

single Milne seismograph, taking fifth place. The 'reliability' values given are as follows :

$$\begin{array}{l} \text{Wellington} \quad \frac{8}{24} = 0.3; \\ \text{Christchurch} \quad \frac{4}{8} = 0.5. \end{array}$$

This surprising result led me to make a detailed examination of the data for Wellington and Christchurch. Working on the same lines as Jeffreys, and using the same data, I obtained the following values for the 'reliability' :

$$\begin{array}{l} \text{Wellington} \quad \frac{11}{27} = 0.4; \\ \text{Christchurch} \quad \frac{3}{9} = 0.3. \end{array}$$

The above results differ from those obtained by Jeffreys, but they are more in accordance with the instrumental equipment at the two stations. However, if more recent observations were used, both stations would undoubtedly have higher values.

The P residuals at Wellington are nearly all negative. Of the eleven not exceeding ± 4 seconds, eight are negative, two are zero, and one is positive ; giving a mean residual of nearly -2 seconds. This suggests that the deviations found for this station are not random errors, and that the station should be classed with those showing systematic errors. These observations giving negative residuals refer to Pacific earthquakes with epicentres to north or north-west of Wellington, and it is possible that these need some readjustment, as there is generally a lack of near stations in eastern azimuths as compared with western azimuths. It seems certain, as suggested by Jeffreys, that sufficient weight has not been given to Wellington and Christchurch in the determination of Pacific epicentres.

In dealing with the utility of his results, Jeffreys selects a number of stations of good 'reliability' for each of the five regions. As 'Pacific' stations, those selected are : Riverview, Palau, Manila, with Melbourne and Adelaide to check Riverview.

This cannot be considered a complete list for years following 1931, since both Wellington and Christchurch would almost certainly be included as stations of good 'reliability'. Also, the standard errors of P should now be less than the value of 4 seconds, which Jeffreys applies to these stations.

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¹ "A Comparison of Seismological Stations", *Mon. Not. Roy. Ast. Soc., Geophys. Suppl.*, 3, No. 9, 423 (April, 1936).

I SHOULD agree with Mr. Hayes that not much importance should be attached to the difference between Wellington and Christchurch. The standard error of a reliability r based on n observations is $\sqrt{r(1-r)/n}$; then with my data the results are Wellington 0.33 ± 0.10 , Christchurch 0.50 ± 0.18 . This is for all earthquakes recorded at the stations. For Pacific earthquakes alone, I get Wellington 0.36 ± 0.13 , Christchurch 0.56 ± 0.19 . The difference is therefore not more than might be attributed to

random sampling. On the other hand, we may notice that there were three times as many readings of P at Wellington as at Christchurch, though in most cases the amplitude of the motion of the ground must have been about the same, and many of the inferior observations at Wellington refer to earthquakes when Christchurch failed to record P at all.

The data as presented in the International Seismological Summary do not indicate the clearness of the movement, and it is probable that the clearer movements at Wellington correspond to a much higher reliability. I also directed attention in my paper to the fact that in some cases too little weight seems to have been given to the near stations in determining the epicentres, and that for this reason the reliabilities found for both stations may be too low for earthquakes in the South Pacific ; but to remove this error would mean recalculating the whole of the epicentres.

Support can be found for the higher reliability of Wellington in strong or fairly near earthquakes from the residuals at the British stations with Milne-Shaw instruments in the series of deep-focus earthquakes that I have discussed recently¹. Oxford is excluded because it has already been found to have a high reliability. The residuals for the others together have the following distribution :

Residual (seconds)	-2	-1	0	1	2	3	4	5	6	7	8
Number	2	2	6	2	2	1	0	1	1	0	1.

These correspond to a mean reliability of $15/18 = 0.83 \pm 0.09$; but the mean for these stations for general work was only 0.50 ± 0.08 .

The results in my paper do not place the stations in a definite order of merit, since the sampling error is appreciable ; but they serve to indicate approximate weights to use in the determination of epicentres. I should recommend using for Wellington, when within 30° , the weights for reliability 0.6 until further information is available.

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¹ *Mon. Not. Roy. Ast. Soc., Geophys. Suppl.*, 3, 310 (1935).

"A Treatment of Modern Physics"

UNDER the above title, E. N. da C. A., in *NATURE* of June 13, has subjected my co-worker, Mr. N. K. Saha and myself, to a vigorous 'strafing' for writing "A Treatise on Modern Physics", Vol. 1, published by the Indian Press of Calcutta and Allahabad. In fairness to the large number of readers (not merely Indian) who, between the publication of the book in November, 1934, and its review in *NATURE*, have wasted, according to the reviewer, thirty shillings on a book advocating a "method of teaching" which he holds "to be pernicious", I, as the senior author, seek permission to publish the following apology in *NATURE*.

Reviewers have their own right, which I do not propose to question, but they are expected to give a short *résumé* of the subject matter of the book, point out mistakes or misstatements of facts, find out possible errors in the presentation of current ideas and to deal with important omissions, as has been done in *NATURE* by Prof. R. H. Fowler in a review of another work by me. In no case have we come across a review in which the reviewer finds faults with the author for not including matter which is expressly stated to be reserved for subsequent treatment.