	$[xy]$	$[xp]$	σ_3
$t_5 t_4$	$+7.78$	-8.00	4.8
$t_5 t_1$	$+4.13$	-11.63	4.9

The result is similar to that in the foregoing. $[xp]$ is negative with respect to consecutive trials. I have not calculated the values for all of the five trials because reaction time is not a good case; the distributions being asymmetrical, a disturbing factor is present. This will require special investigation.

These few observations lead to the following hypothesis: When a geometric form is taken as the type of biological activity the correlation between one dimension, taken as fixed, and its variation from another dimension will range indefinitely as positive or negative according to the geometric relations between the points from which the measurements are made. When two dimensions are correlated the degree of correlation will be increased or decreased by virtue of the equalization between the above correlation and the correlation between the parts common to both.

The method used by Spearman to determine the true correlation for psychological tests in which t_1 and t_2 seem to represent ordinates of a similar curve, assumes that $[pq]$ will be constant for the successive trials. Turning to our last formula and substituting

$$[pq] = [x^2] + [xp].$$

we have shown that $[xp]$ is a variable of uncertain range causing $[pq]$ to vary. Thus an unknown variable is introduced by the use of the Spearman formula. There is reason for assuming that $[xp]$ will be negative in many psychological tests, thus reducing $[pq]$, whence the method of Spearman will give correlations artificially increased.

To put it in another way, the formula of Spearman assumes that

$$r_{t_1 t_2} = \frac{[pq]}{\sigma_1 \sigma_2} = 1$$

or

$$= \frac{[pq]}{\sigma_1^2} = 1.$$

It is evident that this can be only when t_1 and t_2 are identical. $[pq]$ will be a constant when t_1 and t_2 are of the same type. We have shown above that the method of observation will sometimes result in a geometrical relation between t_1 and t_2 causing $[pq]$ to vary. Whenever this occurs the method fails.

CLARK WISSLER.

TREATMENT OF SIMPLE HARMONIC MOTION.

THE very great importance of simple harmonic motion in the physical world demands very careful consideration of the method of presenting and treating it for students beginning the work in advanced physics.

From the books on physics which I have at hand, I have selected fourteen which are used by a large portion of American students for their first study of simple harmonic motion. Eleven of these present and define simple harmonic motion merely as the projection on a diameter of uniform circular motion, deriving equations and other definitions by use of this uniform circular motion. Some of them scarcely suggest the question whether there really is such motion; much less, under what conditions or by what law of force it would occur.

Three of the fourteen texts give simple harmonic motion a *dynamic* definition, presenting it as produced by a force acting toward and varying as the distance from a center. But even these three, in treatment, make the *auxiliary circle* very prominent.

An experience of a good many years with large numbers of students leads me to believe that in the minds of very many the *auxiliary circle* with its functions and *circular motion* 'looms larger' than the actual simple harmonic motion. It seems to me highly desirable to dispense with the auxiliary circle in both definition and treatment.

The definition should be dynamic. This dynamic definition should be drawn from experiments.

The treatment should be a problem, a study of the motion caused by a force acting by the law found in the experiments.

I offer the following as an illustration of treating simple harmonic motion as above suggested; and for students not using calculus.

Experiments.—One or more on each, flexure, elongation, torsion. Find the law of force and displacement, stress and strain.

Problem.—Find mathematical expressions for the motion of a free particle under such a law of force.

Take ee' as the path, with center c. Let h equal the acceleration at unit distance from c; and let the acceleration at any point in the path be directed toward c and vary as the distance from c.

$$ce = a, \textit{ amplitude.}$$

$$ek = a.h$$

$$cp = x, \text{ a variable, } \textit{displacement.}$$

then

$$\tfrac{1}{2}a.a.h = \text{work from } e \text{ to } c.$$

$$\tfrac{1}{2}x\frac{x}{a}a.h = \text{work from } p \text{ to } c.$$

$$\frac{(a^2 - x^2)h}{2} = \text{work from e to } p.$$

$$= \tfrac{1}{2} V^2, \text{ velocity squared, if work was done on unit mass.}$$[1]

$$V = \sqrt{h}\sqrt{a^2\left(1 - \frac{x^2}{a^2}\right)} = a\sqrt{h}\sin\theta,$$

$$\theta = \cos^{-1}\frac{x}{a}.$$

To construct this geomerically and determine the constant $a\sqrt{h}$.

For any point, p, with $cq = a$, construct θ pcq, by bringing q into the perpendicular from p.

Take qr perpendicular to cq, $= a\sqrt{h}$ on some scale (which need not be known).

On qr make the right triangle qsr, $r = \theta$.

Then $qs = a\sqrt{h}\sin\theta =$ velocity at p in the simple harmonic motion.

Let $T =$ the *period*, the time of a complete vibration, from e to e' and back to e; and let $t =$ any portion of time.

If cq is given a uniform angular velocity $2\pi/T$, that is, θ is made to vary uniformly with time, the component of q's motion parallel to p's path will at every instant equal the motion of p. The linear velocity of q, $2\pi a/T$, is equal to the constant $a\sqrt{h}$. θ is at any instant (reckoning time from leaving e) equal to $2\pi t/T$.

[1] Unit mass was taken to simplify work in getting the form of the equations. The relation of mass to simple harmonic motion should be determined and put in the formulæ. Though only two or three of the text-books under consideration make any allusion, even, to mass.

Hence, for velocity at point, p, in simple harmonic motion,

$$V = \frac{2\pi a}{T}\sin\frac{2\pi t}{T}.$$

From this the equation for acceleration can be obtained. Phase and epoch can be defined and introduced into the equations.

I. THORNTON OSMOND.

THE BRITISH ASSOCIATION AND AFFILIATED AND CORRESPONDING SOCIETIES.

THE report of the council of the British Association presented at the South African meeting the following resolution, from the conference of delegates, was referred to the council by the general committee for consideration and action, if desirable:

(i.) That a committee be appointed, consisting of members of the council of the association, together with representatives of the corresponding societies, to consider the present relation between the British Association and local scientific societies.

(ii.) That the committee be empowered to make suggestions to the council with a view to the greater utilization of the connection between the association and the affiliated societies, and the extension of affiliation to other societies who are at present excluded under regulation 1.

This resolution, having been referred to a committee, consisting of Dr. E. H. Griffiths, Sir Norman Lockyer, Professor Meldola, Mr. F. W. Rudler, Mr. W. Whitaker and the general officers, to consider and report thereon to the council, the committee made the following recommendations:

I. (i) "That any society which undertakes local scientific investigation and publishes the results may become a society *affiliated* to the British Association.

(ii.) "That the delegates of such societies shall be members of the general committee.

(iii.) "That any society formed for the purpose of encouraging the study of science, which has existed for three years and numbers not fewer that fifty members, may become a society *associated* with the British Association.