The cold stimulus was unable to evoke more than a very weak response. This inability to reduce the blood volume and thereby diminish the flow through the body surface helps to account for the very rapid loss of body temperature. In the second cord dog the regulation appeared somewhat better; this experiment was, however, performed seven days after operation instead of one or two days, as in the other experiments, and there may have been time for some readjustment of the development of the mechanism. This increase in blood solids from 18.1 to 18.9 per cent. in forty minutes did not, however, suffice to prevent the rapid fall in body temperature.

Dogs made poikilothermic by cervical cord section are deprived of reactions which may be set up between the temperature sense nerve endings and the circulation. The shifting of water from the blood to the tissues is evidently such a reaction. It is therefore concluded that the rôle of the nervous system in the reaction against cold is to convey impulses from the temperature sense nerve endings to "heat centers" which in turn, besides shivering and vasoconstriction, incite blood thickening. Hemo-concentration lessens the water available either for heat dissipation by evaporation or for providing blood bulk enough to flood the peripheral vessels.

92 (1674)

The effects of environmental temperature changes upon blood concentration.[1]

By H. G. BARBOUR.

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Experiments upon normal dogs, kept at rest in hot and cold baths up to the neck, have shown regular changes in total blood solids. Blood solids were determined simply by weighing a sample of 15–16 drops shed freely from the ear vein and drying to constant weight.

Exposure to hot baths for various intervals is illustrated by Table I, to cold baths by Table II.

[1] From investigations aided by the Elizabeth Thompson Science Fund.

TABLE I.

HOT BATHS.

Dog Number	3	3	3	3	4	4	6
Initial bath temp.	40° C.	41.5°C.	41° C.	40° C.	40° C.	40° C.	40° C.
Percentage of Blood Solids.							
Before bath	21.6	21.5	21.4	22.2	19.3	17.5	19.4
After 10 mins. in bath				21.6	18.7		
" 15 " " "	21.2	21.1	20.3			16.5	
" 25 " " "				20.6			
" 30 " " "	21.6[1]		19.5				
" 40 " " "					16.9		
" 1 hr. 45 mins. in bath							18.8
Out of bath (and cooled with blower,) 25–45 min.	22.2		22.2				

TABLE II.

COLD BATHS.

Dog Number	3	3	4	8[2]	9[2]	9[2]
Initial bath temp.	11° C.	8° C.	10° C.	...	...	...
Percentage of Blood Solids.						
Before bath	20.5	19.6	17.3	20.3	20.5	20.4
After 10 mins. in bath		21.7				
" 15 " " "	22.4		18.8			
" 25 " " "		21.7		22.3		
" 30 " " "						21.0
" 35 " " "	22.5					
" 45 " " "					21.5	
Out of bath, 20–40 mins.	20.8	21.2	19.3			

It will be seen from the tables that normal dogs respond regularly to a moderately high environmental temperature by hemodilution and to a cold environment by hemo-concentration. Roughly, the change usually approximates 2 per cent. of the total blood weight, which means a 10 per cent. change in the fluid content of the blood.

The circulatory factor in regulation against overheating and cooling consists not merely in transferring of blood respectively to or from the body surface but also in actual shifting of water into

[1] Bath had cooled down to 37.5°.

[2] Under morphine and chloretone. Cold stimulus was ice-water sponge and blower.

or out of the blood stream. The response to a hot environment is peripheral vasodilation *plus* hemodilution; a cold environment evokes vasoconstriction *plus* hemoconcentration.

To simplify the above presentation the rectal temperature readings have been omitted; these showed in the case of the cold baths and sometimes in the case of the hot, that the bath conditions were too extreme for the animal to withstand in spite of the regulatory responses.

Confirmatory evidence has been accumulated since the above experiments were carried out.

93 (1675)

The life history of an amicronucleate race of Didinium nasutum.

By MARY W. PATTEN.

[*From the Osborn Zoölogical Laboratory, Yale University.*]

A series of pedigree lines of *Didinium nasutum*, consisting of the progeny of a single exconjugant, were bred continuously under practically constant environmental conditions from December 16, 1919, to September 10, 1920.

A cytological investigation of the preparations made daily from stock left after each isolation, demonstrated the absence of a morphological micronucleus in vegetative, dividing and conjugating animals. In the race from which these pedigree lines were derived by conjugation, and also in other unrelated races of *Didinium*, micronuclei were easily demonstrable. It is clear, therefore, that the parent race was micronucleate, while one of its progeny, a single exconjugant (the original cell of the race under investigation) was amicronucleate. Moreover, this amicronucleate condition persisted throughout the life of the race, that is, through 652 generations.

At various intervals during the life history of this culture, periods showing a tendency for encystment and conjugation occurred, but the animals which encysted or conjugated invariably died, a fact undoubtedly related to their amicronucleate condition. Rhythmical periods of depression followed by increased vitality,