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**Incoming Letter: Sidney Townley to Leuschner May 16, 1907**

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**Letter from Sidney Townley to Prof. Leuschner, May 16, 1907**

Ukiah, California.

1907 May 16.

My dear Leuschner:-

A few days ago I received a letter from Professor Reid of Johns Hopkins University making inquiry about the difference in the time of the earthquake as published in my article in Science and that sent to the Investigation Committee. In answering his letter I gave in detail the manner in which my time was obtained and the errors to which it is subject. As others may be studying the recorded times of the shock it occurred to that fuller notes concerning my time should be on record with the Commission and I therefore enclose a copy of the letter which was sent to Professor Reid. I am sending a copy also to Professor Lawson.

You better take a few days vacation after Commencement and come up here to see the Observatory.

Very sincerely yours

Sidney D. Townley

**Letter from Sidney Townley to Professor Harry R[ei]d, May 13, 1907**

Ukiah, California.

1907 May 13.

Professor Harry Fielding Ried [sic]

Johns Hopkins University

Baltimore, Md.

My dear Sir:-

Your letter of May 3 *rd* has just been received. The time of the earthquake at Ukiah given in my article published in Science for May 11, 1906 is incorrect. On account of the uncertainties of the time I gave at only to the nearest minute, placing dots in the seconds column but the printer placed two zeros there. This makes the sentence following the tabulation, "the times are correct within two or three seconds", misleading also. This refers of course to the three aftershocks only, because if the seconds were not given for the principal shock it manifestly could not be correct within the limits given.

My record of the time of the principal shock is to be taken with several grains of allowance. The circumstances are as follows:- On the night preceding the earthquake I was working in the observatory until about three A.M.; at the time of the shock I was in a sound sleep and did not awaken until my bed was shaking violently; I took my watch from under the pillow, got out of bed immediately, went to the window to look at the watch, and its face then read 5h 10m 50s; I then returned to bed and slept until about half past nine; about noon the watch

was compared with the standard clock of the observatory; during the early evening hours stars were observed in order to determine a new correction to the clock; assuming that the clock did not change its correction by an appreciable amount between noon and early evening the correction to the watch was found to be + 1m 45s, which gives 5h 12m 35s as the corrected time at which I looked at my watch; if we allow five seconds for the time that it took me to get from bed to window then we have 5h 12m 30s for the time of beginning of the earthquake.

You will see at once that there are several sources of error by which this time may be affected. In the first place it is not certain that I awoke with the first tremor of the earthquake. In fact I feel almost certain that I did not, and the beginning might easily have been five seconds before I awoke. In the second place it might easily have taken me more than five seconds to get from the bed to the window, a distance of about ten feet. Possibly ten seconds would not be too big an allowance for this. In the third place the watch was not compared with the clock until seven hours after the earthquake and it may have changed its correction several seconds in that time. The watch is an excellent timepiece but it was running slow during all of last year, perhaps losing a minute a week. This rate would make a difference of 2.5 seconds in seven hours. If then we assume that I was five seconds slow in awakening, that it took me ten seconds instead of five to get to the window, and that the correction to the watch was + 1m 42s instead of + 1m 45s then the time for the beginning of the earthquake shocks at Ukiah comes out 5h 12m 17s.

From a scientific standpoint I am not very proud of this time record and I perhaps made a mistake in ever giving out a time to anything but the nearest minute. Although the shake was the most severe I had ever felt I did not at the time realize its importance, otherwise I would not have gone back to bed or have waited till noon to make the watch comparison.

I would be glad to know what you are able to make out of these times and those of Berkeley and Lick Observatory. I am free to confess that they are somewhat of a puzzle to me. If we assume with Dr. Omori (Bulletin of the Imperial Earthquake Investigation Committee, Vol. I, No. 1) that the center of disturbance was at the head of Tomales Bay in latitude + 38 (degrees) 15' and longitude 123 (degrees) west, that the time of beginning was 5h 12m, and the velocity of propagation of the preliminary tremors 12 kilometers per second, then the time at Berkeley should be 5h 12m 6s, at Lick Observatory 5h 12m 12s, and at Ukiah 5h 12m 8s. This represents the time given for the Lick Observatory within one second but is over half a minute off for Berkeley. If the center was at Tomales Bay how could the time at Berkeley be later than at the Lick Observatory? After finishing the last sentence I looked up the preliminary report of the State Earthquake Investigation Committee and find that the time given there for Berkeley is 5h 12m 6s so I suppose Dr. Omori has made a mistake. My revised time of 5h 12m 17s is still nine seconds late which might easily be because I was sleeping soundly at the time the shock came and any estimate of the time it took me to awaken cannot be anything more than a mere guess.

[Handwritten]: Trusting that this letter may be of some service to you I am

very sincerely yours  
Sidney D. Townley