world in the last three decades. The United States, even at the present time, is very derelict in making explorations in foreign countries for the benefit of its citizens and the conservation of its industries, but if we would lead the world, we must change our policy. Japan is the only country thoroughly awake to the need of foreign exploration. Her scholars are in every quarter of the globe, dozens of them, picking up every grain of information possible for use in the mother country. It is much to be regretted that we have not already adopted the same far-sighted and commendable policy.

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A SEISMOLOGICAL NOTE

THERE seems to be rather widespread misunderstanding as to the way in which the velocity of seismic waves varies with the density of the medium in which they travel.

From the theory of elasticity it is developed that the velocity of longitudinal waves in an elastic medium is $\sqrt{\frac{\lambda+2\mu}{\varrho}}$ where λ is Lame's compression constant, μ is the rigidity and ϱ is the density. The velocity of transverse waves is $\sqrt{\frac{\mu}{\varrho}}$. For surface waves of the Rayleigh type the velocity is $0.92\sqrt{\frac{\mu}{\varrho}}$ where Poisson's constant is taken as 0.25.[1] In the Rayleigh wave the particle vibrates in an ellipse in a vertical plane which contains the direction of propagation. Uller[2] has also found theoretically a value for the velocity of surface waves which varies inversely with the square root of the density.

Now Angenheister[3] found a greater velocity under the Pacific than under Asia for both types of surface waves, the L and M groups. He also found for nearby earthquakes a greater velocity for the preliminary groups for an under-sea path. Tams[4] and Visser[5] have also found the L group to have a greater velocity for sub-oceanic paths. Gutenberg[6] found for the Chilean earthquake a greater velocity in the M group for a Pacific path than for a path under South America, the Atlantic and Europe. He found the velocity of the L group to be independent of path. But it is important to notice that the phase of very long waves identified by him as the L group, and checked by the writer, are of greater velocity than the group which has usually been identified as L. Thus it is apparently not the group identified as L by other investigators, as Gutenberg suggests. The new velocity is 4.35 to 4.4 $\frac{\text{km}}{\text{sec}}$. For oceanic paths Angenheister found a still greater velocity for L but a lesser velocity for continental paths.

It seems established then that for at least part of the surface waves the velocity under the Pacific is greater than the velocity under continents.

Some writers have cited this increase of velocity under the Pacific as evidence that the density is there greater than under the continents.[7]

But from this increase alone the conclusion would be that of a less density beneath the ocean, since the velocity varies inversely with the square root of the density. It is only when we compare with gravitational measurements which indicate a greater density for ocean bottoms that we are forced to conclude that the greater velocity of seismic waves beneath the Pacific should be explained, as we explain the velocity increase with depth in the earth, by an increase in the elastic constants λ and μ which more than compensates for the increase in density.[8]

Thus we see that the increased velocity of seismic waves beneath the Pacific can not be cited as an evidence of greater density beneath oceans than beneath continents.

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THE TREATMENT OF WART DISEASE OF POTATOES WITH SULPHUR

IN the "Annals of Applied Biology," XII, 2, 1925, a paper was published by Roach, Glynne, Brierley and Crowther entitled "Experiments on the Control of Wart Disease of Potatoes by Soil Treatment with Particular Reference to the Use of Sulphur." In 1922

[1] G. Angenheister, "A Study of Pacific Earthquakes," *New Zealand Journal of Science and Technology*, Vol. 4, No. 5, 1921; also J. H. Jeans, "The Propagation of Earthquake Waves," *Proc.* Royal Soc. London, A, Vol. 102, 1923.

[2] Karl Uller, *Annalen der Physik*, Folge 4, 56, 1918, S. 463.

[3] *Op. cit.*

[4] E. Tams, *Centralblatt für Mineralogie, Geologie und Paläontologie*, Jahrgang, 1921, 2, S. 51.

[5] S. W. Visser, "On the Distribution of Earthquakes," Batavia, 1921.

[6] "Das Erdbeben in der chilenischen Provinz Atacama am 10. November, 1922," Veröffentlichungen der Reichsanstalt für Erdbebenforschung in Jena, heft 3, 1924.

[7] N. H. Heck, "Earthquakes of 1925," Bulletin of the Seismological Society of America, Vol. 15, No. 2, June, 1925, page 107; also Alfred Wegener, "The Origin of Continents and Oceans," English translation, Methuen and Co., Ltd., London, 1925, page 35.

[8] Angenheister, *op. cit.*

treatment of a light soil at Ormskirk with sulphur had given promising results, whilst in 1924 the amount of disease was reduced from 73 per cent. in untreated soil to 8 per cent. with an incorporation of 10 cwts of sulphur per acre and to less than 4 per cent. with 20 cwts sulphur per acre. On a heavy clay at Hatfield clean plots were obtained with an application of 40 cwts per acre. During the past season a larger experiment has been carried out to test these results and the deductions drawn from them and to determine whether the effect be a permanent one. As we have learned that experiments are being set up in other countries to test the efficacy of this sulphur treatment it is desirable that the discrepant results obtained by us this season should be known as soon as possible. In our test at Ormskirk the following arrangement was adopted.

Plot	Treatment
1	None.
2	15 cwts Sulphur per acre in Autumn.
3	10 " " " " " "
4	7½ " " " " " " / 7½ " " " " " " Spring.
5	5 " " " " " " Autumn. / 5 " " " " " " Spring.
6	15 " " " " " "
7	10 " " " " " "
8	None.

In the untreated plots the plants grew well and were heavily warted. In the treated plots a first set of tubers planted in May and a second set planted in July almost entirely failed to grow. The surviving plants showed in all plots considerable amounts of wart disease, although much less than in the control areas. At Hatfield two tons of sulphur per acre was applied; the crop was damaged and a considerable amount of wart disease was present.

Unavoidable differences in the conditions (seasonal, manurial, etc.) under which the work was carried out in 1924 and in 1925 suggest certain explanations of these results, but we are not in a position to say that any one of them is correct. The results already published are not of course invalidated, but it is clear that the sulphur treatment can not, in the absence of further information on the soil and other factors involved, be regarded as a reliable method for freeing soil of the parasite causing wart disease. A more detailed account of our work will be published in the "Annals of Applied Biology," XIII, 2, 1926.

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THE ATTITUDE OF THE ELECTRICAL RAILWAY COMPANIES ON ELECTROLYSIS

THE creed of the scientist and the engineer always has been to follow unbiasedly Truth, wherever she may lead, so that in solving any problem the engineer seeks to obtain the *whole* truth and then to act according to that truth.

However, certain incidents seem to show that there is a tendency not to follow literally this much respected and necessary ideal, where the problem being studied lies between directly interested parties. This is very regrettable, since a suppression of data, obtainable by one group but not by the other, necessarily inhibits the solution of any engineering or scientific problem. Moreover, such an attitude among men of science loses the confidence of the public and lessens their respect.

This departure from our creed has been forcibly brought to my attention by recent incidents which have occurred in Los Angeles in connection with studies on corrosion by stray current electrolysis.

The electrolytic conditions of Los Angeles have been and are such as to demand the attention of all metallic substructure owning companies and the electric railway companies, and therefore, engineers in general.

The Los Angeles Section of The American Institute of Electrical Engineers decided to have an academic paper on the general subject of "Electrolysis," presented at one of its monthly meetings. I was asked to prepare and present such a paper.

Upon hearing that the subject of electrolysis was to be presented locally and before it was known what was to be said, the engineering representatives of the electric railways held an indignation meeting, criticized the action of the local section of the A. I. E. E. in scheduling the subject of electrolysis and resolved not to attend the meeting.

I prepared copies of the address and presented them to the engineering representatives of both the railway companies and the public utility companies owning affectable structures so that they could prepare any discussion or raise any objections prior to the presentation of the paper. Up until the time of giving to the railway companies these copies of the proposed address, I knew nothing of the attitude that they had taken.

Upon learning their view of the matter, wishing to have the railways' representatives at the meeting and not desiring to jeopardize the cooperation between any of the parties, I offered to cancel all parts of the paper to which the railway companies objected. They had very few objections to the paper, but all parts that they did object to were cancelled. All reference to Los Angeles was omitted. However, the railway companies were not satisfied and