

## LETTERS TO THE EDITOR.

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## Tribute to Hertz.

[We have received the following two communications. In accordance with the wish expressed in the first letter, the writer's name is not given.—ED.] :—

ON page 133 of this week's number of NATURE, Prof. Oliver J. Lodge suggests "an act of tribute" to the memory of Hertz, "useful to students in this country," to which I desire to contribute *anonymously*; and I enclose my cheque for £200.

To this distinguished man the world is more indebted than has, as yet, been made known. His broad mind enabled him to conform to what Herbert Spencer has said to be the first condition of success in scientific research, viz. "an honest receptivity; and willingness to abandon all preconceived notions, however cherished, if they be found to contradict the truth."

When invited, in 1889, to witness demonstrations, declared by men of science to "demonstrate the discovery of a force previously unknown to them," he did not excuse himself on the ground of his own occupations, nor yet because he believed the man to be a charlatan. He gave over five hours to the examination of photographs of the discoverer's researching instruments; at the end of which he said that were he to go to America to witness the production of the energy, he could render no assistance; that the man must work out his system alone; and that, in order to work it out, he should not attempt to apply it to mechanics until he had obtained full knowledge of the laws of nature governing its operation.

This advice, within a period of four years, followed faithfully as it was (after nearly twenty years of work on engines), has now led to the completion of a system of vibrating physics, with entire mechanical success (it is for the assistance thus rendered that I give my tribute of gratitude); and will, in the not distant future, give to the world "the crowning achievement of an age of scientific progress," opening "the unseen highways of the air" to ships of thousands of tons burden, by the neutralising of gravity.

June 9.

SINCE writing my letter Prof. Dewar has been here, and some remarks made by him have caused me to think I can better serve the end that I have in view by another appropriation of the £200 which I offered to you for the publication of Hertz's works, although he made no suggestions, nor does he know that I have sent it.

Will you kindly hold the cheque until I gain further information, or return it to me, as you may think best?

June 10.

[The cheque has been returned to the writer.—ED.]

## Bullet-Proof Shields.

I AM induced by the sight of the letter from Mr. Frederick J. Smith, in NATURE for June 7, to suggest an idea for armour-plating which occurred to me a few weeks ago, and which seems to me to offer certain advantages over Mr. Smith's proposal.

If a space were filled closely with balls of approximately the same size as the expected missile, would not the resistance be greater than that offered by either a solid plate or by Mr. Smith's cylinders, while there would be a considerable diminution of weight as compared with either?

Each ball, except those at the surface of the receptacle, would be surrounded by twelve balls, to the three of which furthest from the missile the force of the impact would pass, radiating from the ball struck at an angle of  $180^\circ$ . The direction thus deflected would be passed on, again at an angle of  $180^\circ$ , to  $3 \times 3$  balls, each of which would again forward it to its three hindermost balls.

These balls, of which there should perhaps be six layers, should be of the hardest metal available; perhaps of aluminium steel or aluminium bronze. Possibly they should be set in some soft and elastic medium that would prevent their leaking out at the hole made by the missile in the rigid covering; and, if this be not done, then a sheet of india-rubber of sufficient

thickness to close after the entry of a bullet should be placed outside the frame holding the balls.

This method seems to me to have 50 per cent. more deflecting power than that of Mr. Smith, as the cylinders would only divide the direction of the missile into two, while the spheres would divide it into three.

Whether the missile would behave like Achilles when he so unwarrantably passed the tortoise, or whether its initial line would be curled round hexagonally in every direction, as it theoretically should be, might, I think, be very simply proved by experiment.

EMMA HUBBARD.

Kew, June 10.

## The Teeth and Civilisation.

IN reply to Mr. Arthur Ebbels, I can state some facts about several thousand people in the north isles of Scotland. We find here side by side old people with strong teeth free from decay, though possibly worn down like those of an old horse, and several later generations among whom dental caries is quite general, and including many girls in their teens who are almost edentulous.

No increased wear and tear of the nervous system, nor over-strain of the fifth nerve, nor increased privation can explain this extraordinary contrast. Work is if anything less arduous, clothing and other comforts more.

The habits of the older and younger generations form an equally striking contrast. The former, even as children, were thinly dressed, and did well on three meals daily. Both men and women gathered seaweed for kelp in all weathers, and worked until the tough bere bannock in their pockets became a tempting meal. It was then torn and masticated with incisors and molars doing their proper work. A drink of milk at the nearest farm completed the repast. Oatcake or oatmeal as brose or porridge served for breakfast and dinner, and home-brewed ale was a frequent beverage. Four distinctive facts can be pointed out. (1) They did not eat till they were hungry and at long intervals; (2) plenty of exercise for teeth and jaws; (3) no hot drinks; (4) they could eat without drinking. In all these points the younger generation differs. White bread is preferred, washed down with tea at  $150^\circ$  to  $160^\circ$  F. (tested with thermometer). The eat-and-swirl method of eating is universal, the bolus being swept into the oesophagus without even the pretence of mastication. It is considered that not even a child can eat without a hot drink ready to its hand, and children of eighteen months may be seen drinking strong concoctions of theine and tannic acid, and refusing other food. And this usually for every meal. As school children they exist but do not thrive on this diet, but at twenty commences a divergence in the habits of the sexes. The woman, unless engaged in outdoor work, eats and swills more; the hungry ploughboy eats and masticates more, and swills less. As regards the teeth, two results are observed.

Either decay and disintegration takes place, or else the alveoli shorten until the teeth hang loose by their exposed fangs and drop out. This pseudo-senile change may happen before thirty. The incisors hardly ever suffer so much from inertia; biting is essential, but on the other hand the first impact of the semi-boiling tea is borne by them, and they often share the general ruin. Neuralgias of the fifth nerve and stomachic catarrh are exceedingly common. Oatmeal is of course almost banished from the diet of the people.

The only fallacy seems to be this: May not the old people in question be the exceptionally hardy survivors of a race equally prone to dental decay? Others must judge; but the old folk say, "I never heard much of toothache when I was young."

Sunday, May 26.

ED. JAS. WENYON.

It may be mentioned, in reply to a letter on the "Teeth and Civilisation," that this agent probably affects the health of the human teeth by the injurious nature of the food and diet she introduces in her wake. The worn-down crowns of the molar teeth of the native will correspond with the use of *grain food* and vegetable diet, mostly cold, when the silex in their constituents triturates the teeth down by degrees. But the use of *meat diets* by the civilised peoples will not affect the crown of the teeth, but tend to induce rheumatic or gouty disorders and affections of their periosteum. The most likely medium of *teeth caries*, however, being induced is the use of hot drinks, soups, tea and coffee, which primarily may cause a fissure in the enamel by unequal contraction and expansion of the structures of the teeth. Into