

ON THE PROPERTIES AND PROXIMATE PRINCIPLES OF THE ERGOT
(*Acinula Clavus*, of Fries).

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FEW articles of the *Materia Medica* have occasioned greater diversity of opinion than the Ergot. Since this article was first recommended to the attention of the profession by our learned countryman, John Stearns, M.D., now of the city of New York, and formerly President of the New York State Medical Society, most writers have coincided with regard to its efficacy in increasing the parturient efforts of the uterus—some, however, have denounced the article as dangerous both to the mother and child ; while others have discarded it as entirely destitute of medicinal powers.

Having become satisfied, from experience, of the valuable properties of the article, though I had witnessed several cases of its deleterious narcotic effects on the child, I made some experiments, in the autumn of 1831, for the purpose of ascertaining the active principle of the medicine, and of obtaining a convenient form for administration.

A quantity of pulverized ergot was macerated, for several days, in sulphuric ether ; the liquid was then evaporated in a glass vessel, until it no longer afforded the smell of ether. There remained at the bottom of the vessel a small quantity of thick heavy oil, resembling in appearance fish oil : above this was a lighter oil, much more abundant than the former, of a light reddish brown color, and of a sweetish nauseous taste.

In order to ascertain whether this *light oil* contained the active medicinal principle, I cautiously administered it in six successive cases of parturition. The results were summarily as follows. In the first case twenty drops were administered, thirty minutes before the birth of the child. In the second case thirty drops were administered—the child was born after an interval of an hour and a quarter. Third case, forty drops—child born within thirty minutes.

In neither of these cases did the medicine appear to accelerate the labor, or to produce any effect either on the mother or child.

In the fourth case, fifty drops were administered ; and the child was born after an interval of about forty minutes. Within about fifteen minutes after taking the oil, the woman complained of a strange sensation in the head, which she attributed to the medicine. No other effect was observed, which appeared like the operation of ergot.

In the fifth case, the child was born forty minutes after the administration of sixty-five drops of the oil ; and, in the sixth case, the child was born sixty minutes after the administration of seventy-five drops. These were both easy labors ; but the children, for a considerable time after birth, had a livid appearance, and respired with much difficulty and irregularity, with the ordinary appearance of ergotism.

In neither of these six cases, did the medicine appear to have the least effect in increasing the uterine contraction.

Being apprehensive, from these trials, that this oil possessed dangerous

narcotic properties, without the power of increasing uterine contraction, I next proceeded to use the ergot which had been deprived of its oils by maceration in ether. Thus deprived of its oils, the ergot was found to have lost much of its weight, and to have become nearly destitute of taste.

This substance was administered in about twelve successive cases of parturition—the quantity given in each case being, in size, equal to from twelve to thirty grains of ergot not deprived of its oils. Its operation was found very prompt in increasing uterine contraction and accelerating labor; and in no case did the child manifest the least symptoms of ergotism, but exhibited a healthy color, and breathed and cried well, immediately after delivery.

These results led me to the conclusion, which I by no means anticipated at the commencement of my experiments, that the power which ergot possesses of increasing uterine contraction, depends on a different proximate principle from that which causes unpleasant, and, in some cases, fatal narcotic effects.

In the winter of 1831–2, these results were stated to my student, Mr. D. H. Moore (now Dr. Moore of this city), and by him communicated, in his inaugural dissertation, to the committee of examination in the Medical Institution of Yale College.

This gentleman, at my suggestion, administered the light oil, above mentioned, to some of his fellow students, with results which unequivocally proved its narcotic powers. Since that time I have witnessed the effects of this oil on several young men, students in my office; and the results observed by Dr. Moore and myself, were so similar in the different cases, that it will be sufficient to particularize one case.

Mr. H. A. D., aged 19, commonly not easily affected by narcotics, took two and a half fluid drachms of this oil in the course of one afternoon, in August 1833. He first took ʒss., at 2 o'clock, just after eating a full meal. His pulse was now 82 in a minute—respiration 19. Within seven minutes he felt a rather agreeable sensation in the head, such, he said, as he had sometimes experienced after taking sulphuric ether. I now took him with me, in a gig, about a mile, to see a patient. This agreeable sensation in the head soon disappeared, and was succeeded by an unpleasant, heavy, confused feeling, particularly in the posterior part of the head. Half an hour after taking the oil, he complained, while riding, of sensations similar to those attending sea-sickness. This heavy confused feeling in the head alternated frequently with a disagreeable sensation resembling nausea. The latter sensation, he remarked, appeared to be not in the stomach, but rather posterior to, and above the stomach—probably in the pneumo-gastric nerves. There was at this time a general languor and lassitude, and a constant inclination to spit. At the expiration of forty-five minutes, the disagreeable sensation alternating between the head and the region of the stomach, with the general languor and lassitude, became extremely unpleasant. He complained also of observing frequent flashes of light in the eyes, which induced him once to inquire whether it lightened.

At 3 o'clock he took ʒj. of the oil. This, like the first dose, within about seven minutes, was succeeded by an agreeable sensation in the

head, and a slight general exhilaration, during the continuance of which all of the unpleasant sensations, above mentioned, disappeared. The latter sensations, however, soon returned, with additional severity. He now walked with me about forty rods, to visit a patient; I hurried home, however, apprehensive that the appearance of my student would cause suspicions of intoxication. He complained of a rather painful rigidity of the muscles, and an extreme lassitude in the lower extremities, which caused considerable difficulty in walking; the skin generally had a rather livid color; the pupils were dilated; and the countenance had a remarkably heavy idiotic expression. On returning home, forty minutes after taking the last dose, the pulse was diminished in frequency to 65—respiration 14.

At 4 o'clock he took another dose of 3j. Like the former doses, this produced a transient slight exhilaration, succeeded by the unpleasant sensations in the head and the region of the stomach. At 5 o'clock the pulse was 36, slow and feeble—respiration 8, slow and small. The capillary action in the skin was remarkably slow—a portion of the skin deprived of its blood, by pressure with the finger, being a long time in recovering its color. From about the time of taking the second dose, he had frequent and pretty copious discharges of urine. He had considerable difficulty in walking about half a mile to his lodgings, on account of the extreme general languor and lassitude, a confusion in the head, and the painful rigidity of the muscles of the extremities.

Feeling unable to keep awake, he retired early, and slept very sound through the night.

On the following afternoon, Mr. A. B. W. aged 20, easily affected by narcotics, took forty minims of the light oil of ergot at a dose. The effects were almost precisely the same as in the former case—this subject, owing to an extreme susceptibility to the action of narcotics, being affected by a much less quantity of the oil.

It may be remarked, that, in order to avoid any influence of the imagination, neither of these young men was informed of the nature of the substance taken, or of the expected operative effects.

In these two young men, the effects of ergotism continued apparent nearly a week—the pupils of the eye being dilated; the pulse and respiration very small and infrequent; the capillary action very slow; and the skin livid; with a loss of appetite, a general languor and lassitude, and a rigidity and soreness of the muscles—the muscles of the thighs, and other parts of the lower extremities, being more particularly affected. For three days the frequency of the pulse continued below 50, with a proportionate infrequency of the respiration.

With a view to observe the effects of the *simple infusion of the ergot*, I administered to two other young gentlemen a quantity of the infusion prepared by digesting two ounces of the pulverized ergot in a pint of water, a few degrees below the boiling temperature. Mr. J. M. H. took fourteen ounces, and Mr. J. C. N. eight ounces, in doses of two ounces, in the course of about two hours, commencing at 3 o'clock, P. M. The effects were similar in the two cases. Both experienced a transient slight nausea, directly after taking each dose, which they attributed simply to the taste. A very slight dilatation of the pupils was

observed ; but there was no headache, no retardation of the respiration, pulse or capillary circulation ; no change in the color of the skin, and none of the general languor, lassitude and drowsiness, with which the other young gentlemen were affected after taking the oil. Instead of a depressing operation on any part of the system, the prominent effect observed was a considerable degree of exhilaration, with preternatural wakefulness—both of them lying awake, with a very pleasurable train of sensations and thoughts, through nearly the whole succeeding night. Mr. N. had formerly taken a quantity of the light oil above mentioned ; and he observed that the contrast, between the operation of the infusion and the oil, was very striking. About two hours after taking the last dose of the infusion, he experienced a slight transient spasmodic rigidity of the muscles of one thigh—perhaps an effect of the imagination and a recollection of the former operation of the oil. He was unable to take as large a quantity of the infusion as Mr. H., remarking, after taking the fourth dose, that the taste, associated with a recollection of the former nauseous operation of the oil, forbade his stomach receiving any more.

It being ascertained, as above stated, by my own experiments and those of Dr. Moore, in the early part of 1832, that the light oil of the ergot possessed active narcotic powers ; and also that the ergot deprived of its oils, by maceration in ether, retained the property of increasing uterine contraction ; it occurred to me that a *simple infusion of the ergot might be administered without danger of any deleterious operation*. From that time, now more than two years, I have constantly given the ergot in this form, being cautious to have none of the sediment mixed with the infusion ; and, though I have administered the article with the happiest effects in numerous cases, I have in no case seen any narcotic effects either on the mother or child.

I am authorized to state, also, that Dr. Beers, the Professor of Obstetrics in Yale College, in his extensive practice has very frequently during this period employed the ergot in this form, with the satisfaction of witnessing no unpleasant operation in any case. Before this period he had commonly given the sediment with the infusion, and had frequently witnessed its narcotic operation both on mothers and children—indeed, he had commonly observed the child affected more or less with asphyxia, when the labor had been protracted more than forty or fifty minutes after the exhibition of the ergot.

Dr. Lyman Parker, of Wallingford, a gentleman of much obstetrical experience, informed me, some time since, that he had made frequent use of the ergot, and had been perfectly incredulous with regard to its possessing any deleterious property. On inquiry concerning his mode of administration, he stated that he had always employed the article in infusion, carefully avoiding the sediment. On the contrary, in conversing with several medical friends, who had acquired a strong prejudice against the ergot, I learned that they had given the substance in powder, or the infusion together with the sediment.

I find also, on referring to different authors who have engaged in the discussion concerning the ergot, that those who consider the article as safe in its operation, commonly exhibit the clear infusion ; while those who denounce the article as dangerous, commonly give the substance in

powder, or a very strong infusion or decoction in large quantities—in which cases it is not improbable that little care has been observed to avoid giving some portion of the sediment with the infusion or decoction. Probably, too, by decoction a considerable portion of the narcotic oil would be extracted.

This circumstance, of the different doses and modes of administration, will probably account, in part, for the great discrepancy of opinion which has prevailed with regard to the ergot.

Another circumstance, also, I observed in the course of my experiments—that *the properties of different specimens of ergot, found in the shops, are extremely various.* Some specimens I found to afford a very large quantity of the above described narcotic oil—the oils constituting one-half, or two-thirds, of the whole weight of the ergot; while other specimens yielded but a very moderate quantity of oil.

I observed, too, that the ecbotic powers of the ergot were not at all in proportion to the quantity of oil contained. One specimen, which contained a very large proportion of the narcotic oil, I administered in infusion, in several cases of parturition, without the least apparent effect in increasing uterine contraction.

This great difference in the quality of ergot will, perhaps, explain the cases recorded by some rash practitioners, in which very large quantities of ergot have been administered without injurious effects. One case is recorded in which a practitioner states that he gave about a quarter of a pound in the course of one night, with no apparent effect. From my experiments, I have no doubt that such a quantity of some ergot found in the shops, would have proved fatal to both mother and child.

This difference in the quality of ergot, probably gave rise to the opinion, which has prevailed, that ergot loses its properties by age. This opinion, which has been amply refuted by the communications of Dr. E. Woodward and Dr. R. Hazeltine, in the Boston Medical and Surgical Journal, I have long known to be incorrect—having witnessed prompt and salutary effects from ergot which had been kept in powder from six to twelve months.

A notice has been recently published, in several of the periodicals, that M. Boettcher, of Europe, from some experiments, has come to the conclusion that the quality of ergot varies according to the time it is gathered—that “the action of the ergot of rye collected before harvest is very energetic, while that collected after harvest is totally powerless.” Of the correctness of this conclusion I have had no means to decide, as the ergot rarely grows in any considerable quantity in this vicinity, and I have depended on the shops for a supply, and consequently have not known at what time it was gathered.

The periodicals, a few months since, contained also an abstract of a *chemical analysis* of ergot, made in Europe, which is subjoined.

“In 103 parts of ergot, M. Wiggers, of Berlin, has found—White oily matter, 35.0; Solid fatty matter, crystallizable, and of peculiar nature, 1.04; Cerine, 0.75; Fungous matter, 46.08; Ergotine, 1.24; Vegetable ozmazome, 7.76; Sugar, 1.55; Gummy extract, with red coloring principle, 2.32; Vegetable albumen, 1.48; Acid phosphate of

potash, 4.42; Phosphate of lime, and traces of iron, 0.28; Silica, 0.14. There are some remarkable points in the preceding analysis. In the first place the presence of vegetable ozmazome identifies the ergot with the class of mushrooms, in which this substance forms a considerable proportion. In this ozmazome seems to reside the power which promotes parturition. The ergotine is insoluble in water, and seems, from the experiments of M. Wiggers, to be the principle in which the poisonous qualities of the ergot reside. On several animals it has operated as a powerful irritant poison, while the ozmazome produced no such effect."

If vegetable ozmazome is soluble both in ether and water (and I believe that chemists consider this a property of that substance), I am disposed to doubt the conclusion of M. Wiggers, that "In this ozmazome seems to reside the power which promotes parturition"; for I found that ergot, which had been thoroughly macerated in ether, still retained this power.

But in the most important practical result, it appears that we coincide—that "*the principle in which the poisonous qualities of the ergot reside is insoluble in water.*" If these poisonous qualities reside in the principle which he supposes, it would seem that in my experiments the ergotine remained in solution in the light oil.

In conclusion, I would enjoin the two following rules for the mode of exhibiting the ergot in cases of parturition—not adverting to the cases, or particular symptoms, which indicate its use—subjects already ably treated of by different writers.

1. *The ergot should always be exhibited in the form of a watery infusion.*

2. *A large quantity should not be exhibited in any case—the infusion of twenty-five or thirty grains, in divided doses, being abundantly sufficient.*

Unless the latter rule is observed, the practitioner will occasionally observe a narcotic operation; for some portion of the powder will commonly remain suspended in the infusion, and, if a large quantity is prescribed, this may be sufficient to occasion unpleasant narcotic effects. I have found, moreover, that if an increase of uterine contraction was not produced by this quantity of the ergot, no advantage was gained by the exhibition of a greater quantity—indeed, it has appeared to me that, in general, a very large quantity of ergot is less efficient in producing uterine contraction, than a less quantity; the narcotic operation of the ergot, like that of opium, when administered with ergot, appearing to counteract its favorable operation.

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