HEIGHT AND WEIGHT

WITHIN the last few years public attention has been drawn to the question of what individuals weigh, by the facilities afforded for weighing by the construction of weighing-chairs. These chairs are not only to be seen at the Crystal Palace, where diminutive boys tout for custom, offering to tell your "correct weight," but they are also seen at the stations of the Metropolitan Railway and many other places. The practice, therefore, of getting weighed is obviously on the increase, and we want to utilise the knowledge thus gained by showing how it may be turned to most advantage. It will be easily seen that to know the weight of a person without reference to some other standard, such as height, would be of little advantage. But if by taking the height of a person we can say what he ought to weigh, then we have a means of ascertaining what persons ought or ought not to weigh. The difficulty on this subject has been to determine what a man of a certain height really ought to weigh. If this can be determined, then we can say whether a man of a certain height exceeds or falls short of the average weight of men of his stature.

One of the earliest efforts made to obtain anything like a fixed relation between height and weight was that of Dr. Boyd, who weighed a certain number of inmates in St. Marylebone Workhouse. He took the height and weight of 108 persons labouring under consumption, and found they measured 5ft. 7in., and weighed ninety pounds. He then measured and weighed 141 paupers who were not consumptive, and found that their average height was 5ft. 3in., and that they weighed 134lb. This subject attracted the attention of the late Dr. John Hutchinson, and he determined to take the height and weight of all classes of persons in the community. In this way he collected the height and weight of upwards of 5,000 persons. This list, however, included persons who exhibited themselves as giants and dwarfs, and other exceptional cases. He therefore reduced his instances to 2,650 persons, all of whom were men in the vigour and prime of life, and included sailors, firemen, policemen, soldiers, cricketers, draymen, gentlemen, paupers, and pugilists. This group of cases was intended to make one class as a set-off against another, so as to get a fair average. The following is the result of Dr. Hutchinson's observations :—

Height.		Weight.		Height.		Weight.	
ft.	in.	st.	lb.	ft.	in.	st.	lb.
5	1	8	8	5	7	10	8
5	2	9	0	5	8	11	1
5	3	9	7	5	9	11	8
5	4	9	13	5	10	12	1
5	5	10	2	5	11	12	6
5	6	10	5	6	0	12	10

Of course the result of these investigations of Dr. Hutchinson can only be considered as approximative, and he himself thought that a larger number of observations would lead to a more perfect law. The fact is, his observations are quite sufficient to establish all that we need, and to show that amongst a certain set of healthy men his estimate of weight and height may be regarded as an approach to a healthy standard. It is only where considerable departures from the estimates given by Dr. Hutchinson take place that any particular case demands attention. If this table is examined, it will be seen that the increase in weight for every inch of height is a little more than five pounds. In fact, allowing for any error in observation, we may say that Dr. Hutchinson's table is reducible to the law that for every inch of stature beyond 5ft. 1in., or sixty-one inches, a healthy man increases five pounds for every inch in height. If this deduction be accepted, we may very much simplify Dr. Hutchinson's table, and say that as a rule, a man's weight increases at the rate of five pounds for every inch of height, and this rule holds good for all practical purposes. Starting then with a person 5ft. in height, who, according to the assumed law, should weigh 8st. 3lb., we obtain the following results :—

Height in inches.	Height in feet.		Weight in pounds.	Weight in stones.	
in.	ft.	in.	lb.	st.	lb.
60	5	0	115	8	3
61	5	1	120	8	8
62	5	2	125	8	13
63	5	3	130	9	4
64	5	4	135	9	9
65	5	5	140	10	0
66	5	6	145	10	5
67	5	7	150	10	10
68	5	8	155	11	1
69	5	9	160	11	6
70	5	10	165	11	11
71	5	11	170	12	2
72	6	0	175	12	7
73	6	1	180	12	12
74	6	2	185	13	3
75	6	3	190	13	8
76	6	4	195	13	13

Although this law is approximately good for a certain number of cases, even above and below this table; it is practically found, and especially in the case of children and growing persons, that there is a wide difference of weight at heights below 5ft.

Attention may also be drawn here to the fact that there will constantly occur in the community instances of persons where either the muscular or bony systems are excessively developed, and who consequently weigh more or less than their height. Dr. T. K. Chambers, in his admirable essay on corpulence, published in 1859, calls especial attention to the researches of Mr. Brent on the assumed weights of the statues of antiquity. In order to get at this, Mr. Brent immersed in water accurate copies of these statues, and by ascertaining the quantity of water they displaced he calculated their weights. Dr. Chambers has taken the pains to reduce the absolute weights of these statues to assumed heights, and thus compared the heights and weights of these statues of antiquity with Dr. Hutchinson's modern man. Without giving the whole of the heights and weights, we present the series at the assumed height of 6ft. Thus :—

	Height.	Weight.	
	in.	st.	lb.
Bronze Tumbler .	60	11	4
Hutchinson's Man	60	12	10
Dying Gladiator..	60	14	0
Theseus, Brit. Mus.	60	15	0
Hercules, ,, ,,	60	16	10
Farnese Hercules .	60	18	7

On this table Dr. Chambers remarks: "Of the statues here selected, the Bronze Tumbler may be taken as the type of extreme lightness and activity, the Dying Gladiator of robust strength. In Theseus and the smaller Hercules the sculptor's idea of a hero where the bodily strength must be equal to that of any possible man. The Farnese Hercules exhibits a development of muscle greater than is ever known to exist in the human species."

Dr. Chambers also gives the height and weight of certain celebrated prizefighters, the result of Mr. Brent's observations, which makes it very obvious that in certain cases the great weight depends on muscular and osseous development.

	Height.		Weight.	
	ft.	in.	st.	lb.
Perrins	6	2	17	0
Caunt	6	2	14	7
Spring	5	11	13	3
Jackson	5	11	14	0
Bendigo	5	9	12	0
Johnson	5	8	13	5
Slack	5	8	13	10
Mendoza	5	7	12	4

The conclusion we come to with regard to these weighings and measurings is that all ordinary departures from the average height and weight of the body deduced from Dr. Hutchinson's tables are due either to an increase or decrease of the fatty matter or of the adipose tissue in the body. Thus, taking the composition of a human body weighing 154lb. and measuring 5ft. 8in., it will be found that it contains 12lb. of fat.* It is then mainly due to the diminution or increase of this substance that human beings weigh more or less than the standard weights given in the above table. It will be therefore here worth while to inquire what is the use of fat in the system, and what indications are afforded by the height and weight of the human body for caution in diet and regimen.

The exact way in which fat is produced in the tissue of plants and animals is not known, but there is evidence to show that it is found very generally in the tissues of plants and especially in the seeds. Oil when used for commercial purposes is mostly obtained from the seeds of plants, as seen in castor oil, rape oil, linseed oil, cocoa-nut oil, palm oil, and a hundred others. As it is found in the seeds of plants, so it is found in the eggs of animals. The embryo of all animals is developed in contact with oil, of which we have a familiar instance in the yelk of the egg of birds. It appears also that the muscular and other tissues grow under the fostering influence of the adipose tissue.

Besides this primary influence on the growth of the body, fat subserves many other purposes. In the first place it seems to be a reserve of material for producing muscular force when needed. Animals grow fat in summer, but as the supply of this material becomes scanty in winter they lose their fat and get thin. Man himself gets fat in summer and grows thin in winter from the demand on this store for heating purposes. Hybernating animals go to their winter sleep sleek and fat, but wake up in the spring lean and meagre, from the loss of fat in maintaining the animal heat necessary for life. Fat is thus seen to be an essential of animal life. Where there is too little deposited for the purposes of life, then serious disease has already commenced or may set in; whilst on the other hand a redundancy of this deposit may seriously interfere with the functions necessary to life.

It is from this point of view that the value practically of a knowledge of the height and weight of individuals becomes apparent. When the weight of a person is much below his height, then it may be suspected that some disease has set in, which may go on to the destruction of life. One of the earliest symptoms of consumption, the most fatal disease of the civilised inhabitants of Europe, is a tendency to loss of weight. Long before any symptoms are present of tuberculous deposits in the lungs, this loss of weight is observable in persons afflicted with consumption. And at this stage a large amount of evidence renders it probable that the fatal advance of this disease may be prevented. Within the last thirty years a practice has been resorted to with great success of administering to persons losing weight and threatened with consumption, cod-liver oil, pancreatic emulsion, and fatty substances, as articles of food, for the purpose of preventing or arresting the tendency to loss of fat, which obviously results in the production of fatal disease. In fact, it may be stated generally, not without exceptions, that wherever the weight is much below the height, there the commencement of dangerous disease may be suspected, and precautions taken to prevent the loss of fat. That this treatment has been successful in really preventing disease, and loss of life as the consequence, is the conviction of a host of intelligent practitioners of medicine. At the same time, it should be remembered that it is not only necessary in these cases to administer cod-liver oil or pancreatic emulsion as medicines, but that the consumptive should have recourse to a fatty diet, and should eat butter, cream, cream-cheese, fat, and fatty articles of diet.

On the other hand, this knowledge of the true relations of height and weight presents us with individuals who weigh a great deal more than the standard presented by the above tables. In certain individuals, and, in fact, in particular families, there is a tendency to develope adipose tissue. However free from fat may be the food, what little it contains is arrested in the tissues of these individuals, and they become "fat;" that is, they weigh more than their height. The consequences of this fatness are very various. The fat may be so deposited all over the system as not to be an obvious obstruction to the functions of life; but every one can understand that, in the case of two men of equal stature, say 5ft. 8in., one having to carry eleven stone and the other twelve, the latter will be at a disadvantage. This arises from two causes. The heavier man carries, in the first place, a greater weight, and in the second place, his heart has to project into the tissues of the body a larger amount of blood in order to keep him alive. For every pound a man weighs above his height, his system is at a disadvantage, and he suffers in various ways. When fat is equally distributed about the body then no immediate disadvantage is felt. But when fat is accumulated in particular parts of the body, interfering with the functions of particular organs, then its evil influences become speedily apparent. The most accurate account of the effects of the accumulation of fat in the viscera of the chest, will be found in a pamph-

* See Guide to the Food Collection, South Kensington. Third Edition.

let by Mr. Banting, who, although not at all what we should call a fat man, nevertheless, so suffered from fat in the chest that he could not walk forwards downstairs, or stoop to buckle his shoe. There is no doubt that in his case there was a necessity for immediate relief, and he obtained it by abstaining from articles of food which supply fat to the system.

When persons weigh much above their height, it is obviously a matter of importance that they should as much as possible relieve the tax put upon their muscular and circulating system by diminishing their weight. Fortunately, this is not a very difficult thing to do, but it should be done with caution. "To Bant" with success requires caution. The immediate withdrawal of all fatty food, and the substances, such as starch and sugar, which produce fat, is frequently attended with dangerous results. Mr. Banting's diet, although so beneficial in his case, was not altogether a judicious one, and we have no doubt that many of our "stout" friends have found an early grave by their determination to reduce themselves to the standard of weight for their height. With regard to stout people, or those who weigh more than their height, it should be recollected that if they have suffered no inconvenience from their weight, it is better to leave well alone. There are few people living in the scientific circles of London who are not well acquainted with the portly forms and genial faces of well-known men from seventy to eighty years of age. It would be folly on the part of the men who have thus achieved the normal age of threescore years and ten to commence any system of artificial diet, when their natural instincts have guided them, in spite of their weight, to their present green old age.

When studied from a judicious point of view there is no doubt that an estimate of the height and weight of an individual ought to enter into every estimate of the possible chances of life. In medical practice it may become the deciding point of the treatment of disease; whilst in those estimates which Assurance offices are obliged to make of the prospective value of life, it is of the utmost importance. Whenever the weight is below the height there is a fair suspicion of scrofulous or tuberculous disease, which no Insurance office is justified in overlooking. Whilst, on the other hand, when the weight is greatly in excess of the height, there is a tendency to those sudden impairments of muscular and especially circulating powers, which may lead to premature and unexpected death. E. LANKESTER

FOSSIL MAMMALS OF NORTH AMERICA

The Extinct Mammalian Fauna of Dakota and Nebraska; together with a Synopsis of the Mammalian Remains of North America. By Dr. Leidy. With an Introduction on the Geology of the Tertiary Formations of Dakota and Nebraska; with a map. By Dr. Hayden. (Philadelphia, 1869. London: Trübner and Co.)

II.

IN the preceding article the Miocene portion of Dr. Leidy's great work has been reviewed. That part of it relating to the Pliocene and the Quaternary still remains for analysis. That we are able to classify the American Mammalia as the Miocene, Pliocene, and Quaternary, we owe to Dr. Leidy; and his definitions of the two former of these are amply supported by the results arrived at by the Geological Survey of the district, under the direction of Dr. Hayden. The Pliocene strata on the Niobrara River, and in the valleys of the Platte and Loup Fork Rivers, rest on the Miocene beds, which furnished the Mammalia treated of in the first essay. And thus there is evidence that the one series is of later age than the other. Palæontologically, also there is a most remarkable break. Not one species and only one or two genera, namely, Rhinoceros and Castor (Aceratherium ?), are common to the two. With this exception, all the Miocene Mammalia had disappeared during the time that intervened between the formation of the two lacustrine deposits in that region. This fact implies that the one formation is separated from the other by a shorter interval than their European analogues; for in the latter many genera, such as the Mastodon, Hipparion, Hyæna, Elephant, and others, pass from Miocene into Pliocene in such a way as to cause one group of life gradually to shade off into the other, and to render it sometimes impossible to define the last stage of the one from the first of the other.

In the American Pliocenes a Ruminant, the *Merycohyus*, possessed of a full complement of teeth, represented the family to which the Oreodon of the preceding epoch belonged. One species, *M. elegans*, was about the size of a sheep, while a second, *M. medius*, was rather larger. Since the latter is founded only on one upper and three lower molars, it is rather hard to follow Dr. Leidy when he defines the animal as being "one half larger in diameter than *M. elegans*, and intermediate in size between the lama and camel." From such a slender premiss, any exact estimate of the size of the animal must be worthless. The camel tribe were represented by three distinct genera. The Procamelus is distinguished from the camel by the presence of an additional premolar in the upper, and two in the lower jaw. One species, *P. robustus*, was about the size of the living camel. The Homocamelus is remarkable for its large canine, and for the isolated position of the first upper premolar; while the *Merychodus necatus* had molars without an accessory column between the lobes, as in the sheep. The deer is represented by one small species, *Cervus Warreni*, with antlers small and bifurcating, like those of the *C. trigonalis*, figured by M. Gervais from the French Pliocenes, and the *C. dicranoceros* from the Suffolk Crag, and the Miocene of Eppelsheim. One small bifurcating antler, or horncore, may possibly be the solitary evidence of the presence of the antelope in America, but it more probably belongs to a species of deer. In none of the living antelopes is the horncore prolonged into the branch of the horn. *Cosoryx furcatus* therefore cannot fairly be quoted in proof of the range of those herbivores as far as North America.

The Pliocene American Rhinoceros (Acerathere ?) *R. crassus*, belongs to the brachydont division, characteristic of the Pliocenes and Miocenes in Europe. The Mastodon, *M. mirificus*, was devoid of tusks in the lower jaw, and belonged to the tetralophodont section of Dr. Falconer. A species of elephant (*E. imperator* Leidy) was also living during the American Pliocenes. So far as the fragmentary condition of the molar will admit of decision, it belongs