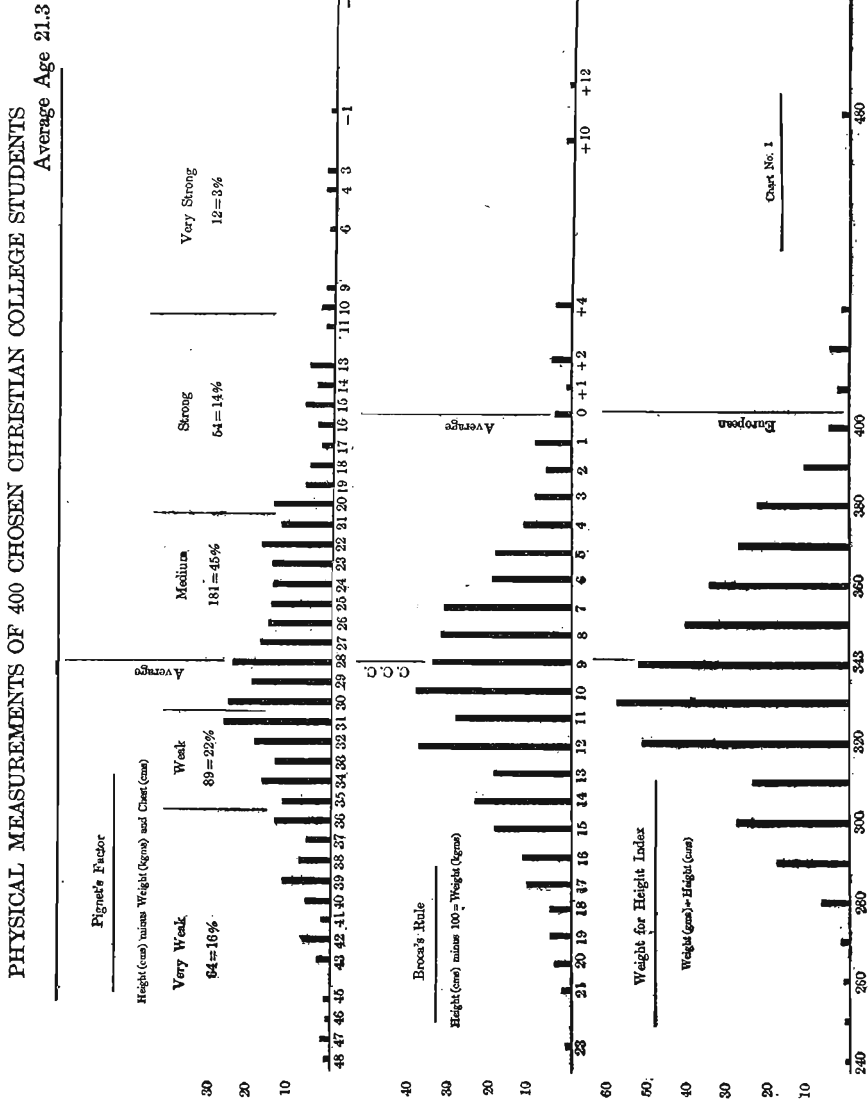


PIGNET'S FACTOR AS A MEASURE OF PHYSIQUE IN
KOREAN STUDENTS WITH SPECIAL REFERENCE
TO CHOSEN CHRISTIAN COLLEGE.

by

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Pignet's Factor has been frequently employed as an indicator of physical fitness, especially by military medical examiners. It is an attempt to correlate the weight, height and chest circumference of the individual concerned and from them determine his physique and evaluate courses of physical training. The factor is obtained by deducting the circumference of the deflated chest in centimeters plus the weight in kilograms from the height in centimeters. Under 10 is considered "very strong", 11 to 20 "strong", 21 to 30 "medium", 31 to 35 "weak" and over 35 "very weak". It was found that 86% of Russian army recruits came in the "strong" and "very strong" classes, as did 33% of the German Army recruits, and 11% of the British recruits, while only 6% of Chinese civilians could be so classified. On the other hand 17% of the Chinese were classed as "medium", 15% as "weak" and 62% as "very weak". It goes without saying that the same figure would not be normal for Russian soldiers and Chinese and Koreans. What should be the standard for Orientals has not been determined, but that the factor is of value in estimating physique has been demonstrated by the fact that after 2 or 3 months of physical training of the British recruits there was a 50% increase in the stronger classes, and in the words of Dr. G. D. Whyte (1) "of those Russian recruits having factors between 26 and 30, 40% were dismissed from the service in a short time for disability and a large proportion of the remainder were 'constantly sick', while of those with a factor over 30, 90% had to be dismissed for disability, and of the remainder one half were eventually invalided from the service for tuberculosis or general debility. This shows how a large factor may portend ill-health". The factor is a measure of physique-physical development and potentialities—not necessarily of existing health conditions. The average for 400 students of Chosen Christian College (whose average age was 21) was 28, with 12 or 3% ranking as "very strong", 54 or 14% as "strong", 181 or 45% as "medium", 89 or 22% as "weak" and 64 or 16% as "very weak".



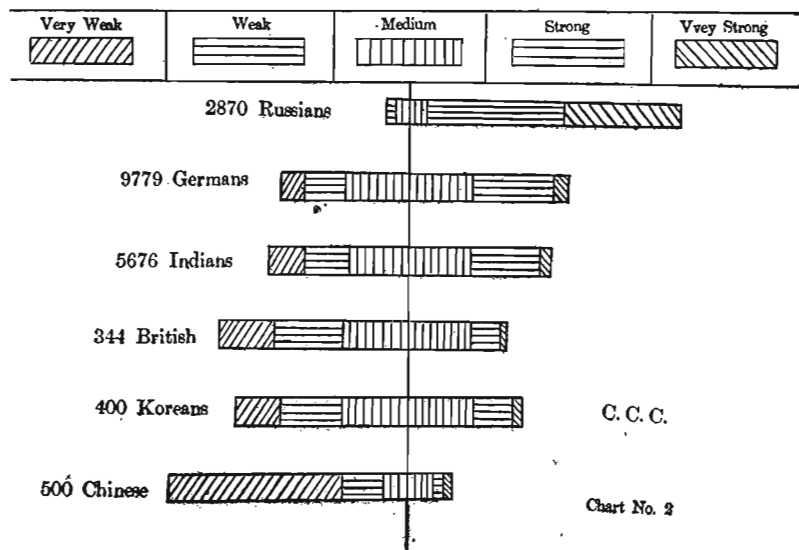
In preparing the Chart (No. 1) combining graphically the *Pignet's Factor* data with those for *Broca's Rule* (height in cm minus 100 should equal weight in kilograms for Europeans) and the *Weight for Height Index* (weight in grams divided by height in centimeters), the C.C.C. averages for all three were made to coincide as were also the European averages by the other two standards. These show very clearly that judging by height and weight only, the standard for the Koreans must be definitely lower than that for Europeans. But when the results of our measure-

ments are placed on the Pignet's Factor chart (No. 2), it becomes evident that our students rank even better than the reported results for the British Army Recruits. In other words, we can conclude that for their height and weight (although below European standards) the C.C.C. students compare favorably in physical development with Europeans, and as far as we are able to judge from the comparatively small number of determinations made so far, Pignet's Factor provides a satisfactory standard for estimating physique, especially in adults. In the case of adolescents, Dr. Whyte says (1). "It must be borne in mind that quite apart from any system of physical culture, the factor will be found better, that is, smaller, amongst older boys."

PIGNET'S FACTOR IN ADULTS OF DIFFERENT RACES

	Over 35 Very Weak	31 to 35 Weak	21 to 30 Medium	11 to 20 Strong	Under to Very Strong
Russian Recruits	3%	11%	48%	40%
German Recruits	8%	14%	45%	28%	5%
Indian Army	12%	16%	43%	25%	3%
British Recruits	19%	24%	45%	10%	1%
C.C.C. Students	16%	22%	45%	14%	3%
Chinese Civilians	62%	15%	17%	4%	2%

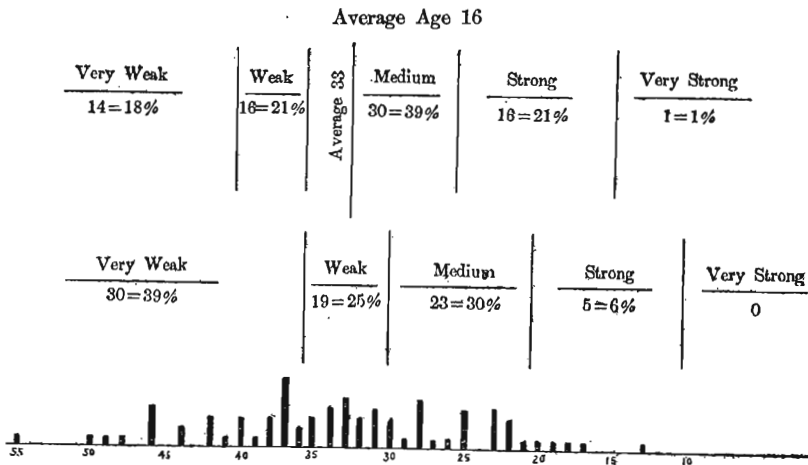
DIAGRAM BASED ON THE ABOVE TABLE



Determinations of the factor were made on 77 students in a Girls Secondary School (Chungsin), ages 12 to 21, the average age being 16.

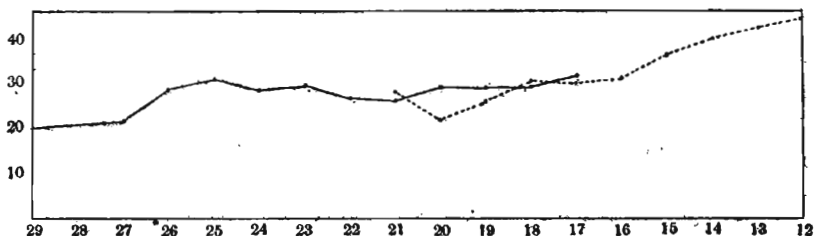
As shown on the charts (Nos, 3 and 4) the factors were found to be notably larger than for the older students—the average being 33, with much larger percentages in the “weak” and “very weak” classes and proportionately smaller figures in the other classes. It will be noted that there was a difference of 5 in both the factor average and the average age when compared with the C.C.C. figures. If then we shift the classification to the left by 5 points, making under 15 “very strong”, 16 to 25 “strong”, 26 to 35 “medium”, 36 to 40 “weak”, and above 40 “very weak”, the results approximate more nearly to those for the C.C.C. students. We believe that some such change in the standard—perhaps a shift for each year of age up to 20 or 21 will have to be made. In order that we may get light on this point, we have asked for the cooperation of the principals of the Mission middle schools throughout Korea in making the determinations on their students.

PIGNET'S FACTOR 77 GIRLS IN MIDDLE SCHOOL



PIGNET'S FACTOR AND AGE

Dot = Chungsin Girls
Smooth = C.C.C. Boys



Since the factor has been demonstrated to be a valuable measure of physique, and since by its use the Korean students, in proportion to their height and weight, have been shown to compare favorably with Europeans, and since it has been shown that adequate physical training can increase the proportion of those in the strong classes with a corresponding decrease of those in the weak classes, what are we to say and do about those students who classify in altogether too large numbers in the "weak" and "very weak" classes? We begin to see light on that greatest of all health problems for Korea's student class—viz. tuberculosis. Admittedly however many of the sources of tuberculosis must be found in heredity, family and living conditions over which the schools can have little or no control. Pottenger says (2) "We are probably conservative in estimating that 75% of all children have an infection before they reach the age of adolescence". A recent study by C. A. Stewart (3) calls attention to the two types of tuberculous infection. The first or primary infection is generally glandular or may even be without symptoms, and does not confer an immunity to the reinfection or pulmonary type of the disease. Do not the 38% of the C.C.C. students in the "weak" and "very weak" classes provide a fertile field for these secondary infections which demand such a large toll of both students and alumni? Especially when it is recalled that in many cases the student is placed in that class not because of short height, over which he has no control, or light weight which he may or may not change, but because of deficient chest girth, for which the negligence of himself and his lower and middle school trainers as well as the college authorities, may be held largely responsible. Of the 64 students in the "very weak" class, 5 had heart lesions, 18 had lungs which could not be classed as normal, 29 had chronic nose and throat conditions, 15 were flat chested, 23 were definitely classed as "poor" or "weak" on their physical examination records, and only 7 were listed as of "good" physique.

On the other hand, of the 12 "very strong" by Pignet's Factor, all were listed on their physical examination records as either "good" or "excellent" physique except one who had a *Paragonimus Westermanii* infection. Of the 54 "strong" by Pignet, all were listed as "good" or "excellent" except two (one of whom was "flat chested"). One student who was ranked Pignet 20.5, W/H 263 and Broca -10, developed an active tuberculosis during the year. However he had lost a brother by the same disease three years previously and as he was one of the three who fell below the college average by Broca's Rule and his Pignet's Factor was 20.5, so that he just made the "strong" class by the narrowest margin, we feel he is the "exception that proves the rule". Inci-

dentally, 44 or 66% of the "strong" and "very strong" classes had chronic nose and throat inflammations, but aside from 2 compensated heart lesions, one case of temporary albuminuria, and 2 cases of *Paragonimus Westermanii* infection, in addition to the one case which developed tuberculosis, no other evidences of systemic disease were found among the 66 "strong" and "very strong". As a class they are excellent risks.

Of the 12 "very strong" by Pignet's Factor, all but 2 were up to or above the European average by both Broca's rule and Weight for Height Index, and of the 54 "strong" only three fell below the college average by Broca's Rule and none below the college average by Weight for Height Index.

On the other hand, of the 64 "very weak" students, 34 ranked lower by Pignet's Factor than by both Broca's Rule and Weight for Height Index, and 21 lower than by one or the other, making a total of 55 or 86% who were given a lower classification because of deficient chest measure rather than because of lack of weight. Of the 89 "weak" students 29 ranked lower by Pignet's Factor than by both of the others and 42 lower than by one of the others, making a total of 71 or 80% who were given a lower classification because of deficient chest measure rather than because of lack of weight or height. In other words, of the 151 students classed as "weak" and "very weak" by Pignet's Factor, 126 or 83% were given a lower classification because of deficient chest measure than their height and weight alone would have called for. This not only demonstrates the value of Pignet's Factor as a measure of physique, but gives us real concern for the large percentage of our students found in the two lower classes.

A very large responsibility is placed on our educational institutions because of these "weak" and "very weak" students. Should Pignet's Factor be made a standard for acceptance or rejection at enrollment time? Certainly not in the middle schools and possibly not in the colleges. There are spiritual and intellectual values in life far superior to mere physique. And yet, the losses sustained by reason of student sacrifices to tuberculosis raise serious questions as to the advisability of providing educations for those who are physically unequal to the task of securing the education or making use of it in after life. Often the brightest students in school rank low in physique. Do they become valuable members of society or has their education been a case of "love's labour lost"?

We are convinced that it would profit much if the middle schools would classify their students by Pignet's Factor and then inaugurate special courses of physical training with a view to improving the phy-

sique of the students, using the Factor as a guide. Very low factors, if accompanied by other evidences of physical deficiency should cause the rejection of applicants for college. Certainly in the case of the professional schools, where only a limited number can be accepted out of a large list of applicants, and where the weight of the course causes a heavy drain upon physical reserves, low classification by Pignet's Factor should be sufficient reason for the rejection of the applicant.

But not alone on the school is the responsibility. The individual students must be brought to realise their own responsibility to themselves, not only to coöperate with the school authorities in their efforts on their behalf, but to observe the rules of hygienic living and to practise deep breathing and those simple exercises, which, if persisted in, will not only develop the now flat and thin chests, but will add largely to physical fitness and mental alertness, and we trust help to provide that resistance against respiratory disease, the lack of which is now accountable for so many sacrifices to the white plague.

"A sound mind in a sound body" must more than ever be our watchword.

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