

precipitated from these solutions after an interval of time which varied with the different inoculations. These experiments show the almost universal presence of organisms capable of precipitating ferric hydroxide. In order to show definitely that organisms were responsible for this precipitation, sterilized duplicates of the different cultures were prepared and these did not show any precipitation.

It was found likewise that solutions of different iron salts are affected in a different manner during these inoculations. In some solutions no precipitate forms, perhaps because the salts used inhibit bacterial growth. In other solutions, notably solutions of inorganic salts, the precipitation of ferric hydroxide takes place almost immediately, due to oxidation by oxygen present in the solvent. Certain solutions were kept under anaerobic conditions by passing carbon dioxide through them and it was found that in some of them ferric hydroxide was precipitated while in others no precipitation took place. In general the experiments have shown that precipitation may take place from solutions of ferric, as well as ferrous salts.

Up to the present the writer's attempts to isolate the lower bacteria present in soil and water, which are responsible for the precipitation of ferric hydroxide, have been unsuccessful, but it is planned to prepare and to experiment with various kinds of media in order to bring about this result. Until this isolation has been accomplished it will not be possible to study their morphology.

The morphology of the higher iron bacteria, unlike that of the lower, can be studied very readily, as they can easily be distinguished from other types due to their characteristic form. While it is comparatively easy to cultivate such forms as *Crenothrix* and *Chlamydothrix* in the laboratory, it is extremely difficult to isolate them from other forms in order to study their physiological processes. This is because of the fact that numerous lower bacteria find lodgment on the threads of these higher types, and are continually transferred with them.

One of the principal points of interest in connection with these investigations has been to note the relation that the iron bacteria might have to the formation of iron ore deposits. It has been claimed that they play an important part in the formation of numerous small deposits of bog iron ore, and it seems possible that their activities may in part be responsible for extensive beds of sedimentary iron ore as well. Further, the fact of finding iron bacteria in underground mines opens the possibility that certain underground deposits of iron ore have been formed by them.

The writer hopes soon to publish a detailed report on the results of these various investigations.

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U. S. GEOLOGICAL SURVEY

A TYPICAL CASE

I HAVE read your correspondent's letter on "A Typical Case Exemplified" in the number of *SCIENCE* dated May 21, 1915, and I have been struck by certain parallels and differences in his case and my own case. I feel that perhaps my case is worthy of citation.

I, too, completed my work for the doctorate in one of the oldest and largest of eastern institutions and, after having spent a year as instructor there, came to the northwest at the invitation of the president of the institution and the head of my department with the promise that I should have a *fair* opportunity for original investigation. During my sojourn of five years here, I have encountered no such conditions as cited by your correspondent and know of no such conditions in any western institution with which I am familiar. Before completing my work for the doctorate, I spent my time in three western institutions as student and instructor. In all of them, I found the research spirit freely encouraged. In my experience I have never been told that research was personal and that I must bear the expense and take time for it from my recreation and sleep. As a rule, the man imbued with the research spirit is not likely to allow such obstacles to stand in his way without surmounting them and is likely

to suffer from a want of recreation and lack of sleep.

The problem before the western institution is quite different from that which confronts the older eastern institutions. The western institutions are in a state of flux and developing with the country. They are dependent upon the legislatures for part of their income. The legislatures are, as a rule, generous, but frequently the funds available for appropriation are not sufficient to meet all demands and some one must suffer. The difficulty of finance is one not characteristic of western institutions but nation wide. It thus happens that funds for investigation requiring elaborate apparatus and equipment are not always available. Such conditions can not be laid at the door of the administration which, as a rule, does the very best it can under given conditions.

Considerable space was devoted to the prominence of extension work and the popular place it occupies in the institutions' activity. It is true that extension work occupies an important position, but in no sense does it overshadow the research worker. The two go rather hand in hand. The extension lecturer should be a man possessing the research spirit if his extension work is to be of any educational value. Extension work is a legitimate function of a university in that it extends the truth, for no amount of exploration for truth is worth the effort it costs but extension be the ultimate end.

Undoubtedly your correspondent's case is a bona fide one, but to assert that such conditions which he cites are characteristic of our western institutions is fallacious. There are unquestionably institutions of the character he describes but they are not localized in any particular section of the country. No man need affiliate himself with such an institution, for the report of the Federal Educational Commission and other literature should give some evidence in one way or another of such a condition.

Our western institutions can not entirely disregard the research spirit, for they are looking towards a wider recognition in the educa-

tional world; and such recognition can come only from the attainments of the individuals composing the teaching staff. To suppress the spirit of original investigation is to cast them into utter oblivion in the field of higher education.

The thing with which I particularly wish to take issue in your correspondent's letter is the statement that research is impossible in the western university. The thing which I wish to emphasize is that no such condition is characteristic of the western institution, that sporadic cases do exist I do not deny, but such cases are not confined to the west but are scattered nation wide.

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SCIENTIFIC BOOKS

The Determination of Sex. By L. DONCASTER, Cambridge University Press, 1914. New York, G. P. Putnam's Sons.

Professor Doncaster's book gives a popular account of recent work on sex determination, avoiding as far as possible technicalities which might embarrass the untrained reader. The author has succeeded in his difficult task of presenting a considerable body of matter, much of it controversial, to a general audience. He points out that determination of sex means not the control of sex (*i. e.*, the production of sex at will) but the study of the causes that lead to the appearance of males and females. "We may discover the causes of storms or earthquakes, and when our knowledge of them is sufficiently advanced we may be able to predict them as successfully as astronomers predict eclipses, but there is little hope that we shall ever be able to control them."

Doncaster is not a little concerned that the use of the word cause in connection with sex determination be clearly understood. A factor *A* may be invariably followed by a condition *E*, but between the two there may be a chain of events *B*, *C*, *D*. Should *B* or *C* or *D* be produced in some other way this would also lead to *E*. Similarly for sex, a female results when certain conditions are realized in the egg, a male when other conditions prevail. This general philosophical point of view will,