply any antiseptic quality in that drug. In some instances I also employed the constant current.

Dilatation of Veins.—In dilatation of veins it is desirable to secure some emptying of the greatly stretched vessels by gravity or pressure in order to allow the shortening by ergot of the overstretched and paralyzed unstripped fiber of their walls.

I will refer here to edema because it is the direct sequence of circulatory stasis from vascular dilatation. Ergot is striking in its relief of this condition, and the more so the more recent the occurrence of the edema.

Inflammation begins in congestion, which consists of an area of abnormally dilated blood vessels. If ergot is promptly and sufficiently administered, the congestion is relieved and the succeeding stages do not occur; in other words, the inflammation is aborted. When it is not applied, or not sufficiently applied, in the stage of congestion, ergot will modify or limit the extent of the succeeding stages; and it is also an effective aid in promoting the absorption of exudates, because this process demands a restricted caliber of capillaries and lymphatics, which ergot tends to secure by contracting unstripped fiber.

FEBRILE DISEASES.

A very extensive class of diseases, in which an abnormal relaxation or paralysis of unstripped muscular fiber is the prime factor, is the febrile, whether from zymotic, infectious, autotoxemic or other irritants. I say that the abnormal state of the unstripped fiber is the prime factor, because it is that state that determines, in some way, the serious and fatal elements of those diseases.

I distinctly appreciate that the generally accepted theory to-day is that the prime factor in these diseases is the bacterium, waste product or other irritant; but the deduction which I am obliged to make from a rational consideration of my clinical experience is that if a good degree of that state which we denominate "tone" exists in this class of fiber to begin with, or is promptly secured by proper treatment to that end, the effects which would otherwise result from those irritants do not occur, or, if they have had opportunity to initiate, those results will be dissipated or modified by a proper, thorough and persistent treatment applied to the restoring of tone in that unstripped fiber which is deficient in tone. The serious and fatal elements of febrile diseases may be summarized under the following heads:

First. Congestion and the succeeding stages of inflammation, including unresolved exudates.

Second. Hemorrhage from ulcerative corrosion of tissues, or from rupture of weak or greatly strained blood vessels.

Third. Disturbed function of glands or other vital organs, including disturbances of digestion, assimilation and elimination.

Fourth. Insufficient oxidation.

Fifth. The so-called vasomotor pareses.

Sixth. Exhaustion and paralysis of the heart.

Congestion.—Congestion and its sequences will be admitted to be related to vascular atony for, if the vessels are not abnormally weak, they will not be abnormally dilated, and if not abnormally dilated, there is no congestion.

Hemorrhage.—The hemorrhage from ulceration is plainly thus related, for ulceration succeeds inflammation and inflammation begins in congestion. The weakness of vascular walls leading to rupture is due, in part,

directly to a relaxed state of unstripped fiber, which permits overstretching from increased tension, and, in part, to trophic defects, which, in turn, are due to relaxation of the minuter vessels.

Disturbance of Glandular Function.—The dependence of altered or deficient function of glands or other organs and tissues, on atonic unstripped fiber may not so clearly appear, but I can reach no other conclusion after observing the restoring of function by various means that relieve internal congestions and stimulate unstripped muscular fiber.

Assimilation and elimination require for their best performance a caliber of the minuter blood vessels that admits of sufficient lymph spaces in which the nutritive and waste materials may circulate.

Insufficient Oxidation.—Oxygenation is too little considered in relation to disease. Oxygen is desirable as a stimulant to vital activities, and is necessary to the normal chemistry of waste; and, not only does vascular relaxation in the lungs interfere with the access of air to all the air cells, from which the oxygen is transferred to its carriers in the blood, but wherever there is congestion in the general vascular circuit there is interference with the proper transference of that element from its carriers to the tissues of that region, or to the waste elements that require oxidation.

Vasomotor Pareses.—As to the essential condition in the so-called vasomotor pareses, whether it lies wholly in the abnormal state of the unstripped fiber in the dilated blood vessels of the general circulation, or, in part, in an abnormal state of the vessels of the vasomotor centers, or partly in an exhausted state of the vasomotor centers, as vital batteries, I will not assume to say, but this I will say, that stimulation, by the constant current of the vasomotor centers related to certain areas of the circulation, as of the brain, will correct the abnormal vascular areas so related; and that ergot which, I believe, acts directly on the abnormally relaxed unstripped fiber, accomplishes the same end; and that ergot is applicable to the abnormally relaxed fiber anywhere in the body, which is not practicable as to the constant current; and also that the usually employed medicinal agents, of which strychnin, digitalis and alcohol are the chief representatives, are unreliable and very often fail to accomplish the end desired. Furthermore, that in serious states of cardiac exhaustion the usually employed stimulants are even detrimental and frequently directly determine death, because, while failing to correct the vascular defects which have produced the exhaustion and which, so long as they exist, will continue to oppose the heart, they add to its exhaustion by irritatingly prodding it to its utmost additional effort, which, continued, must lead to its utter failure.

Exhaustion of the Heart.—Exhaustion of the heart is generally treated as if it depended solely on waning force in the heart centers, which are, therefore, stimulated with all the armamentarium at command, which more frequently results in increasing its exhaustion than in diminishing it.

The change effected by ergot in the action of the heart, as to a great variety of its abnormal manifestations, including the very weak, and even absent pulse, and the extremest tension, so great that the radial artery seemed ready to burst, has impressed me that the condition which produces cardiac exhaustion and paralysis is the abnormally relaxed state of some part or parts of the general vascular circuit, and that the indication is to correct that abnormal state rather than to depend solely on forcing the heart to greater effort by admin-

istering heart stimulants. Very often such correction will be all that is necessary, but when that does not suffice, a judicious use of heart stimulants will be rational after such correction, when their use, before the vascular system is toned, would be as distinctly irrational.

On the other hand, when the action of the heart is excessive and the vascular tension high, ergot will be calmative to the heart and diminish the vascular tension, by correcting the abnormal state of the circulation existing somewhere, that had been the irritating excitant of the heart; and I hold that this is more rational than the use of depressants for such purpose. In such conditions of high vascular tension I have never found it necessary, after using ergot, to resort to depressant medication.

From what I have said it will be recognized that I do not regard the raising of blood pressure as the *sine qua non* in states of low vascular tension, as in shock or collapse, but that the true *desideratum* in such states is to bring about an equable distribution of blood throughout the entire body by contracting all those vascular walls that are abnormally weak, relaxed and stretched; and this is the peculiar province of ergot.

FUNCTIONAL NEUROSES.

Another extensive class of diseases, in which the securing of an equable distribution of blood is the prime indication, is that denominated nervous, more particularly the functional neuroses.

In a communication just received from Dr. Adolph Rupp of New York, I am informed that Waring's Bibliotheca Therapeutics states that W. Hamburger of Leipzig, in 1848, published a work on "The Extraordinary Curative Power of Ergot in Nervous Diseases." I am curious to see this work, published before I was born, and I will be greatly obliged to anyone who may put me in the way of obtaining it. It apparently had as little influence on the profession at large as my own first published paper on ergot would have had but for the accidental presence at its reading of Dr. Frederick Holme Wiggin of New York, to whose appreciative interest in the subject I am indebted for the wider interest the profession has since manifested.

Beginning with the use of this drug in insanity, which I was taught by the late Dr. John P. Gray of Utica, I gradually extended its application by a process of analogic reasoning on similar pathologic elements (circulatory) in other diseases, until I finally grasped the general principle that in many nervous diseases there exists an abnormally relaxed state of some part of the vascular system, and that this is fundamentally causative of the symptoms commonly assumed to be related to abnormal states of the nervous tissues. From this point of view many facts were rationally explained which I had not before clearly understood, and the more carefully I analyzed etiologic and pathologic factors and elements of these diseases the more assured I became of the correctness of this deduction.

The principal symptoms that are associated with the so-called nervous diseases are pain, nervousness (including irritability, both mental and physical, and restlessness), spasm, convulsion, delirium, insanity, insomnia, stupor, or coma, disturbed function of sensory, motor, or vasomotor nerve tissue, and the various pareses.

As generally applicable, the statement that "pain is the cry of nerve for food," is poetry of the Keats or Shelley type, highly imaginative. The deduction I make from my own observation is that pain is usually

a result of pressure, and that the causative pressure is usually from congested blood vessels. The fact, however explained, is that most pain is relieved by administration of ergot. Ergot contracts relaxed unstriated fiber, and the relaxed unstriated fiber of blood vessels is surely the most likely to be associated with pain.

Headache, as the most common form of pain, deserves especial mention as one of the kinds of pain which is almost uniformly relieved by ergot.

The pain of pneumonia, of appendicitis, of neuritis, of inflammatory states in general, of some neuralgias, the all-over ache or indefinite discomfort of developing fevers, the agony of angina pectoris, and intestinal colic, are among the kinds of pain that ergot relieves, and, therefore, are doubtless due to relaxed unstriated fiber, chiefly in vascular walls.

Nervousness, from its simplest type to the intense agitation of the reaction from alcoholic and drug addiction, is strikingly amenable to ergot, and indicates that motor as well as sensory functional disturbance is related to a disordered state of the unstriated fiber, and this is still more markedly demonstrated by the relief of spasm and convulsion by the same drug.

Insomnia is generally conceded to be due to abnormal vascular states in the brain. While I am writing, a subject is sleeping who fell asleep before I had completed the first injection of my solution of ergot (two fluid drams), which I administered within half an hour of his coming under my care. That hypodermic injection was given at 10 p. m., April 30, and it is now 4 p. m., May 2. He has slept continuously during the forty-two hours, except when aroused to give him food or medicine. The subject, a physician, has been a drug habitue for several years, and has latterly been using hypodermically a dram or two drams of morphia *per diem*, and, in addition, two drams or more of cocain each week. During the last day, April 30, he used two drams of morphia and a considerable quantity of cocain. The sleep has been natural in appearance, and, though awakened with some difficulty, he was clear and calm when awake, and immediately fell asleep after taking what was given him. The pulse has ranged from 64 to 80, and has been of good quality, and only a few times was a little spartein added to the ergot solution. He has had no morphia nor other narcotic, nor any hypnotic.¹ I do not class ergot as a hypnotic, but if you

1. The case referred to is illustrative of the action of ergot in the general class of drug habit cases. At the end of sixty hours the crisis was passed and without a particle of suffering or delirium, or even of heart depression, in spite of the immediate complete withdrawal of the extensive dosage of the drugs. The sixth day he began to come to my office for treatment, static and constant currents, and at the end of the second week he removed to the country, where, at a farm house and living much out of doors, eating and sleeping well, he is gaining rapidly in flesh, color and spirits. He does not recall nor did he at any time manifest a desire for his drugs or substitutes.

Another habitue, a woman, is now under like treatment in the same public hospital and with the same satisfying results.

Besides ergot, the only treatment in either case has been cathartics, laxatives and digestives, dry cupping, hot and cold sponging of spine and the constant or static current. The important work was accomplished by ergot.

Abstract of record sheets of W. C. A. Hospital, Jamestown, N. Y.: Case of H. L. F., admitted 9:30 p. m., April 30, 1904.

10 p. m., after tub bath, was given 10 grains of blue mass, followed by ergot solution, 2 drams (all ergot was given hypodermically).

May 1, 1904, "Slept soundly all night."

At 10 a. m., 2, 5 and 8 p. m., ergot, 1 dram, the first three with sparteine, 1/10 or 1/20 grain. Action of bowels secured with saline and enema. Liquid diet every three or four hours. F. E. Buckthorn, 3 drams, nocte. Pulse ranged from 64 to 80; temperature, 6 p. m., 99.8 F.

May 2, 4:30 a. m., "Sleeping soundly until now." "Wanted morphia this a. m." 7:30 a. m., "Sleeping most of the time." 6:30 p. m., "Very restless for two hours." 8 p. m., "Nauseated,

know of any other drug that will permit or procure such sleep in such a case, it is surely your duty to make it known to the profession.

Promotion of sleep of a normal character, when ergot has been administered for some other purpose, has been noted hundreds of times in my experience, and this has been one of the most positive characteristics of the drug, from which I deduce that normal sleep is an accompaniment of a certain state of closure of the vessels of the brain, reducing the quantity of blood in that organ below that which is associated with the activities of the waking state.

A recent case, illustrating the relation of ergot, and, therefore, of relaxed unstriated fiber to insomnia, delirium and pain, is worth relating.

I was called to a neighboring city to see a man in whom these three symptoms had existed for six days. His history evidenced that he had been nervously exhausted from overwork, and, while away from home on a business errand, he had an attack of influenza, the temperature reaching 103 F. He apparently had some realization of the mental disturbance, as he had repeatedly said that if the pain continued much longer he would become insane. Before I had finished giving him the first hypodermic of ergot he said the pressure in his head was relieved. There was no delirium after the first hypodermic of ergot. He slept, which he had not done from hypnotics and opiates. The severe pain in head and back, which had not been relieved by the opiates, was promptly relieved by the ergot, and soon dissipated. His treatment, in addition to ergot, was one dry-cupping along the spine and clearance of the bowels by a mercurial and salines.

SURGICAL CASES.

I might enumerate other disorders or classes of disease to which relaxed unstriated muscular fiber is importantly related, but I will speak of but one more class in which it plays a serious and often fatal rôle, because the indication is not properly met. I refer to conditions requiring surgical operation, and I do so under the title of this paper because it is the general practitioner who should so thoroughly appreciate the indications

vomited." (This followed and I believe was due to cocoa with milk at 5 p. m. A. T. L.) Ergot, 1 dram, at 4:30 and 8 a. m. 12 noon and 6 p. m., sparteine twice. At 9 p. m. "applied 10 dry cups to spine." Ergot, 2 drams, with sparteine. Buckthorn, 2 drams, nocte. 10 p. m., "Sleeping quietly." Pulse, 68 to 80; temperature, 99.4 to 100.2 F. Bowels and kidneys sufficiently active.

May 3, 5:45 a. m., "Slept well till 5 a. m., not as soundly as previously, about 7 hours." 12 noon, "Pulse full, nauseated." 4:30 p. m., Rochelle salts, $\frac{1}{2}$ ounce. "Vomited small amount." 10 p. m., "Has been sleeping quietly." At 1 and 5 a. m., 12 noon, 5:10 and 10 p. m., ergot 1 dram, first time with sparteine. At 2:15 p. m., "Galvanism" (10 cells, one hour). Pulse, 70 to 74; temperature, 99.2 to 99.6 F.

May 4, 5 a. m., "Restless and nausea. Slept most of night, about 6 hours." "Pulse full and good all night." 2:30 p. m., "Galvanism." 11 p. m., "Very restless." Ergot, 1 dram, at 5 a. m., $\frac{1}{2}$ dram at 2 and 11 p. m. Lactopeptin with nourishment. Pulse, 76; temperature, 98.4 F.

May 5, 5 a. m., "Quite restless early in night, did not sleep as well as usual, about 5 hours." Ergot, $\frac{1}{2}$ dram, at 8 a. m., 7 and 11 p. m. 1:45 p. m., "Galvanism." Pulse, 76-78; temperature, 98-99.8.

May 6, 2 a. m., "Very nervous, legs aching, restless, not sleeping well." 7 a. m., "Had poor night. Did not sleep well. Aching and tired this a. m. 10:30 a. m., "Static treatment at Dr. Livingston's office. Ergot, $\frac{1}{2}$ dram, at 2, 4 and 8 a. m., 40 minims at 1:10 p. m., $1\frac{1}{2}$ drams at 5 and 9 p. m. (Diet enlarged. A. T. L.)

May 8, "Slept about 5 hours."

May 9, "Slept about 5 hours."

May 10, "Slept most all night." 8 a. m., Pulse, 84; temperature, 98.5 F.; respiration, 18.

(In the remarks note was not made of the frequent naps during the day, which, in part, accounts for the less sleep at night. May 14, "Removed to boarding house on lake." A. T. L.)

and the means with which to meet them that, when the case is passed over to the surgeon, it is already prepared both for anesthesia and operation. The surgeon's relation to a case is so often at the last moment that there is then no time for the preparation that I believe to be important, namely, the toning of whatever unstriated fiber may be lacking in normal tone.

The important objects attained by this preparation of surgical cases are:

First. A more safe and comfortable anesthesia, avoiding nausea, retching, vomiting, mental excitement and excessive heart strain.

Second. Avoidance of shock from anesthesia or operation.

Third. Relief of shock from traumatism.

Fourth. Avoidance or modification of post-operative pain.

Fifth. In certain cases, avoiding intestinal paresis.

Sixth. In all cases, promotion of the process healing.

In all these there is certainly a most urgent demand for a good state of tone in the unstriated fiber involved.

The evidence afforded by the action of ergot in shock is that the condition is not so much a paralysis of vasomotor centers as it is a tremendous disturbance of the equilibrium of the circulation, the internal vessels being extremely engorged, rendering the efforts of the heart practically futile. The indication is, therefore, primarily, to contract the dilated and engorged vessels which will send their excess of blood to the peripheral vessels, which again establishes an active circulation, the obstacle to the heart being thus removed. It may then be found that the heart needs more stimulus than it can get from the exhausted nervous batteries, in which case the secondary indication appears, namely, for a judicious use of heart stimulants.

I recognize that according to the prevailing theory today, the prime indication is to raise blood pressure, but I think that this theory will be found to be erroneous.

Until an approximately equable circulation (equable distribution of blood) has been secured, the raising of blood pressure will generally be detrimental, even though it temporarily increases the force of the heart's action, and the subject will be all the more certain to die.

METHODS OF TONING UNSTRIATED MUSCULAR FIBERS.

From all that I have said it will be recognized that I regard the toning of relaxed unstriated muscular fiber as important in a great variety of diseases, and of vital import in many instances. As to the means by which such toning may be accomplished, you have possibly guessed one that I have in mind, but there are others.

Electricity.—Electricity in general, but the constant current in particular, is of inestimable value to this end, and applicable in many more instances than is likely to appear at first thought to the occasional user of that force. A truth which I clearly demonstrated in 1890, namely, that the constant current stores the individual with force, as it does the storage cell, is of much importance in this connection, namely, that the constant current is essentially like the vital force in its effects on functional activities.

Dry-Cupping.—Dry-cupping aids materially in relieving internal states of congestion; directly, by withdrawing a considerable amount of blood (if several cups are applied) from the general circulation, and indirectly by causing much damage to the superficial ves-

sels, the repair of which detracts from the abnormal internal activities.

Hot and Cold Applications.—The alternate brief applications of hot and cold water, or hot water and ice, over the entire length of the spine unquestionably tones the nerve centers, either directly or by stimulating their vascular walls, in either case indirectly toning the unstriated muscular fiber which they supply with force.

Massage.—Massage, by its mechanical impulse to the venous circulation and by the increased assimilative and eliminative activities produced in the massaged tissues, aids in securing a more equable distribution of blood throughout the body.

Mercurial Treatment.—Mercury, by its so-called "portal stimulation," but more particularly, I believe, by its notable stimulation of glandular activity, also greatly tends to a more equable distribution of the blood.

Ergot.—I might continue to enumerate measures, physiologic or therapeutic, of more or less value in securing the desired object, but they will occur to anyone who thoughtfully considers his teaching and experiences, and I will refer, in conclusion, only to that one other, which is the chief, the direct, the specific, and the only universal stimulant and tonic to the weak, relaxed, stretched or paralyzed unstriated muscular fiber, namely, ergot.

Having employed this drug during more than thirty years of practice, and in a constantly widening sphere of application, and having observed in thousands of instances its exceptional therapeutic power, and in scores of instances a power that suggested magic, because of the immediate and wondrous change it wrought, I have come to regard it as the one drug without which I would feel impotent in the practice of my profession.

This confident reliance has developed from the recognition that the efficiency shown in so many and so varied states of disease, was because of a really simple and single therapeutic action; and that the existence of a localized or more general state of abnormal relaxation of unstriated muscular fiber is always an indication for, and should determine a broad, rational application of this drug.

I recognize that some of my statements are likely to be regarded as extreme, perhaps as unwarranted, because not in accordance with general experience; but I also recognize that the difficulty of acceptance is wholly due to the limitation of the general experience, and I do not hesitate to rest my reputation on this broad proposition, that the general practitioner, surgeon or specialist, who does himself and his patients the justice to apply in his practice, fully, judiciously and fearlessly, the principles which I have endeavored to clearly express, will demonstrate for himself that ergot is capable of accomplishing all I have claimed for it and more; and that, besides being the great equalizer of the circulation, relieving pain, procuring calm and comfort, and promoting sleep, aiding repair, increasing elimination, supporting the heart, releasing the habitué from his horrible thralldom, and accomplishing many other desirable ends, to some of which I have elsewhere referred, it is, to a degree that can not be asseverated of any other drug, the savior of life.

THE SOLUTION AND METHOD OF ADMINISTRATION.

By an unfortunate blunder, for which neither THE JOURNAL nor myself was responsible, there appeared in connection with my paper² on "Some New and Un-

usual Therapeutic Applications of Ergot," a formula for a solution of ergot which has given much unnecessary annoyance and suffering, and has unfairly prejudiced both patient and physician against the drug. I therefore desire to dissipate such impressions which are unjust to the drug by giving two formulæ, either of which I can commend, and neither of which, if properly prepared and applied, will cause sufficient hurt or inflammation to constitute a serious objection to even the most nervous and sensitive patient, especially when the exceptional therapeutic benefit is taken into consideration. The first, which I have used long enough to test its keeping quality, is solid extract of ergot, one dram, dissolved in sterile distilled water, one ounce. Filter this solution and afterward add two minims of the purest chloroform and shake gently. This solution sometimes stings a little while being injected, but otherwise is satisfactory.

The second is solid extract of ergot, one dram, dissolved in a saturated solution (about two grains to the ounce) of chloretone in sterile distilled water, one ounce. After filtering the solution, add two grains of chloretone and shake gently.

The added chloretone is to secure an abundance of the preservative, and this is the most satisfactory preparation I have ever used, because, being somewhat anesthetic as well as antiseptic, it will not hurt, if injected slowly, as all hypodermics of ergot should be given. This solution, however, is given tentatively, as I am not yet assured that it will be perfectly preserved for a considerable time. It is satisfactory for short periods. I take from five to ten and sometimes even fifteen minutes to apply a hypodermic of ergot. It pays to take this time because of the better therapeutic effect, since, curiously, although so marvelously potent if not interfered with, ergot is distinctly less potent if interfered with by anything which increases vascular tension, as the strain of bearing a hurt, physical or mental activity, or erect posture. In general, it is much better that the patient be recumbent while the ergot is administered, and that posture maintained for half an hour or so after the administration. I recommend only the alcoholic (pharmacopeial) solid extract for solutions for hypodermic use, and I caution against the acetic acid solid extract for such purpose.

Even in the alcoholic solid extract there is a slight acidity which it is desirable to neutralize in order to have the most perfect result as to absence of hurt and local irritation, and this is accomplished by adding three or four minims of a saturated solution of chemically pure bicarbonate of soda to the ergot solution just before administering it. I commend this measure only to the physician who is willing to be at some pains to avoid even a little hurt and succeeding annoyance to his patient. Another matter of importance in making the solution is asepsis, as watery solutions of ergot are extremely prone to develop bacterial or fungus growth. All utensils, bottles, corks, filtering paper, etc., used should, therefore, be sterilized, and the same care should be exercised as to the syringe and needles when administering. The dose for an adult is from one-half to two drams of the above solutions; and the assertions of my various papers as to effects are based on such solutions made from the pharmacopeial solid extract prepared by a reliable house. I have experimented with some solutions supposed to be about five times the strength of my solutions, which were evidently not so, and clinical results alone can satisfactorily determine such relative strengths. Confusion and disap-

2. THE JOURNAL A. M. A., March 21, 1903, p. 774.

pointment are likely to result from such disparities in solutions prepared for hypodermic use, and it would be more satisfactory if all manufacturers adopted the same strength of solution based on pharmacopeial solid extract. After thirty years of strikingly satisfactory experience with ergot, I am unwilling to accept statements of the futility of the drug in an indicated case unless I know that a proper solution has been properly applied in proper quantities to the case. The syringe used for ergot administration should be all glass with asbestos packing, and should be of capacity of from one to two drams. The ideal syringe has not yet been made.

DISCUSSION.

DR. R. H. MONTGOMERY, Youngstown, Ohio—I am surprised at the apathy with which this paper is received. I am sorry that it is buried under an avalanche of gallstones. In our hospital the use of ergot has been attended with the happiest results when used according to the indications pointed out by Dr. Livingston.

DR. J. O. STRANAHAN, Rome, N. Y.—The use of ergot in the insane institutions of New York, as mentioned in the paper, was first suggested by Dr. Gray of Utica, N. Y. His experience of three years in the Hudson River State Hospital in cases of paretic convulsions proved this agent to be of value. He had at one time 100 paretics, and he universally used this agent in solution immediately on the onset of the paretic convulsions. These patients recovered consciousness sooner by the use of ergot, and the effect was very lasting. In private practice I have followed this principle, and I must say that in these cases of cerebral congestion, particularly meningitis, there has been no drug which has served me so well as ergot.

DR. H. GRAD, New York—My observation with the therapeutic action of aseptic ergot has been entirely with surgical cases, particularly its action on nausea following anesthesia and the concomitant shock of the operation. I know of no other therapeutic measure that will control and mitigate the feeling of nausea following anesthesia as a few judiciously applied hypodermics of ergot. Nor is there any doubt in my mind that it has a decided beneficial effect on shock. I know of no other drug that will bring that degree of calmness of nerve and repose of mind to the patient in his recovery from anesthesia as aseptic ergot. Every prolonged anesthesia is followed by a degree of nausea, retching and vomiting which varies with each individual, but as a rule these symptoms are directly in proportion to the length of the time the anesthesia is administered and the quantity of anesthetic ingested. Beside these symptoms, there are others which frequently arise, namely, headache, delirium and a feeling of wretchedness, indescribable, but most distressing to the patient. The popular saying, "I don't mind the operation, but dread the anesthesia," testifies to the fact that the suffering incident to the operation is not to be compared to the torture directly the result of a prolonged anesthesia. Now, therefore, if we possess a therapeutic measure that will prevent, or even only mitigate, those disagreeable sequelæ of anesthesia it certainly deserves consideration. In aseptic ergot we find such a measure, and those who will give it a trial will be charmed with its effect. Since I have been using aseptic ergot in these cases I have been able to give my patients a measure of relief for which they felt grateful, and I would be very unwilling indeed to part with so excellent a therapeutic measure.

DR. JAMES J. WALSH, New York—My own experience with ergot is limited to seeing its effects on delirious alcoholics, where undoubtedly it is of great service. Ergot is undoubtedly useful in those conditions in which we find a relaxation of the blood vessels in the abdominal region; here we may have an accumulation of much blood of the body, and it has been pointed out by German observers that practically two-thirds of the blood of the body may be contained within these abdominal vessels at one time. Therefore, by toning up these blood vessels the circulation can be made better and certain symptoms may be made to disappear. Dr. Homer Wakefield of New

York, who has seen good effects from ergot in many neurotic conditions, but who is unable to be present at this meeting, has asked that his opinion of the value of ergot in such affections be stated. Dr. Wakefield has found ergot of decided benefit in the treatment of heart disease with lost compensation, especially in combination with the Schott method of treatment. Dr. Wakefield has also found ergot of decided benefit in cases of dilated heart and the consequent lessening of resistance in the circulation, and this has been shown by the *x*-rays to have become smaller in size.

DR. ALEXANDER LAMBERT, New York—In Bellevue Hospital in New York City it has been a part of my duty to attend to the alcoholics and morphin habitués coming in. Last year there were about 8,000 alcoholics there, and they remained one, two, three, four, five or six weeks, or even longer. In those cases it has always been difficult to lower the death rate beyond 3 per cent. in nine years; those patients with wet brain rapidly sank, due to the exhaustion of delirium. Since using ergot I have obtained a 44 per cent. lower death rate. Ergot quiets the nerves. Formerly I could tell by looking at the tongue of the patient how long the individual had been drunk: when giving ergot I can not; ergot takes the shake out so quickly. When I went on duty I found 16 cases tied in their beds; when I used ergot, within forty-eight hours only one needed to be tied, the rest having a more comfortable time. This agent certainly prevents the dilatation of the capillaries of the brain and contracts those already dilated, and ergot is the only drug in my experience of about ten years at Bellevue that would contract these and prevent or help cure the alcoholic wet brain. The use of ergot in the treatment of morphin habitués takes away the craving for this drug and helps them through their period of misery and woe caused by the cutting off of morphin. I have never seen a patient go into complete collapse when ergot was given. I can speak most heartily of Dr. Livingston's paper, and of the opinions he expressed regarding the use of ergot. It is a drug that will be more appreciated in the future, and it is one of the few drugs against which my skepticism has been changed to unqualified respect.

DR. J. B. TAYLOR, Philadelphia—I should like to know why this drug should be given hypodermically rather than by the mouth. In country practice it is, in many instances, very difficult to give a hypodermic. In giving it hypodermically, is there no danger of ergotism?

DR. ALEXANDER LAMBERT, New York—I have given it every two hours for two weeks and never saw ergotism develop.

DR. ALFRED T. LIVINGSTON—I prefer to use ergot hypodermically because then I am absolutely certain, from a given dosage, what effects I can obtain; by the mouth one can not be certain. Again, ergot is often very offensive to the stomach. Hypodermically, it is certain and inoffensive; by way of the mouth, it is an uncertain agent and may disturb the digestive tract. I have not employed it to any extent in rheumatism, but it would seem to be indicated, because the fundamental factor in either inflammation or disordered function is an abnormal state of the circulation.

Prophylaxis of Anthrax.—J. Lignières, director of the National Institute of Bacteriology at Buenos Ayres and later at Palermo, announces that it is possible to prevent infection from anthrax by proper disinfection of the hides of infected animals. No disinfectants are known which will destroy anthrax spores without at the same time destroying the hides. The anthrax bacteria, however, are extremely vulnerable. It is possible to kill them all by immersing the hide for fifteen minutes in a 5 per cent. solution of crude carbolic acid or cresil, creolin, etc. If this is done at once after the animal is skinned no spores will develop and the hide is effectually sterilized. His extensive tests have demonstrated that no spores develop in the hide until at least two hours after the animal has been skinned. He advocates that every hide in an anthrax focus should be systematically disinfected in this way as a routine procedure, not restricting the disinfection to the known infected animals. The hides are uninjured.