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ON THE
ACTION AND USE OF ACONITIA

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THE following observations have been made, firstly with the view of elucidating the precise action of aconite; and, secondly, of ascertaining whether or not it exercises any control over the febrile state. The pure crystallized aconitia of Mr. Morson, or of Messrs. T. and H. Smith, of Edinburgh, was employed in every case.

ON THE HORSE.—The subject of this and the two following experiments was a weakly brown colt of the pure race-horse breed.

Observation 1.—The pulse being 48, of good volume and power, and the respirations 7, $\frac{1}{100}$ of a grain of aconitia dissolved in rectified spirit was injected under the skin of the shoulder.

After *one hour* there was no change except a falling- or sucking-in of the false nostril at each inspiration.

After *two hours* the pulse was accelerated ten beats; it was strong, full, and irregular. The respirations and pupils were unchanged. The falling-in of the false nostril at each inspiration continued; it was marked by a linear depression of the external skin corresponding to the false nostril, and there was manifestly a slight impediment to the entrance of air. The

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dilator of the nostril was evidently paralysed, for there was no tendency to retraction when the part was supported by the finger. The skin and mucous membrane about the nasal orifices were not sensitive to the prick of a pin.

After *seven and three quarter hours* (midnight) the horse was lying down in his box apparently comfortable. Pulse 48, of initial volume and power; the lips, gums, and tongue dryish. He had continued to munch a little hay throughout.

In this observation two effects were observable:—1. Palsy of foremost inspiratory muscle, the dilator narium; this was the earliest symptom, and was rendered apparent by an impediment to the inspiratory act in the chest itself, but which was too slight to cause any other appreciable effect on the respiration. 2. Increased arterial pressure, due to the same respiratory impediment.

Obs. 2.—After an interval of a month, the pulse being 48, and the respirations 7, as before, the $\frac{1}{50}$ of a grain of aconitia dissolved in ℥xx of rectified spirit was injected. The animal dunged immediately after the needle was withdrawn.

After *one hour* palsy of the dilator narium as before. Pulse 50, increased in volume and power. Continued to eat, and did not seem much affected; but there was great irritation at the seat of puncture, for the horse frequently bit at it.

After *an hour and a half* pulse 60, full and strong.

After *three hours* pulse 68, full and strong; there was thirst and the horse drank a pailful of water; had dunged a second time. Stood very quiet.

After *six and a half hours* lay down quietly in his stall. Pulse 52, regular, but weak; respirations 6 to 8, unequal and irregular; false nostril collapsed. Champed a good deal, and a considerable quantity of frothy mucus flowed at intervals slowly from the mouth. Had dunged and passed urine, but now refused both hay and water, and was evidently weak, allowing both the head and ears to hang down. He raised himself without trouble, but then stood stock-still; was quiet and dull, and, though naturally irritable, allowed me to pinch his skin. He continued in this state up to the end of the *eighth hour*.

The next day, after an interval of *eighteen hours* from the time of injection, he seemed quite recovered, but the pulse was 40 and decidedly weak.

In this case the chest movements were appreciably affected; the respiration was impeded; the cardiac acceleration and arterial pressure were proportionately increased. When the effects of the aconitia had ceased, the result of increased cardiac action and prolonged tension was indicated by feebleness of the pulse. It is doubtful whether the apathy on pinching the skin was due to anæsthesia or to the indifference of languor; from further observations I am inclined to attribute it to the latter cause. General muscular weakness was very marked. Thirst at the end of the third hour, no doubt, indicated congestion of the gastric mucous membrane. The subsequent refusal of water was probably due to lingering spasm of the gullet (see next *Obs.*). The excretions were normal.

Obs. 3.—After a long interval, the pulse being 50, and the respirations 8, the $\frac{1}{4}$ of a grain of aconitia dissolved in \mathfrak{m} xx of rectified spirit was injected. No change took place until the end of *an hour*, when the falling-in of the false nostril was observed.

Ten minutes later the respirations fell to 5, and the inspirations were long drawn; there was a rumbling of air and water in the abdomen. Pulse 56, stronger.

After *an hour and a half* the pulse was 68, full, regular, and soft; some beats even feeble; the inspirations were sudden and spasmodic, and the expirations slow and laboured, but not audibly so.

Ten minutes later the horse was restless, walking and turning about, and making an audible noise in expiration from vibration of the nostrils. Respiration 5, irregular; two deep inspirations, then a long pause of one third of a minute, followed by two inspirations and another pause.

After *an hour and three quarters* restlessness and distress, with diminution of muscular power indicated by a tendency to stumble or totter.

After *two hours* the slow, irregular breathing which had continued to the present time was now succeeded by great

rapidity, and the horse panted like a winded dog with occasional suspensions, corresponding probably to the pauses noticed in the slower breathing. The animal now broke out into sensible perspiration and dunged thrice. The pulse was 84. There was further diminution of muscular power; he was quite conscious and very sensitive.

Ten minutes later, after much stumbling, he fell down, and the respirations were reduced to 5. He attempted to rise, but for a while could not, and sat on his haunches, and then, after a desperate effort, regained his legs.

Five minutes afterwards he was seized with an intense spasm of all the voluntary muscles, rendering the legs rigid, and raising him for a moment on his front toes; the breathing was stridulous, the pulse so small and rapid that I could not count it. When the muscles relaxed he stumbled and fell, and then the respiration, although greatly accelerated (68), became deep and free, and he lay quietly, bathed in sweat, and did not regain his legs again for five and a half hours.

After *two and a half hours* ropy saliva began to trickle from the mouth, and seeming attempts to swallow it caused retching. Pulse 40, very feeble. Respirations about 68, panting, and not quite regular; excessive prostration.

After *three hours* the pulse was still further reduced to 30, and was very feeble; the respiration continued slightly spasmodic and about 65.

After *three and a half hours* the breathing became slower and freer, and the pulse rose to 80, but it was still very small and feeble. Occasional attempts to swallow produced great choking and general spasm, but in the intervals he lay very quiet.

After *four hours* the respirations were reduced to 24, and the inspirations were regular and full drawn, occasionally interrupted by a succession of short, panting ones. The pulse rose to 84, but remained very feeble and compressible. The profuse sweating which had continued for nearly three hours was now ceasing; the abdomen and hind quarters alone were clammy, and the skin was everywhere warm. There was still much distress, but now associated with deglutition. During the following hour he dunged twice; there was much rumbling, and very large quantities of wind were passed.

After *six hours* he still lay helpless as before on the side, too

feeble to raise a limb. The respirations 36, shallow, and the inspirations at times still panting. The pulse 60, regular, effaced by the slightest pressure, and some beats very faint. At this time a little water was placed in his mouth by means of a sponge, and it produced for some seconds the most violent choking spasm and intense distress, so that he struggled to get up and kicked about in a state of desperation in order to draw air into the chest, but none entered, and he fell back exhausted. The pulse rose to 120, then relief came with a decided hiccup, and the inspirations followed regularly at the rate of 24 a minute, alternating with long, grunting, laboured expirations, the intercostal spaces being wide enough to receive two fingers, and for several minutes at a time undergoing neither contraction nor further expansion. He continued in this state for the next hour, the pulse beating 60 regularly as to time, but very irregularly as to force, some beats being pretty full, but followed by five or six beats very faint and indistinct. The respirations rose to 36.

After *eight hours* the respiration was freer, and the pulse improved in power. At this time he regained his legs, stood with some difficulty, evacuated both the bowels and bladder, and ejected some clear glairy fluid from the nostrils. During the next hour he stood still with the head drooped; the pulse much fuller and the beats of equal power, but still very soft and compressible. The intercostals were now acting well; the respirations 40, with a faint, blowing, expiratory sound like that of a horse after a hard run. Skin hot and dry; the ears damp. The mouth was closed throughout, and on now opening it the muscles of the jaw resisted somewhat, and some glairy mucus ran from the mouth. The tongue was normal. At intervals of a few minutes the regularity of the breathing was interrupted by a sigh-like inspiration, followed for a few seconds by short, rapid breathing, 70 to 80 a minute, and then falling to 40 again, and becoming regular.

As often as a little water was offered it was refused, and it provoked a slight spasm of the throat and the panting respiration just described.

From this time recovery was progressive; during the night the evacuations of the bowels and bladder were free, but the motions were not loose. Next morning, *eighteen hours after the*

aconitia was given, the horse was comfortable but very quiet, the respiration was normal, the pulse 55, regular, but small, feeble and compressible. The tongue, pupils, and mucous membranes were normal, the skin warm and sensitive. He had refused food previously, but now accepted it.

The pupils were unchanged throughout, consciousness completely retained, and the skin highly sensitive. The dung passed during the latter part of the time was rather pale, of disagreeable odour, softish, and contained undigested oats.

In this case the dose proved very nearly fatal. The symptoms appeared in the same order as in the preceding observations, and almost the whole of the effects are attributable to the respiratory difficulty caused by intermittent spasm of the muscles attached to the upper part of the chest, and of those of the respiratory passages, rising to great intensity at intervals; while the muscles of the rest of the chest wall, excepting the diaphragm, were generally in a state of incomplete palsy. The diaphragm was evidently for the most part in an enfeebled condition, but sometimes the action was aroused, and once, at least, became spasmodic. The heart throughout indicated the degree of hindrance to the breathing; the dyspnoea at first causing increased cardiac action and arterial pressure, and when the inspiration was greatly retarded, intermission of the former. As often as the breathing became free, the pulse fell, and then indicated by its flaccidity the immense strain of which the heart had been relieved. But we have here evidence of spasm of the gullet also, indicating the general implication of the pneumogastric nerves. The symptoms referable to this cause are closely akin to, if they be not identical with, those which characterise hydrophobia. The muscular weakness was excessive, but did not amount to paralysis, for the struggles were violent when the choking spasms came on. The skin appeared highly sensitive throughout, in the earlier stage the settling of a fly caused vibration of the cutaneous muscle.

The following case completes this series.

Obs. 4.—The subject of this experiment was a sturdy grey entire horse, about fourteen hands high. The pulse 38, and respirations 8.

Half a grain of aconitia dissolved in f3j of rectified spirit was injected into the loose areolar tissue behind the shoulder. The injection caused irritation in the part.

After *half an hour* the pulse was 44 and stronger.

After *one hour* he began to be restless and champed, and suddenly began to froth at the mouth, and to slobber freely, and a minute later strong spasm of the glottis and windpipe came on, and the long-drawn inspirations were audible. Once he made an effort to swallow the frothy mucus, and it immediately brought on a severe choking spasm of the glottis, as if it were completely occluded by a foreign body; the head was drawn backwards, the muscles of the neck becoming very rigid. After this passed off the pulse was 48, increased in volume and power. Respirations 10, the lower ribs being very powerfully drawn in during inspiration. He dunged twice, and now began to stagger.

During the next ten minutes, the inspirations became audible, being accompanied by a low faint snore, the slobbering continued, and, the inspirations becoming rapidly more difficult, suffocation seemed to threaten.

After *one hour and ten minutes* from the time of injection a canula was passed through the skin into the trachea. It gave no relief, although the air passed through it freely. Five minutes later, the inspirations were reduced to 8, and a violent suffocative paroxysm came on, in which the horse tottered and fell. After a few seconds, and with great effort he regained his feet, when the respirations were 40 and deep, and he was wet with sweat. In the course of five minutes, the breathing again became stridulous, and he fell down a second time. As he lay the inspirations were 28, full and deep, and some wind was passed from the bowels. He regained his legs for a few minutes, and fell down a third time, never to rise again, and lay upon the side with the legs straight out, the respirations varying from 32 to 22, each inspiration being attended by a long-drawn whistle of low pitch, and a good heaving of the chest and abdomen. The pulse 86, full and strong.

During the next half hour the respirations and pulse continued to rise, and it appeared as if the chest was retained in the inspiratory expansion, and the diaphragm alone acting efficiently, and slowly heaving the abdomen.

After *two hours* the breathing was 40 and difficult, the inspirations and expirations being attended respectively by a sudden tuckling in and flapping out of the abdominal walls as if the diaphragm was now paralysed. The pulse had risen to 136, and it still remained as before, regular, strong, and hard.

Twenty minutes later the respirations were reduced to 20, and were very shallow; in a word there was extreme orthopnœa; the teeth were firmly clenched at each inspiration, and the air was forced out of the chest by prolonged and very forcible contraction of the chest and abdomen. After continuing thus for twenty minutes this evident obstruction of the air passages was suddenly removed, and the inspiratory muscles, as if set free, responded fully, and the respirations were doubled in number and frequency, the inspirations were very full and snoring from vibration of the nostrils, and the expiration was a forcible loud blow. This easy state of matters did not last long, the breathing became slower and shallower, the pulse became irregular, two or three violent beats and then a long pause, and both rapidly failing, the animal died two hours and forty minutes after the injection of the aconitia. Consciousness and common sensation were retained to the minute of death. The pupils were unchanged throughout.

The chest was opened within ten minutes of the death of the animal. The lungs were completely collapsed behind the heart, perfectly healthy, of a pale rose colour, and, excepting the upper lobe of the right, increpitant; on opening the pericardium, a faint quiver affected the heart; the left cavities were firmly contracted and contained only a little dark blood, the muscle of the ventricle was quite hard. The blood was chiefly contained in the right heart and the great vessels connected with it, the veins and the auricle being enormously distended. No attempt was made to revive the pulsation of the right heart, as the great vessels were divided at once. The blood was very dark, and coagulated very soon.

The stomach contained about six pints of bright, clear, glairy, and very acid fluid. The œsophagus throughout its whole length was like a hard rope; its passage, including the cardiac orifice of the stomach, was so firmly occluded that it gave as much resistance to the passage of the index finger as a new kid glove. The glottis was open; the muscular fibres of the

diaphragm were flaccid. Rigor mortis had not come on an hour and a half after death.

Here we have a case of intermittent suffocation, the symptoms being precisely similar to those of the preceding case, but the spasms were more violent, and recurred more frequently. The introduction of the canula gave no relief because the air tubes below were in a state of constriction, and the action of the diaphragm only increased this, and at the same time produced collapse of the lower part of the chest walls.

ON THE DOG.—The subject of the following experiment was a young sheep-dog weighing twenty-one pounds ; the medicine was given fasting.

Obs. 5.— $\frac{1}{200}$ of a grain of aconitia contained in $\text{m}\nu$ of dilute alcohol was injected beneath the skin. Within eight minutes he was restless and whined, apparently from local irritation.

After *fifteen minutes* began to cry piteously and then retched violently, with emission of urine. Then there was an interval of quiet, the respiration 12, and the heart throbbing strongly, followed by struggling and retching, the hind legs losing power. From this time up to within four minutes of his death, thirty-eight minutes after the injection, the poor dog was in the most terrible distress ; there was inability to stand, and if, as happened once in the earlier stage, the body was sustained on the legs for a moment, these were outspread and greatly tremulous, and in the paroxysms he crawled frantically on the belly, beating the forepaws on the floor. The paroxysms succeeded each other very rapidly, and consisted apparently of violent retching, the head being either strongly retracted or bent downwards, and the lower jaw forcibly depressed ; the widely opened mouth was purple and stuffed with frothy adherent mucus ; the ineffectual expulsive efforts were followed by the most distressing cries. *Thirty-three minutes* after the injection the cardiac beats were 110 to 120, regular and strong ; the respiration 12. After this time the breathing seemed to consist in the retching efforts, and finally after two inspirations, separated by intervals of half a minute, the respiration ceased ; the pupils at this time were dilated. Consciousness was retained throughout, and the poor

animal seemed to seek my help in the paroxysms, and in the intervals feebly turned his head, and wagged his tail when spoken to. The pupils up to three minutes before death were normally contracted—unaffected—afterwards they were completely dilated.

I examined the body five minutes after death; on lifting it by the arms from the floor to the table, air entered the lungs; the body was flaccid, the chest collapsed, the concavity of the diaphragm lay very high; on puncturing an intercostal space, air rushed into the chest cavity. The lungs were of a pale red-lead colour, and partially collapsed. The right heart and the large vessels connected with it, as well as those at the roots of the lungs, were enormously distended; on relieving the distension of the auricle a very little by pricking the superior cava, this cavity began to contract regularly sixty times a minute, and continued to do so for twenty minutes. The left heart was firmly contracted, and contained only a teaspoonful or two of dark venous blood. All the blood was very dark, and the temperature of that in the inferior cava, twenty minutes after death, was 105° Fahr. It coagulated almost immediately. The œsophagus, stomach, intestines throughout, and the bladder, were completely occluded by hard contraction. The mucous membrane of the stomach, like that of the mouth, was dusky purplish, the edges of the rugæ being darker, from congestion, and covered with a frothy, very tenacious mucus. There was only one (right) kidney and ureter; the bladder end of the abortive ureter formed a white fibro-fatty mass about one inch long by a quarter of an inch wide, ending in a smooth round free end. The gall bladder was full of healthy bile.

Rigor mortis came on within an hour.

Intermittent suffocation is the leading feature in this case, when the swift action of the poison had reached its full violence. The terrible paroxysms, of which there were six or seven during the last five minutes of life, and which seemed to be retching, were really ineffectual efforts to draw air into the chest and to expel that contained in it. The motor branches of the vagi, radiated inflexible cramp on the respiratory and alimentary ways indifferently, and this was only interrupted when the asphyxia which it produced was so complete that the excited

nerve centres could no longer find food for their extravagant action. The spasm relaxed, the blood was soon again sufficiently revived for the generation of a fresh torrent of nerve force, and this in a little time found vent in another spasm. As soon as the respiratory difficulty began, restraint was placed on the right heart and it battled well for a time, but towards the close of each suffocating paroxysm it was distended almost to bursting. So long as the animal could take an effectual inspiration, the paralysing pressure was removed, and it resumed its action. At first strong, it laboured mightily to overcome the obstruction, but lost power after each violent exertion. The muscles of inspiration were, however, the first to fail, the chest-walls fell in, the relaxed and dilated air passages no longer offered impediment to the egress of air, and the lungs collapsed by virtue of the resilience of their elastic tissue. The heart, meanwhile, unrelieved of its load, was still or only faintly quivering, and yet ready to resume efficient action when room was given by venesection for its exertion.

ON THE CAT.—*Obs. 6.*—The following instructive case completely illustrates the full effects of aconitia and complete recovery from them. The subject, a vigorous kitten fourteen weeks old, weighing nearly three pounds, very nearly succumbed to the $\frac{1}{1000}$ of a grain of the alkaloid injected in m^{v} of water beneath the skin.

After *fifteen minutes*, having previously been still and comfortable, slight spasm of the larynx came on, the head was forcibly pushed forwards several times, the neck outstretched, and inspiration accompanied by a faint stridulous noise. This continued for a few seconds, and was followed by working of the jaw.

During the next ten minutes she had three similar attacks, but throughout maintained her position, and was quiet, and apparently comfortable in the intervals. At the end of this time a fifth and stronger attack impelled her to start away in a reckless manner and with an angry cry, and she sat on the haunches, breathing irregularly, 60; the inspirations being short, catching, and with a few considerable pauses. Three minutes afterwards (the thirty-third minute) she had another attack.

After *forty minutes* the respirations were reduced to 6, and the intervals of inspiration were sometimes so long that it appeared as if the breathing would be soon arrested; the head was curved forwards and on the ground, the tongue protruded from the opened mouth, and slightly drawn in with each inspiration, and there was occasional twitching of the facial muscles.

During the next thirteen minutes, and after a seventh spasm, the respirations were 60, each inspiration being a little snatch, which moved the whole body just as the foot is raised by the popliteal artery when the ham of the same leg is placed on the knee of the other. Then for two minutes the respirations were suddenly reduced to 14, and became irregular again; each inspiration was a little snatch which jerked the body forwards, without, however, permanently disturbing the balance, until the inspiratory difficulty reached a certain point, and then the animal was suddenly impelled forwards in a desperate scramble. After the last of three of these attacks, each equalling in severity those which follow larger doses of the poison (see Obs. 5), and each attended by a most savage agonising cry, the poor little animal got a sudden relief to the breathing, the respirations rising to 100, good panting movements of the abdomen, and no longer jerking the body. As she lay on the carpet with the legs outspread, mewing feebly at first, the pants became slighter and less frequent, and at the end of *an hour and a quarter* from the time of injection were reduced to 24.

During the next twenty minutes she remained in the same state; her quiet being only once disturbed by a spasm (the eleventh), after which the respirations were 20. At the end of this time the respirations were 25, and it appeared that a considerable improvement had taken place in this function, for two or three successive inspirations were well drawn by strong laboured contractions of the diaphragm. This, however, did not bring the relief I expected, but, on the contrary, distress; and it was soon apparent that the diaphragm was holding an unequal contest with the expiratory muscles, including, no doubt, those of the air-tubes and larynx; for this action had not continued a minute before one of these laborious, but ineffectual, descents of the diaphragm provoked a forward rush and cry of anguish.

During the next half hour this was repeated thrice, and then the laborious action of the diaphragm was only occasionally repeated. The breathing generally being 17 to 24, regular, and of the character described as existing after forty minutes.

For the next half hour she lay quiet and motionless on the side, breathing 20 tranquilly, and apparently sleeping, but raising the head and mewling when spoken to; the heart beating rapidly 240, but regularly.

After *two and a half hours* she was aroused by the most severe paroxysm she had had, lasting a minute, and arresting the breathing nearly the whole of the time. A little frothy mucus was expelled from the mouth. On recovery, the respiration was 16, quite regular and free, and continued so with good heaving of the chest and inflation of the lungs for the next half hour. During the first half of this time the action of the heart was very rapid and regular, except towards the end of expiration, when it uniformly intermitted. During the latter half of this time the respiration was full and thoracic, the lung sounds quite clear, and the pulse was regular throughout the respiratory act, but varied in frequency from 100 to 250. The diaphragmatic effects were now rare, but as often as they occurred the animal was aroused from a state of quietude; and twice, between the third and fourth hours, affected with a slight spasm. The respirations in this interval were 14 to 15, the inspirations full drawn, and the pulse 260, and regular.

After *four and a half hours* she was lying quietly on the stomach with the head resting on the floor—but raising it and mewling gently when spoken to, the respirations 22, regular and good, the pulse 140, also regular and of fair power—when she was suddenly seized with a succession of most violent, retching-like spasms, induced by inability to expire. The first was attended by the expulsion of a small spoonful of frothy mucus, the others with a little blood-stained froth. She had in all six such attacks, the first four coming on at intervals of a quarter of an hour, and the last two at intervals of an hour, and they gradually diminished in intensity. During this long interval a low moan accompanied each rather long expiration, and the inspiration was also prolonged, beginning by expansion of the chest and followed by the abdominal expansion, the action of the diaphragm being delayed.

At the end of this interval, *i. e. six and a half hours* after the injection of the aconitia, she was couching naturally, apparently dosing, but turning the head to the slightest noise and liking to be caressed. The respirations 60, regular, and fairly performed. The pulse at the rate of 100 during expiration, and of 160 during inspiration. The pupils unchanged. There was no more spasm nor apparent discomfort after this, and up to the tenth hour after the injection she remained in a quiet dozy condition, but disturbed by the least noise, and raising the head and looking up. The respirations regular and rapid, 130 (!); the lung sounds clear; the cardiac action regular and strong, the pulse being 150. She had neither taken food nor passed any excreta for eleven hours. She now met me at the door with tail erect, walked down-stairs, and manifested pleasure on seeing her feline relatives in the kitchen. In fact, she was quite recovered, and soon afterwards passed a large quantity of urine. Next morning she ate ravenously, and was quite well and lively.

The phenomena are not difficult to explain in this case. The earliest effect was intermittent spasm of the larynx, with intervals of dyspnœa. The spasm now and then reached a climax and suffocation impended; when the spasm had exhausted itself, a brief relief to the chest followed. Before the end of the second hour, either the expiratory muscles were in a state of continuous and partial cramp, or the muscles of inspiration were wearied and partially paralysed, for there was urgent dyspnœa, the diaphragm alone sustaining the inspiratory act, and its ineffectual efforts provoked great distress. This muscle, moreover, survived the influence which simultaneously cramped one set of the respiratory muscles and paralysed the others, and thus preserved the life of the animal. After the struggle was over, and the respiratory muscles were freed from the restraint, the respirations were increased out of all proportion to the pulse. The action of the heart throughout corresponded to the respiratory difficulty. This was most conclusively illustrated at every stage, but more particularly between the third and fourth, and the sixth and seventh hours. Locomotion was weakened, but the voluntary efforts were throughout very violent when excited by

the distress of spasm. Consciousness and common sensation were retained throughout, the former completely.

Obs. 7.—In this case, a young cat, weighing nearly three pounds, succumbed to the $\frac{1}{500}$ of a grain of aconitia, seven and a quarter hours after the subcutaneous injection of the poison.

No symptoms occurred until *half an hour* afterwards, when she was affected with a series of rapid spasmodic gulplings, attended with evident distress and a stiff, tottering gait, after which she sat quiet, apparently engaged with her own sensations.

After *forty-five minutes* the respirations were 80, hurried and irregular; the inspirations short and attended with an elevation of the nostrils, by which they were easily counted; when caressed she purred, but the purr was soon converted into a moist râle; she lay loosely on her belly with the hips and shoulders outspread and the tail laxly extended, and responded feebly when spoken to; the breathing became quiet during the next fifteen minutes, but irregular and 60; the femoral pulse 120.

After *an hour and a quarter* another but more severe choking spasm, the head being forcibly retracted, and the purple mouth violently opened as desperate attempts were made with a despairing cry to draw air into the chest. Then she lay on her side, inspiring with open mouth twenty-three times a minute, each inspiration followed by closure of the mouth and an audible gulping sound.

During the next hour she had five intense spasms, each announced by an open-mouthed cry, the protrusion of a purple tongue, and champing of tenacious frothy mucus; the respirations 26 to 16, for the most part regular—a laboured distressed inspiration, and short sudden expiration; the heart was beating strongly, about 90, with a slight occasional irregularity. There was some distress in the intervals due to spasmodic gulping, which often regularly alternated with the inspirations.

After *two and a half hours* the respirations were 16, of the same character; the femoral pulse full, hard, and regular, excepting at the moment of inspiration, when it was inclined

to intermit; the finger barely caught the weaker pulsations which indicated a momentary diminution of arterial pressure.

During the next hour she was free from the choking spasms, but the spasm of deglutition continued as before; the respirations were gradually reduced to 9, each shallow inspiration accompanied as before by opening of the mouth. The pulse varied from 60 to 80, and continued of good volume and power, a few accelerated beats occurring at the end of inspiration. The pupils were contracted to mere slits towards the dark side of the room. The crawling powers were feeble; the body became cold; she still answered me with a faint mew. The bowels acted involuntarily twice during the hour.

During the next three hours there were only two choking spasms and an attack of retching, in which she expelled very forcibly an ounce of fluid from the stomach; the respirations, 12 to 16, maintained the same character; the pulse varied from 96 to 76, was fairly regular, but weak; general feebleness increased, but she still purred when caressed.

After *seven and a quarter hours*, and a long and even tranquil interval of more than half an hour, the animal was seized with violent retching, attended at first with expulsion of a little frothy mucus; after three or fourretchings, each ending in an agonising cry, and the expulsion of about four ounces of urine, she fell over on the side and the breathing ceased for long intervals, during which the contracted shoulders quivered with spasm and the paws were strongly flexed.

During the next three minutes there were three faint inspirations, and then the pupils dilated and the body became completely lax. The temperature of the rectum six inches within the body was at this time 92° Fahr.

Spasm of the gullet occurred simultaneously with spasm of the larynx in this case, as, no doubt, happened in the others, but was noticeable in this on account of the gulping noise; the inspiratory difficulty was soon declared by the orthopnœa and elevation of the nostrils. The third nerve evidently conveyed spasm between the second and third hours; and the contracted pupils from that time to the moment of death may have been taken as an index of the continuous state of cramp which affected the expiratory muscles. Consciousness was

completely retained throughout; the limbs seemed partially paralysed in the state of quietude, but during the spasm she was able to make strong efforts. The effect of inspiration on the pulse was also very marked in this case. The evacuations were doubtless due to spasmodic contraction of the circular fibres of the intestines (see Obs. 5, p. 10).

Obs. 8.—In the following case, that of a half-grown cat weighing three pounds, death occurred in three quarters of an hour after the subcutaneous injection of the $\frac{1}{500}$ of a grain of aconitia.

The symptoms came on after ten minutes with a stilted walk and evacuation of the bowels.

After *fifteen minutes* she was lying sprawling on the side or belly, the respirations 34, shallow, semi-stridulous, and accompanied by a low whine or moan. Between the twenty-fifth and thirtieth minutes she had a fit of struggling, turning over and over, scrambling about in an angry-looking way, lashing the tail, growling in a subdued tone, and occasionally pushing the paws over the sides of the mouth.

After *half an hour* she ejected a little piece of frothy mucus from the mouth. Respiration 18, forced. All the distress seemed to be caused by inability to inspire freely, the shoulders being tucked in, and the mouth opened at each inspiration. The mouth was occasionally opened wide, and a strong effort made to expire or to vomit as she turned from side to side in great distress.

After *forty minutes* another momentary struggle left the respirations varying during the next five minutes from 26 to 36; the inspirations short, snatchy, and ineffectual, each being accompanied by a depression of the lower jaw. The heart's action regular but weak, 140; the surface cold.

At the forty-fifth minute the respirations were suddenly interrupted by an interval of half a minute, two short inspirations followed, then an interval of forty seconds, ending in a faint inspiratory effort, the immediate and complete dilatation of the pupils from a state of complete contraction which had existed for the previous fifteen minutes, and flaccidity of the body. Consciousness was preserved to within a few minutes of death.

The chest was opened without injury to the veins two minutes afterwards; the right auricle and roots of the great veins pulsated regularly but feebly 72 times in the minute, and continued to do so for ten minutes. The right heart and vessels attached were greatly distended by dark blood. The left heart was contracted and contained a few drops of dark venous blood. The lungs were completely collapsed and of a dusky vermilion tint. The bladder was full, the intestines contracted, the stomach empty but flaccid, and the cardiac end of the œsophagus also flaccid.

Here the increased dose of poison produced a rapid succession of suffocative paroxysms caused by spasmodic closure of the glottis.

Obs. 9.—A female cat, two years old, was the subject of this experiment. One eighth of a grain of aconitia dissolved in ℥xv of spirit of wine, injected under the skin of the neck, caused death in twenty minutes.

After fifteen minutes she had vomited a little, and was now on her side curled forwards, the fore legs strongly incurved, the mouth widely opened and covered with mucus, gasping for breath and struggling frantically. After the spasm was over she walked a few yards with a tottering gait, and then fell over in another suffocative spasm; then there was a short intermission, during which I was able to notice the breathing. At one time I counted six laboured inspirations in a minute, becoming progressively slower until the last long interval was closed by another paroxysm and the final cessation of the breathing twenty minutes after the injection of the poison. In this last spasm urine was expelled. The pulsation of the heart was palpable for some seconds after the respiratory death. The pupils were fully dilated and the eyelids widely opened during the five minutes the spasms prevailed.

The chest was contracted, and the diaphragm firmly pulled up high into the chest cavity. The chest was opened three minutes after death. The lungs were collapsed behind the heart, of a dull rose colour, and retained but a trace of crepitation. The blood was collected on the right side of the heart and great vessels in connection with it and the roots of the lungs. The heart was quite still. The pulmonary veins con-

tained some dusky crimson blood, the left auricle was flaccid, the ventricle contracted. On cutting through the great veins, the right ventricle contracted completely, the auricle partially and remained flaccid. The blood was dark; it speedily coagulated, forming a firm clot. The œsophagus, stomach, intestines, and bladder were empty and contracted, but not firmly as in Obs. 4 and 5, pp. 8 and 10.

In this case the action of the drug was almost continuous during the five minutes which elapsed between the commencement of the symptoms and death. Exhaustion of the inspiratory muscles ensued before the whole of the blood had become completely venous. The object of removing the blood from the distended heart by cutting through the veins was to ascertain whether the ventricle had retained the power of active contraction. This complete depletion, of course, prevented the renewal of pulsation in either cavity.

ON MAN.—The subject of the following observations was a large but lethargic man, Charles W—, æt. 54, lamed by chronic sciatica. The pupils were a little unequal; at a given light the right was $\frac{1}{8}$, the left $\frac{1}{7}$. The pulse was 66, regular, of good volume and power; the respirations 16 to 17.

In order to test the value of the following observations, I watched the effect of complete rest of mind and body on the respiration and pulse during two and a half hours as he sat still without once rising from his seat.

After *an hour and a quarter* the pulse was 61, of initial volume and power, the respirations 16; there was slight somnolency.

After two and a half hours the pulse was 58, not changed appreciably in volume and power, and the respirations were 15; the pupils were unchanged.

Obs. 10.—The $\frac{1}{100}$ of a grain of aconitia, taken by the mouth at intervals of three days, always caused slight tingling in the mouth and face, coming on within an hour and lasting for two or three hours. On another occasion—

After the $\frac{1}{75}$ of a grain a faint glowing feeling in addition was perceptible throughout the body, and there was a little somnolency. On another occasion—

The $\frac{1}{150}$ of a grain converted the glowing feeling into a

numbing-glow—a comfortable feeling as if he were going off to sleep, and, if he did not move about, actual somnolency. These effects attained their maximum two hours after the dose; he felt warmer while they continued, and there was at the time and afterwards some difficulty in voiding urine.

Obs. 11.—The pulse being 66, and the respirations 17, he took the $\frac{1}{150}$ of a grain of aconitia, and did not rise from his chair for three hours.

After *forty minutes* the pulse was 60, unchanged; the respirations 17; somnolency was coming on.

After *an hour and a quarter* pulse 58, unchanged; respirations 16; pupils unchanged. He had slept for twenty minutes; a general glow pervaded the body.

After three hours pulse 56, unchanged, unaffected by deep inspirations; respirations 16, regular. The glow and somnolency continued, and he had dozed several times; the tongue and pupils were unchanged, and he felt comfortable throughout.

Obs. 12.—On another occasion, after sitting still for an hour and a half, at the end of which time the pulse was 60, the respirations 17 to 16, I gave him the $\frac{1}{100}$ of a grain of aconitia.

After *an hour and a quarter* the pulse was 54, unchanged in volume or power; the tongue and pupils unchanged.

After *three hours* pulse 52, of initial volume and power; the respirations 16, natural; the pupils very slightly dilated (?). He felt warm and dozed much after the medicine.

Obs. 13.—He took the $\frac{1}{50}$ of a grain repeatedly at intervals of three days at 9 a.m. The effects were uniform. The medicine “upset him very much all day; he felt languid and sleepy; he could not hold the head up or keep his eyes open.” He was giddy and could not walk across the room without help; the vision was hazy; the erect posture induced nausea. He could not eat much on the medicine days on account of a difficulty of swallowing and a pain in the back of the neck and behind the jaws in the parotid region, so that in eating he had to press the back of the neck with his hand. A glowing,

tingling feeling pervaded the body, and there was a burning feeling in the gullet, "as if a hot coal were there."

The tingling in the mouth and face came on within half an hour, the somnolency after one and a half or two hours. At first he slept for an hour, but afterwards the sleep was dreamy and broken. The giddiness, dimness of vision, and the muscular weakness were most marked between the sixth and tenth hours. There was always some dysuria, and occasionally retention with hypogastric pain.

Nausea was generally a prominent symptom, and the pain in the neck often remained until the next day.

I kept him under observation for three hours after one dose, but could detect no appreciable effect on either the pulse, pupils, or breathing. At the end of this time the pulse was 60, regular, of good volume and power, a trifle more compressible, perhaps, than before the dose; but this will always be found the case after a long rest of mind and body and with a tendency to sleep. The respirations 17, regular and easy; the tongue and pupils unchanged.

These observations were repeated on two other adult males with uniform results. Doses ranging from the $\frac{1}{75}$ to $\frac{1}{50}$ of a grain of aconitia always produced decided aconitism—general numbness and tingling, but most marked in the face and throat; nausea giddiness, somnolency, and muscular weakness. This latter is always a prominent effect, and it strongly resembles the condition induced by hemlock.

Obs. 14.—Frederick G—, æt. 12, a well-developed boy, afflicted with epilepsy, the $\frac{1}{100}$ of a grain of aconitia given repeatedly at intervals of three days produced the following effects:

After *three quarters of an hour* a tingling pricking sensation running up the legs to the spine and head, and tingling of the fingers, much giddiness and somnolency, but the sleep was disturbed by frequent awakings.

After *two hours* he was unable to walk or even stand without great exertion, and on rising from the recumbent posture he was unable to see for a minute, and there was nausea. The effects lasted for seven or eight hours, after which he slept comfortably, and felt quite well the next day. I was unable

to discover any influence on the breathing, pulse, pupils, or tongue, nor was there any diminution of temperature.

This observation was repeated with uniform results on another young patient, Samuel H—, æt. 9.

THE SUBCUTANEOUS USE OF ACONITIA IN MAN.—The following is the solution which I have employed :

Aconitia, 1 grain ;

Acetic acid, 1 minim ;

Rectified spirit, 2 fluid drachms ;

Water sufficient to make the mixture measure 2000 grain measures.

Dissolve. $5\frac{1}{2}$ minims (= 5 grain measures) = $\frac{1}{400}$ of a grain of aconitia.

This solution will keep unchanged for years ; a drop of a solution prepared four years ago placed on my tongue to-day produced numbing and tingling of my palate for five hours afterwards. I have used this in doses varying from the $\frac{1}{1000}$ of a grain (= $\frac{1}{250}$ by the mouth) to the $\frac{1}{200}$ of a grain (= $\frac{1}{50}$ by the mouth).

The $\frac{1}{1000}$ of a grain rarely produced appreciable effects ; the $\frac{1}{200}$ caused effects equal in intensity to the $\frac{1}{50}$ of a grain when given by the mouth. Beyond this dose I have not thought it safe to go.¹ The injection always produced considerable local burning, pricking, and smarting, but never inflammatory action. I have employed it in cases of spasm of the voluntary muscles and in sciatica, but without benefit, and I have come to the conclusion that the alkaloid is unfit for subcutaneous use.

CONCLUSIONS.—Excepting those on the horse,² the foregoing observations, which have been made at long intervals during

¹ In the report of the committee on the hypodermic mode of injection, 'Med.-Chir. Trans.,' vol. 1, p. 584, it is stated that the $\frac{1}{100}$ of a grain was injected beneath the skin. In the "Appendix," p. 631, giving details of the experiments, nothing is said of this case, nor are any effects mentioned as resulting in the two other cases in which the $\frac{1}{320}$ and the $\frac{1}{210}$ of a grain respectively were used. Now, since the $\frac{1}{24}$ of a grain very nearly killed a horse (see Obs. 3), the $\frac{1}{100}$ of a grain would most surely cause very severe effects, if not death, when given by subcutaneous injection to man. I assume, therefore, that the aconitia used in this case was "the far less active sample" referred to, p. 567.

² I would here express my obligations to my friend Mr. Frederick Mavor, of Park Street, for placing these animals at my disposal and for aiding me in my experiments on them.

the last seven years, have never yet been associated in my memory, and I have now for the first time brought them together in the words in which they were recorded.

As mere observations of all the phenomena that presented themselves, they were noted without regard to any theory or preconceived idea of the action of the plant. Upon examination they will be found to present the most complete uniformity. To my mind the phenomena which are detailed are intelligible enough, and when brought under our view will serve to clear up the vagueness and uncertainty which have hitherto surrounded the subject.

In a brief review of each case I have indicated the cause and sequence of the phenomena therein presented, and I shall, therefore, content myself with the following summary :

1. Aconite affects a portion of the cranio-spinal axis in the same manner that strychnia affects the whole. It produces an excitation which results in intermittent spasm.

2. The focus of the action of aconite is the medulla about the roots of the pneumogastric, hypoglossal, and spinal accessory nerves. Thence its influence radiates along the cranio-spinal axis with rapidly diminishing intensity, as far forwards as the centres of the third nerve, and as far downwards as the origin of the phrenic. The centres about the focus of action are more or less in a state of constant excitation, while those towards the limits are sometimes in a state of depression and sometimes in one of excitation; thus, for example, during a spasm the pupils may be completely contracted, but in the intervals, and always after moderate doses, they may be slightly dilated, or, at least, the muscular apparatus engaged in accommodation is so far enfeebled that dimness of sight and giddiness result as after conium. And so also with the diaphragm; it is enfeebled by small doses, and is alternately affected by spasm and exhaustion after large ones. Occasionally, however, and during the more violent suffocative spasms, the muscles of the whole of the anterior part of the body, including the anterior extremities, are involved in the attack (see Obs. 3, p. 4, and Obs. 7, p. 15).

3. Beyond the limits above indicated aconite exercises a depressing influence on the cranio-spinal axis, almost amounting to paralysis.

4. The action of the alkaloid on the sensory function appears to be coextensive and coequal with that on the motor function, the area for intense action having the same limits, beyond which the anæsthesiant action rapidly diminishes in intensity. Thus, while the head and neck are deprived of sensation, the rest of the surface is only partially affected, and the sensibility of the lower parts of the body only slightly or not at all disordered.

5. Apart from the derangement of accommodation, from spasm or enfeeblement of the muscular apparatus of the eye and the ear, the senses of sight and hearing were unaffected; the latter, indeed, was *apparently* wholly unaffected. There was no evidence of any impairment of smell. Taste was, without doubt, greatly disturbed, both on account of its relation to common sensation, and of the deep implication of the fifth nerve.

6. Beyond the slight depression of function resulting in somnolency (after medicinal doses and in the intervals of the paroxysms which follow poisonous ones) aconite has no direct influence on the brain, and the effects produced by asphyxia have usually only a brief duration at the end of a paroxysm or immediately preceding the death of the animal. The intense distress of impending suffocation produces, however, a total disregard for everything else but the desire for relief, and thus the animal rages frantically about as if actually delirious.

7. The sympathetic nerve is unaffected. At the moment of death the pupils dilate vigorously; and after death the heart may continue to pulsate,¹ or, if the right heart be arrested by distension, its action may be revived by depletion. The contracted left heart is still, only because it is empty.

From the evidence adduced, it is I think, conclusively proven that the heart is only secondarily affected, and as a consequence of the respiratory difficulty. If I could scandalise common sense by belief in the idea that the heart was under an inhibitory influence conveyed to it by the cardiac branches of the pneumogastric, I might argue that the foregoing observations go very far to disprove the existence of such a function, unless I could persuade myself that the cardiac branches of the

¹ This I find is strictly in accordance with Dr. Fleming's observations: 'Inquiry into the Physiological and Medical Properties of Aconite,' p. 91, et seq.

vagi were paralysed and incapable of conveying an inhibitory influence at the time when the other branches of the nerve were conveying violent excitations—a supposition as preposterous as that of nervous inhibition itself. The cardiac branches of the pneumogastric are the means simply of connecting the heart with the cerebro-spinal system, and regarded as such, the only question is to what extent they embarrass the heart by any cramping influence which they may convey during the action of aconite. It is not evident that they convey any such influence, but if they did it could at most be but slight. The cardiac action, as we have seen, is greatly interfered with during the action of the alkaloid, and an attentive study of the foregoing Observations, especially 3, p. 5, and 6, p. 14, will clearly show that the whole of this interference is the result of the impeded respiration, of the suffocative spasms, and of the brief relief which the localised spinal exhaustion brings to the heart. The following observation will render the cardiac phenomena in the preceding cases still more clear.

Obs. 14.—Alfred L—, æt. 21, had formerly smoked to excess, but was in good health, his ailments being due to nervousness and a naturally (?) feeble cardiac action. After a walk of three miles and a short rest the pulse was 76, of good volume and fair power; the respirations 18. He now took the $\frac{1}{150}$ of a grain of aconitia and remained dozing in a chair by my side without once rising until the following observations were completed. The more general effects of the alkaloid were slight.

An hour after the dose the pulse was 58, regular, and slightly increased in volume and strength; respirations 16. He had dozed several times.

After two hours the pulse was 48, otherwise unchanged; the respirations 15.

Near the end of the *third hour* the pulse had fallen to 44, and was of initial volume and power; the respirations 14, with diminished movement. He had dozed several times. On causing him now to take eighteen deep forcible inspirations in the minute for several minutes, the pulse was gradually and uniformly accelerated and numbered during the first minute 56, during the fourth 62, and during the seventh 65. The breath-

ing was now allowed to resume its spontaneous tranquillity, and during the ninth minute the pulse numbered only 45, but as the heart had not quite adapted itself to the change, one or two beats were weaker than the rest. This little irregularity of power, however, disappeared in the course of the next minute, when the pulse resumed an uniform rate of 45, equal pulsations, and preserved it. On now causing him to expire forcibly and hold the breath for fifteen seconds the pulse rose to 59, and fell next minute with normal breathing to 48, and then to 45, which it maintained with perfect regularity. After an interval the last observation was repeated, and then it was ascertained that the acceleration took place during the latter half of the time, and that the ratio rapidly increased until the urgent call for air was obeyed. The acceleration amounted to 8 beats during the one eighth of a minute, equal to 64 for the whole minute. But if air had been prevented entrance to the chest for so long a time as a minute it is probable that the acceleration having reached its maximum very rapidly would then on account of excessive pressure on the right heart have declined, to be advanced again the moment the cardiac distension was relieved by an efficient inspiration or two.

Thus it is that a depression of the respiratory function causes at first a depression or sleepy condition (for sleep may in certain conditions be observed to have the same influence on the respiration and pulse as that I have just described) of the cardiac action. Then, and much more so when the respiratory difficulty is increased, the act of inspiration is followed by acceleration, and it is thus that both temporary suspension of the inspiratory action and its restoration combine to produce the acceleration of pulse in aconitia poisoning which accompanies the suffocative paroxysm, but which only attains its maximum directly after this is over.

It is further to be observed that the pulse rapidly fails towards the end of the paroxysm, and if the animal fall flaccid after this is over it would appear that death had resulted from syncope. Such, however, is not the case, as the facts above given and a little reflection will prove. After death the left heart is found empty and the lungs collapsed. If collapse had occurred only at the moment of death—death from syncope—the left cavities would have been full, for the blood would

naturally pass in this direction, and not, of course, towards the engorged right heart. Nor, on the other hand, can death be due to spasm of the heart—of the left heart—for let us consider what would occur in such a case. The left ventricle and cavity are spasmodically closed, the right heart we know is engorged, the lungs are anæmic, and suffocation impends; the last act of life under such circumstances would be to suck the right heart empty and allow its cavity to contract, spasmodically on this theory also; and we should find the lungs expanded and the great veins collapsed. But it has been shown that these conditions do not exist.

Why then does the pulse intermit and fail under the finger during the suffocative paroxysm? Obviously *not from want of power* in the left ventricle, *but from want of blood*; it is really emptied during the paroxysm.

8. Death results from asphyxia and progressive collapse of the lung, the former being due to the spasmodic closure of the respiratory passages and paralysis of the muscles of inspiration, and the latter to paralysis of the muscles of inspiration and notably of the diaphragm, which is tucked up higher and higher by the intermittent efforts of the upper intercostals, the *scaleni*, and *sterno-mastoid* muscles.

If, however, the heart be weakened by disease it may be unable to sustain the strain imposed by obstructed inspiration, and death would then result from syncope, and thus the terrible battle would be sooner ended.

An examination of the published cases¹ of poisoning by aconite will, I believe, show that the action of the poison is uniform and strictly in accordance with the foregoing facts and explanations.

I now come to the second part of my task—the influence of aconite on the febrile state. I give the following cases in the

¹ The following references may be consulted:—‘*Phil. Trans.*,’ vol. xxxvii, p. 287; a case by Mr. Sherwin, ‘*Lancet*,’ 1837, March 25th; Pereira, vol. ii, pt. ii, p. 687; and a particularly instructive case by Drs. W. H. Thompson and W. Cayley, ‘*Brit. Med. Journ.*,’ November, 1872, p. 579.

order in which they occur in my note-books, only placing the different fevers in separate categories and associating similar doses. I might have extended this part of my paper, but I find that the remaining cases differ in no essential particular from those adduced. The following is the formula of the mixture used :

Aconitia, 1 grain ;

Rectified spirit, 6 fluid ounces ;

Camphor water, to measure 5 pints (100 fluid ounces) ; mix.

F. $\frac{3}{ss} = \frac{1}{200}$ of a grain of aconitia.

The aconitia was always given in a single dose, and once only, excepting in a few cases, in the twenty-four hours. In a few other cases a dose was given on alternate days only. It is evident from the foregoing Observations that the doses given were efficient ones, and that their effects extended usually over from eight to twelve hours. Indeed, I soon found that nausea and vomiting, often followed by diarrhœa and partial collapse, occurred when the dose was given twice in the twenty-four hours.

Obs. 15.—Harriett S—, æt. 13, admitted on the 3rd day of a moderate attack of scarlatina. She took the $\frac{1}{800}$ of a grain of aconitia once daily from the 3rd to the 9th day inclusively.

3rd day, before the aconitia.—	Pulse 120.	Rash vivid.
4th „ after „ „ „	120.	Rash bright, pimply, serous on the arms, from profuse sweating.
6th „ „ „ „ „	104.	Conjunctiva injected. Rash fading.
7th „ „ „ „ „	96.	To have fish.
9th „ „ „ „ „	60.	Active desquamation.

She took a full diet on the 10th day, and left the hospital well on the 25th day.

Obs. 16.—Sarah B—, æt. 6, admitted on the 6th day of a moderate attack of scarlatina. Took the $\frac{1}{800}$ of a grain of aconitia once daily from the 7th to the 19th day inclusively.

7th day.—	Pulse 108.	Rash well developed ; glands of the neck swollen and knotty.
9th „ „	96.	Rash was vivid ; retching this morning ; rhinorrhœa ; cervical glands hard.

12th day.—Pulse 100. Tongue moist and clean.
 16th „ „ 88. Skin cool; glandular swelling decreasing.
 19th „ „ 84. Skin cool; general desquamation; glandular swelling subsiding; hunger.

She took full diet the next day. Left bed on the 30th day and the hospital on the 44th, after a renewal of the glandular swelling.

Obs. 17.—Jane B—, æt. 7, the sister of the above, admitted on the 5th day of a moderate attack of scarlatina. She took $\frac{1}{800}$ of a grain of aconitia twice a day from the 5th to the 14th day inclusively. The pulse on admission was 124, and it gradually subsided, being 100 on the 7th day, 84 on the 10th, and with the temperature normal on the 14th. She left bed on the 28th day and the hospital on the 40th day.

Obs. 18.—Alfred T—, æt. 11, admitted on the 2nd day of an attack of scarlatina. He took $\frac{1}{400}$ of a grain of aconitia every other morning from the 3rd to the 9th day inclusively.

2nd day,	no aconitia.	—Pulse 128.	Rash vivid.
3rd „	after „	„ 132.	
4th „	no „	„ 128.	Rash still very vivid.
6th „	„ „	„ 116.	Saline aperient.
8th „	„ „	„ 108.	General desquamation.

Convalescence proceeded without interruption. He took full diet on the 14th day, left bed on the 20th, and the hospital on the 35th day.

In this case the aconitia did not repress the rising fever.

Obs. 19.—Samuel D—, æt. 10, admitted on the 2nd day of an attack of scarlatina. He took the $\frac{1}{400}$ of a grain of aconitia every alternate morning from the 2nd to the 9th day inclusively.

2nd day,	before the aconitia.	—Pulse 128; weak.
3rd „	after „	„ 132.
4th „	no „	„ 124.
5th „	after „	„ 120; good volume and power.
6th „	no „	„ 96.

Convalescence began the following day, and continued with

slight interruption from glandular swelling in the neck. He left bed on the 29th day and the hospital on the 35th.

Obs. 20.—Charlotte C—, æt. 9, admitted on the 5th day of moderate attack of scarlatina. She took the $\frac{1}{400}$ of a grain of aconitia from the 5th to the 10th day inclusively.

5th day, before aconitia.	—Pulse 100.	Temperature 103°.
6th „ after „ „	100.	102.7°.
7th „ „ „ „	60.	99°. Desquamation.

On the 9th day she took fish; and on the 11th the aconitia was omitted and she took full diet, and went out well after an attack of variola.

Obs. 21.—Amelia H—, æt. 14, admitted on the 2nd day of moderate attack of scarlatina. Took $\frac{1}{400}$ of a grain of aconitia once daily from the 2nd to the 11th day inclusively.

2nd day, before the aconitia.	—Pulse 120.
4th „ „ „	116, of good power; profuse perspiration. Rash vivid.
5th „ „ „	108. Surface of chest and abdomen and neck rough with sudamina, which, being filled with milky serum, resembled miliary pustules.
8th „ „ „	64. General and active desquamation; tongue moist and clean; hunger.
11th „ „ „	64. Feeling well.

She took full diet on the 12th day. Subsequently (a week later) she had a relapse with aural discharge and swelling of the tonsils, but she left the hospital well on the 32nd day.

Obs. 22.—Charles K—, æt. 9, admitted on the 3rd day of an attack of scarlatina. He took $\frac{1}{400}$ of a grain of aconitia twice daily from the 4th to the 13th day inclusively.

4th day, before the aconitia.	—Pulse 116.	Pupils $\frac{1}{4}$.
5th „ after „ „	100.	Pupils $\frac{1}{8}$.
8th „ „ „	100.	Rash nearly faded; began to convalesce.
10th „ „ „	68.	Pupils $\frac{1}{8}$; skin cool; tongue moist and clean. Fish.
12th „ „ „	88.	Pupils $\frac{1}{8}$; appetite good; desquamation.

Next day he ate full diet. On the 20th day the pulse was 64, and the skin was desquamating actively.

Obs. 23.—William L—, æt. 13, admitted on the 2nd day of a slight attack of scarlatina. He took the $\frac{1}{400}$ of a grain of aconitia every alternate morning from the 3rd to the 9th day inclusively.

2nd day, before the aconitia.—	Pulse 84.	Rash developed.
3rd „ after „	„ 112.	
4th „ no aconitia	„ 92.	
6th „ „	„ 80.	Skin cool; rash faded.
8th „ „	„ 72.	Desquamation beginning.
9th „ before and after „	„ 65.	

He took full diet the following day, and rapidly convalesced.

Obs. 24.—George B—, æt. 13, admitted on the 2nd day of a severe attack of scarlatina. He took the $\frac{1}{300}$ of a grain of aconitia every other morning from the 3rd to the 16th day inclusively.

2nd day, before the aconitia.—	Pulse 128.	Rash vivid; had vomited; cervical glands swollen.
4th „ aconitia the previous day.—	128.	Tongue dry; bowels freely open; rash vivid.
5th „ „ to-day	104.	Much improved.
6th „ no „ „	92.	Tongue dry in the centre.
8th „ „ „ „	96.	

He continued to improve; the glandular swellings subsided. On the 15th day the pulse was 84, and there was abundant desquamation. He left the hospital well on the 25th day.

Obs. 25.—Eliza M. K—, æt. 24, admitted on the 4th day of a slight attack of scarlatina. Took the $\frac{1}{200}$ of a grain of aconitia once every alternate day from the 4th to the 10th inclusively.

4th day, before the aconitia.—	Pulse 110.	Rash developed.
6th „ after „	„ 60.	Skin cool; rash still present; hunger.

The pulse continued 60. On the 8th day she felt quite well, and the rash was nearly faded. On the 14th day there was a

slight relapse, with swelling of the right tonsil. She left bed on the 22nd day and the hospital on the 31st.

Obs. 26.—Arthur M—, æt. 15, admitted on the 3rd day of an attack of scarlatina. Took $\frac{1}{200}$ of a grain of aconitia once daily from the 3rd to the 10th day inclusively.

3rd day, no aconitia.—Pulse 124.	Rash vivid; throat moderately affected.
4th „ aconitia „ 108.	Temperature high; rash very vivid.
6th „ „ „ 84.	Rash fading; throat not sore.
10th „ „ „ 60.	Active desquamation; hunger.

Left bed on the 20th day and was discharged well on the 21st day.

Obs. 27.—Elizabeth B—, æt. 15, admitted on the 4th day of a moderate attack of scarlatina. Took $\frac{1}{200}$ of a grain of aconitia once from the 5th to the 10th day inclusively.

4th day, before taking aconitia the pulse was 116.	} Temperature 102°; rash vivid.
5th „ after „ „ „ 110.	
10th „ „ „ „ „ 60.	Temperature normal; desquamating actively.

Left bed on the 21st day and the hospital on the 27th.

Obs. 28.—Elizabeth J. M—, æt. 24, admitted on the 3rd day of a rather severe attack of scarlatina, which commenced with sickness. Took $\frac{1}{200}$ of a grain of aconitia once daily from the 3rd to the 5th day inclusive.

3rd day, before the aconitia.—Pulse 124.	
4th „ after „ „ 124.	Was perspiring; vomited both before and after the aconitia.
5th „ „ „ „ 116.	Vomiting continued, four times to-day, watery fluid and mucus; the pulse became small, and there was prostration.
6th „ no aconitia „ 116.	Stronger and better; no more vomiting.

A week afterwards she was convalescent and taking full diet.

Obs. 29.—James B—, æt. 17, admitted on the 3rd day of mild attack of scarlatina. Took $\frac{1}{100}$ of a grain of aconitia

every alternate morning from the 3rd to the 19th day inclusively.

3rd day,	before the aconitia.—	Pulse 100.	Rash fading.
5th „	after „	„	88, of good volume and power.
19th „	no „	„	60. Temperature normal; rash gone, active desquamation, and felt quite well.

On the 21st he took full diet, and left the hospital well on the 36th day. A dose of castor oil was required on the 4th day, after that the bowels acted regularly.

On looking over these cases I fail to see that the aconitia has exercised any appreciable influence on the course of the fever. When the drug was given before the fever reached its height, as in Obs. 18, 23, and 24, the pulse rose, and subsequently declined from day to day in the usual manner; and on comparing these cases with others of similar severity, and treated by other drugs, there is no marked difference observable. The cases were, for the most part, of moderate severity. All did well, and escaped any serious complications. Variola was prevalent in the wards when some of these cases were inmates, and two or three contracted variola in a mild form. It is to be observed that there was profuse perspiration in two (Obs. 15 and 21) on the 4th day.

All the remaining observations, except the last, are upon cases of typhus—a disease in which, owing to the great prostration and the tendency to pulmonary congestion, the action of aconitia might be expected to be prominently displayed.

Obs. 30.—Florence F—, æt. 11, admitted on the 7th day of an attack of typhus. Took $\frac{1}{400}$ of a grain of aconitia once daily from the 8th to the 10th day inclusively, and the $\frac{1}{360}$ of a grain every alternate day from the 12th to the 18th, having a dose on each of these days.

7th day,	no aconitia.—	Pulse 128.	Rash copious, measly; slight injection of the conjunctiva.
9th „	after „	„	124, of good power. Rash bright.
10th „	„ „	„	128, weaker.
12th „	„ „	„	116, good.

13th day, no aconitia.—Pulse 104, good. Rash fading; some diarrhœa in the afternoon; no sickness.

14th	„	after	„	88,	of good power. Bowels still a little loose.
15th	„	no	„	84.	Skin cool; bowels quiet.
16th	„	after	„	88.	Skin warmer; tongue moist.
18th	„	„	„	60.	Cool; takes fish.
19th	„	no	„	96.	

She took full diet on the 21st day. Left bed on the 25th and the hospital on the 34th.

Obs. 31.—Catherine C—, æt. 12, admitted on the 4th day of a severe attack of typhus. She took the $\frac{1}{400}$ of a grain of aconitia once every other day from the 5th to the 15th day inclusively.

4th	day,	before	the	aconitia.	—Pulse 128. Rash copious.
5th	„	no	aconitia	„	124, weak.
8th	„	„	„	„	124, of fair power.
10th	„	„	„	„	116. Vomited this morning; bowels not relaxed.
11th	„	after	aconitia	„	116. No vomiting since yesterday morning.
13th	„	„	„	„	60, good. Skin cool; no sickness nor diarrhœa.
15th	„	„	„	„	60, good. To have fish.

She left bed on the 19th day and the hospital on the 25th.

Obs. 32.—Annie H—, æt. 11, admitted on the 4th day of a mild attack of typhus, and took $\frac{1}{400}$ of a grain of aconitia every other day from the 4th to the 13th day inclusively.

4th	day,	before	the	aconitia.	—Pulse 116.
„	„	after	„	„	108.
6th	„	„	„	„	120. Tongue dry.
11th	„	no	„	„	104. Rash still present.

On the 13th day she was feeling well, and took fish; two days later full diet, and left her bed on the 20th day.

Obs. 33.—Deborah Q—, æt. 11, admitted on the 4th day of slight attack of typhus. She took the $\frac{1}{400}$ of a grain of aconitia once every alternate day, from the 6th to the 10th inclusively.

4th day, no aconitia.—Pulse 100, good.
 5th „ „ „ „ „ „
 6th „ after „ „ 116.
 7th „ no „ „ 108.
 8th „ after „ „ 92. The rash nearly faded.
 10th „ „ „ „ 88. Temperature normal. Tongue moist.

She took fish next day. On the 12th day she became deeply flushed. Pulse 100; temp. 102°, and the physical signs of congestion of the base of the right lung. The affection became more general. She recovered under the usual treatment, and left her bed on the 21st day, and the hospital on the 24th.

Obs. 34.—Frederick R—, æt. 16 (brother of William R—, see *Obs. 38*), admitted on the 6th day of a mild attack of typhus. Took $\frac{1}{200}$ of a grain of aconitia once daily from the 8th to the 17th day inclusively.

6th day, no aconitia.—Pulse 116, good.
 7th „ „ „ „ „ „
 8th „ after „ „ 84. Rash still present.
 11th to 15th day, after aconitia.—Pulse 72. Temperature 103°. Sordes; injection of conjunctiva.
 16th and 17th „ „ „ 65. Temperature normal.

The pulse was of good volume and power throughout. He ate fish on the 16th day, full diet on the 18th, left bed on the 23rd, and the hospital on the 31st. The pupils measured $\frac{1}{3}$ '' from the 11th day onwards.

Obs. 35.—George R—, æt. 12, brother of the preceding patient, admitted on the 6th day of an attack of typhus. He took $\frac{1}{200}$ of a grain of aconitia once daily, from the 7th to the 18th day inclusively.

6th day, before the aconitia.—Pulse 120. Some stupor; rash present; tongue moist.
 7th „ after „ „ 110.
 8th „ „ „ „ 88.
 11th „ „ „ „ 68. Rash gone. Temperature undiminished. Tongue parched.
 12th „ „ „ „ 52.
 15th „ „ „ „ 68. Temperature undiminished. Tongue moist.
 17th and 18th day after aconitia „ 88. Took fish,

From this time the temperature declined, and convalescence was rapid. The pupils ranged from $\frac{1}{4}$ to $\frac{1}{3}$ ", from the 11th to the 18th day.

Obs. 36.—John E—, æt. 28, admitted on the 8th day of a severe attack of typhus. He took the $\frac{1}{200}$ of a grain of aconitia twice daily, from the 8th to the 16th day inclusively.

8th day before the aconitia.—Pulse 124. Rash present; mind obscure; tongue moist.			
9th	„	after	„ 120. Weak. Ordered 3vj whiskey.
10th	„	„	„ 84. Delirium.
11th	„	„	„ 60, weak. Rash present; tongue dry; deglutition impaired; prostration. Temperature 103°.
12th	„	„	„ 84, small. Profuse sweating; stupor.
13th	„	„	„ 60, good. Skin moist; expression improved.
14th	„	„	„ 60, of fair power.
15th	„	„	„ 84, small and compressible. Body cool, mind clear, hands tremulous, and an exhausted look.

Two days after the omission of the aconitia, the pulse was 88, of fair volume and power; he took fish. A large bed sore formed over the buttock; but he gradually improved, and left the hospital well on the 75th day.

The pupils were contracted on the 9th day, but subsequently moderately dilated.

Obs. 37.—Ernest R—, æt. 14, admitted on the 7th day of a moderate attack of typhus. He took the $\frac{1}{200}$ of a grain of aconitia once daily from the 8th to the 21st day inclusively.

7th day, before the aconitia.—Pulse 124. Tongue dry; sordes; mind dull.			
8th and 9th days, after the aconitia.—Pulse 100—68. Tongue dry and brown; rash still present.			
11th day, after the aconitia.—Pulse 100.			
12th	„	„	„ 72, regular, of good volume. Aspect natural; hunger.
14th	„	„	„ 60, of moderate volume and power. Temperature normal.
16th	„	„	„ 60, of good volume, after deep, forced inspiration for half a minute, 80. Tongue moistening.
18th	„	„	„ 60. Tongue still parched in centre.
21st	„	„	„ 88, of good volume and power. Temperature 101°. Ate fish.

In the afternoon of the same day the tongue was moist and the temperature normal. He left bed a few days afterwards, and went out of the hospital on the 31st day. The pupils varied from $\frac{1}{8}$ to $\frac{1}{6}$ during the attack, on the 21st day they were $\frac{1}{4}$.

Obs. 38.—William R—, æt. 19, admitted on the 7th day of a moderate attack of typhus. He took the $\frac{1}{200}$ of a grain of aconitia twice daily, from the 8th to the 19th day inclusively.

7th and 8th days, before the aconitia.—Pulse 104.

9th day, after the aconitia.—Pulse 100. Tongue dry; rash fading.

10th	„	„	„	100,	of good volume, easily compressed.
					Temperature 101°. Pupils $\frac{1}{4}$ ''.
12th	„	„	„	92.	Pupils in sunlight, as he slept, $\frac{1}{7}$ ''.
14th	„	„	„	64.	Temperature 100°. Tongue dry and glazed. Pupils $\frac{1}{4}$ ''.
16th	„	„	„	64.	Sordes; apathy. Wine, six ounces.
19th	„	„	„	88.	Was more lively; tongue clean and moist. Hunger.

He took full diet on the 22nd day, when he left bed, and went out of the hospital on the 30th day.

Obs. 39.—Christopher McC—, æt. 15, admitted on the 5th day of an attack of typhus. He took $\frac{1}{60}$ of a grain of aconitia once daily, from the 5th to the 14th day inclusively.

5th day, before the aconitia.—Pulse weak, 120. Tongue dry; conjunctiva injected. Six ounces of wine.

6th	„	after	„	„	68. Vomiting during the preceding night; skin moist.
7th	„	„	„	„	80, of good volume and power. Pupils $\frac{1}{4}$ ''.
					Mind clear.
10th	„	„	„	„	116. Pupils $\frac{1}{4}$ ''.
11th	„	„	„	„	110. Hunger.
14th	„	„	„	„	68. Tongue moist. To have fish.

He took full diet on the 18th day, left bed on the 20th, and the hospital on the 26th day.

Obs. 40.—James S—, æt. 17, admitted on the 4th day of an attack of typhus. He took the $\frac{1}{200}$ of a grain of aconitia once daily, from the 5th to the 14th day inclusively.

5th day, before the aconitia.—Pulse 120, weak. Tongue dry; the mind clear.

7th „ after „ „ 64. Skin warm; slight delirium.

8th „ „ „ „ 75. A little cough and nausea. Pupils $\frac{1}{3}$ ''.

10th „ „ „ „ 100, of fair volume and power. Temperature 100°. Pupils $\frac{1}{6}$ ''.

12th „ „ „ „ 88, good, Pupils $\frac{1}{3}$ ''.

Tongue dry and brown at the centre; thirst.

Three days afterwards he took full diet, left his bed on the 19th day, and the hospital on the 27th.

Obs. 41.—Rosina S—, æt. 22, admitted on the 7th day of an attack of typhus. Took $\frac{1}{200}$ of a grain of aconitia twice a day from the 7th to the 11th inclusive, and from the 14th to the 16th inclusive.

7th day, no aconitia.—Pulse 124.

8th „ aconitia „ 108. Headache—the head felt “so big.” General pains in the limbs.

10th „ „ „ 100.

11th „ „ „ 88. Rash still present; tongue dry and red; conjunctiva injected.

13th „ „ „ 72. Rash fading; tongue moist and clean.

19th „ „ „ 56. Respiration 28. Hunger. Full diet.

During the afternoon of the 14th day she had repeated and copious vomiting. It was attributed to the aconite, and this was omitted. Vomiting recurred in the evening of 16th, and was evidently due to the same cause. She left the hospital well on the 28th day.

Obs. 42.—Mary A. S—, æt. 38, admitted on the 4th day of a moderate attack of typhus. Took $\frac{1}{200}$ of a grain of aconitia twice a day, from the 5th to the 9th day inclusively.

4th day, no aconitia.—Pulse 96. Respiration 24. Temperature 103.2°.

7th „ aconitia „ 80, very small. Vomited a little green fluid.

9th „ „ „ 84.

10th „ „ „ 116. Temperature 103°. Mucous râles in the chest.

13th „ „ „ 100. Tongue dry; a dull, heavy look.

16th „ „ „ 68. Tongue cleaning; appetite returning.

A small parotid swelling appeared on the 19th day, but it

quickly subsided. She left bed on the 34th day, and the hospital on the 40th.

Obs. 43.—Mary A. C—, æt. 13, admitted on the 7th day of a moderate attack of typhus. Took $\frac{1}{200}$ of a grain of aconitia once daily, from the 8th to the 14th day inclusively. On the 7th day the pulse was 124, the rash copious, the tongue moist. The fever had subsided without any untoward symptoms by the 14th, when there was hunger. She left bed on the 22nd day, and the hospital on the 26th.

Obs. 44.—Amelia D—, very fat, æt. 28, admitted on the 7th day of a rather-severe attack of typhus. Took $\frac{1}{200}$ of a grain of aconitia once daily, from the 7th to the 11th day inclusively, and the $\frac{1}{400}$ of a grain from the 12th to the 13th inclusively.

7th day, before the aconitia.—Pulse 124, soft.			
8th	„	after	„ 120, soft.
9th	„	„	„ 108.
10th	„	„	„ 100, weak.

An hour after the aconitia was taken on the 10th day she was attacked with diarrhœa and vomiting, followed by pallor and collapse. She recovered under the influence of brandy, but continued very prostrate. On the 13th day there was subsultus and picking of the bedclothes, and much sordes. Pulse 100. She took 12 ounces of brandy daily, and gradually improved; and, on the 16th day, the pulse was 104, of good volume and fair power, the tongue moist and clean. She left bed on the 31st day, and the hospital on the 36th.

Obs. 45.—Catherine G—, æt. 14, admitted on the 4th day of a severe attack of typhus. She took $\frac{1}{200}$ of a grain of aconitia every other morning, from the 6th to the 18th day inclusively.

	Pulse.	Temp.	
4th day, no aconitia.	. 124	—	
5th „ „	. 124	103·8°.	
6th „ after aconitia	. 116, weak.	103·4.	Rash vivid; tongue moist.
7th „ no „	. 116	103·8.	
8th „ after „	. 120, good.	103·8.	Rash copious and bright; tongue dryish,
9th „ no „	, 124	104·4.	

10th day, after aconitia	Pulse. . 116	Temp. 103.	Rash bright; tongue dry and brown in centre.
11th " " "	. 112	103.6.	Less injection of con- junctiva.
12th " no "	. 128	103.	Tongue dry, brown, and cracked; diarrhœa in the evening; light coloured motions.
13th " after "	. 108	102.	Bowels still loose.
14th " no "	. 100	100.8.	
15th " after "	. 104	101.	Tongue moist.
16th to 18th day, after aconitia	100	101—100.	

She left her bed on the 25th day, and the hospital on the 30th.

In this case diarrhœa came on at the pyrexial crisis, and it does not appear to have been provoked, or prolonged by the aconitia. It was unaccompanied by sickness.

Obs. 46.—Clara R—, æt. 21, admitted on the 7th day of an attack of typhus. Took $\frac{1}{200}$ of a grain of aconitia in a single dose, from the 8th to the 19th day inclusive.

		Pulse.	Resp.	Temp.	
7th day, no aconite	.	120	28	102.8.	
8th " aconite .	.	120	30	104.2.	
9th " Morn., aconite		112	40	103.8.	General mucous râles.
Even. "		84	48	104.	Tongue dry and brown.
10th " Morn. "		112	40	103.8.	
Even. "		92	44	103.8.	
11th " Morn. "		112	36	103.2.	
Even. "		96	42	103.4.	
12th " Morn. "		92	40	101.4.	Pupils $\frac{1}{8}$; said she could not drink, and gulped a little; the throat was a little sore.
Even. "		104	42	103.6.	
13th " Morn. "	}	108	44	103.4.	
Even. "					
14th " "		108	44	103.4.	Pupils $\frac{1}{4}$; conjunctivæ injected; sordes.
15th " Morn. "	}	104	36	101.6.	
Even. "				100.4.	
16th " Morn. "	}	96	36	99.	
Even. "				99.2.	
17th " Morn. "	}	84	28	98.	
Even. "					
18th " Morn. "	}	76	28	97.6.	
Even. "					
19th " Morn. "		80	24	97.6.	
Even. "		68	24	98.	

She subsequently had small glandular abscesses in the axillæ, pneumonia of the lower lobe of the right lung, and after recovering from these, paralysis of the intestines, with enormous gaseous distension and fœcal retention. She ultimately left the hospital strong, and nearly well of the intestinal affection.

Obs. 47.—Mary A. G—, æt. 16, admitted on the sixth day of an attack of typhus. On the 7th day the rash was developed. $\frac{1}{200}$ grain of aconitia was given every morning from the 8th to the 18th day inclusively.

			Pulse.	Resp.	Temp.
7th day,	before aconite was given.		124	32	102.2°.
8th day,	1 hour after the aconite.		132	32	104.2.
9th	"	"	108	36	" Five loose stools.
10th	"	"	108	32	101.8.
11th	"	"	108	24	102.
12th	Morning	"	108	24	102.
	Evening	"	92	36	98.8.
13th	Morning	"	100	40	102.4.
14th	Morning	"	92	32	101.2.
	Evening	"	82	28	98.7.
15th	Morning	"	84	28	100.
	Evening	"	76	30	99.2.
16th	Morning	"	84	36	99.6.
	Evening	"	74	24	98.
17th	Morning	"	72	20	98.4.
	Evening	"	72	24	98.
18th	Morning	"	80	24	99.
	Evening	"	74	22	98.4.
19th	Morning	No aconite being taken	72	20	97.6.
	Evening		100	32	98.8.
20th	Morning	" "	100	32	98.4.
	Evening		68	24	98.4.

The case was one of moderate severity, there was no diarrhœa after the 9th day. There was a little sickness on the 12th day. The tongue was dry and cracked on the 16th day, otherwise she expressed herself as feeling well. On the 18th day she took fish, and left the hospital on the 32nd day.

Obs. 48.—Anna C—, æt. 30, admitted on the 8th day of an attack of typhus. She took $\frac{1}{200}$ of a grain of aconitia from the 9th to the 20th day inclusively.

			Pulse.	Resp.	Temp.	
8th day,	before the aconitia	.	124	28	104.8.	Rash developed; occasional crepitant râles at the bases of lungs.
9th	„ after	„	.	—	—	
10th	„ Morning	„	.	100	40	103.2. Bowels very loose; enema opii.
	Afternoon	„	.	108	28	—
12th	„	„	.	88	44	102.4.
13th	„ Morning	„	.	84	44	99.8.
	Evening	„	.	84	30	99.2.
14th	„ Morning	„	.	92	40	100.
	Evening	„	.	72	36	98.8.
15th day,	Morning	„	.	72	44	99.4. Hunger. Fish and ale.
	Evening	„	.	78	36	98.6.
16th	„ Morning	„	.	84	44	99.4. Slight congestion still at the bases of lungs.
	Evening	„	.	76	36	98.6.
17th	„ Evening	„	.	82	36	98.4.
18th	„ Morning	„	.	72	40	99. Rash gone; more liveliness.
	Evening	„	.	94	30	97.4.
19th	„ Morning	„	.	72	34	98.4.
	Evening	„	.	82	36	98.4.
20th	„ Morning	„	.	80	28	} 98.8.
	Evening	„	.	84	36	
21st	„ Morning	„	.	76	36	} 98.6.
	Evening	„	.	76	36	
22nd	„	„	.	76	36	98.4.

The aconitia was omitted on 21st day, and full diet was ordered. The patient left the hospital well on the 29th day. The attack was one of moderate severity.

Obs. 49.—Elizabeth R—, æt. 16, admitted on the 5th day of a moderate attack of typhus. Took $\frac{1}{100}$ of a grain of aconitia from the 6th to the 14th day inclusively.

			Pulse.	Resp.	Temp.	
5th day,	no aconitia	.	. 100	30	103.4.	Tongue dry in centre.
6th	„ aconitia. Morn.	.	. 104	32	103.8.	} Tongue dryish in centre.
	Even.	.	. 80	36	103.6.	
7th	„ Morn., before the aconitia	.	. 92	32	103.	
	Even., after	„	. 84	36	104.	
8th	„ Morn., before	„	. 84	32	102.8.	Tongue moist, almost clean,
	Even., after	„	. 84	36	103.8.	

			Pulse.	Resp.	Temp.
9th day,	Morn., before the aconitia	}	84	32	102·8.
	Even., after „				
10th „	Morn., before „	}	68	32	{ 101. 100·4.
	Even., after „				
11th „	Morn., before „	.	60	28	97.
	Even., after „	.	—	—	100·4.
12th „	Morn., before „	.	60	28	97.
	Even., after „	.	60	24	98·2.
13th „	Morn., before „	.	76	24	97.
	Even., after „	.	66	24	97·6.
14th „	Morn., before „	.	72	32	97. Fish.
	Even., after „	.	64	24	97.
15th „	no aconitia	.	64	24	97. Full diet.

She left bed on the 24th day, and the hospital on the 27th.

Obs. 50.—Bridget O'D—, æt. 19, admitted on the 7th day of an attack of typhus. Took $\frac{1}{200}$ of a grain of aconitia once daily from the 9th to the 13th day inclusively.

			Pulse.	Resp.	Temp.
8th day,	no aconitia	.	120	32	104·6°.
9th „	„ Morn.	.	104	32	104.
	Even.	.	84, weak.	24	104.
10th „	Morn., before the aconitia	.	80	28	102·2.
	Even., after „	.	112	32	104.
11th „	Morn., before „	.	116	32	103·4. Pulse of fair strength two hours after the aconitia.
	Even., after „	.	120	32	102·4. Conjunctiva injected.
12th „	Even., after „	.	96	32	103·4. Tongue dry and brown.
13th „	Morn., before „	.	120	32	103. Active congestion of both lungs as high as the scapular spine.
	Even., after „	.	96 { very weak }	44	101·4.

Five hours after the aconitia, on the 13th day, she was in a state of partial collapse. The pulse was 100 and weak, the cardiac action was too feeble to be heard above the crepitant râles in the lungs, and the impulse was scarcely perceptible; vomiting and diarrhœa occurred at intervals during the afternoon and evening, and the skin was cold and clammy. The aconite was

discontinued, and ammonia and brandy given. The gastric disturbance had ceased next morning. She was flushed and the pulse was 120, much stronger; the respirations 40. In the evening the pulse was 128, and the respirations 68; the temperature 102.8° . Active pulmonary congestion was present throughout the lungs, and the next day the respirations were diminished to 48, but the pulse had risen to 148; the rash was vivid. Next day (the 16th) the respirations were 56, the pulse 148, temp. 104.6° ; the cheeks were suffused with a dusky blush, and she died in the afternoon.

The subsequent history of this case is given to show the usual progress and termination of pulmonary congestion in typhus. It impended, as it commonly does in this disease, from the 7th day. The effects of aconite must, I think, be admitted to be present on the 13th day, and it certainly did not control the pulmonary affection; nor do I think that it hastened the fatal event, for the case is one which occurs very often under any treatment.

The foregoing cases of typhus, twenty in number, illustrate the full development of the disease in young subjects. I think it must be conceded that the crisis occurred early, and my impression at the time was that, compared generally with similar cases under different but simultaneous treatment, the aconite cases passed through the disease remarkably well. One (Obs. 49) died of pulmonary congestion; convalescence in another (Obs. 36) was prolonged by a large bed-sore; the rest left their beds between the 21st and the 25th day.

It will require a vast number of observations and comparisons to decide the question whether or not aconite has a more beneficial influence in the febrile state than other and dissimilar medicines; and the foregoing observations will, therefore, I hope, be accepted as a small contribution to this result. I could have wished that the respirations and temperature had been taken in every case, but this, under the circumstances, was more than we could possibly undertake. My thanks are due to Dr. W. Henderson, my resident assistant at the Fever Hospital, for his ready and efficient help in this matter.

Obs. 51.—Jane J—, *æt.* 20, admitted on the 7th day of an

attack of relapsing fever. She took the $\frac{1}{100}$ of a grain of aconitia from the 7th to the 16th day inclusively. She continued well and ate full diet from the 9th to the 14th day (the apyretic interval), the pulse being 84, the temperature normal, and the tongue moist. On the 14th day from the commencement of the primary fever¹ she had a relapse, and the secondary fever was more severe than the primary. At the acme, on the 16th day, the pulse was 120, temperature 104°, and there was slight delirium. On the 24th day the pulse was 116, temperature 102°. On the 27th she resumed full diet, and left the hospital on the 42nd day.

This case illustrates the general conclusion to be derived from the whole of the foregoing cases, viz. that if it be conceded that aconite ameliorates the febrile condition, it does not much control it; and it further shows that it cannot in any degree anticipate or cut short the pyrexial stage in a disease against which, if it did possess the ~~anti~~antifebrifuge properties ascribed to it, its influence ought to be most marked.

I have said nothing respecting the action of aconite on the secretions, for I have but little evidence.

The frothy mucus (improperly called saliva) which appears in the mouth as one of the earliest symptoms of aconite poisoning, is an exsudation from the congested mucous membrane of the fauces and gullet, being chiefly forced up from the latter by the forcible contractions of its muscles. Afterwards there is usually a little trickling of clear glairy mucus, which is no doubt derived from the general mucous surface as well as from the glands contained within and beneath it. In the dog the exsudation of this clear fluid is much more copious under the influence of morphia. In Obs. 4 a large quantity of very acid fluid was found in the stomach, and it seems to have been secreted in consequence of the special action of the drug on the pneumogastric nerves. No such result occurred in the other fatal cases. The free evacuation of the contents of intestines (see Obs. 3 and 4) is due partly to increased watery secretion from the intestinal mucous membrane, and partly to increased peristaltic action. The urine is generally retained for a long

¹ In the majority of the patients under my care in this epidemic, the relapse occurred on the fourteenth day.

time, and then the quantity seems inordinate ; where there is no relief by sweating, the quantity of this secretion, the watery constituent at least, is, no doubt, increased, since the amount of water exhaled from the lungs is diminished. The sweating observed in Cases 3 and 4 is, like the excretion of more water by the kidneys, a secondary effect.