of contact with an ordinary solid determines the mutual reaction of the corpuscles and the liquor sanguinis. Yet no coagulation occurs as the result of such an operation. It is, I presume, in the capillary system that the correcting influence is exerted.

Again when intense inflammatory congestion is produced by the application of some irritant substance to the web of a frog's foot, we see that the corpuscles, both red and white, adhere to one another and to the walls of the vessels, and block the capillaries. Mechanical violence is one of the many irritating agencies which produce such congestion; and from what we know of the effects of the pressure of the cord upon the vessels of the sheep's foot, we cannot doubt that the blood must be coagulated in the congested vessels: that between the corpuscles there must be cementing fibrin. The distinguishing characteristic of acute inflammatory exudation is of itself pretty clear evidence to this effect. The exudations in intense inflammation differ from those of dropsy by being coagulable; hence the brawniness of tissues that are intensely inflamed, or the lymph in acute pericarditis. How can this coagulable character of the effused liquor sanguinis be explained except by supposing that the walls of the capillaries have acted for the time being like ordinary solid matter, and that, as a consequence of this behaviour of the capillaries, the corpuscles have given up to the liquor sanguinis (to use Schmidt's language) the necessary fibrinoplastic substance? And if the exuded liquor sanguinis coagulates, we cannot doubt that the plasma which remains in the capillaries is also coagulated. Nevertheless, if the irritant has not been pushed so far as to cause the death of the part on which it has acted, the tissues in due time recover, and we see the corpuscles gradually detaching themselves from each other, to pass on into the circulation. And we may surely say that, not only do the corpuscles recover their original non-adhesive character, but the fibrin which binds them together is redissolved.

I believe, therefore, that although in the larger vessels the vascular walls are negative as regards the coagulation of the blood, in the capillary system there must be potent agencies counteracting any tendency to clotting induced by abnormal conditions, and capable even of redissolving fibrin.

A CONTRIBUTION TO THE STUDY OF CHLORALAMIDE.

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CHLORALAMIDE was introduced by Professor von Mering, of Strassburg. The advantages claimed for it over some of the other hypnotics are that it does not depress the cardiac, respiratory, or cerebral centres, the blood pressure is not markedly lowered, and it does not interfere with the normal course of digestion. Over sulphonal, the advantages claimed are that its action is more speedy, its use is not marked by depression, giddiness, motor inco-ordination, or deferred action. Chloralamide is further free from the somewhat deterrent taste and smell of paraldehyde, and is more active than urethane.

PHYSICAL PROPERTIES AND CHEMICAL CONSTITUTION.

Chloralamide occurs in white crystals which have a slightly cool bitter taste. It is soluble in water to the extent of about 1 in 10, in alcohol it dissolves in about 1 in 1½. If dissolved in water of temperature above 120° F., it decomposes. It is also decomposed by a caustic alkali, by carbonates or bicarbonates of an alkali, but its solubility is increased and its decomposition is prevented by the presence of a weak free acid such as hydrochloric. Chloralamide is the result of the chemical combination of chloralhydrate CCl_3CHO , and formamid CHO NH_2 , or the formula may be thus expressed:

REFLEX FUNCTIONS OF THE SPINAL CORD.

Numerous experiments were performed on frogs to elucidate its action on the reflex function of the spinal cord. The

method employed was in all essential points similar to that described in my former studies. The result of these observations was to show that chloralamide diminished the reflex functions of the spinal cord. This was shown by the long delay of the period at which the limbs were moved or withdrawn from the stimulant after the injection of the drug. Chloralamide did not diminish, at any rate in any marked degree, peripheral sensation, for it was found that the non-ligatured limb continued to be more active in response to the stimulant than the ligatured limb. In this point the drug contrasts with paraldehyde, urethane, and sulphonal, all of which had distinct influence in diminishing peripheral sensation.

EXPERIMENT I.—To give an example, the following is a type. Frog, 34 grammes in weight, decerebrated, right iliac artery and vein ligatured; stimulation in H_2SO_4 (1 in 800), 5 minims 6 per cent. Chloralamide solution injected into dorsal lymph sac.

Before Administration of Chloralamide.			
Ligatured Limb.		Unligatured Limb.	
8 seconds limb withdrawn	...	7 seconds limb withdrawn	...
6 " " "	...	5 " " "	...
6 " " "	...	6 " " "	...
At 2.50 P.M., 5 minims, 6 per cent. solution chloralamide injected into dorsal lymph sac.			
Ligatured Limb.		Unligatured Limb.	
15 seconds limb withdrawn	...	18 seconds limb withdrawn	...
19 " " "	3.30 P.M.	2 " moved	...
20 " " "	3.55 P.M.	10 " withdrawn	...
20 " " "	...	8 " moved	...
...	4.15 P.M.	28 " withdrawn	...
No movement	...	20 seconds, withdrawn with difficulty	...
...	5 P.M.	20 seconds moved feebly	...
...	11 A.M. next day; H_2SO_4 (1 in 400).	30 seconds feeble movement.	...
No response...	...	30 seconds feeble movement.	...

Experiments were also performed to test its action on frogs, and these confirm the observations of Kny, published in the *Therapeutische Monatshefte*, Heft 8, 1889. It had a distinct hypnotic effect, and diminished all the reflexes, but the frog ultimately recovered.

EXPERIMENT II.—A frog of normal activity, 32 grammes in weight, was taken at 9.35 A.M.; 15 minims of 4 per cent. solution of chloralamide was injected into dorsal lymph sac. At 9.55 its leap was heavy, fore and hind limbs were weakened, reflex of eye diminished; if placed on its back it occasionally struggled to right itself. At 10.8 reflex gone, but immediately after testing a strong co-ordinate spring was made; tendency of movement to be laboured. At 10.12 high spring made, and has since lain on its back. At 10.14 it turned suddenly to its right side, and executed violent movements of flexion and extension, and regained a sitting position. At 10.17 conjunctival reflex abolished; leg remained in same position when extended; when turned on its back made efforts to rise, but failed, and remained motionless on its back, with the legs drawn up. At 10.55 no reflex of eye or hind limbs; respirations very feeble; no cardiac pulsation visible. At 2.50 P.M. no reflex present except that of eye, but it is distinct. At 3 reflexes present in fore and hind limb and eyes, but all feeble. At 5 all reflexes present, and stronger than when last noticed. At 6.10 reflexes present, still feeble, feeble jerking efforts to move head and fore limbs. At 8.30 all reflexes present stronger than last; efforts to move more marked. By the close of the succeeding day the frog gradually recovered its normal activity.

BLOOD PRESSURE AND RESPIRATION.

Kymographic experiments on blood pressure and respiration were performed. The following observations were made, showing its action on the smaller carnivora. The drug was injected into the peritoneal cavity, afterwards into the left femoral vein, and finally into the peritoneal cavity. It will be seen from the chart that there is a slight lowering of the blood pressure after the injection, but it was only when a considerable quantity was injected, so as to reach the heart almost directly, that its influence in lowering was at all marked. Its action on the pulse was, practically speaking, slight, for at the beginning of the experiment the pulse rate was 144 per minute, and after the various injections it became accelerated to from 156 to 168 per minute, while at the end of the experiment it slowed to the initial rate of 144 per minute. Its action with the smaller doses was to increase the respirations, but with larger doses there was marked slowing and weakening, and finally complete cessation. Thus before injection the respirations were from 48 to 54 per minute; after the first injection the rate was increased to from 60 to 66 per minute. After the larger injections the rate diminished to 44, 48, 34, 40, and 36 per minute, at which periods, in addition to the

slowing, the respirations became extremely feeble and shallow, and the animal died from paralysis of the centre.

EXPERIMENT IV.—*Cat under Ether.*

Time.	Dose of Chloralamide.	Respirations.	Pulse.	Blood Pressure.	Remarks.
0 mins.	—	60	144	126 m.m.	
12 "	0.25 grm.	48	156	136 "	Chloralamide, dissolved in salt solution, was injected into peritoneal cavity.
18 "	—	48	144	120 "	
24 "	—	54	156	120 "	
34 "	0.25 grm.	48	168	110 "	Chloralamide, dissolved in salt solution, was injected into left femoral vein.
40 "	—	54	162	112 "	
50 "	—	60	156	110 "	
60 "	—	54	168	100 "	
65 "	0.4 grm.	60	156	100 "	Chloralamide, dissolved in salt solution, was injected into left femoral vein; respiration feeble.
75 "	—	44	150	86 "	
81 "	—	40	132	80 "	Respirations more feeble.
87 "	—	36	144	66 "	
91 "	0.6 grm.	36	144	60 "	Chloralamide, dissolved in salt solution, was injected into peritoneal cavity.
97 "	—	24	144	34 "	Respirations very shallow and feeble; pulse regular.
100 "	—	abolished	144	33 "	Pulse still regular.

ACTION ON MOTOR NERVES.

The result of many experiments on motor nerves—the sciatic of the frog being used—was to show that the drug had a marked influence in diminishing and ultimately destroying the conductivity of the nerve trunk. Subsequent washing of the nerve in a salt solution did not restore its conductivity. In these experiments the apparatus employed was that planned by Professor Cash, F.R.S., and described in the *BRITISH MEDICAL JOURNAL* of December 2nd, 1889, in my paper on Urethane.

ACTION ON MUSCLE SUBSTANCE.

A series of experiments were performed on the gastrocnemii of the frog; and here again Dr. Cash's muscle chamber was employed. The experiments were of two kinds. In one the immersion of the muscle in 4 per cent. solution chloralamide dissolved in 0.75 per cent. salt solution, and single stimulations were used to test the irritability of the muscle substance; in the other, the immersion of the muscle in 4 per cent. solution chloralamide dissolved in 0.75 per cent. salt solution, and the application of the Faradic current to test the irritability of the muscle.

(1) *Result of Single Stimulation.*—(a) That the drug slowly diminished the irritability of the muscle substance; (b) that subsequent washings of the muscle in salt solution did not restore the irritability.

(2) *Result of Faradic Current.*—(a) A gradual lowering of the normal tetanic curve; subsequent washings in salt solution did not restore muscular irritability.

Chloralamide is thus, in its action on muscle substance, much akin to paraldehyde, urethane, and sulphonal. But its action in diminishing muscular irritability is more active, and there is less tendency for the muscle to recover its irritability. No initial period of irritability was observed to follow the action of the drug. In this it differs from paraldehyde, but resembles urethane and sulphonal.

CLINICAL OBSERVATIONS.

A number of experiments were undertaken to observe the action of chloralamide on the kidneys, including the increase or decrease of urea and phosphates, as well as the fluid con-

stituents and the reaction of the urine. I have to thank several friends who willingly allowed themselves to be placed on a regulated and restricted diet for these observations. The results from all the cases pointed to the same conclusions. One case has been selected as a type of the others, and in all its essential features it agrees with the observations recorded in the other cases. The object of these experiments being not so much to record the hypnotic effect of the drug as to ascertain its action on the excretion of the kidneys, the subjects were not confined to bed, and were allowed a moderate but regulated amount of exercise. The diet was carefully regulated, both in fluids and solids, and was kept constant during the whole period of the observations. The experiment was continued until the subject expressed a desire that the observations should cease. The details of the method employed here also were similar to those previously described.

EXPERIMENT V.—The diet in the following case is given in detail;

Diet of A. H.

		Fluids. Cubic Centimetres.	Solids. Grammes.
Breakfast	Porridge Bread Milk	— — 340	145 65 —
Dinner	(Soup Bread Pudding, rice Beef Potatoes	170 — — — —	— 60 170 85 112
Supper	(Egg Bread and butter Milk Water	— — 340 475	60 85 — —
		1325	782

Daily Journal of A. H.¹

Date.	Chloralamide Dosage.	Urine passed in 24 hours.	Specific Gravity.	Urea.	Phosphates.	Pulse.			Respirations.		
						9 A.M.	10.30 A.M.	12 P.M.	9 A.M.	10.30 A.M.	12 P.M.
1890.		c.c.									
March 6 ...	None	1,300	1011	18.9	3.1						
" 7 ...	"	1,250	1015	18.8	3.0						
" 8 ...	"	1,330	1012	18.9	2.7						
" 9 ...	5 grains	1,250	1014	21.2	2.5	76	76	80	20	22	22
" 10 ...	"	1,170	1014	23.4	2.5	76	78	78	22	22	22
" 11 ...	5 "	1,020	1015	19.3	2.0	84	84	86	24	24	24
" 12 ...	None	1,170	1014	21.0	2.8						
" 13 ...	"	1,010	1015	22.2	2.4						
" 14 ...	"	1,300	1012	26.0	3.1						
" 15 ...	10 grains	1,320	1012	27.7	3.2	68	68	72	20	20	20
" 16 ...	10 "	1,000	1018	20.0	2.4	80	78	80	20	20	20
" 17 ...	10 "	1,490	1010	28.3	3.0	84	92	92	20	20	20
" 18 ...	None	1,200	1014	21.6	2.8						
" 19 ...	"	1,220	1015	26.8	2.4						
" 20 ...	"	1,020	1018	23.4	2.4						
" 21 ...	15 grains	1,260	1019	25.2	2.5						
" 22 ...	15 "	1,360	1016	24.2	2.7	76	80	80	20	20	20
" 23 ...	15 "	980	1020	21.5	2.0	88	88	88	20	24	20
" 24 ...	None	1,230	1016	24.6	2.4						
" 25 ...	"	1,830	1014	28.9	3.5						
" 26 ...	"	1,440	1014	27.3	2.9						
" 27 ...	20 grains	980	1020	19.6	2.3	76	84	84	20	20	24
" 28 ...	20 "	1,360	1016	27.2	2.7	84	84	76	24	24	24
" 29 ...	20 "	1,200	1018	22.8	2.4	76	76	76	20	20	16*
" 30 ...	None	1,020	1012	22.4	2.4						
" 31 ...	"	1,420	1010	28.4	2.8						
April 1 ...	"	1,000	1016	18.0	2.0						
" 2 ...	25 grains	1,000	1018	18.0	2.0	80	96	108	20	24	20
" 3 ...	25 "	970	1020	19.4	1.9	76	88	80	20	20	16*
" 4 ...	25 "	1,130	1016	24.8	2.2	78	80	68	20	16*	16*
" 5 ...	None	1,570	1014	25.1	2.5						
" 6 ...	"	1,240	1016	23.5	2.5						
" 7 ...	"	1,130	1018	21.4	2.1						

* Sleeping.

¹ The reaction was acid throughout the experiment. The method followed for the estimation of urea was that employed by Russell and West. The phosphates were estimated by a volumetric solution of uranium acetate.

Urea.—The result of these observations showed that with the smaller doses (5 grains) of chloralamide there was an increase, but with the larger doses (25 grains) there was a decrease. During the three days at the beginning, when no chloralamide was given, the total quantity of urea excreted was 49.3 grammes. The total quantity excreted during the three following days with doses of 5 grains daily was 54.3 grammes, or an increase with chloralamide of 5 grammes, or a daily increase of 1.8 grammes.

In another experiment the total quantity of urea excreted without the drug was 55.5 grammes, but in three days with 5-grain doses the total excretion was 63.9 grammes, or an increase of 8.4 grammes with the drug, or a daily increase of 2.8 grammes. Here also, with 10-grain doses, an increase was observed; for on the three days when no drug was given the total excretion was 69.2, while with the drug the total excretion was 76 grammes, an increase of 6.8 grammes, or a daily increase of 2.28 grammes; but when large doses, such as 25 grains, were given the decrease in the excretion of the urea was evident. Thus, in one experiment, no drug having been given for three days, the total excretion was 55.6 grammes. When daily doses of 25 grains were given the total excretion was 52.9 grammes, or a decrease with chloralamide of 2.9 grammes, a daily decrease of 0.9 gramme. Again, in another experiment, the total excretion of urea for three

A.—Stimulation Series: 1 per cent. chloralamide in normal salt solution; coil 7.5 c.m.: I, normal stimuli; II, 10' later in chloralamide; III, 10' later in chloralamide; IV, 10' later in chloralamide; V, 10' later, coil 3.5 c.m.; VI, 5' later, coil 3.5 c.m.; VII, 5' later, coil 0.0 c.m.; VIII, 5' later, coil 0.0 c.m. Subsequent washing in salt solution did not restore the muscle irritability.

days prior to the administration of the drug was 68.8 grammes, and the total excretion of urea for three days when 25-grain doses were given was 62.2 grammes, a decrease of 6.6 grammes, or a daily decrease of 2.2 grammes. It is therefore evident that the smaller doses of the drug—doses that have no appreciable hypnotic action—tend to increase the elimination of urea, but as soon as doses large enough to produce hypnotic action are given there is diminution in the excretion of urea. In this the action of chloralamide closely resembles the action of paraldehyde, urethane, and sulphonal.

Phosphates.—The experiments also showed that there was a tendency for the drug to diminish the excretion of the phosphates and that this diminution was present during the whole time the subject was under the influence of the drug with both the smaller and the larger doses. In fact the largest diminution of the excretion of the phosphates in three days took place at the beginning of the experiment, when the small doses of the drug were exhibited.

In one experiment the total phosphates excreted in three days, prior to the administration of the drug, was 6 grammes, and, with 5-grain doses daily, the total excretion for three days was 5.5, or a decrease of 0.5 gramme for the three days, and this was the largest decrease that took place during this experiment. In another the total quantity of phosphates excreted before the administration of the drug was 8.8 grammes, and the total quantity excreted during three days with 5-grain doses was 6.6 grammes, a decrease of 2.2 grammes. Here, also, this was the largest decrease during the investigation. All through this case the diminution of the phosphates was more marked than in some of the others.

Excretion of the Fluid Constituents of Urine.—With the smaller doses (less than 20 grains) no constant result was obtained, the excretion of three days without administration being sometimes greater and sometimes less than when administered. Thus, for three days without the drug, the total quantity excreted was 3,880 cubic centimetres, and, in

the three succeeding days with the drug, the total quantity excreted was 3,440 cubic centimetres.

Again, in three days without the drug the total quantity excreted was 3,480 cubic centimetres, and in three days with 10-grain daily doses was 3,810 cubic centimetres. But when daily doses of 20 grains and upwards were given there was a decrease of excretion of fluid constituents when the subject was under the influence of the drug. Thus, when daily doses of 20 grains were given the total excretion for three days was 3,540 cubic centimetres, and on the corresponding three days without the drug 4,500 cubic centimetres, or a total decrease in the three days with chloralamide of 960 cubic centimetres, or a daily decrease of 320 cubic centimetres. Again, when 25 grains were given, the total excretion for three days was 3,100 cubic centimetres, and a corresponding three days without 3,440 cubic centimetres, or a decrease in three days of 340 cubic centimetres, or a daily decrease of 113 cubic centimetres. This result was characteristic of the whole series of observations, and it seems to point to the conclusion that large doses diminish the excretion of the fluid constituents. The reaction, colour, and odour of the urine remained normal during the whole time. No albumen was detected.

Pulse.—The pulse-rate, which was observed before administration, and at intervals of one, two, three, and four hours after, did not show any alteration with the smaller doses, but when doses of 20 grains and upwards were given there was an occasional acceleration during the first hour or two to the extent of four to ten beats per minute.

Respiration: Skin: Temperature.—The rate of respiration, which was observed at similar periods as the pulse-rate, did not show any marked change from the normal with the smaller doses, but with doses of 20 grains there was noticed diminished frequency in the number of respirations, and this was most evident when the subject was asleep. Breathing was easy, full, and tranquil. The action on the skin and temperature was negative.

Effects on Digestion.—When it is considered that a prolonged regulated diet of itself tends to blunt the edge of the appetite, the results of these experiments showed that chloralamide had no apparent deleterious effect. In no case was it evident that its administration in any way impaired the desire for food. No irritation to the gastro-intestinal tract was observed. In no case was pain complained of, neither did vomiting nor diarrhoea follow its use, and constipation at no time supervened. Occasionally slight morning headache was complained of; but even here it was difficult to prove that it was caused by the drug. This non-irritating effect of chloralamide to the gastro-intestinal tract was further confirmed by other clinical observations in many cases of insomnia, in which it seemed clear that neither appetite nor digestion was disturbed. No thirst was complained of during exhibition.

Hypnotic Action.—Records of its hypnotic action were carefully taken, though the chief object in this part of the investigation was not so much to test its hypnotic value as to note its effects on the excretions of the kidneys and digestion. With the smaller doses there was no evidence of any sleep-inducing power; but when doses of 20 grains and upwards were given and the subject placed in favourable surroundings for sleep, the hypnotic influence became evident. As a rule, sleep came on in about half an hour after the dose. The sleep induced was pleasant, tranquil, and easy; awakening was gradual, and without mental confusion, headache, or depression. In one case with doses of 25 grains there was talkative excitement, slight mental confusion, and a restless condition of the whole body, although this motor disturbance was most marked in the lower extremities. Along with these conditions there were temporary giddiness, staggering gait, flushed face, and slight frontal headache. As these phenomena so persistently followed the administration of the drug, in this case at least, it would appear that they were due to it. It has to be observed, however, that even here there was no disturbance of the appetite.

CLINICAL OBSERVATIONS IN CASES OF INSOMNIA.

In a large number of cases of insomnia where chloralamide was employed as a hypnotic the result was distinctly satisfactory. Sleep was induced within a short time after exhibi-

tion, was pleasant, and lasted from five to eight hours, and with few exceptions the patient awoke much refreshed, and without headache, mental confusion, depression, or drowsiness. The drug was given chiefly in cases of insomnia, when no, or only slight, pain was complained of.

Its analgesic action was also observed in cases of neuralgia, where pain was a factor in producing the insomnia. It was evident, however, that in such cases the drug had no markedly alleviating influence on the pain. In cases where the pain was mild the patient stated that, besides the refreshing sleep induced, there was sometimes an alleviation of the pain as well. Possibly the cases in which this was most noticed were pulmonary complaints.

It is desirable to remember that in cases where pain is a prominent factor much analgesic action is not to be expected.

In addition to the direct hypnotic action of the drug, it was frequently observed that the patient being once put in the way of sleep, there followed a series of sleepful nights. Still more frequently was it noticed that on the night succeeding the administration of the drug sleep supervened spontaneously. That this did not depend upon deferred action of the drug is shown by the fact that the patients stated that they had no feeling of drowsiness or depression during the day.

In no case was it noticed that a craving for the drug was developed, although in some cases it was given for two or three weeks almost nightly.

Chloralamide so far resembles paraldehyde in the fact that a point of tolerance is not speedily reached. In some cases the same dose produced a like result week after week. This was specially noticeable in a noisy fatuous female, who, besides being excitable and emitting intolerable clucking noises, suffered from insomnia. Doses of 35 grains, in about half an hour, allayed excitability and induced a sleep of six to eight hours. The drug was given in the same quantity nightly for a month with equally good results throughout.

There were some cases, however, in which unpleasant results followed the administration of the drug; these were comparatively few. In these there were pre-somniol excitement, motor irritability, giddiness, and headache. One case especially showed mental exaltation and confusion of thought, and inco-ordination of the upper and lower extremities—indeed, many of the features of alcoholic intoxication. Headache was also complained of in this case.

In none of the cases in which the drug was tried was there observed any disturbance of the gastro-intestinal functions. In no cases was vomiting observed. This non-disturbance is of much importance in the selection of a hypnotic.

Chloralamide contrasts favourably with sulphonal as to deferred action. It was frequently noticed that, following a dose of sulphonal, the hypnotic action did not take place for a number of hours, so that sleep was projected into the following day, whereas with chloralamide sleep, if it supervened at all, came quickly, and passed off within six or eight hours. Another claim for chloralamide over sulphonal is the fact that sleep is more speedy in its onset after administration. The comparatively easy solubility of the substance may so far explain its more rapid action. Its slightly bitter taste formed no material objection where its use was indicated. It was given in doses of 25, 30, 40, and 45 grains. The most satisfactory, however, was a dose of 30 grains dissolved in cold water, to which were added a few drops of hydrochloric acid and some flavouring syrup.

The following examples are types of many cases:

CASE I. *Insomnia from Senile Changes*.—J. G., aged 76. Insomnia for two weeks; dose of 25 grains taken at 10 P.M., sleep followed till 4 A.M., and then from 4.30 to 12 noon. Subsequent doses generally gave a sleep of eight hours. Patient was much gratified with the effect of the drug.

CASE II. *Mitral Regurgitation*.—W. J., aged 74. No pain, but extreme nervousness; insomnia for about a week. Dose of 30 grains; about two hours thereafter sleep followed, and continued for six hours. Following night no powder was taken; sleeplessness occurred. Next night chloralamide was given in same doses, and same result followed.

CASE III. *Neurasthenia and Insomnia*.—T. J., aged 76. After a dose of 15 grains there followed sleep from five to six hours, from which patient awoke refreshed. Powders were continued from time to time with equally satisfactory results. This patient stated that on the night succeeding the taking of the powder he generally slept well without a further dose.

CASE IV. *Phthisis, Alcoholic Tendency, and Insomnia*.—J. S., aged 42. Bromide of ammonium in 30-grain doses, no effect. Opium 1½-grain doses gave a restless sleep, with morning headache. Thirty grains chloralamide at bedtime, half an hour after exhibition produced five hours' sleep.

Patient stated that he frequently slept well without a hypnotic from 11 P.M. to 1 A.M., when he awoke and continued sleepless. Chloralamide given at 1 A.M., sleep followed in half an hour, and continued seven hours, and he awoke refreshed. Sulphonal in 15-grain doses had been tried in this case with no appreciable effect.

CASE V. *Dilated Heart and General Anæmia and Insomnia*.—J. M., aged 84. Twenty-grain doses of sulphonal produced what patient stated to be "feelings of intoxication," followed by one or two hours of sleep. Thirty grains bromide of ammonium had no effect; 25 minims nepochene gave short uneasy sleep, with dry tongue and headache in the morning. Twenty-five grains chloralamide given, there followed in half an hour sleep from 12 P.M. to 5 A.M. No confusion nor headache on awakening, but marked refreshment. The powders were given frequently, and continued to act well.

CASE VI. *Chronic Bronchitis; Insomnia*.—C. S., aged 70. Chloralamide 30 grains at 8.30 P.M.; slept very soon after, and sleep continued till 5 A.M., occasionally awakened by coughing, but felt much refreshed. No powder following night; did not sleep so well. Next night 15 grains chloralamide at 8 P.M.; no hypnotic effect observed at 12 P.M.; another dose of 30 grains given, slept till 7 A.M.

CASE VII. *Phthisis; Cough*.—M. G., aged 20. Fifteen-grain doses of chloralamide at bedtime gave a good night's rest; patient expressed great comfort, and had no unpleasant feelings on awakening. Subsequent doses produced like good results.

CASE VIII. *Hysteria*.—J. M., aged 23. Insomnia for some time. Chloralamide 25-grain doses answered, and sleep pleasant and refreshing.

CASE IX. *Locomotor Ataxia; "Lightning Pains"*.—W. W., aged 45. Insomnia for some time. Chloralamide 25 grains produced four to five hours' sleep; awoke, and re-slept for three hours. Satisfactory results followed exhibition of the drug.

SUMMARY.

The following summary embodies the results of the observations detailed in this contribution to the study of chloralamide:—

1. The reflex irritability of the spinal cord was diminished.
2. Peripheral sensation was not reduced.
3. On frogs there were hypnotic action, slowed respiratory and cardiac actions, abolition of reflexes, and subsequent recovery of the normal condition.
4. Blood pressure was slowly reduced with large doses.
5. Pulse rate was not affected.
6. Respirations were reduced and finally abolished.
7. The conductivity of motor nerves was destroyed, and was not restored by subsequent washing in salt solution.
8. The irritability of muscle substance was destroyed, and was not restored by subsequent washing in salt solution.
9. The excretion of urea was increased by small doses—0.3 to 0.6 gramme—but was diminished by large doses—2 to 3 grammes.
10. The excretion of phosphates was diminished with both large and small doses.
11. The excretion of the fluid constituents of the urine was not constantly affected by the smaller doses, but was diminished by the larger doses.
12. Reaction of urine was not influenced.
13. Colour and odour of urine were not affected.
14. No albumen was detected.
15. Action on the skin was negative.
16. Temperature was not affected.
17. Digestion did not appear to be interfered with.
18. Hypnotic action in the healthy was induced with doses of 1.25 gramme and upwards.
19. In painless insomnia the results were highly reliable.
20. In insomnia with moderate pain the results were fairly reliable.
21. In insomnia with acute pain it was not reliable.
22. The analgesic action was feeble.
23. The hypnotic effect followed usually within half an hour after exhibition.
24. The sleep induced was tranquil, pleasant, and natural, and the awakening free from confusion or depression.
25. No deferred action.
26. No craving for the drug was noticed.
27. The point of tolerance was not readily reached.
28. The doses found most reliable were from 2 to 3 grammes.
29. Giddiness and inco-ordination and headache sometimes followed administration.
30. In senile insomnia, pulmonary diseases, and hysteria the results were highly satisfactory.

In conclusion, I have pleasure in thanking Professor J. Theodore Cash, F.R.S., for suggestions and kind assistance and the unstinted use of his apparatus and laboratory.

DR. DONALD has been appointed one of the Visiting Surgeons of Chalmers' Hospital, Banff, N.B., vice Dr. Barclay, resigned.