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EARTHQUAKES IN AUSTRALASIA.

BY GEORGE HOGBEN, M.A., SECRETARY SEISMOLOGICAL COMMITTEE,
A.A.A.S., TIMARU, N. Z.

SEISMOLOGY is a branch of science that until quite recently received very little attention in Australasia. This could hardly be said to be due to the lack of phenomena; though, with one or two exceptions, the earthquakes that have taken place, even in New Zealand,—the seat of the worst disturbances,—have been very mild in character. The stimulus the subject has received lately was given by the Australasian Association for the Advancement of Science, an association which has done so much in other departments to encourage systematic scientific work. As one of the research committees, the A. A. A. S. appointed a committee to report upon seismological phenomena in Australasia; and I think I cannot make a better beginning of what I have to say on the subject than by setting forth in brief the work this committee is attempting to do.

In the first place it has set itself to compile a list of all recorded earthquakes (within the area of its investigations) up to the present time, including in that list all the important details as far as they are given in the existing records.

In the next place we have attempted to provide for the future recording of earthquake shocks in all the colonies according to a uniform system. These records include, among other details, the exact time of the beginning of each shock, the time being checked by the standard telegraph time of each colony through the medium of the Public Telegraph Departments.

Inasmuch, also, as it is, to a large extent, as part of a world-system of observations that our observations in Australasia may become useful, we propose to do for the islands of the Pacific, as far as circumstances will admit, what is being done for the Australasian colonies. There, of course, exact time-observations are generally out of the question; but with the aid, already largely promised, of missionaries, consuls, and other residents, much more, we trust, will be done than at first appears possible.

To secure uniformity in recording the intensity of earthquakes, the Committee have adopted as a common standard the Rossi-Forel scale of intensity. Though rough and variable to a slight extent, it has the advantage of being a recognized standard and is suited to the nature of the evidence at our command.

The materials obtained are used, where sufficient data are to be had, in the determination of the origins of the shocks. In many cases the epicentrum and velocity of propagation can be found; and in a few instances the facts are sufficient in number and accuracy for a more or less probable determination of the depth of the centrum or actual source of disturbance. With the

advantage of easy reference to a standard time in most parts of the Australasian colonies, and with increased experience and skill on the part of the observers, it is hoped that accurate observations may become more and more common; in fact, in New Zealand, where the present system has been in use for three and a half years, we find that this is the case. It is true that we have very few seismographs; but the great value of time observations based upon a universal standard time has been fully shown by Major Dutton in his report upon the great Charleston earthquake of August 31, 1886, and his conclusions in that respect are fully borne out in our experience.

The want of special instruments cuts us off from any direct means of determining the amplitude and intensity of the shocks; but the field of research already indicated will give us enough to do for some time to come.

If it be asked what we expect to accomplish by our investigations, I reply that any general theories relating to earthquake phenomena must be based upon observations in all parts of the world, and we aim at making our work of sufficient value to count as a part—only a small part, perhaps—of the materials required for solution of many of the interesting questions arising out of, or connected with, seismology. For example, the nature of the interior of the globe, whether solid or liquid, or solid but potentially liquid,—a problem discussed in such an interesting manner by Osmond Fisher in "The Physics of the Earth's Crust,"—would receive considerable light from the determination of the depth of earthquake-origins. If no earthquakes, let us suppose, could be shown to come from a greater depth than twenty-five miles, we should have a strong presumption that at about that depth there was a great change in the condition of the interior; and with a very large number of instances we might have something like a proof of such a break in continuity. The physicists have been at war over this point for some time, and without undue conceit we may say that a definite solution is at least as likely to come from seismology as from any other branch of physics.

In another paper I hope to give a short account of the results already obtained from our observations in this part of the globe. I trust, however, that the editor will allow me to say here that I shall be very glad to communicate with or receive hints from any one engaged in seismological work in America (North or South), especially with reference to earthquakes occurring on or near the coast of the Pacific.

THE PREFIX AQ- IN KITONAQA.

BY ALBERT S. GATSCHET, VINITA, INDIAN TERRITORY.

UP to the present only two scientists are known to have studied seriously the Kootenay or Kitonāqa language, which is spoken by about one thousand Indians in northwestern Montana and in the adjacent parts of British America. These two investigators are Dr. Franz Boas and Dr. A. F. Chamberlain; both have collected a large amount of lexical material and a considerable body of ethnological texts. Chamberlain's report on the tribe and language forms one fascicle of the publications of the British Association for the Advancement of Science, which contains the Transactions of the Edinburgh Meeting of 1892, and is entitled, "Eighth Report on the Northwestern Tribes of Canada," with preface by Horatio Hale (octavo, pp. 71).

The prefix *aq-* plays a great part in this northern language, for the large majority of the substantives, many particles, and other terms begin with it. The *q-* is pronounced like the Spanish *j* and the German *ch* in *lachen*. It appears from Chamberlain's long list of the substantives beginning in *aq-*, that this prefix should really be spelt *äqk-*, for *-k* is always following the first two sounds.

These two sounds easily combine with each other in many of the Indian languages. In Peoria and Cheyenne the *k-* alternates with *qk-*, and in Tonica of Louisiana every *k-* may be spelt *qk-* as well, for this is simply an "expansion" of the simple sound *k-*. Chamberlain ventures no derivation or explanation of this prefix, and Boas is also doubtful concerning its origin.