2. Simplify the formalities for admission of patients into asylums. This may be readily done by granting the local authorities the power of allowing the provisional admission for four weeks, while the tribunals pass sentence for the prolongation of residence. As I have already said, these authorities are always at hand, and the assistance of a solicitor might be dispensed with.

3. The present law leaves the care for the insane to the provincial authorities, and orders those provinces in which no asylum exists, or need exist, to deal with the managers of asylums for a certain number of beds. This is simply an anachronism. An asylum *need* exist in every province, and an Article should be inserted requiring every province suitably to provide for its insane inhabitants within the limits of that same province.

By all means let us follow the example of England, and let us have our Broadmoor. No country should be without one.

It would be a fine measure to fix a maximum number of patients for every asylum. The appointment of a minimum number of physicians might, perhaps, be an interference with certain household arrangements.

4. Suppress the obligatory interdiction after a three years' stay in an asylum. As I have already said, this part of the law is easily and frequently evaded. And, besides, is it not ridiculous to go through an expensive and tedious procedure in the case of a pauper lunatic, of whom it need not be feared that he will mismanage what he does not possess, viz., property?

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*Caffeine, in its Relationships to Animal Heat and as Contrasted with Alcohol.** By W. Bevan Lewis, L.R.C.P.Lond., Senior Assist. Med. Officer, West Riding Asylum.

The observations now to be recorded relative to the physiological action of Caffeine upon animal thermogenesis were carried on several years ago as part of a series of experiments in the same direction with numerous potent alkaloids, atropine, solanine, hyoscyamine, strychnine, and others. †

The experiments with Caffeine and Alcohol ‡ were to me a

* While the title of this article may seem at first sight to have little to do with "Mental Science," its great importance in relation to the treatment of mental as well as other diseases, and the use of alcohol in the asylum dietary, must be admitted.—[Eds.]

† "Calorimetric Obs.," West Riding Asylum Reports, Vol. vi.

‡ "Physiological Action of Alcohol in Relationship to Animal Heat." "Journal of Mental Science," Vol. xxvi.

source of special interest from a consideration of the importance of both as entering so largely into the dietetics of modern life, and I had purposed greatly enlarging the scope of such observations when the restrictions of the anti-vivisection enactments compelled me to abandon my object. Several important papers have lately appeared upon the physiological and therapeutic actions of Caffeine; and, as the active principle of Coffee cannot fail to prove of interest to the physiological enquirer, especially from our present point of view, I have ventured to detail the results of my observations, incomplete though they be, as a small contribution towards our knowledge of a subject of general interest.

The calorimeter made use of was one recommended for such observations by Dr. Burdon Sanderson. It was repeatedly tested by various methods to gauge its accuracy, and always with satisfactory results. The water in the outer chamber was kept in constant movement, and an extremely sensitive centigrade thermometer used in taking its variations in temperature. As to the atmosphere of the room, deviations in temperature during the course of these observations were carefully recorded, and found always to be insignificant, every precaution having been taken to ensure an equable temperature and the elimination of any probable fallacy.

The animal chosen for these experiments was the rabbit, and the alkaloid in solution was injected into the stomach by a suitable and ready arrangement. Each rabbit was carefully weighed, and its normal heat production in the calorimeter and variations in body temperature noted prior to the administration of the drug—the same animal never being employed for a second series of observations. It will be seen from the tabulated experiments that each observation is devoted to three problems:—

a. The total heat formation of the animal expressed in gramme-units for periods of quarter of an hour before and after the use of the alkaloid.

β. The diminution, augmentation, or stationary condition of the body temperature.

γ. The total heat formation for each interval expressed in gramme-units per gramme of body weight.

As the animals differ much in weight they would consequently shew great variations in heat production on this account; hence the last estimate is necessary as affording at a glance the proportional heat formation in the various animals operated upon. The following Tables afford *typical results* ob-

tained from a large series of experiments under different doses of the alkaloid. We will begin with the minimum doses administered.

Table 1.

(Observations ¼ hour each.)*

Rabbit given 2½ grains of Caffeine.

Weight of Animial, 2198 Grms.	Total Heat-Formation.	Loss or Gain in Body-Temperature.	Fresh Heat-Formation per Gramme of Body-Weight.
Observation 1.	2633	— 1216	1·19
„ 2.	3850	Nil.	1·75

The amount of Caffeine here given was not above ·00113 grains for every gramme of the animal's weight, and in the succeeding experiment a still smaller dose was given (the rabbit being much heavier), corresponding only to ·001 grain for each gramme of body weight.

Table 2.

(Observations ¼ hour each.)

Rabbit given 3 grains of Caffeine.

Weight of Animal 2940 Grms.	Total Heat-Formation.	Loss or Gain in Body-Temperature.	Fresh Heat-Formation per Gramme of Body-Weight.
Observation 1.	3587	— 105	1·17
„ 2.	4746	— 100	1·57
„ 3.	997	— 571	0·298

In these two animals the normal heat formation prior to administration of the Caffeine varied betwixt ·96 and 1·17 heat-units for each gramme of body weight; hence we find the immediate result of the alkaloid to be a *slightly augmented heat formation,* the highest registry 1·75 being attained within half

* The figures in each column represent *gramme-units of heat.*

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an hour where the stronger dose was given. In the last case the third observation reveals a fall far below the normal (0·298 gr. un.), as the sequel to the primary heat augmentation. Corresponding to this increased formation and evolution of heat, we likewise observe, in Table 2, a loss from the body-temperature amounting during the last interval to 571 heat-units, the rabbit's temperature having fallen from 102·7° Fah. to 101·8° Fah.; and in Table 1, when the stronger dose was given, 1216 heat-units were lost, a fall in temperature from 103·5° Fah. to 101·9° Fah. It will, however, be noted that in the last case during the second interval the animal's temperature remains stationary, the loss or gain being stated as nil, and that this corresponds also to the period of greatest heat formation. Thus, in doses corresponding to little over *one thousandth of a grain* for each gramme of body weight, we have as a result a *primary slightly augmented heat formation* with *a lowering of body temperature*—the latter most marked, but more quickly checked, where the larger dose is given.

Let us now give our attention to somewhat larger doses of the alkaloid. In Tables 3 and 4, where two or four grains respectively of Caffeine have been administered, we see on reference to the animal's weight that the actual amount given is about the same in both cases (·0013 grains per gramme of body weight), but above that given in Table 1.

TABLE 3.

(Observations ¼ hour each.)

Rabbit given 2 grains of Caffeine.

Weight of Animal 1525 Grms.	Total Heat-Formation.	Loss or Gain in Body-Temperature.	Fresh Heat-Formation per Gramme of Body-Weight.
Observation 1.	3867	— 1265	2·53
„ 2.	1833	— 499	1·20
„ 3.	3084	+ 284	2.02
„ 4.	4134	+ 354	2·7
„ 5.	3177	+ 424	2·083
„ 6.	3850	Nil.	2·52

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Table 4.

(Observations ¼ hour each.)

Rabbit given 4 grains of Caffeine.

Weight of Animal 2928 Grms.	Total Heat-Formation.	Loss or Gain in Body-Temperature.	Fresh Heat-Formation per Gramme of Body-Weight.
Observation 1.	2729	— 1494	0·932
„ 2.	7165	— 534	2·44
„ 3.	6787	+ 814	2·31
„ 4.	4247	— 279	1·45

In Table 3 the most striking feature is the *prolonged duration* of the stage of augmented heat formation, which, for a period of one hour, is represented by two gramme-units per gramme of body-weight during each observation, and at one period the product reaches 2·7 gramme-units. The first two observations in this Table represent an exceptional condition, which occurs with some animals when placed in the calorimeter. In this instance the first two observations give the results prior to administration of Caffeine, and yet we find an augmented heat-formation and a large primary evolution from the body-temperature, both conditions greatly diminished during the next interval at the end of which the alkaloid was given. This primary action is due to the comparatively unnatural state in which the animal is placed, and the stimulus to heat-formation appears to be induced by the chill of the surrounding fluid where the balance betwixt the temperature of the latter and the atmosphere has not been fairly established, as was the case during the earlier stage of the experiment. Towards the termination of the first half hour a more normal condition of thermogenesis has set in, and now, Caffeine being given, a further rapid increment of thermal units takes place, *together with an addition to the body temperature.* This addition of heat-increments, which tends to re-establish the norma of temperature, proceeds for three quarters of an hour.

In Table 4, the first observation represents the normal state of the animal in the calorimeter, the three remaining observations being the results of the four grains of Caffeine. Here

also the immediate effect of the surrounding fluid is to cause a loss from the body-temperature of 1494 heat-units, but no augmentation of the fresh heat-formation occurs as in the previous experiment. The heat-formation is, under the operation of Caffeine, augmented to about the same extent, and a sudden attempt at restitution of body-temperature is also seen at the third observation.

A further increase of the dose of Caffeine shows in the strongest light the characteristic action of the alkaloid when given in large quantity. Three experiments may be here cited as typical of the conditions thus induced. In Tables 5, 6, 7, Caffeine was given in doses varying from 2½ to 4 grains, which, when the relative weight of the animals is considered, correspond respectively to ·0018 grs., ·0021 grs., and ·00218 grs. for each gramme of body weight. In the two last experiments, therefore, the dose given was quite double that of the experiments detailed in Tables 1, 2.

TABLE 5.

(Observations ¼ hour each.)

Rabbit given 2½ grains of Caffeine.

Weight of Animal 1343 Grms.	Total Heat-Formation.	Loss or Gain in Body-Temperature.	Fresh Heat-Formation per Gramme of Body-Weight.
Observation 1.	2055	— 744	1·53
„ 2.	5010	— 122	3·73
„ 3.	6206	+ 186	4·62
„ 4.	4308	+ 61	3·20
„ 5.	2850	+ 183	2·12

An explanation is required relative to this last experiment (Table 5). As before stated the loss from body-temperature, which occurs in the normal state when the animal is placed in the calorimeter, appears partially due to the unnatural surroundings and partly to the struggles which most rabbits make when handled and confined within the chamber, a transient and abrupt evolution from the body-temperature usually occurring at this period.

Table 6.

(Observations ½ hour each.)

Rabbit given 4 grains of Caffeine.

Weight of Animal 1880 Grms.	Total Heat-Formation.	Loss or Gain in Body-Temperature.	Fresh Heat-Formation per Gramme of Body-Weight.
After much exertion and struggling.	*	— 1735	*
Observation 1.	4315	— 351	2·29
„ 2.	10095	— 171	5·37
„ 3.	8019	+ 85	4·26
„ 4.	5452	+ 85	2·90

In the experiment illustrated by Table 6, I had to deal with an unusually sensitive and timid animal which struggled frantically, and which was therefore allowed to rest out of the calorimeter for a period of 15 minutes, at the termination of which period it was found to have lost 1735 gramme-units of heat from its body temperature. Exhausted by its previous struggles the animal offered little or no resistance to the administration of the alkaloid, and was immediately transferred to the calorimeter.

Table 7.

(Observations ½ hour each.)

Rabbit given 4 grains of Caffeine.

Weight of Animal 1830 Grms.	Total Heat-Formation.	Loss or Gain in Body-Temperature.	Fresh Heat-Formation per Gramme of Body-Weight.
Observation 1.	4101	— 1265	2·24
„ 2.	5447	+ 80	2·97
„ 3.	3225	+ 425	1·76
„ 4.	7633	+ 167	4·17

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In each of these three last experiments the thermometric observations reveal an exceptionally exalted state of thermogenesis. The fresh heat formation amounts to quite double what was registered in Tables 3, 4. In Table 6, especially, is this maximum result seen, where, in the second observation, 10095 gramme-units are formed within the period of 15 minutes, corresponding to 5·37 heat-units for each gramme of body-weight. Each experiment illustrates, in a striking manner, the following features, as especially characteristic of the action of these larger doses :—

1. Great increase of fresh heat-formation.
2. Prolongation of the above stage of stimulated thermogenesis.
3. Maximum of heat-formation attained at a later period with the augmented dose of the alkaloid.
4. Early efforts at the restitution of the norma of temperature—seen in all cases alike.

Thus in Table 7, the stage of exalted thermogenesis extends *over one hour*, at the termination of which period the maximum is attained, the animal having in this case taken the *strongest dose of Caffeine* as yet given.

So also in Tables 5 and 6, the same stage is seen extending through the whole of the first hour subsequent to the administration of Caffeine; in Table 5 (the smaller dose), the greater heat-formation occurs in the earlier observations; in Table 6 (the stronger dose), this occurs later on, yet not so long deferred as in the next case (Table 7), where the largest amount of Caffeine was given.

TABLE 8.

(Observations ¼ hour each.)

Rabbit given 6 grains of Caffeine.

Weight of Animal 2207 Grms.	Total Heat-Formation.	Loss or Gain in Body-Temperature.	Fresh Heat-Formation per Gramme of Body-Weight.
Observation 1.	6391	— 1425	2·896
„ 2.	3701	— 1502	1·677
„ 3.	5023	— 203	2·274
„ 4.	4440	Nil.	2·011

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Still larger doses (6 grs.) of the alkaloid were given, but always with the effect of causing such intense cerebral excitement, with irritability and violent struggling, that the results were peculiarly interesting. The characteristic heat-augmentation of the Caffeine was still more protracted and delayed in its appearance, whilst the earlier stages were chiefly characterised by great loss from body-temperature. This earlier stage, induced by very large doses of the alkaloid, are represented in Table 8, the later stages not being included.

Perhaps I cannot better illustrate the effects upon animal heat of the larger doses of Caffeine than by tabulating two typical experiments along with calorimetric observations upon rabbits (a) in the normal state (b) after the administration of alcohol; and (c) after Caffeine in strong doses combined with alcohol.

The animal in the normal state was experimented upon under most favourable circumstances; and I have on several previous occasions taken the results given in the first column as a fair average statement of thermogenesis in the healthy state. It will be noted how low the heat formation is in this case when compared with that registered after strong doses of Alcohol, and also after Caffeine; for whilst in the normal state 1·08 heat units is the maximum attained, and usually the registry is not above 0·96, in the case of the stronger dose of Caffeine the maximum is 4·62; and in the case of Alcohol 4·28, the stage of exalted thermogenesis extending over an hour with both. Again, when the cases treated with Caffeine are compared with those which have had Alcohol, a great distinction is observed as regards body temperature. In the former case the primary discharge is succeeded shortly by *retention and addition* to the body temperature; in the latter case a *continuous and prolonged discharge of the body heat* occurs, gradually diminishing, however, and restitution commencing at the sixth observation, so that, by the end of one hour and a quarter from the administration of the Alcohol, the animal's temperature had fallen 6·5 degrees Fahrenheit, *i.e.*, from 103·8° to 97·3°. The animal to which three drachms of diluted Alcohol had been administered was profoundly affected, apart from this inability of the system to reinstate the norma of temperature; beyond the dulness, heaviness, and somnolence from which it suffered, there was paralysis of its limbs and frequent severe rigors, with almost constant trembling.

We may, I think, rightly conclude from these comparative observations that whilst both Caffeine and Alcohol alike increase

Table 9.

(Observations extending over ¼ hour.)

Rabbit	In Normal State.		After 180 mins. Alcohol.		Caffeine (weaker dose).		Caffeine (stronger dose).		Caffeine 6 Grains + Alcohol 2 Drachms.	
	Body Temp.	Heat Units per Gr. Body Wt.	Body Temp.	Heat Units per Gr. Body Wt.	Body Temp.	Heat Units per Gr. Body Wt.	Body Temp.	Heat Units per Gr. Body Wt.	Body Temp.	Heat Units per Gr. Body Wt.
Observ. 1.	+ 98	0·96	— 2151	1·32	— 1255	* 2·53	— 744	* 1·53	— 715	* 0·51
„ 2.	+ 98	0·96	— 1974	2·35	— 499	* 1·20	— 122	3·73	+ 535	1·024
„ 3.	+ 98	0·96	— 936	2·43	+ 284	2·02	+ 186	4·62	— 899	Not appreciable.
„ 4.	+ 98	0·96	— 462	2·0	+ 354	2·7	+ 61	3·20	Nil.	0·88
„ 5.	+ 497	0·64	— 379	4·28	+ 424	2·083	+ 183	2·12	*	*
„ 6.	Nil.	1·08	— 352	1·92	Nil.	2·52				
						* Prior to administration of Caffeine.		* Prior to administration of Caffeine.		* Prior to administration of Caffeine & Alcohol.

to a great extent the normal heat formation, they differ in the very important feature that *alcohol by an excessive and prolonged discharge of heat greatly lowers the body-temperature,* whilst on the other hand *Caffeine tends rapidly to reinstate the norma of temperature by retention.*

As to the parts played by the respiratory and the general cutaneous vaso-motor systems in the loss of animal heat, I have but one remark to offer. Whenever by any mischance the slightest interference with respiration took place in a rabbit whose temperature was reduced by Alcohol, as for instance by the regurgitation of a little fluid into the trachea, the increased thermogenesis was immediately checked, and the body temperature fell so low as to render a fatal termination imminent.

When large doses of Caffeine and Alcohol combined are administered the interesting results seen in Table 9 are apparent. An early stage of diminished heat-formation precedes the increased thermogenesis, whilst the fall in body-temperature, which characterises the action of alcohol, appears more or less *completely antagonised by the Caffeine.*

In all cases treated by Caffeine the contracted pupil, increase of salivary secretion, and mucous discharge from the bowel were prominent symptoms. To these were superadded changes in the vaso-motor condition of the ears, and occasionally, as before remarked, violent struggling as the result of cerebral excitement. All these symptoms have been described previously as characteristic of a group of alkaloids, containing Caffeine, Theine, Cocaine, and Guaranine.*

In the valuable report to which I allude the effect of the injection of Theine and Caffeine into the rabbit indicate very clearly a primary lessened and subsequent increased temperature of the ears, variations rapidly induced by the mode of administration. In all my experiments the alkaloid was given by mouth, and the dose never pushed up to the lethal point. It appears to me, in conclusion, to be a point of great interest, and one suggestive of further observation, that whilst stimulating heat formation Caffeine should differ from Alcohol in retention of heat and addition to body-temperature, and should antagonise so effectually the vast heat-discharge which occurs in the vaso-motor paresis induced by Alcohol. It would be premature to attempt any very definite deductions from the above series of experiments, but I venture to assume they have therapeutic and dietetic indications, which may prove of value.

* See "Report on the Antagonism of Medicines," by J. Hughes Bennett, 1875. Being the Report of the Edin. Committee of the Brit. Med. Association.

Universal experience points to the unfavourable action of Alcohol where retention of body heat is essential; and we even have the verdict of Arctic explorers and others of similar experience and import as to the preference given to tea, coffee, and their allies over spirits as an article of diet, considered from the point of view of conservation of temperature; and although the physiological action of Alcohol may prove of especial value in some cases, we can well conceive those other conditions where its use either therapeutically or dietetically considered cannot fail to prove highly prejudicial.

Prognosis in Cases of Refusal of Food. By HENRY SUTHERLAND, M.D.

"May good digestion wait on appetite, and health on both." So speaks the greatest of our English poets—the immortal Shakespeare.

Who can estimate too highly the blessing of a good appetite? Who is there amongst us who does not feel that loss of appetite is one of the greatest curses that can be inflicted upon suffering humanity? Is not a good appetite the greatest proof that we are in good health? Is not loss of appetite, in however small a degree, an evidence that there is something wrong with us? and is not complete loss of appetite a sure indication of approaching dissolution and death?

The causes of loss of appetite are so various that it is almost impossible to arrange them under any definite heads. All ages are affected by it, from the puking child to the hoary-headed man of fourscore years. Both sexes are liable to it, although as will be shewn the female is more prone to it than is the male.

Civilization undoubtedly increases it, from the fact that more artistically prepared foods excite us first to eat too much and then make us loathe our food from our excesses. Moral and physical causes both play their part in its production. Mental causes are almost innumerable, from the mere loss of appetite due to reasonable grief, down to the insane suicidal attempt of a lunatic to destroy himself by refusal of food under the influence of delusion.

Somatic influences again are equally powerful and varied, sometimes depending upon a mere trifle, such as loss of