The Galton Laboratory

December 9, 1941

Dear Yates,

I have recalculated the gravity formula, including the second even harmonic suggested by Jeffreys, based on the Brown and Bullard values for Washington and Teddington. It comes out as

$$980.618 - 2.529 \cos 2\lambda + .0029 \cos 4\lambda$$

Comparing this with Jeffreys' formula 978049

$$978.049\,(1 + .0052895 \sin^2\lambda - .0000059 \sin^2 2\lambda)$$

the discrepancies I find are that Jeffreys' differs from ours by

−.043 at the Equator + .015 at 45°, and +.072 at the Pole. Apart from the average difference of about .015 clearly ascribable to Jeffreys having used the Potsdam standard, there is a discrepancy of .115 in the difference between Pole and Equator. In fact, to agree with Jeffreys in the first even harmonic we should need a value about 2.586, instead of 2.529. I presume that Jeffreys' value is better than ours in this respect, but to adopt it would be to drop the aim, which was perhaps impracticable, of basing both the first two coefficients on the two recent, and apparently reliable determinations of Brown and Bullard at Washington and Teddington. .003 would be as good as .0029 in the last term, and perhaps less likely to be misread. I should, therefore, be content to ~~moit~~ omit the word "whence", and give

$$980.618 - 2.586 \cos 2\lambda + .003 \cos 4\lambda,$$

and if anyone writes to know where it came from, explain that it was a compromise.

Yours sincerely,