

AN  
INAUGURAL DISSERTATION  
ON

*Animal Heart.*

SUBMITTED TO THE  
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Animal heat, the heat of the body of any organized warm-blooded animal; more clearly defined, it is the resulting element of every molecular change in the condition of the organic components of the body, in which their elements enter into new compounds with the oxygen of the atmosphere.

In the first place let us inquire, what are the agents required for the production of this caloric? and secondly how are they appropriated in such manner as will render the production of heat possible and what are the means by which caloric is generated.

To the first I would answer:



Farinaceous and oleaginous substances together with oxygen.

To the second inquiry I answer that the Farinaceous and oleaginous substances are appropriated through the medium of the digestive apparatus, and the oxygen probably entirely by the atmosphere through the medium of the pulmonary organ.

All of the farinaceous, and a small portion of the oleaginous material is rendered by the vegetable kingdom, while the larger portion of the greasy material is obtained from the animal kingdom. This latter clause being a Physiological fact, we discover the stupidity and folly



of some, who affecting to be wise  
(touching the nutrition of the body),  
prohibit the use of animal food;  
failing to observe its all impor-  
tant use as a calorific agent,  
more especially during the winter  
seasons,

We have now the material  
which when properly used  
can be made to yield the nor-  
mal amount of heat, and our  
bodies furnish the machine  
by which it is generated and  
used.

It is positively requisite  
that this be a continuous func-  
tion, when we reflect that every  
action of the economy muscu-  
lar or otherwise is attended with  
a destruction of tissue proper



to the organ in which the ac-  
tion is accomplished and that  
this tissue must be reproduced  
and cannot be reproduced foreign  
to the influence of Animal  
Heat, as its chief use in the  
economy is to govern and  
control the formative opera-  
tions of the systems.

The digested food is absorbed  
by the lacteals thrown into  
the Receptaculum chyli, then  
passes through the thoracic  
duct into the left subcla-  
vian vein thence to the lungs  
where it meets with the oxy-  
gen of the atmosphere, passing  
now through the systemic  
circulation to every part of  
structure, as arterial blood, is



fit material for the production of caloric.

The oxygen carried to the various tissues through the medium of the blood, - to a small extent through the skin - literally burns down the old machine, at the same time re-appropriating some of the old material by chemical action produces animal heat.

Whether the blood yields the normal secretion to all secreting organs before this action obtains, or while this is in progress or afterwards I have not been able to learn.

The oxidation of the combustible matter of the organism is effected in the capillaries of the body. There is but little oxyda-



tion effected in the lungs, as the heat of the lungs is a little less than other parts

There is no production of heat save that produced in the capillaries.

That is the result of combustion, but as to how combustion happens and what is the precise nature of the combustible beyond the evident fact of its containing carbon and hydrogen is as yet entirely hypothetical.

The carbonic acid produced by this combustion is dissolved in the blood rendering it venous together with the debris of the body is doubtless the cause of its dark colour,



and in all probability the prime cause of the detrimental influence of venous blood upon the nervous system.

The elements of the blood which are supposed to carry this important element (oxygen) are three in number; there is some dissolved in the serum; the red corpuscles carry the major part - which is probably their function - and according to Müller the fibrine assists materially in distributing it through the system.

When the blood is passing through the pulmonary organs, it is in close relation to the external air, then the oxygen obeying the law of the diffusion of gases passes through



the extremely delicate walls of the air cells (consisting only of the fibrous coat) combines with the crude material of the venous blood changing its colour and quality. This - as before stated - is the first step towards the production of heat. It goes thence to the ultimate disposition of structure, burning down the old material and depositing fresh and nutritious matter, conveying in solution the material elements for secretions proper to every secreting organ, and producing animal heat whenever it affects molecular change.

The production of heat is directly under the influence of the



nervous system, so also is it requisite that a normal amount of heat be present to insure the healthy condition of the nervous system. So we see at once, that in order to the performance of their normal functions the one is entirely dependent upon the other, and their relation to one and the other as to cause and effect is wisely planned and undoubtedly of divine origin.

So wonderfully accurate is their adaptation and completely subservient to each and the other, that the boldest speculator, or profoundest Physiologist, has never attempted to assign a separate,



distinct and independent office to each apart from the direct influence of the other.

From what has been said it is an evident fact, that it is necessary that an elevated temperature of the body be preserved at a fixed standard to insure the correct performance of the vital functions of the Human organism.

To insure that which is observable, an admirable degree of constancy, regularity and similarity, it is Equally imperative that the power to generate caloric and elevate it to a fixed standard, and not only so but to insure a continuance of these actions; the system must



be qualified to maintain this under the various deleterious circumstances to the influence of which our bodies are liable to be subjected.

<sup>24</sup> This is an admirable adaptation of means to certain ends. If the body only furnished so much heat, no more nor no less, for its preservation under the most favourable circumstances, what would be the result? We would have then to exist where the seasons were perennial. If we were organized for a cold climate and the body generated sufficient heat and could furnish no less, our summers would burn us up, and vice versa. Therefore its grand and prime use



(As before remarked) is to control and determine the formative operations of the system and insure a continuance of them to license man to inhabit all climates; fit and prepare him for all the migrations observable in his species, and capacitate him for the various vocations whereunto men are called and driven.

The system has the capacity for elevating or depressing its temperature, as circumstances may require, during the continuance of Equable seasons.

During cold weather we observe the instinct of the system (if allowed the expansion) through the



medium of the appetite, as it requires more animal food than during warm weather. The same is observed in the inhabitants of the polar regions; they subsisting almost entirely upon animal food, it furnishing more material for the production of animal heat than any other quality of food. The same truth (general) holds as regards animals.

Having thus briefly + imperfectly alluded to some of the means by which a normal amount of heat is generated, which is necessary to insure a salutary performance of the general functions of our bodies; let us now inquire how its temperature is prevented from being raised



too high. How is it that a man can expose his body to a temperature in air heated over the temperature of which is from one to two hundred degrees above that of his own body for a short time, say one to three hours?

The ready remedy for this is extremely simple when once understood. The means provided by nature for these emergencies are of the simplest possible character; and it is evident to every thinking mind that these means should be uncomplicated and present whenever our bodies are likely to be thus deleteriously influenced.

From the entire moist & soft surface of our bodies simple



evaporation is constantly occurring as from any inorganic body surrounded in like manner as to external and internal circumstances; and the amount of this evaporation is almost entirely controlled by the condition of the atmosphere, as to warmth and dryness, rest and motion. (Under ordinary circumstances, I believe the amount of fluid evaporated from an adult body in twenty-four hours, is estimated at or near three pounds.)

When we are exposed to the heat of our summer sun, if this provision of nature did not exist, our condition would be precarious in the extreme, at most very unpleasant, as we



might be able to keep our bodies cool by constant artificial evaporation, or keep the temperature so low as would be compatible with existence, but the condition of the atmosphere during our summer is such as is known to the prigorifying of our surface; in other words to afford a good and sure medium for the extraction of any superabundance of Animal Heat, by promoting evaporation.

When the condition of the atmosphere is such as fits it for dissolving more or less watery vapour, just so much more or less will the body loose, and the reduction of its heat be facilitated in a direct ratio with the amount lost or dissolved in the atmos-



phere, so far as this one action or function controls or influences this action, and also the rapidity with which the ~~evaporation~~ occurs. If the temperature of the air be high but dry, much caloric is carried off in connection with the vapour, and we suffer but little from the accumulation of heat.

In cold weather very little is thus thrown off even though the air be dry, and a warm atmosphere charged with dampness is very near as ineffectual in the reduction of the animal heat of the body; also if the air be in motion at the time it is dry and elevated in temperature it assists materially in cooling the heat and inversely when



it is still.

A Knowledge of this fact estoblishes the use of the fan. We know that the simple motion of the fan does not deprey the temperature of the air, but it is because it increases the motion of the air removing that portion which is partially charged with humidity & caloric, and the vacuum thus made, is filled with fresh air whose capacity for absorbing watery vapour and Calorie is Equal to that which first came in contact with the skin.

I earnestly invoke the clemency of your great and cultivated mind, and trust that I shall receive your favour as far as is compotible with the discharge of your entire duty to the profound and philanthropic profession to which I aspire, and to the elevated and enviable position so meritiously awarded you.