

## CORRESPONDENCE.

## ON THE RELATION BETWEEN THE HEIGHT AND WEIGHT OF MEN.

*To the Editor of the Journal of the Institute of Actuaries.*

SIR,—The following statistics regarding the weight of the human body, and the effect which various influences have on it, may be interesting to your readers. They are founded on 2,000 cases taken from the records of a Canadian life company. This number was chosen as sufficient to give reliable results, without increasing needlessly the amount of labour.

Although I am acquainted with several tables purporting to show the average weight corresponding to various heights, I have been unable to find on what basis any one of them rests. Some differ very greatly from others. It thus became a question by what table should a company be guided. To solve the matter I made an investigation, and give herewith the results, with very slight adjustment. Only healthy English-speaking lives were included.

*Average Weight at various Heights.*

Height.	Weight.		Height.	Weight.	
	lbs.	st. lbs.		lbs.	st. lbs.
5 ft. 1 in.	125'	= 8 13'	5 ft. 7 in.	145'5	= 10 5'5
5 " 2 "	128'	= 9 2'	5 " 8 "	151'	= 10 11'
5 " 3 "	131'	= 9 5'	5 " 9 "	156'5	= 11 2'5
5 " 4 "	134'	= 9 8'	5 " 10 "	161'5	= 11 7'5
5 " 5 "	137'5	= 9 11'5	5 " 11 "	167'	= 11 13'
5 " 6 "	141'	= 10 1'	6 " 0 "	173'	= 12 5'

The average height of adult Canadians of British extraction was found to be 5 feet 8·6 inches, and their average weight 155·0 lbs. The French cases were kept separate, and their average height was found to be 5 feet 7·3 inches, and their weight 149·9 lbs. French Canadians are, therefore, as a rule, about one and one-third inches under the English standard in height, and five pounds under it in weight. They are, however, generally heavier than English people of the same height.

The declined lives were also kept separate. Taking into consideration only those cases in which the cause of rejection was a tendency to lung disease of any kind, whether manifested in the applicant personally or in his family history, it was seen that, although their average height was exactly the same as that of the healthy cases, their average weight was only 147·6 lbs.—about seven and one-half pounds under the healthy standard. Some such result was expected, and it but confirms the rule that light weight generally accompanies a consumptive tendency. The other rejected cases exhibited nothing remarkable.

The influence of age is considerable, as may be seen from the following table:—

*Weight at various Ages.*

Ages.	Weight.			Ages.	Weight.		
	lbs.	st.	lbs.		lbs.	st.	lbs.
16 to 20	142·5	=10	2·5	41 to 45	159·2	=11	5·2
21 „ 25	149·6	=10	9·6	46 „ 50	163·5	=11	9·5
26 „ 30	151·3	=10	11·3	51 „ 55	167·7	=11	13·7
31 „ 35	157·3	=11	3·3	56 „ 60	172·4	=12	4·4
36 „ 40	158·2	=11	4·2				

The weight of healthy persons thus increases about thirty pounds in forty years, or about three-fourths of a pound for each year. By far the largest increase is at the younger ages. Whether this rule of increase holds good much after sixty, I have no means of knowing. It is, however, evident that a young man may be considerably under the tabular weight for his height and still be perfectly healthy, while the same variation, in an elderly man, would be very suspicious.

We have already seen that a consumptive tendency and a spare habit of body, generally go hand in hand. As weight is found to increase with age, we may, perhaps, infer that the liability to consumption is less among lives selected late in life, than among those entering at an early age, although the deaths from that disease are pretty evenly distributed over the ages, among assured lives as a class.

The influence of occupation is next to be considered. The following table shows the main results on this score:—

*Average Weight of Persons engaged in various Occupations.*

Occupation,	Weight.			Occupation,	Weight.		
	lbs.	st.	lbs.		lbs.	st.	lbs.
Agents, Brokers, &c.	156·2	=11	2·2	Founders and Moulders	151·3	=10	11·3
Butchers	169·3	=12	1·3	Hotel-keepers, &c.	166·7	=11	12·7
Barristers	160·1	=11	6·1	Labourers	148·3	=10	8·3
Bankers, Ins. Managers, &c.	154·2	=11	0·2	Merchants	153·7	=10	13·7
Blacksmiths	155·4	=11	1·4	Machinists	153·5	=10	13·5
Clerks and Salesmen	147·1	=10	7·1	Masons, Bricklayers, &c.	162·2	=11	8·2
Carpenters, Coopers, &c.	152·6	=10	12·6	Manufacturers	151·1	=10	11·1
Commercial Travellers	158·1	=11	4·1	Shoemakers and Saddlers	148·0	=10	8·
Clergymen	163·7	=11	9·7	Teachers	151·4	=10	11·4
Druggists	148·1	=10	8·1	Tailors	145·1	=10	5·1
Doctors	160·6	=11	6·6				
Farmers	160·9	=11	6·9	TOTAL	155·0	=11	1·

As these statistics are based exclusively on Canadian data, they may be compared with those of other countries, and I will be much

pleased to see this done. It must be remembered, however, that the average age at entry should be taken into consideration. In the company referred to it is 28 years.

Montreal,  
21 October 1880.

Yours truly,  
T. B. MACAULAY.

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P.S.—Since writing the above, I have noticed in Dr. Allen's *Examinations in Life Insurance*, a statement to the effect that the average height of Continental Europeans is a little less than 5 feet 6 inches; that of emigrants from Great Britain, about 5 feet 7 inches; and that of Americans, about 5 feet 8 inches. We have seen that the average of English-speaking Canadians is over 5 feet 8 $\frac{1}{2}$  inches. If Dr. Allen is correct, he strongly confirms the opinion I have always held, that Canadians are a hardier, better developed, and more muscular race of men than can be found in almost any other country.

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A valued correspondent writes to us on the subject of Mr. Macaulay's letter:—

The circumstances of age, occupation, race, season, &c., are so various, that tables constructed like Macaulay's, Quetelet's, Hutchinson's, and others, on the basis of observations made on a particular class of men, must be expected to give discordant results.

The table [printed below] which I am accustomed to regard as *the model* for men at the age of (say) 30 years, is constructed on the principles laid down by Mr. Brent, and explained many years ago, in a work on "Corpulence", by the late Dr. Chambers, of London. It assumes that the proportions of an ancient statue (say the Fighting Gladiator) are the correct thing, that the specific gravity of the human body is the same as that of water, and that the cubes of homologous dimensions are in the proportion of the weights; and six per-cent for clothes is added to the weight calculated for the displacement of water by a body built on such a model. The resulting formula is  $W = \frac{h^3}{2,000}$ , where  $h$  is the height in inches and  $W$  the weight in pounds.

When a man's weight exceeds or falls short of the standard according to the table, by (say) 15 per-cent, I consider he is not a well-proportioned man, and in case of his life being proposed for assurance, such divergence from the standard of ideal perfection should be seriously considered as a possible ground for the application of extra premium.

*Table of Proportions between Height and Weight of Healthy Men.*

HEIGHT.	WEIGHT.		-WEIGHT.		+WEIGHT.		HEIGHT.
	Model.		½th too little.		½th too much.		
Inches.	lbs.	st lbs.	lbs.	st. lbs.	lbs.	st. lbs.	ft. in.
63	125	8 13	104	7 6	146	10 6	5 3
63·5	128	9 2	107	7 9	149	10 9	5 3·5
64	131	9 5	109	7 11	153	10 13	5 4
64·5	134	9 8	112	8 0	156	11 2	5 4·5
65	137	9 11	114	8 2	160	11 6	5 5
65·5	141	10 1	117	8 5	165	11 11	5 5·5
66	144	10 4	120	8 8	168	12 0	5 6
66·5	147	10 7	122	8 10	172	12 4	5 6·5
67	150	10 10	125	8 13	175	12 7	5 7
67·5	154	11 0	128	9 2	180	12 12	5 7·5
68	157	11 3	131	9 5	183	13 1	5 8
68·5	161	11 7	134	9 8	188	13 6	5 8·5
69	164	11 10	137	9 11	191	13 9	5 9
69·5	168	12 0	140	10 0	196	14 0	5 9·5
70	172	12 4	143	10 3	201	14 5	5 10
70·5	176	12 8	147	10 7	205	14 9	5 10·5
71	179	12 11	149	10 9	209	14 13	5 11
71·5	183	13 1	152	10 12	214	15 4	5 11·5
72	187	13 5	156	11 2	218	15 8	6 0
72·5	191	13 9	159	11 5	223	15 13	6 0·5
73	195	13 13	162	11 8	228	16 4	6 1
73·5	199	14 3	166	11 12	232	16 8	6 1·5
74	203	14 7	169	12 1	237	16 13	6 2
74·5	207	14 11	172	12 4	241	17 3	6 2·5
75	211	15 1	176	12 8	246	17 8	6 3
75·5	215	15 5	179	12 11	251	17 13	6 3·5
76	219	15 9	182	13 0	256	18 4	6 4

We are inclined to question the correctness of the principle adopted in the calculation of this "model" weight, that the bulk and weight of a man increase as the cube of the height, or that in well-built men of all heights, the breadth is proportional to the height. We believe that tall men are generally slighter, and short men stouter, in proportion, than men of middle height; and a comparison of Mr. Macaulay's figures with those in the other table supports this opinion. Mr. Hutchinson's table is printed in vol. i, p. 88, of this *Journal*, in an extract from Dr. Chambers's work on Corpulence.—ED. J.I.A.