

will take up his work at Berkeley next September.

DR. RICHARD P. STRONG, director of the Government Biological Laboratory at Manila, and professor of tropical medicine in the Philippine Medical School, has been appointed head of a newly established department of tropical medicine in the Harvard Medical School.

#### DISCUSSION AND CORRESPONDENCE

##### ON COMPARING AMMONIFYING COEFFICIENTS OF DIFFERENT SOILS

IN the issue of *SCIENCE* for November 29, 1912, there appears on page 761 a special article under the above caption by Professor Chas. B. Lipman, of the University of California. The brief is devoted almost entirely to a friendly criticism of certain conclusions drawn by the writer regarding a comparison of the ammonifying efficiency of certain Colorado soils with that of soils from other stated localities. Such criticisms, when presented in the proper spirit, and there is no reason to feel that this has not been the case here, are always welcome and are often helpful.

Now, the writer admits quite freely that the fundamental facts brought out by Professor Lipman are very largely true. However, he is not willing to concede so readily that the criticisms based upon these facts as applied to the case at hand are altogether warranted.

Among Professor Lipman's comments is to be found the following:

Despite the fact that Professor Sackett makes some qualifying statements in discussing the comparisons, he does not seem to attach importance enough to some factors of which he appears to be fully cognizant and gives no consideration to other very important factors.

In support of this statement, the critic offers the following, all of which tends to leave the impression that the writer has not taken these matters into consideration and given them due weight, in spite of the fact that statements to the contrary appear in the original publication<sup>1</sup> referred to:

<sup>1</sup>Bulletin 184, Colorado Experiment Station, June, 1912, Part I, "The Ammonifying Efficiency of Certain Colorado Soils."

The writer (Lipman) of this note fails to appreciate the value of a comparison of the ammonifying powers of various soils as obtained by different investigators whose methods vary as much as ours do to-day.

The writer in selecting the results of the work of others for comparison was particular to choose only such as were obtained in laboratories where practically the same methods have been employed, and wherever there has been any departure from the procedure of the majority, such departure has been indicated.

On page 21 of the bulletin cited occurs this statement:

The methods employed by the different experimenters have been practically the same, so the results should be comparable.

Again, Professor Lipman points out the importance of all investigators employing the same brand, in fact the same lot, of dried blood in comparative work, intimating that the writer has ignored this point. This would be an ideal condition, most certainly, the desirability of which no one questions, but how impractical! If investigators would submit the analysis of such materials as the above along with their reports, this would assist greatly in comparative studies. The writer is fully aware that dried blood may vary all the way from 6 to 13 per cent. total nitrogen, and had he not had clearly in mind the possible influence of its composition on ammonification, why should he have called the reader's attention to this statement on page 23 of Bulletin 184?

With the exception of the New Jersey figures, the percentages given in Table No. 6 are based upon blood meal containing 13.05 per cent. of total nitrogen, and cottonseed meal with 7.84 per cent. total nitrogen. In the New Jersey work, Lipman (J. G.) states that the blood meal and cottonseed meal contained, respectively, 13.18 per cent. and 6.405 per cent. total nitrogen.

Unfortunately, the composition of the blood meal employed by the different investigators cited in the comparative studies, with one exception, was not given, and consequently the writer, in order to get some basis for comparison, was compelled to compute the results

given on the basis of blood meal containing 13.05 per cent. total nitrogen, such as was employed by the Colorado Station. To the end of making available more complete data for comparative studies, the writer would take this occasion to urge those who are engaged in research work to be less reluctant about giving the details of their investigations, for it is obvious that comparative work is impossible and worthless except it be carried out with a strict observance of points of technique.

Professor Lipman refers to the importance of having a large number of soils in any comparative study:

It must also be added here that the comparison of only a few soils can not be invested with much importance, even if the soils are described by similar names.

In this matter, his point is well taken, but when the data do not exist, we must be satisfied with the information at our disposal. Moreover, it seems to the writer that a comparison of the ammonifying efficiency of twenty-seven niter soils with that of ten soils selected at random in Colorado and elsewhere should have more weight than the critic would concede.

Again, Professor Lipman writes:

It is, of course, obvious that sandy loams may embrace soils of very widely differing natures and that no just comparison can be made between a sandy loam, so called in one district, with a sandy loam so called in another district.

If this comment is intended as a criticism of Bulletin 184, it is absolutely without foundation, for no place in this publication can there be found any statement which suggests, implies or asserts a comparison of soils on a physical basis.

The one very important factor which the writer is said to have given no consideration, and upon which Professor Lipman has dwelt at some length, is what appears to be a radical departure from the normal in the method of preparing the soil cultures for studying ammonification. Professor Lipman states that "Professor Sackett sterilizes his soils with mercuric chloride and then rinses them with sterile distilled water prior to inoculation with

a *soil infusion*." Then follows a critical discussion of this method.

The writer begs to state in defense of this assertion that *no such procedure has ever been practised* in his laboratory and probably never will. This seemingly direct contradiction resolves itself into a rather amusing circumstance when it is learned that Professor Lipman has gained this erroneous impression, upon which he has grounded his chief criticism, from his failure to observe certain punctuation marks in the crucial sentence. On page 4 of Bulletin 184, this sentence occurs:

As soon as the soils were air dry, which seldom requires more than twenty-four hours in our atmosphere, each was ground in a glass mortar, sterilized with mercuric chloride and subsequently rinsed with boiled, distilled water, and passed through a thirty-mesh wire sieve.

From this, it is perfectly clear to the writer that it is the glass mortar which was sterilized with mercuric chloride and subsequently rinsed with boiled, distilled water. However, Professor Lipman makes it the soil which received this treatment, and thereby hangs the tale.

As confirming the Colorado investigations, the writer is pleased to learn that on several occasions Professor Lipman has noted a high ammonifying efficiency in soils of California, which contain abnormal amounts of nitrate, as well as in certain soils obtained from the vicinity of Grand Junction, Colorado.

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#### THE TERMS SEGMENT AND SEGMENTATION IN GEOLOGY

THE terms segment and segmentation which are so conveniently and widely used in the biologic sciences have not found their way into geologic literature to a very notable extent, although they seem to be well suited to geologic science. In searching for a general term which could be applied to a minor part of the earth and having the dimensions of a solid, the word segment appeared to me as the most convenient, and on reflection I recalled