DISCUSSION

THE PROBLEM OF EARTHQUAKE PREDICTION

CORRELATIONS between the occurrence of deep and shallow focus earthquakes presented by the writer at the Easter meeting of the American Geophysical Union have been interpreted in the public press[1] as a hint to earthquake forecasts. It has, however, to be said that our present knowledge of the phenomena of earthquakes does not permit any prediction of location and time of occurrence of a major earthquake with scientific precision.

Such a statement is certainly unsatisfactory, and it seems to be very necessary to discuss this matter, considering all the facts. We know that earthquakes are in many regions of the world an ever-impending menace to life and property. We may estimate the average number of people annually killed by earthquakes to be about 40,000. Such a number compares almost with the number of men killed in wars if we consider that major wars occur only three or four times in one century. People make frantic efforts to avoid wars, arrange costly conferences and maintain large international bodies for that purpose. All other natural and environmental dangers for human beings are fought with all the intelligence and means we possess. A large army of physicians fights diseases, which in earlier times were taken as acts of God and insuperable to mankind. Many large research institutions sharpen the weapons of these physicians in their fight. In the case of earthquakes, on the contrary, we accept the situation as our ancestors did, as inevitable fate. It is certainly true that we can not prevent them, but it is also true that an effective earthquake forecast system could insure against the worst consequences of quakes, namely, losses of life. The number of scientists and institutions engaged in research to create such a system is exceedingly small. We have perhaps some 400 seismologists in the world and about the same number of earthquake observation stations. The majority of these experts, however, concentrate their efforts on questions which are far from the problem of earthquake occurrence. The research on earthquake wave-velocities and similar questions is their main target, firstly, because the economic results of such research in application to geophysical prospecting are uncontestable, and, secondly, as many believe that it is futile to make an attempt to attack the question of forecasting earthquakes. The fields of earthquake-geography-and-geology as well as the field of earthquake-statistics, which may pave the way to the prediction of these disasters, are obsolete and only a very small number of people, certainly not exceeding 50 in the whole world, are more or less active in these fields. What we need is first of all a more complete survey of earthquake occurrence. Our best observational statistics go back to prewar-times, when A. Sieberg[2] numbered 9,000 earthquakes of all kinds per year, while other investigators believe to-day that there might be as many as 40,000 annually.[3] These numerical values and their geographic distribution have to be much more closely surveyed than heretofore.[4] But besides these surveys which would base an earthquake forecast on a probability extrapolation of statistical data, we have to investigate into the few merely physical phenomena which supposedly are forerunners of earthquakes. These are the earth tiltings, which occur within some months prior to major earthquakes, as observed on Mt. Tukuba;[5] furthermore, the occurrence of gravity changes as observed by Tomaschek and Schaffernicht to precede earthquakes by several hours, and the appearance of electromagnetic wave disturbances which were recently discussed by V. Piatti.[6] All these lines have to be followed up to prove whether they enable us to forecast earthquakes.

Summarizing, it has to be said that we have to admit "ignoramus," but there is no reason to believe in "ignorabimus," and the only conclusion which we have to draw is that more research is needed to attack the problem of earthquake prediction successfully.

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[1] See SCIENCE, 81: 2105, supplement p. 11, 1935.

[2] A. Sieberg, "Erdbebengeologie," in B. Gutenberg's Lehrbuch d. Geophysik, Berlin, 1929, p. 172.

[3] Wm. Bowie, *Jour. Wash. Acad.*, 21: 103–175, 1931.

[4] N. H. Heck, *Geographical Review*, 25: 125–130, 1935.

[5] W. Inouye and T. Sugiyama, *Bull. Earthquake Res. Inst.*, 8: 362, 1930.

[6] V. Piatti, *Bollet. Soc. Sismol. Ital.*, 33: 22–42, 1935.

THE WORD "ALLELE"

FOLLOWING the lead of Johannsen, who contributed so much to brevity and precision in genetical terminology, the Batesonian term "allelomorph" is being rapidly replaced by the word "allele." So far as the writer is aware, this abbreviated form was used in English for the first time in a paper prepared by the undersigned for the Fifth International Genetics Congress, held in Berlin in September, 1927.

With the beginning of the current volume of *Genetics*, the editorial board of that journal officially adopted *allele* and its derivatives *allelic* and *allelism* as standard usage for articles published in its pages.

In certain recent articles on Drosophila genetics, published in other journals, the word appears in the form "allel," which is not correct philologically for use in English. The purpose of the present note is to urge

geneticists to standardize the word as promptly as possible by conforming to the proper spelling and pronunciation, ăl-lēle′. The word comes into English by way of the German "Allel" (pronounced äl-lāil′) the accent on the second syllable being appropriate only if the vowel in that syllable be long, as it is in the German and should be in the English. The Greek from which the word is ultimately derived is in harmony with this form, for 'αλλήλων (= of one another, from 'αλλος, other) has the long ē (eta) and the accent on the second syllable.

The normal accent for an English substantive with the spelling "allel" would be on the first syllable, ăl′lel (*cf.* Ma′bel, reb′el, etc.). To throw the accent on the second syllable while retaining the short sound of the vowel in that syllable would require the addition of another l or le (*cf.* rebellious). It is not difficult to find exceptions to these rules, in English, but there is no good reason for *making* exceptions when new words are being launched, and less reason for converting a word which has been used initially in its correct form, to a form which contravenes the normal rules of orthography.

The words "gene" and "clone" have finally won their way to uniform usage, and it is to be hoped that "allele" will reach the same status of uniformity and philological correctness with as little delay as possible. The same principles are involved in all three words.

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GERMAN PERIODICALS AGAIN

As the chairman of the American Library Association committee on German periodicals the undersigned spent ten days in Germany in May conferring with a committee of the Börsenverein and with various German officials. As a result of these conversations, he was authorized to make the following statement (translated):

> I am authorized to make the following statement:
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> A high authority in the German government has informed me that it is the present policy of the German government to reduce substantially the export prices of books and periodicals in order to ameliorate in so far as possible the difficulties which foreign libraries have experienced through depressed currencies in the procuring of German literature. The definite plan and methods will be made known before June 20, 1935.

On June 20 a cable was received from Dr. Hoevel of the Propaganda Ministerium which reads as follows (translated):

> "The foreign prices of German books and periodicals for libraries will be reduced 25 per cent. effective about August first, 1935.—Doctor Hoevel."

The following resolution was adopted by the American Library Association at the closing meeting on June 29:

> RESOLVED:
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> . . . Be it further resolved that this Association endorse the resolution passed by the College and Reference Section and express to the German government its appreciation of the action of the government in effecting a reduction of 25% in the export prices of books and periodicals for libraries. Be it further resolved, that the Secretary be instructed to inform the German government of this action.

The basis of the disagreement between American libraries and German publishers rests upon the method of publication in Germany, which differs from that of most other countries. The publication of scientific books and periodicals generally is endowed to some extent through societies and through university presses. The attempts of the Engineering Societies, the American Mathematical Society, the British chemical societies and other organizations to raise funds for the endowment of scientific publications are well known. There are no endowments left in Germany owing to the depreciation of the currency a number of years ago. Therefore, the publication of scientific books and periodicals must be either self-supporting or subsidized by the government.

Apparently the German government recognizes the difficulties in the situation. The final solution of the problems caused by present-day difficulties in international trade in general and by two divergent methods of scientific publishing in particular is neither simple nor clear, but at least some very decided progress has been made, thanks to this friendly action of the German government.

CHARLES H. BROWN
Chairman A. L. A. Committee on German Periodicals
IOWA STATE COLLEGE LIBRARY

THE BRITISH GUIANA EXPEDITION

WE are preparing to sail to conduct important ethnological and archeological research among the isolated aborigines of the remote Rupununi District of British Guiana before the impending colonization of the region, by the Colonial Government, destroys forever these primitive American Indian cultures.

This is a fully accredited scientific expedition sanctioned by the U. S. Department of State and authorized by the British Guiana Government.

Owing to the character of the work we shall operate radially from a comfortably established Base Camp and Field Laboratory some four hundred miles in the interior and I should like to extend an invitation through the pages of SCIENCE to qualified students in