EFFECTS OF "DRY" & "MOIST" HEAT UPON BODY TEMPERATURE & BLOOD CONCENTRATION OF DOGS

THE EFFECTS OF "DRY" AND "MOIST" HEAT UPON THE BODY TEMPERATURE AND BLOOD CONCENTRATION OF DOGS.

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A THESIS

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by

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The experiments to be described below were undertaken to study the effects of high temperature with relative humidity high and relative humidity low, on the body temperature and water content of the blood. Barbour and Tolstoi[1] have shown that dogs exposed to cold baths concentrate and when exposed to hot baths dilute their blood. They found that the best bath temperature for obtaining "haemodilution" was about 40°C.; at 38°C. no change took place, while at 42°C. some concentration was evident. In six experiments at the latter temperature the average change in blood solids was +0.4%. They suggested that this "haemoconcentration" may be in effect a regulation against overheating in the same manner as against cooling, the animal reducing the amount of fluid in the peripheral circulation and hence in contact with the unfavourable enviromental temperature.

That the change in blood concentration is a function of the central nervous system is indicated by the fact that the characteristic changes in blood solids do not take place when the cord is transected at the level of the sixth cervical verterbra.

In their experiments Barbour and Tolstoi took no account of the relative humidity of the air, for which reason perhaps the results at higher temperatures were somewhat variable. It was hoped in the present experiments by controlling this humidity factor to establish definitely the conditions

under

under which "haemodilution" and "haemoconcentration" take place in a warm enviroment, and if possible, to indicate the factors involved in producing this variation.

BRIEF REVIEW OF SUBJECT.

Heat regulation and the factors involved in maintaining the normal body temperature at a constant level have been the object of many exhaustive investigations during the past twelve to fifteen years; these investigations were very recently the subject of a review by Barbour(2).

The methods of approach have been as varied as they are numerous, and each in turn has served to indicate, in a measure, the methods by which normal body temperature is maintained. There are so many factors involved that the presence of a co-ordinating centre in the brain was early suggested. While such a centre has not been precisely located and anatomically defined, there is much evidence to indicate its existance. In 1885 Aronsohn & Sachs(3) showed that puncture of the median side of the corpus striatum in the mid-brain of the rabbit caused a considerable rise in the animal's temperature. Barbour(4) further showed that cooling this region resulted in an increase in body temperature and warming a decrease in body temperature; that this area was also responsive to pyretic and antipyretic drugs when locally applied was shown by Barbour and Wing(5), thus caffein and beta-tetrahydronaphtylamin produced a rise in temperature; chloral, antipyrin and quinine produce a fall in body temperature.

The

The methods by which the heat-regulating centre exerts its control is another matter.

A vast literature has grown up around this subject and in a treatise of this kind one can only refer to the result. Generally speaking, the methods by which the body regulates against overcooling or overheating are two, - chemical and physical.

1. Chemical - When the body is cooled below the point where physical regulation suffices, increase in general metabolism takes place with increased heat production. When the body is heated evidence of chemical regulation against the increaded temperature is not clear. Barbour and Prince[6] showed that metabolic processes could be reduced by warming the region of the corpus striatum, on the other hand heating the body seems to increase metabolic processes which in turn tend to produce more heat, a vicious circle thus being established .

2. Physical. - (a) against cooling.

Down to enviromental temperatures of about 15°C., physical regulation suffices to maintain a fairly constant body temperature. This was at first presumed to be due to the redistributuon of blood, the superficial vessels contract driving the blood from the periphery to the deeper parts of the body. Later observation has shown that in addition there is an actual diminution in the volume of the circulating blood; haemoglobin, red cell count and viscosity all increase,

indicating

indicating a loss of fluid to the tissues, since brain and abdominal organs increase in size, a "water shifting" mechanism.

(b) With respect to moderate heating (just above skin temperature) this "water shifting" mechanism works in the opposite direction. There is now a peripheral vasodilation, increase in the water content of the blood with a decrease in the size of the brain and abdominal organs. These observations have been made by Barbour and Tolstoi, Hewlett, Van Zwaluwenberg and Marshall(7), Muller and Veiel, cited in (2), and Strassburger, cited in (2). Further evidence along this line has been adduced by Kestner and his collaborators, cited in (2), upon the effects of exercise, they show that marked exercise with sweating dilutes the blood as indicated by diminished red cell count and decreased haemoglobin. Under very extreme tropical conditions, where the temperature and humidity are high, Young, Breinl, Harris and Osborne(8) found the blood sometimes diluted and sometimes concentrated, when however their subjects were confined in a hot chamber with very high humidity concentration of the blood uniformly occurred.

It is possible that the excessive sweating prevents the actual dilution of the blood, water being evaporated as fast as it flows into the blood stream, or that actual blood concentration occurs. No very definite conclusions can be arrived at from the last described experiments since no two observations were made under indentical conditions, especially in the case of the hot room experiments.

Where

Where the enviromental temperature is high, Berti, cited in (2), has shown a vaso-constriction and an increased viscosity of the blood, Barbour points out in his review that this may be a reaction similar to that produced by cold the decreased blood-flow to the surface protecting the body from the extraordinarily high enviromental temperature. Hunt[9] showed that several litres may be lost by sweating without appreciatively diminishing the water content of the blood. In the experiments of Young and his collaborators with subjects in a hot chamber, where sweating was limited by the high relative humidity an increase of between 2% and 3% in blood solids was noted, the weight lost in one instance being only 506 grams in a 45 kilo subject and only 970 grams in an 89 kilo subject.

If one compares Hunt's experiment, which was carried out in a hot air bath, the temperature of which varied from 60°C to 80°C, amd where very profuse perspiration took place without concentrating the blood, with those of Young, Breinl, Harris and Osborne, where the loss of water by sweating was limited by the high relative humidity and blood concentration observed, it seems reasonable to suppose that the "haemo-concentration" under these conditions is due much more to a protective mechanism than to a simple dehyration of the blood by sweating. Reference to these experiments will be made again later

Experimental Part

EXPERIMENTAL PART.

METHODS.

The hot chamber used in these experiments is a slight modification of that described in catalogue No. 16 of the Chicago Surgical and Electrical Co., the modifications including the addition of one extra stove, arrangement of the ventilating fan to run continuously or intermittently as desired, and a brass tube about ½ centimetre in diameter communicating with the outside, through which steam can be blown when it is desired to raise the humidity of the chamber. The inside dimensions are: length, 1.83 metres; width, 1.2 metres; heigh , 1.96 metres, giving a capacity of 4.3 cu. metres. During the time that no active ventilation is in progress, slow interchange of the air in the cabinet with that on the outside is still possible through the ventilating shafts. This, together with the size of the room indicates that during an experimental period of a few hours the accumulation of CO_2 is not a factor to be considered.

The cabinet contained a wet and dry-bulb thermometer, with a small electric fan behind it, and a wire cage within which the animal was confined. The small fan behind the thermometer was kept running continuously during the experiment, except in afew instances where the heat generated by it tended to raise the temperature of the room above that desired On these occasions it was run for about a minute previous to taking the wet-bulb reading. The animal was shielded from the direct air current by a sheet of cardboard. In the protocols

no

"no ventilation" indicates no active exchange of air with the outside of the chamber, "small fan" indicates that the small fan behind the thermometer was going continuously during the experiment.

The animals used were all short-haired dogs in good condition weighing between 9 and 11 kilograms, they were kept at room temperature varying between 22°C. and 25°C., fasted but allowed water for twenty-four hours before the experiment; during the experiment water was also withdrawn.

The animal was weighed and at hourly or more frequently, half-hourly intervals; duplicate samples of blood were drawn and rectal temperature recorded; the animal was then weighed again and transferred to the hot room where it was kept for periods varying from one to two hours, at half-hour intervals duplicate samples of blood were withdrawn and rectal temperature recorded; after removal of the animal from the hot room it was again weighed and at half-hour intervals duplicate samples of blood were again taken and rectal temperature recorded; at the end of the hour the dog was weighed again.

Determination of Changes in Water Content of the Blood. - It was attempted at the outset to control the variation in water content of the blood as indicated by the blood solids by using the dye method of estimating total blood volume described by Keith, Rowntree and Geraghty[10] and modified by Hooper, Smith , Belt & Whipple[11] and Smith[12] It soon became apparent that this method could not be applied in our experiments and so the blood solids was considered

considered the best criterion of changes in fluid content of the blood. While this method may be open to criticism, there is to-day no method for determining absolute or relative changes in blood volume recognized as faultless.

For determination of blood solids the blood was drawn from the leg vein through a hypodermic needle into a weighed watch glass, immediately covered and weighed, dried at 110°C., then weighed again and the percentage of blood solids calculated. Duplicate samples were found to check with a high degree of accuracy.

EXPERIMENTAL DATA.

To clarify the description of the results, it may be well at the outset to enumerate the four levels of the reaction to warming which were distinguished when the results of the various experiments were analyzed.

(a) Level of no change.

(b) Level of "haemodilution", with no rise in body temperature.

(c) Transition level, no change in blood solids and no significant increase in body temperature, but marked panting.

(d) Level of "haemoconcentration", with marked rise in body temperature.

The experimental data may be conveniantly divided into two parts, 1. Effects of various room temperatures with high relative humidity, 80% to 94%, and

2. Effects of various room temperatures with low relative humidity, 21% to 51%.

HIGH RELATIVE HUMIDITY.

In these experiments the room temperature ranged from 27.8°C. to 41°C.

Level of no Change - No experiments were done at a level in which no change occurred, it is assumed to be at about ordinary room temperature 20°C. to 25°C.

Dilution Level. - Between 27.8°C. and 30°C. the animal rested quietly in the cage, there was no panting, practically no change of body temperature, the blood solids on the other hand showed a decrease ranging from 1. 1% at 27.8°C. to 0.2% at 30°C., there was no loss in body weight. Fig. 1.

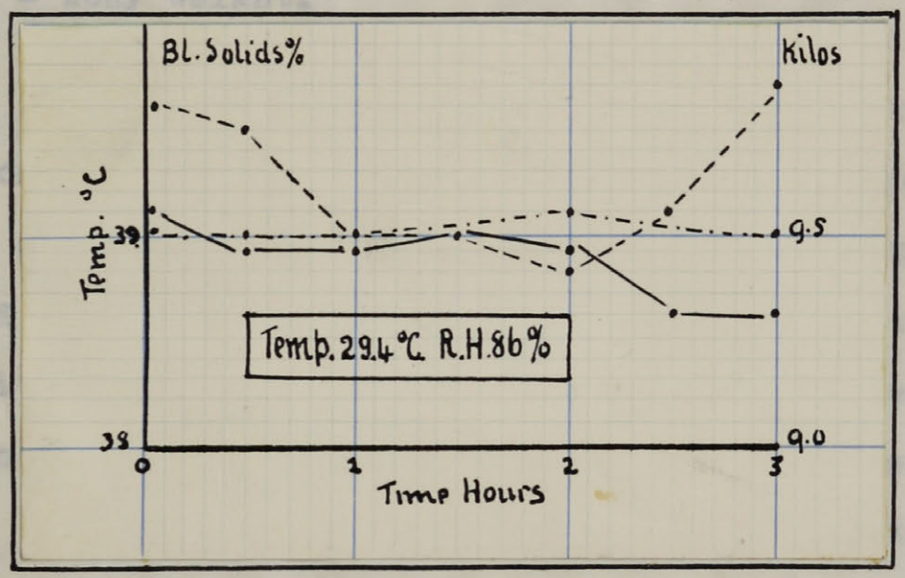

Fig. 1. - Continuous line - body temperature; broken line - percentage blood solids; dots and dashes - body weight.

Transition Level. - Between 30°C. and 33.1°C. there was a moderate degree of panting, practically no change in body temperature and but a slight change in blood solids, a decrease of from 0.1% to 0.2%, practically no change in body weight was noted. Fig. 2.

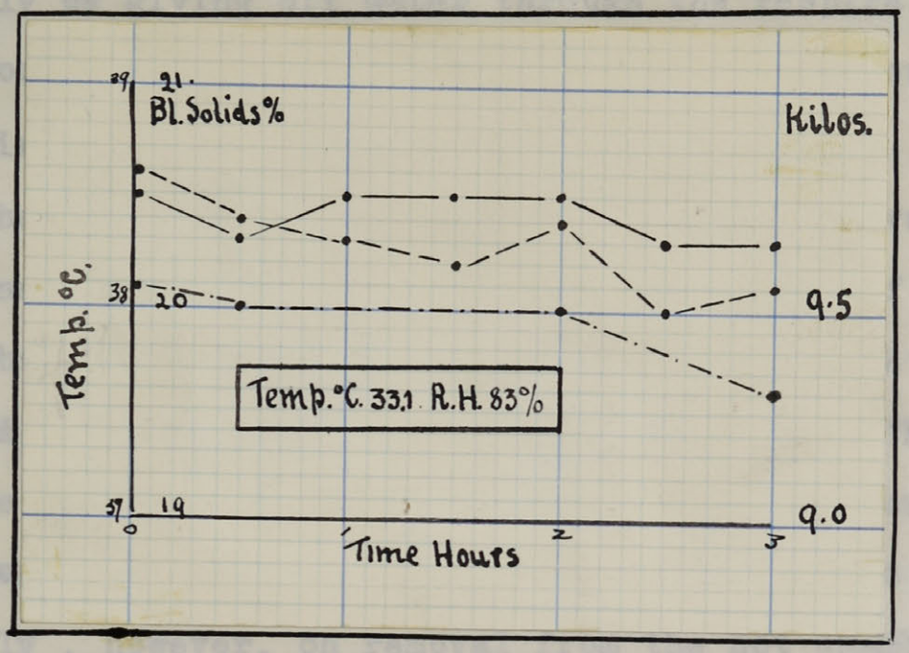

Fig. 2. - Continuous line - body temperature; broken line - percentage blood solids; dots and dashes - body weight.

On removal of the animal from the hot room after both conditions above described, the blood solids invariably showed some degree of concentration. In explanation it might be said that during confinement in the hot room the animal found itself in almost ideal conditions for a state of rest, i.e. an enviroment just a little below body temperature and humid. Consequently on return to ordinary room temperature the reaction is as to cold - the blood concentrates (see experiments 32, 30 and 31, table 2).

Level of Concentration. - When the temperature of the room rose above 33°C., the animal panted very vigourously, the body temperature exhibited a practically poikolothermic rise, in other words, every degree increase in room temperature the animal's temperature one degree. Here the blood solids showed considerable increase, ranging from 2.3% to 3.6%. The animals lost 100 to 300 grams in weight, apparently

apparently by giving off water through the respiratory tract and evaporation from the mucous membrane of the mouth in spite of the air being as saturated as possible.

The body temperature may rise rapidly to over 43.5°C and the animal be on the verge of collapse, and if exposed longer than one hour to one hour and a half, death may occur, as indeed it did in the case of experiment 19. The animal in this case was exposed to saturated air at 41°C. for one hour, amd succumbed one half hour after removal from the hot chamber. Ordinarily , however, on removal from the hot chamber the animal's temperature rapidly fell to normal and coincidentally the blood solids also tended to reach their normal level. Fig.3.

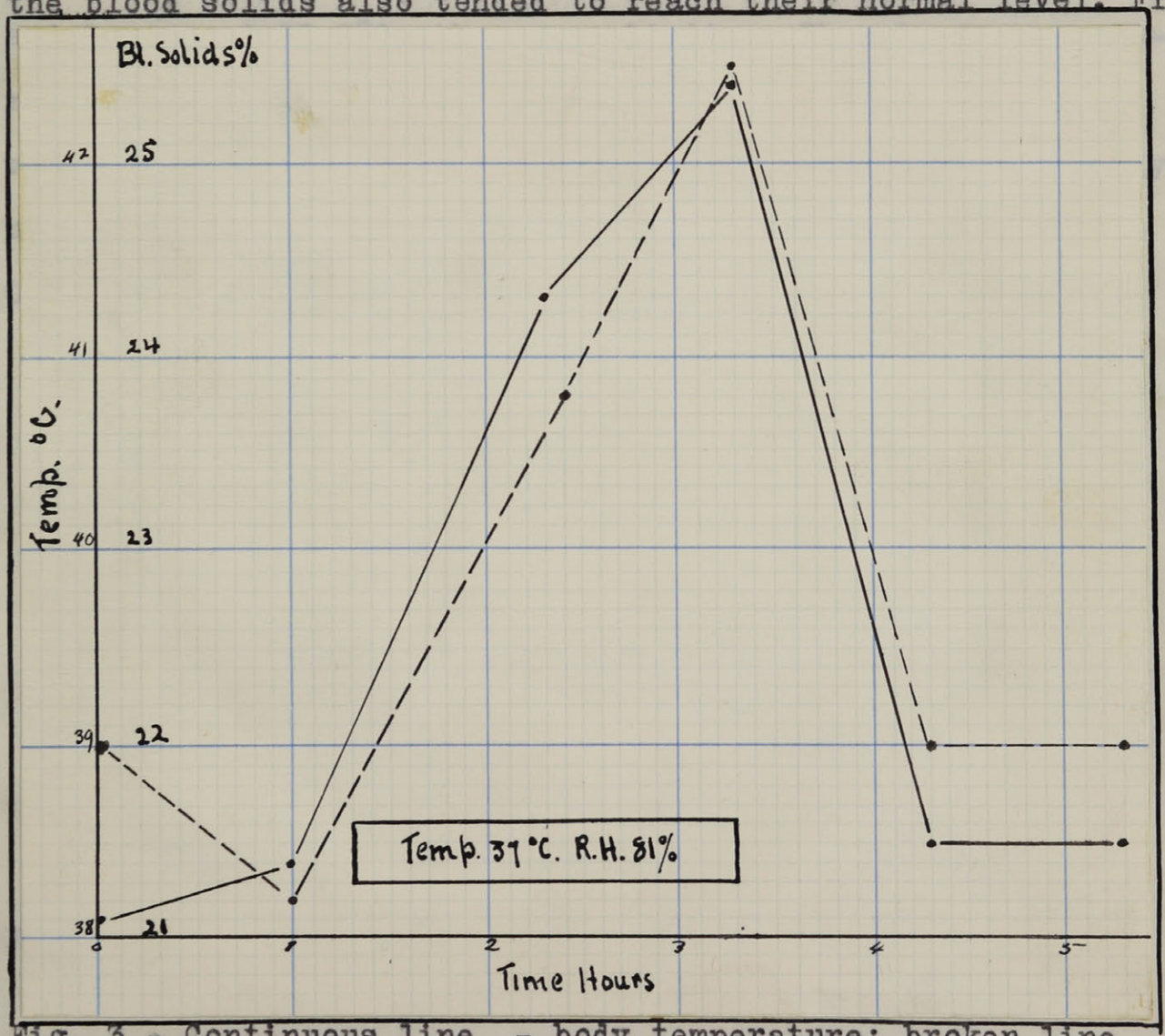

Fig. 3 - Continuous line - body temperature; broken line blood solids.

The data from these experiments are set down in Table 2.

LOW RELATIVE HUMIDITY.

In these experiments the room temperature ranged from 33.5°C. to 54.5°C. It may be stated at the outset that all levels under the conditions of low relative humidity lie in at a higher temperature than at high relative humidity.

Level of no change. - As far as our observations go, this level extends between room temperature of 22°C. and lower and 35.5°C. the upper limit. Thus in two experiments, one at 33.5°C and the other at 35.5°C, there was a very moderate degree of panting, the temperature practically unchanged and the blood solids showed increases of 0.2% and 0.1% respectively, essentially unchanged. Fig. 4.

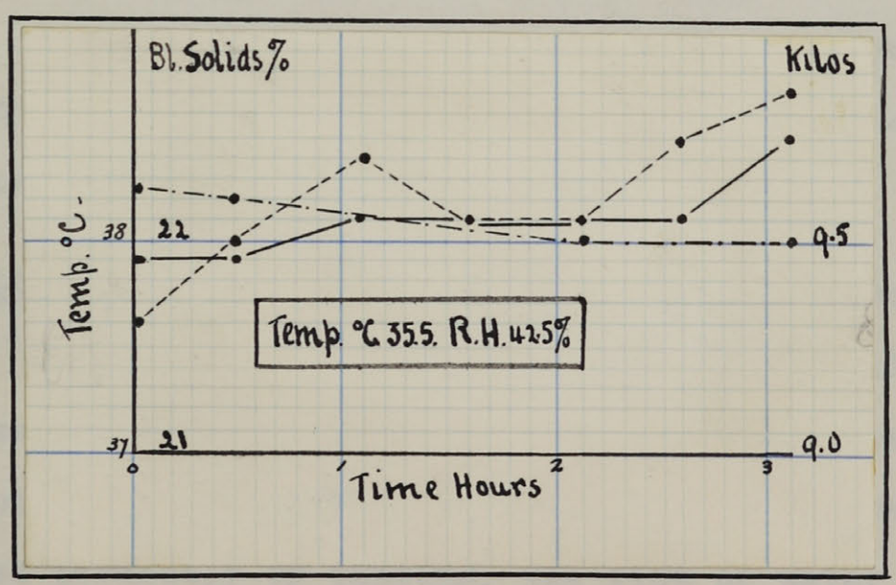

Fig. 4 - Continuous line - body temperature; broken line - blood solids; dots and dashes - body weight.

Dilution

Dilution Level - Between 35.5°C. and 38.8°C., there was a moderate degree of panting, practically no change in body temperature, but a decrease in blood solids of 0.4% in one case and, 0.9% in the other case. Fig. 5.

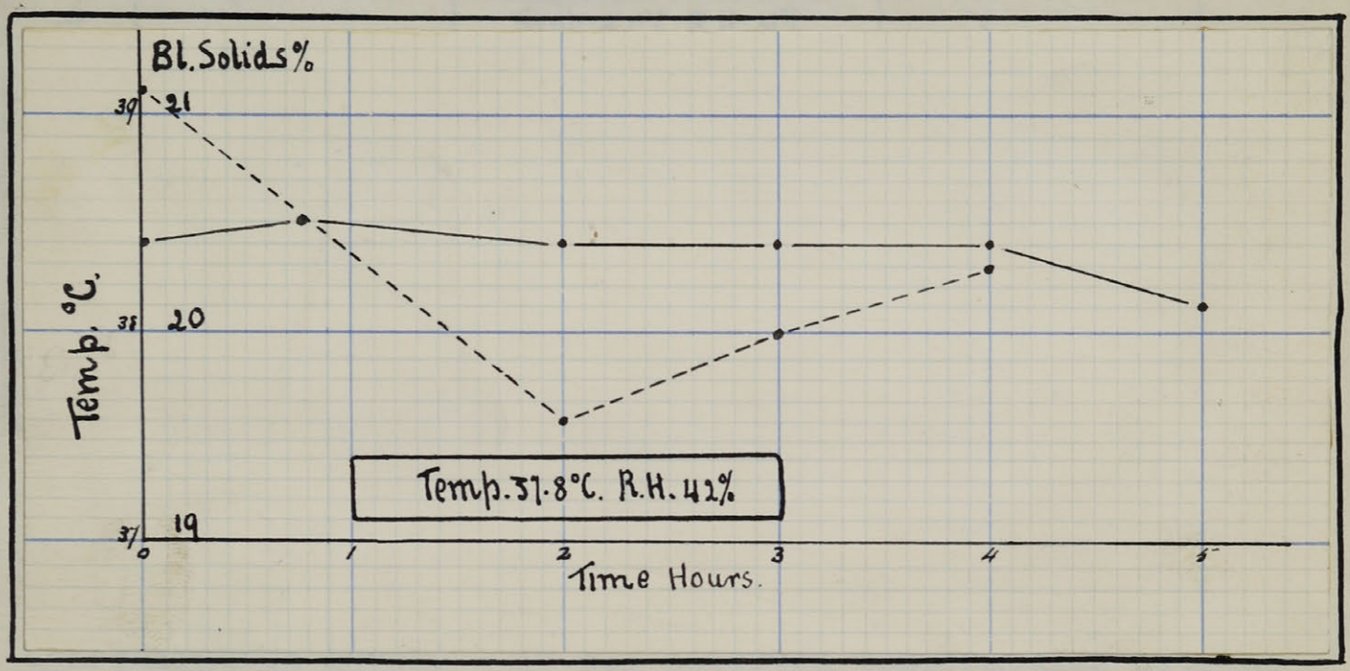

Fig. 5 - Continuous line - body temperature; broken line- blood solids.

In the above two cases, as in those described under the condition of high relative humidity, there was also some blood concentration in the after period.

Transition Level. - This lies in the neighbourhood of 42°C., thus in one experiment at this temperature the animal panted fairly vigourously but the temperature and blood solids were essentially unchanged, the animal apparently regulated perfectly by panting, the flow of water from the tissues to blood stream now being exactly compensated by evaporation. Fig. 6.

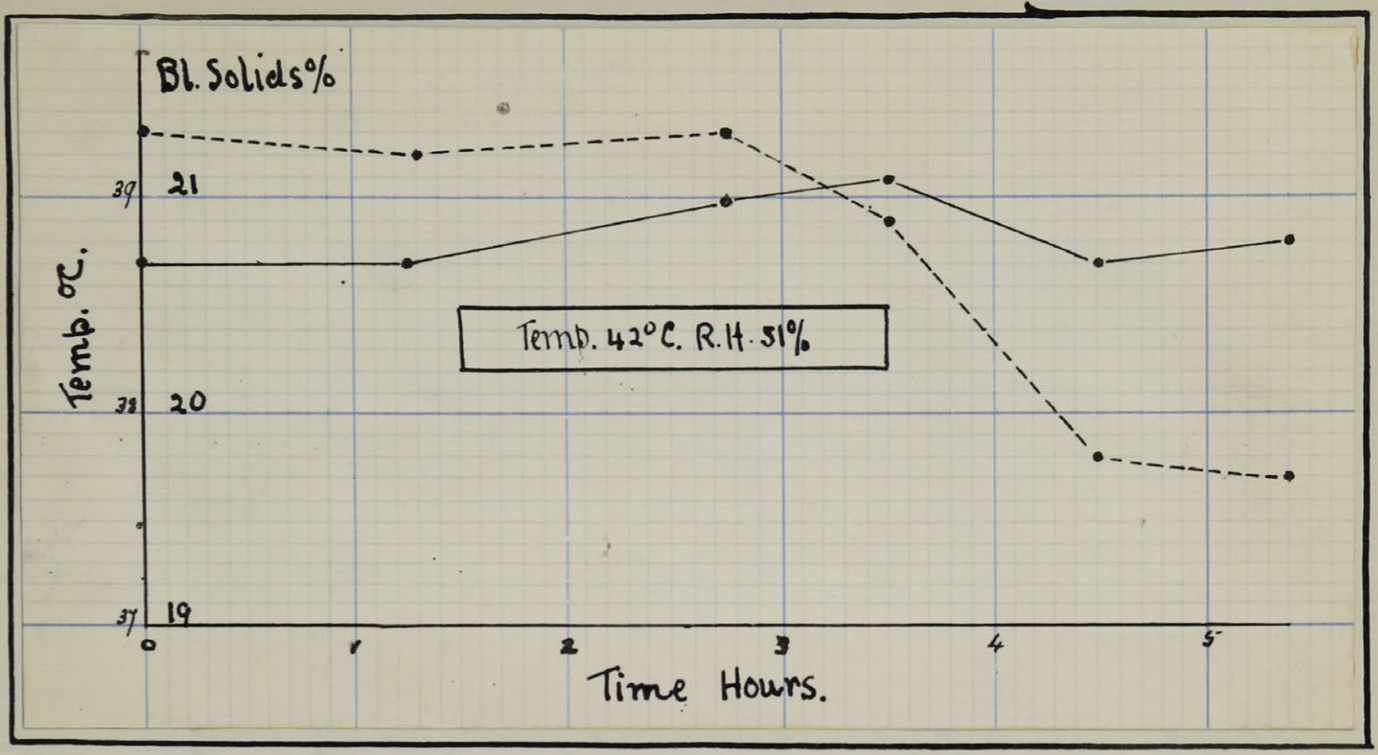

Fig. 6 - Continuous line - body temperature; broken line - blood solids.

Concentration Level. - At all observed temperatures between 42°C. and 54.5°C., there was very vigourous panting, a marked rise in body temperature and a considerable increase in blood solids, 2.8% at 47°C., 3.1% at 50°C., 2.7% at 50°C. and 1.6% at 54.5°C. Under these conditions there was also a loss of 200 to 300 prams in body weight. On return of the animal to ordinary room temperature body temperature rapidly fell to normal and coincidentally the blood solids tended to reach their normal level. Fig. 7.

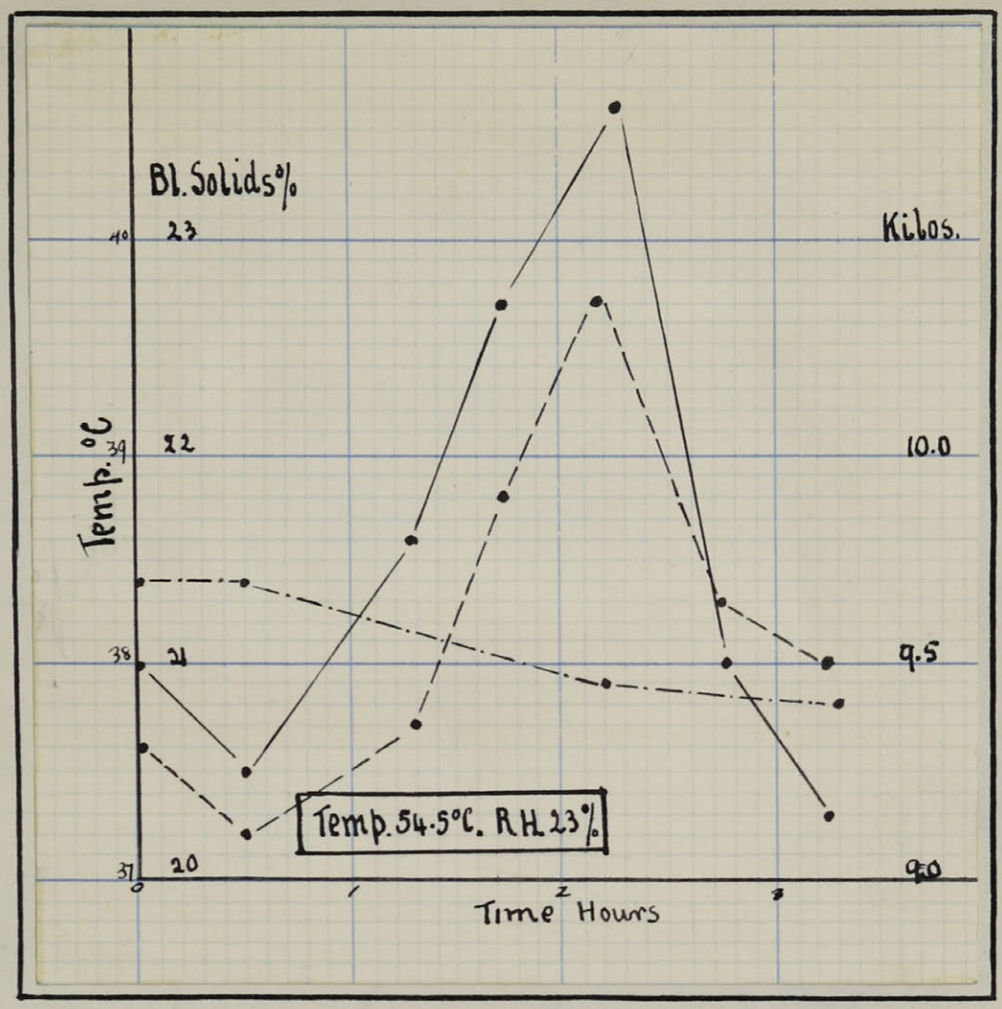

Fig. 7 - Continuous lines - body temperature; broken lines - blood solids; dots and dashed - body weight.

The data from these experiments are set down in Table 1.

THE TEMPERATURE AND BLOOD SOLIDS CURVES FOR "DRY" AND "MOIST" HEAT.

Both groups of experiments are graphically summerized in Figure 8.

In this chart changes in rectal temperature and blood solids percentage are plotted together against variations in enviromental temperatures. The effects recorded are those changes which occurred at the end of one hour's exposure to the room temperature indicated on the abscissa. Points below the abscissa indicate decrease , points above indicate increase.

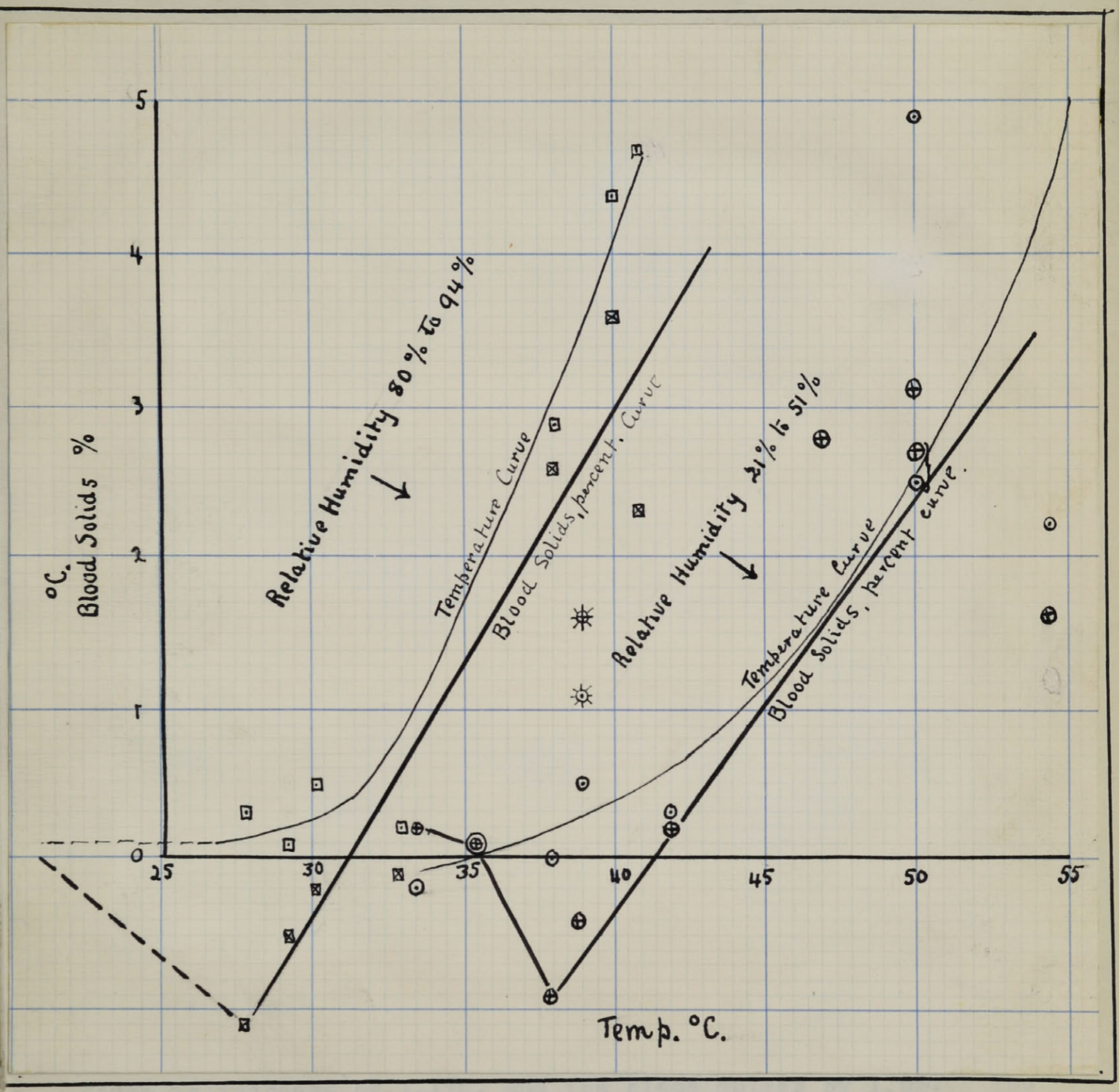

Fig. 8 ⊠-Blood solids %)
⊡-Rectal Temperature) High relative humidity.

⊕-Blood solids %)
⊙-Rectal Temperature) Low relative humidity.

In the "moist" air experiments it will be noticed that where the enviromental temperature ranges between 27°C. and 33°C., the rectal temperature shows variations within normal limits. The blood, however, shows a dilution decreasing from, 1.1% at 27.8°C. to 0.1% at 33°C., above these temperatures the rectal temperature rises rapidly in a practically poikilothermic curve, the blood solids percentage also mounts rapidly, 2.6% at 37°C., 3.6% at 40.5°C., and 2.3% at 41°C.

In the "dry" air experiments it is apparent that between 33°C. and 39°C. the rectal temperature varies within normal limits, but the blood shows dilution, the blood solids showing a decrease of 0.9% at 37.5°C. and of 0.4% at 38.8°C., below these temperatures there is no change. Above 42°C. the rectal temperature rises, the increase varying in extent in different animals, the blood solids percentages also showing a marked increase.

In one experiment, the humidity fell midway between the "dry" and "moist" ranges, the dry bulb being 39.2°C. and the relative humidity 63%. Here the rectal temperature was found to increase by 1.1°C. and the blood solids by 1.6%. The position of these points on the chart(denoted by the asterisks) lies,as would be expected,between the "moist" and "dry" curves #

The temperature of this dog after two hours exposure was increased 1.2°C., 1/10 of a degree higher than shown in the chart, which is the effect after one hour. This is of interest in connection with six experiments of Haldane(13) in 1905 on man made at the same degree of humidity (61%-67%). These subjects were at rest in a room in which the dry bulb temperature varied between 38.9°C. and 40°C. The rise in rectal temperature after two hours exposure would if plotted on our chart fall close to the region of the dog experiment just cited. This shows that the reaction of both man and dog are closely parallel under the given conditions.

Comparing the temperature curves in the "moist" air and that in the "dry" air, it is obvious that in the former no regulation at all takes place in room temperature above 33°C., while in the latter regulation disappears more gradually and at a much higher temperature.

DISCUSSION.

The channels through which a dog may lose heat under moderate conditions of temperature are radiation and conduction from the body and some evaporation from the mucous membrane of the mouth. Under more severe conditions polypnoea comes into play, when the dog will give off much more heat by evaporation of water from the mucous membrane of the mouth and by the respiratory tract.

Our experiments were directed towards closing one or more of these avenues as desired. Thus, firstly, where heat dissipation by radiation and conduction was to be prevented the room temperature was raised above that of the animal's body temperature; secondly, where heat dissipation by evaporation was to be reduced to a minimum, the air was very highly charged with moisture; and thirdly, where all avenues of heat dissipation were to be closed the environmental temperature was raised above that of the body and the air saturated with moisture.

METHODS OF HEAT REGULATION IN THE PRESENCE OF THESE ARTIFICIALLY PRODUCED CONDITIONS.

At environmental temperatures from 22°C. up to 33°C. with low relative humidity, and "moist" air temperatures up to 24°C. the

the animal is not called upon to make any extensive efforts to regulate its body temperature. When the temperature is much below these limits, i. e. when cold, Barbour and Tolstoi have shown that the animal, in part, at least, regulates by "haemoconcentration". Above this range, 33.1°C. "wet" and 38.8°C. "dry", a temperature is reached which closely approximates the animal's body temperature, and were not regulation instituted, its body temperature would rise by virtue of its own metabolism; our experiments tend to show that under these conditions, the animal regulates, in part, by"haemodilution", since in this manner heat dissipation by radiation and conduction is greatly facilitated. This confirms the similar observation of Barbour and Tolstoi on dogs placed in hot baths the temperatures of which range from 41°C., to 42°C.

In man wearing ordinary clothing suitable for temperate climates, Hill, cited by Young, (14) has shown that the "skin-shirt" temperature closely approximates the conditions just discribed above. The obsevations of Kestner and collaborators, cited in (2), that exertion with sweating dilutes blood, may indicate a reaction to the increased temperature resulting from the exertion parallel to that observed in dogs, namely "haemodilution".

When the environmental air temperature rises appreciatively above bodt temperature, 42°C. or higher, the body temperature rises and the blood concentrates. ##

This may seem a discrepancy when compared with the observations of Barbour and Tolstoi in dogs in hot baths, but it really is not so. In their experiments the animals had been exposed to the air so that the mean temperature to which the the entire animal was exposed was considerably below that of the hot bath.

Does this blood concentration at high temperature levels represent only the effect of removal of water from the blood by evaporation, or is it due, in a measure, to some protective mechanism which tends to shift water from the blood to the tissues and so reduce the amount of fluid exposed to the hot external environment? We know that the animal as a whole does not become dried out, and retains in fact a surplus of water for the blood solids tend to return to normal with the temperature after the animal is removed from the hot room . This indicates that the blood concentration is not necessarily passive and further evidence may be adduced from the work of certain investigators on man from two points of view.

On the one hand great loss of fluid may not deplete the blood of water, thus Hunt has shown that a man may lose as much as 2.5 kilograms through sweating and yet not alter the fluid content of the blood. His subject was exposed to "dry" heat varying between 60°C. and 84°C. No record of body temperature was taken, but by the haemoglobin method no change in blood concentration was evident. On the other hand, considerable loss of water from the blood may occur with relatively little dehydration of the body as a whole. Young, Breinl, Harris, and Osborne have shown that the blood concentrated in men who were exposed to high temperatures with high relative humidity and hence where evaporation from the body was limited. Why then do not dogs, when exposed to "dry" heat, also maintain constant blood concentration? Considering that the evaporating surface of man is both relatively amd absolutely many times greater that that of dogs, it might be assumed that the animal concentrates its blood because it needs further means of protection against heat. Since

Since the animal in the hot chamber loses weight by evaporation of water, proof that the observed "haemoconcentration" is due to something besides loss of water from the blood to the air is still needed. It was hoped that by saturating the air of the hot room with moisture the animal could be prevented from losing water by evaporation. This, however, we were unable to accomplish since even when the moisture was condensing on the walls of the cabinet the animal was still able to lose weight by blowing off water, so that whether or not the blood concentration in dogs at high temperature is due to actual shifting of water from blood to tissues or mere passive dehydration of the blood still remains to be definitely determined.

CONCLUSIONS.

1. In "moist" air temperatures between 27°C. and 30°C. and in "dry" air temperatures between 37°C. and 39°C. dogs, in a measure, regulate body temperature by "haemodilution".

2. In "moist" air temperatures above 33°C. dogs are unable to regulate body temperature, the animal becoming practically poikilothermic, under these conditions marked blood concentration occurs.

3. In "dry" air temperatures above 42°C. dogs regulate body temperature very imperfectly, the body temperature rises with marked concentration of the blood.

4. It is suggested that the blood concentration observed in 2 and 3 may be ascribed in part to a protective mechanism

mechanism rather than merely to excessive blood dehydration, due to loss of water by sweating. The only positive evidence for this, however, is that the tissues are not dehydrated simultaneously with the blood.

I am pleased to express to Professor H. G. Barbour, who suggested this research and supervised its execution, my deep sense of gratitude for his interest and encouragement.

TABLE I.

EFFECTS OF VARIOUS ROOM TEMPERATURES WITH LOW HUMIDITY (21% - 51%) ON BODY TEMPERATURE AND BLOOD SOLIDS OF DOGS.

Experiment No.	27‡	28‡	8‡	7‡	6†	5†	23†	22†	26†
Temp. °C. of hot room.	33.5	35.5	37.8	38.8	42.0	47.0	50.0	50.0	54.5
Normal temp. °C. of animal.	37,8	37.9	38.4	39.6	38.7	38.1	38.5	38.8	37.5
Temp. °C. of animal after one hour's exposure in hot room.	37.6	38.0	38.4	40.1	39.0	?	43.4	41.3	39.7
Net change in animal's temp. °C. after one hour's exposure in hot room.	-0.2	+0.1	0	+0.5	+0.3	-	+4.9	+2.5	+2.2
Temp. °C. of animal one hour after return to ordinary room temp. °C.	37.6	38.5	38.4	38.7	38.1	?	38.5	37.3	37.3
Normal blood solids %.	21.0	22.0	20.5	21.4	21.1	19.8	20.4	20.3	20.2
Blood solids after one hour's exposure in hot room.	21.2	22.1	19.6	20.9	21.3	22.8	23.5	23.0	21.8
Net change in blood solids after one hour's exposure in hot room.	+0.2	+0.1	-0.9	-0.4	+0.2	+2.8	+3.1	+2.7	+1.6
Blood solids one hour after return to ordinary room temp.	20.8	22.7	20.3	21.2	19.8	24.9	21.1	21.1	21.0

† Animal panted very vigorously during period in hot room.

‡ Moderate to intermittent panting during period in hot room.

TABLE II.

EFFECTS OF VARIOUS ROOM TEMPERATURES WITH HIGH HUMIDITY (80% - 94%) ON BODY TEMPERATURE AND BLOOD SOLIDS OF DOGS.

Experiment No.	32‖	30‖	31‡	29‡	18†	25†	19#†	
Temp. °C. of hot room.	27.8	29.4	30.2	33.1	37.0	40.1	41.0	
Normal temp. °C. of animal.	38.4	38.9	38.4	38.3	38.4	38.4	39.0	
Temp. °C. of animal after one hour's exposure in hot room.	38.7	39.0	38.9	38.5	41.3	42.8	43.3	
Net change in animal's temp. °C. after one hour's exposure in hot room.	+0.3	+0.1	+0.5	+0.2	2.9	4.4	+4,7	
Temp. °C. of animal one hour after return to ordinary room temp.	38.4	38.6	38.6	38.3	38.5	38.7		
Normal blood solids %.	20.0	20.5	19.4	20.3	21.2	18.6	22.5	
Blood solids % after one hour's exposure in hot room.	18.9	20.0	19.2	20.2	23.8	22.4	24.8	
Net change in blood solids % after one hour's exposure in hot room.	-1.1	-0.5	-0.2	-0.1	+2.6	+3.6	+2.3	
Blood solids % one hour after return to ordinary room temp.	20.4	20.7	21.7	20.1	22.0	20.7		

#Dog died half an hour after removal from hot room.

† Animal panted very vigorously during period in hot room.

‡ Moderate to intermittent panting during period in hot room.

‖ No panting.

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APPENDIX

PROTOCOLS.

February 13, 1923.

Experiment No.5.

Dog No.25. Description: Male brown mongrel, short haired.

Weight: 8 Kg.

2.30 p.m. 4 c.c. 1% Brilliant vital red intravenously.

February 14, 1923.

Time.	Room Temp. D. B. °C.	Room Temp. W. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per cent.
10.30	20.5	[illegible]		38.1	30.1795 28.3075	31.053 29.2775	30.367) 28.5203)	
11.30	20.5			38.1	28.3889 23.0956	29.5475 24.4317	28.617) 23.3602)	19.8
12.30	47.0		?		23.6133	24.9977	23.9267)	22.6
1.30	47.0				23.1468	25.295	23.6778	24.7
2.30	21.5				5.7436 6.9424	6.3352 7.4762	5.893) 7.077)	25.4
3.30	21.5				6.5206	7.2070	6.6914)	24.9

Note: No ventilation.

February 17, 1923.

Experiment No.6.

Dog No.30. Description: Female black mongrel, short haired

Weight: 13.6 Kg.

11.00 a.m. 6.8 c.c. 1% Brilliant vital red intravenously.

February 18, 1923.

Time.	Room Temp. D. B. °C.	Room Temp. W. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per Cent.
10.45	25.1	14.8		38.4	28.3075 30.1795	30.7405 32.8223	28.829) 30.7428)	21.3
12.00	24.8	14.8		38.4	23.0956	23.641	23.2108)	21.1
1.30	42.5	31.0			28.3889 23.6133	29.370 24.773	28.5979) 23.8604)	21.3
2.15	41.4	31.5	51	38.9	23.1468 40.9763	25.0623 44.164	23.5516) 41.6369)	20.9
3.15	25.0	14.8			31.5822 26.3567	33.4163 28.5893	31.9508) 26.8022)	19.8
4.15	24.8	15.0		38.0	11.8868 12.1838	13.195 13.5576	12.1464) 12.4532)	19.7

February 19, 1923.

Experiment No.7.

Dog No.31. Description: Male black mongrel.

Weight: 9.515 Kg.

12. noon. 2.5 c.c. 1% Brilliant vital red intravenously.

February 20, 1923.

Time.	Room Temp. D. B.	Room Temp. W. B.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per cent.
1.00	22.5	13.5		39.6	28.3075 23.0956	29.8151 24.8735	28.635) 23.4761)	21.5
2.00	22.0	13.5		39.6	23.6133 ~~23.1468~~ 23.1468	24.66 ~~24.588~~ 24.588	23.7713) ~~23.4465)~~ 23.4465)	21.4
3.00	38.8	?.0		40.2	28.3889	30.2808	28.7886)	20.9
4.15	38.5	?.0	?	39.7	40.9763 26.3567	43.4608 29.2007	41.5089) 26.9618)	21.3
5.00	21.4	13.5		38.5	11.8868 12.1838	13.5518 13.6308	12.2407) 12.491)	21.2
6.15	21.8	14.0		38.4	31.5822 26.2377	34.4728 27.378	32.1933) 26.476)	21.0

Note: Panting during period in hot room.

February 21, 1923.

Experiment No.8.

Dog No.55. Description: Female black mongrel, short haired.

Weight: 11.4 Kg.

6.20 p.m. 5.7 c.c. 1% Brilliant vital red intravenously.

February 22, 1923.

Time.	Room Temp. D. B. °C.	Room Temp. W. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per cent.
1.00	24.0	14.5		38.4	11.8868 12.1838	13.0022 13.545	12.1233) 12.4714)	21.1
1.45	24.0	14.5		38.5	23.1468 23.0956	24.3915 24.5007	23.4023) 23.3865)	20.5
2.15	37.8	19.6		Dog in hot room.				
3.00	37.8	20.6	42		23.6133 26.2377	25.6379 28.531	24.0132) 26.6874)	19.6
4.00	37.9	20.6		38.4	28.3889 28.3075	29.502 29.818	28.6122) 28.6083)	20.0
4.15				Dog out.				
5.00	24.0	14.0		38.4	40.9763 31.5822	42.1426 33.0727	41.2118) 31.8886)	20.3
6.00	24.0	14.5		37.8	6.3793 6.1532	6.882 6.841	6.4689) 6.2864)	17.8 19.2

Note:

Panting during confinement in hot room.

February 28, 1923.

Experiment No.13.

Dog No.55. Description: Female black mongrel, short haired.

Weight: 11.4 Kg.

5.30 p.m. 5.7 c.c. 1% Brilliant vital red intravenously after withdrawal of blood sample.

March 1, 1923.

Time.	Room Temp. D.B. °C.	Room Temp. W. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet Wt. of Covers. Grams.	Wt. of Blood dry Wt. of Covers. Grams.	Blood Solids Per cent.
11.30	25.2	15.1		38.1	28.3075 23.1468	29.917 24.788	28.6269) 23.4756)	19.9
12.45				38.1	23.6133 28.3889	25.2185 29.7185	23.9148) 28.6359)	18.7
1.00	39.1	22.0		Dog in hot room				
2.00	39.0	23.0	66	38.5	23.0956 26.2377	24.7238 27.6283	23.4127) 26.511)	19.5
3.00	39.1	24.8		38.4	11.8868 12.1838	13.1923 13.8255	12.1414) 12.5047)	19.5
4.00	25.2	15.1			6.9829 6.2483	7.5404 7.031	7.083) 6.3897)	18.0
5.00	24.6	15.0		38.1	7.7166 7.244	8.2004 7.8955	7.8019) 7.3588)	17.6

Notes:

1. Moderate panting while in hot room.

2. Intermittent ventilation, small fan.

March 5, 1923.

Experiment No.14.

Dog No.55. Description: Female black mongrel, short haired

Weight: 10.4 Kg.

4.30 p.m. 5.2 c.c. 1% Brilliant vital red intravenously.

March 6, 1923.

Time.	Room Temp. Dr B. °C.	Room Temp. W. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per cent.
11.15	23.0	31.2		38.4	6.2483 6.9829	7.2441 7.656	6.4336) 7.1064)	18.5
12.15	23.0	31.2		38.5	7.244 7.7166	7.7586 8.5200	7.3395) 7.864)	18.4
12.30				Dog in hot room				
1.30	39.2	32.8	63	39.6	23.0956 23.6133	25.0662 25.4545	23.4888) 23.9857)	20.0
2.40	38.5	31.2		39.6	28.3889 28.3075	30.8700 30.8028	28.8514) 28.7758)	18.7
3.40	23.0	31.2		38.7	23.1468 26.2377	24.8265 28.127	23.445) 26.5765)	17.5
4.40	23.0	31.2		38.4	11.8868 12.1838	13.0437 13.4505	12.0895) 12.404)	17.4

Notes:

1. Severe panting during confinement in hot chamber.

2. No ventilation, small fan.

March 12, 1923.

Experiment No.18.

Dog No.65.

Weight: 12 Kg.

4.00 p.m. 6 c.c. 1% Brilliant vital red intravenously.

March 13, 1923.

Time.	Room Temp. D. B. °C.	Room Temp. W. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per cent.
1.00	21.0	14.2		38.1	6.5685 5.6852	7.2606 6.3558	6.7226) 5.8317)	22.0
2.00	21.0	14.2		38.4	6.1533 5.5285	6.7971 6.3777	6.2916) 5.7109)	21.2
2.20	36.5	33.0		Dog in hot room panting.				
3.20	37.0	34.0		41.3	11.8868 12.1838	12.6260 13.3466	12.0626) 12.4584)	23.8
4.20	37.5	35.5	81	42.4	23.0956 26.2377	24.3944 27.872	23.4262) 26.6582)	25.5
5.20	21.0	14.4		38.5	28.3889 28.3075	30.2555 30.3855	28.7995) 28.7645)	22.0
6.00	21.0	14.4		38.5	26.6587 23.1468	27.6522 24.5745	26.8775) 23.4625)	22.0

Notes:

1. Severe panting during period in hot room.

2. No ventilation, small fan.

March 15, 1923.

Experiment No.19.

Dog No.67. Description: Male brown mongrel, short haired.

Time: Weight: 10.8 Kg.

Time.	Room Temp. D. B. °C.	Room Temp. W. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per cent.
1.00	22.5	14.2		38.3	6.7614 5.8282	7.2320 6.1750	6.8683) 5.9084)	22.9
2.30	22.5	14.2		38.7	6.6740 7.6276	6.9355 8.3075	6.7327) lost)	22.5
3,00	41.	37.5	83		Dog in hot room.			
3.30	41.	38.2		43.3	6.0189 7.7340	6.5867 8.4940	6.1594) 7.9244)	24.8
4.00	40.2	37.0		43.3	6.3957 6.2482	6.7525 6.7875	6.486) 6.3813)	25.0

Notes:

1. Very severe panting throughout period in hot chamber. At 4.00 p.m. animal in state of collapse. Died at 4.35.

2. Autopsy showed haemorrhages at base of lungs.

3. No ventilation, small fan.

March 17, 1923.

Experiment No.20.

Dog No.64. Description: Female mongrel, short haired.

Time: 11.00 a.m. Weight: 14 Kg.

Time.	Room Temp. D. B. °C.	Room Temp. W. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per cent.
T1.15	21.7	14.		38.8	6.5685 5.6852	7.2715 6.2035	6.7407) 5.8120)	24.0
11.45	21.7	14.		39.0	6.3377 6.9835	6.8788 7.8208	6.4692) 7.1877)	24.4
12.05	41.0	37.)			Dog in hot room			
		)	82	42.7	(5.5285	6.1386	5.6808)	24.9
12.35	40.5	37.5)			(6.1533	6.7971	6.3133)	
1.00	22.0	14.0		39.7	(7.2443 (7.3429	7.9698 8.0950	7.4248) 7.5327)	25.0
1.30	22.0	14.0		38.8	(7.7166 (6.9831	8.3170 7.7577	7.8632) 7.1725)	24.4

Notes:

1. Very severe panting during period in hot room which continued for 30 minutes after removal.

2. No ventilation, small fan.

3. Dog had an abnormally high blood solid at start.

March 20, 1923.

Experiment No.21.

Dog No.64. Description: Female mongrel, short haired.

Weight: 14 Kg.

Time.	Room Temp. D. B. °C.	Room Temp. W. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per cent.
1.00	22.0	13.0		38.5	6.3957 6.0189	6.8211 6.5846	6.4970) 6.1524)	23.7
1.30	22.0	14.0		38.5	6.0740 7.3672	7.4125 7.9346	6.8476) 7.5025)	23.65
1.40	51.	25.		Dog in hot room			Weight	14.00 Kg.
2.20	50.8	27.6	21	43.3	12.1838 11.8868	12.7434 12.4498	12.3242) 12.0305)	25.2

Notes:

1. Very severe panting.
2. Dog died 2.25 p.m.
3. No ventilation, small fan.

March 22, 1923.

Experiment No.22.

Dog No.28. Description: Male mongrel.

Time: 2.30 p.m. Weight: 11.8 Kg.

Time.	Room Temp. D. B. °C.	Room Temp. W. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per cent.
2.45	22.	17.		38.8	5.5285 6.5685	5.9368 7.2580	5.6133) 6.7155)	21.0
3.15	22.	17.		38.8	7.3672 7.7166	8.0243 8.3800	7.5008) 7.8514)	20.3
3.20	50.3	27.4		Dog in hot room			Weight	11.8 Kg.
3.50	50.0	28.5	22	40.6	5.6852 6.9831	6.3031 7.5061	5.8207) 7.0978)	21.9
4.15	49.4 (Dog out. Weight 11.59 Kg. stool	30.6		41.3	6.1533 7.2443	6.856 7.901	6.3134) 7.3972)	23.0
4.45	22.0	17.		39.1	7.1494 7.3429	8.0102 8.2725	7.3333) 7.5410)	21.3
5.15				38.8	6.7614 5.8282	7.3463 6.3835	6.8857) 5.9445)	21.1

Notes:

1. Very severe panting during period in hot room, this persisted for 40 minutes after removal.

2. Dog passed stool just previous to being weighed.

3. No ventilation, small fan.

March 24, 1923.

Experiment No.23.

Dog. No.25. Description: Male brown mongrel, short haired.

Time: 10.10 a.m. Weight: 11.75 Kg.

Time.	Room Temp. D. B. °C.	Room Temp. W. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per cent.
10.15	50.	36.4		38.5	6.5685 5.6852	7.4518 6.4132	6.7495) 5.8313)	20.3
10.45	50.	36.4		38.5	7.3429 6.3570	8.2625 6.9670	7.5345) 6.4808)	20.4
11.00	53.5	31.		Dog in hot room			Weight	11.6 Kg.
12.00	50.	36.4))	39	43.4	5.5285 7.7166	6.4920 8.6195	5.7547) 7.9300)	23.5
12.10	50.	36.4		Dog out			Weight	11.260 Kg.
12.30	50.	36.4		39.8	6.7259 6.8368	7.5720 7.6730	6.9285) 7.0382)	24.0
1.00	50.	36.4		38.5	7.3764 6.1533	8.0769 7.0777	7.5455) 6.3770)	24.1
							Weight	11.02 Kg.

Notes:

1. Very severe panting; animal on verge of collapse; one removal from hot room.
2. Animal struggled very violently at each attempt to obtain a blood smaple.
3. Animal passed a stool just previous to being weighed after removal from hot room.
4. No ventilation, small fan.

March 27, 1923.

Experiment No.24.

Dog No.70. Description: Female mongrel, short haired.

Time: 2.00 p.m. Weight: 6.602 Kg.

Time.	Room Temp. D. B. °C.	Room Temp. W. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per cent.
2.00	23.0	36.6		38.8	7.3672 6.5685	7.6930 7.5107	7.4384) 6.7745)	21.8
2.30	23.0	36.6		39.2	6.1533 7.7166	6.6428 8.1779	6.2595) 7.8153)	21.6
2.45	41.4	38.9		Dog in hot room			Weight	6.601 Kg.
3.15	41.0	38.7		42.6	7.3429 7.3764	8.0107 8.3300	7.4867) 7.5808)	21.5
3.30	40.5	36.6	81	42.6	5.6852 6.3570	6.4537 7.1432	5.8488) 6.5242)	21.3
				Dog out			Weight	6.55 Kg.
4.10	23.0	36.6		39.6	5.8282 6.9831	6.5870 7.7722	5.9860) 7.1464)	20.8
4.40	23.0	36.6		39.8	12.1838 11.8868	13.3250 12.8700	12.4245) 12.0905)	20.9
							Weight	6.280 Kg.

Notes:

1. Severe panting.
2. No ventilation, small fan.
3. Animal on removal from hot room in very poor condition, passed several bloody stools; refused water at end of experimental period.

March 29, 1923.

Experiment No.25.

Dog No.55. Description: Female black mongrel, short haired

Time: 1.30 p.m. Weight: 10.480 Kg.

Time.	Room Temp. D. B. °C.	Room Temp. W. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per cent.
1.50	23.0	13.5		38.0	6.5685 7.3429	7.1933 8.0658	6.6950) 7.4774)	18.6
2.20	23.0	13.5		38.4	7.7166 6.1533	8.5434 7.0790	7.8711) 6.3254)	18.6
2.30	40.8	40.0		Dog in hot room			Weight	10.480 Kg.
3.00	40.1	39.5)))	93	41.3	5.6172 6.4252	6.3288 7.4710	5.7755) 6.6578)	22.2
3.30	39.4	37.4)		42.8	11.8868 12.1838	12.7316 13.0588	12.0766) 12.3790)	22.4
				Dog out			Weight	10.360 Kg.
4.00	23.0	13.5		38.7	5.8282 6.9831	6.6030 7.8225	5.9995) 7.1640)	21.8
					7.3672 7.3764	8.1566 8.2303	7.5302) 7.5537)	20.7
							Weight	10.070 Kg.

Notes:

1. Severe panting while in hot room and for about 20 minutes after. Animal in good condition after being taken out.

2. No ventilation, small fan.

3. Dog passed stool 100-200 Gms. just previous to last weighing.

April 2, 1923.

Experiment No.26.

Dog No.55. Description: Female black mongrel, short haired

Time: 2.30 p.m. Weight: 10.17 Kg.

Time.	Room Temp. D. B. °C.	Room Temp. W. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per cent.
2.30	23.0	14.8		38.0	5.8282 6.9831	6.6026 7.8517	5.9889) 7.1613)	20.6
3.00	23.0	14.8		37.5	7.3429 7.7166	8.020 8.7075	7.4795) 7.9165)	20.2
3.15	51.	32.8		Dog in hot room			Weight	10.17 Kg.
3.45	54.5	31.2)		38.6	6.1533 7.3672	6.9786 8.3420	6.3245) 7.5690)	20.7
4.15	54.5	33.4)	23	39.7	8.0413 7.3764	8.8888 8.3655	8.2260) 7.5908)	21.8
4.45	54.5	33.4)		40.6	5.6852 6.5685	6.5050 7.4022	5.8712) 6.7585)	22.7
				Dog out			Weight	9.950 Kg.
5.15	23.0	14.8		38.0	6.3570 6.3377	7.4070 7.5010	6.5815) 6.5864)	21.3
5.45	23.0	14.8		37.3	7.4415 7.7340	8.3203 8.7205	7.6255) 7.9418)	21.0
							Weight	9.940 Kg.

Notes:

1. Severe panting during confinement in hot room and for half an hour after being taken out.

2. No ventilation, small fan.

April 5, 1923.

Experiment No.27.

Dog No.55. Description: Female mongrel, short haired.

Time: 1.30 p.m. Weight: 9.65 Kg.

Time.	Room Temp. D.B. °C.	Room Temp. W. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per cent.
1.30	23.5	18.5		37.9	6.1533 5.8282	6.9502 6.9005	6.3252) 6.0588)	21.5
2.00	23.5	18.5		37.8	7.7166 8.0413	8.5727 8.8633	7.8978) 8.2125)	21.0
2.10	33.	22.		Dog in hot room			Weight	9.650 Kg.
2.40	33.5	23.1)		37.5	7.3764 7.3672	8.2115 8.2255	7.5561) 7.5521)	21.5
3.10	33.5 slight panting	24.4)	44	37.6	7.7340 6.3377	8.4930 7.2066	7.8948) 6.5217)	21.2
3.45	33.5	25.2)		37.6	6.9831 6.5685	8.0440 7.7946	7.2076) 6.8259)	21.1
				Dog out			Weight	9.600 Kg.
4.15	23.5	18.5		37.6	7.4415 7.3429	8.4337 8.3928	7.6483) 7.5625)	20.1
4.45	23.5	18.5		37.6	6.3570 5.6852	7.1452 6.6602	6.5317) 5.8878)	20.8
							Weight	9.450 Kg.

Notes:

1. Moderate panting.

2. No ventilation, small fan.

April 7,1923.

Experiment No.28.

Dog. No.55. Description: Female black mongrel, short haired.

Time: 10.30 a.m. Weight: 9.62 Kg.

Time.	Room Temp. D. B. °C.	Room Temp. W. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per cent.
11.00	25.0	16.8		37.9	5.6852 7.7340	6.4552 8.4572	5.8522) 7.8914)	21.6
11.30	25.0	16.8		37.9	6.3377 7.3429	6.9850 8.2492	6.4802) 7.5425)	22.0
11.35	36.2	23.5		Dog in chamber			Weight	9.600 Kg.
12.05	35.5	24.6)))		38.0	7.4415	8.1560	) 7.6019))	22.4
12.35	35.5	25.2)))	42.5	38.0	6.5685 7.7166	7.4305 8.6723	6.7603) 7.9272))	22.1
1.05	35.0	25.6)		38.0	8.0413 6.9839	9.3035 7.9755	8.3219) 7.2035)	22.1
				Dog out			Weight	9.540 Kg.
1.45	25.0	16.8		38.0	7.3672 6.1533	8.4165 6.9992	7.6025) 6.3430))	22.4
2.45	25.0	16.8		38.5	7.3764 5.8282	8.5050 6.6195	7.6327) 6.0092)	22.7
3.00							Weight	9.500 Kg.

Notes:

1. Moderate panting.

2. No ventilation, small fan.

April 10, 1923.

Experiment No.29.

Dog No.55. Description: Female black mongrel, short haired.

Time: 1.40 p.m. Weight: 9.530Kg.

Time.	Room Temp. D. B. °C.	Room Temp. W. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per cent.
2.00	24.5	14.0		38.5	6.3570 7.7340	7.1275 8.6008	6.5153) 7.9140)	20.6
2.30				38.3	6.3377 7.3672	7.3365 8.3822	6.5402) 7.5735)	20.3
2.45	32.5	30.4		Dog in hot room			Weight	9.500 Kg.
3.15	32.8	30.4		38.5	7.3764 6.9831	8.0995 8.2277	7.5225) 7.2365)	20.3
3.45	33.1	31.0	83	38.5	5.6852 6.5685	6.5995 7.4601	5.8686) 6.7486)	20.2
4.15	33.2	30.4		38.5	7.3429 5.8282	8.2285 6.6730	7.5232) 6.0010)	20.4
				Dog out			Weight	9.500 Kg.
4.45	24.5	13.8		38.3	7.7166 8.0413	8.7315 9.2773	7.9195) 8.2891)	20.0
5.15	24.5	13.8		38.3	6.1533 7.4415	7.0334 8.4145	6.3327) 7.6382)	20.1
							Weight	9.300 Kg.

Notes:

1. Dog panted moderately during confinement in hot room.

2. Small fan, no ventilation.

April 19, 1923.

Experiment No.30.

Dog No.80. Description: Male white mongrel, short haired.

Time: 2.00 p.m. Weight: 9.530 Kg.

Time.	Room Temp. D. B. °C.	Room Temp. W. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per cent.
2.15	22.			39.1	5.6852 6.3570	6.4230 7.2403	5.8368) 6.5400)	20.6
3.00				38.9	8.0413 5.8282	8.7495 6.5612	8.1872) 5.9773)	20.5
3.10	27.3	25.1	Dog in hot room				Weight	9.520 Kg.
3.40	29.1	27.8)	86	38.9	7.7340 7.4415	8.4123 8.0750	7.8687) 7.5678)	20.0
4.10	29.5	27.2)		39.0	6.3377 6.1533	7.1533 6.9110	6.5015) 6.3056)	20.0
4.40	29.4	27.5		38.9	7.3672 7.7166	8.2792 8.6047	7.5475) 7.8926)	19.8
					Dog out		Weight	9.550 Kg.
5.10				38.6	6.5685 7.3429	7.5055 8.3630	6.7562) 7.5497)	20.1
5.55	22.			38.6	7.3764 6.9831	8.3150 7.8055	7.5708) 7.1536)	20.7
							Weight	9.500 Kg.

Notes:

1. No panting throughout experiment.

2. No ventilation.

April 24, 1923.

Experiment No.31.

Dog. No.79. Description: Female mongrel, short haired.

Time: 11.30 a.m. Weight: 9.810 Kg.

Time.	Room Temp. D. B. °C.	Room Temp. W. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per cent.
11.45	24	14		38.6	7.7166 7.3672	8.4143 8.0704	7.8620) 7.5138)	20.8
12.15				38.4	7.3429 6.3570	7.9516 7.1462	7.4615) 6.5108)	19.4
12.30	29.4	26.5)	Dog in hot room				Weight	9.800 Kg.
1.00	29.8	27.0)	80	38.7	6.5685 8.0413	7.3050 8.9260	6.7135) 8.2154)	19.6
1.30	30.3	27.6)		38.9	7.3764 6.3377	8.1718 7.1593	7.5296) 6.4963)	19.2
2.00	30.5	28.0)		38.8	5.6852 5.8282	6.4810 6.6390	5.8453) 5.9912)	20.1
					Dog out		Weight	9.720 Kg.
2.30				38.7	6.9831 7.4415	7.7200 8.7153	7.1323) 7.7025)	20.3
3.00	24.0	14.2		38.6	7.7340 6.1533	8.6710 7.1115	7.9388) 6.3615)	21.7
							Weight	9.690 Kg.

Notes:

1. Dog panting mildly during confinement in hot room.

2. No ventilation.

April 28, 1923.

Experiment No.32.

Dog No.79. Description: Female mongrel, short haired.

Time: 10.00 a.m. Weight: 10.600 Kg.

Time.	Room Temp. W. B. °C.	Room Temp. D. B. °C.	Aver. Rel. Humidity Per cent.	Dog's Temp. °C.	Wt. of Covers. Grams.	Wt. of Blood wet + Wt. of Covers. Grams.	Wt. of Blood dry + Wt. of Covers. Grams.	Blood Solids Per Cent.
10.00	17.0	23.5		38.5	7.3429 6.3377	8.1610 7.4851	7.5125) 6.5769)	20.7
10.30	17.0	23.5		38.4	6.3570 5.6852	7.3812 6.7060	6.5610) 5.8883)	20.0
	26.7	26.8)		Dog in hot room			Weight	10.560 Kg
11.00	26.7	27.3)		38.8	6.5685 7.7166	7.5190 8.5025	6.7603) 7.8753)	20.1
11.30	27.2	27.8)	94	38.8	7.4415 6.9831	8.2898 7.9620	7.6090) 7.1750)	19.7
12.00	27.1	27.8)		38.7	7.3672 7.7340	8.1425 8.7008	7.5157) 7.9203)	18.9
					Dog out		Weight	9.910 Kg.
12.30	17.0	23.5		38.4	8.0413 6.1533	8.6883 7.0306	8.1709) 6.3302)	20.1
1.00	17.0	23.5		38.4	7.3764 5.8282	8.2718 7.1555	7.5594) 6.0995)	20.4
							Weight	9.910 Kg.

Notes:

1. Dog passed about 400 c.c. of urine just on entering the hot room. Weight curve worthless.

2. No panting throughout experiment.

3. No ventilation.