Gregory is designed to extend to the scientific men of New Zealand and Australia, and to take into consideration the larger work of the future, particularly as suggested by the vanishing anthropology of Polynesia. Unless this work is begun immediately and carried through with great energy and system, it will not be done at all. The material in physical anthropology is disappearing with almost incredible rapidity. The ravages of influenza during the past two years have swept away a large part of the members of the Polynesian race. The survivors on certain of the Islands constitute a very small percentage of the original population.

Scientific cooperation has begun through the special research in physical anthropology of the Hawaiian group established between the Bishop Museum and the American Museum of Natural History. Dr. Louis R. Sullivan of the American Museum staff has already left for the Islands and will make as complete a survey as possible of the pure and mixed Hawaiian races among the remnants. These results will be published in the *Memoirs* of the Bishop Museum. It is expected also that Curator Clark Wissler will represent the American Museum at the Pan-Pacific Scientific Congress in August.

Henry Fairfield Osborn

THE ENERGY OF SMALL OSCILLATIONS

To the Editor of Science: The well-known theorem that in any linear harmonic oscillation the total energy is, on the average, half kinetic and half potential is so important in many fields that perhaps the following very simple and elementary proof will be of general interest. It can hardly be new, it is so simple and obvious, but at any rate it is not common, for it does not appear in any of the best known treatments which have been consulted.

Consider a particle of mass m which is displaced from its equilibrium position a distance x, and is vibrating in a circle. Then, as is well known, the kinetic energy is equal to the potential energy. For let the elastic restoring force be given by kx. We must then have $kx = mv^2/x$ for steady motion. The potential energy of the particle when at a distance x from the equilibrium position is equal to the work done in displacing it this distance, which equals the distance times the average force, which equals $1/2(kx)\cdot x$. Substituting the above value of kx we have for the potential energy $1/2mv^2$, and the proposition as stated is established. But any such circular vibration may be thought of as composed of two exactly similar linear harmonic oscillations. (When considering energy the phase difference and direction of oscillation is obviously irrelevant.) Therefore we must associate, on the average, half of the total kinetic and half of the total potential energy of the circular vibration with each of the linear vibrations. Since these are equal in the case of the circular vibration they must also be equal in the case of the linear vibration. The result is obviously perfectly general for any linear harmonic oscillation.

Warren Weaver
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CARBON DIOXIDE AND INCREASED CROP PRODUCTION

To the Editor of Science: Should one infer from Mr. Harrow's note in the latest issue of Science (May 7, 1920) that the question of "fertilizing" with carbon dioxide were not known to plant-physiologists and agricultural chemists in this country?

If so, it might be worth while to mention that for a number of years, at least for the last ten years, this topic has been the subject of many experiments in Europe, especially in Germany.

The botanists, Hugo Fischer and Adolf Hansen among others, have contributed much to its study. It has even found its place in modern German text-books of plant physiology —for instance in Molisch's "Pflanzenphysiologie"—and no doubt, also in those of agricultural chemistry, such as Schneidewind's "Ernährung der landwirtschaftlichen Kulturpflanzen."

M. W. Senstius