them in their minds with certain definite characteristics, specific needs, and desirable treatments.

With the extension of the information gathered in the soil survey to the farmer and the follow-up work which is so very important, the soil survey will undoubtedly prove of great and lasting value in increasing and maintaining soil fertility.

Discussion Following Presentation of Paper by

W.H. Stevenson and P.E. Brown

Several questions suggested in the paper were discussed by Professor Marbut, Professor Whitson, Professor Miller, Professor McCool, and others. The questions are given below and a brief statement of the discussion is included, giving principally the remarks of Professor Marbut which indicate the attitude of the Bureau of Soils on the matters in question.

(1) How can maps of adjoining counties be made to coincide on the county line with respect to names and soil boundaries?

Professor Marbut believes that maps of adjoining counties will never coincide exactly as to type names owing to the separation of new types which is bound to occur as our knowledge of soils increases. However, there should never be variations in texture on county lines. Evidently special care is needed in mapping texture along the borders of the county. The suggestion that one mile beyond the county line be mapped in the unsurveyed territory, and later mapping started there, met with favor.

(2) To what extent will the lime content of the surface soil and of the subsoil serve to distinguish soil types?

Professor Marbut stated that lime in the surface soil should never distinguish soil types, while lime in the subsoil is a distinct type characteristic. He believes that lime is lost from the subsoil only very slowly. Upon being questioned he said that the soil should effervesce "freely". The field men must interpret "freely". Present practice, however, separates soils which give any reaction at all, however faint, and areas are included where no effervescence occurs. Our con-

clusion is that field practice should be made to conform to the Bureau idea as expressed by Professor Marbut, and descriptions of series as supplied to the field men should be modified according to the ideas expressed.

(3) When should phases of soils be mapped and when are they undesirable?

Professor Marbut stated that phases should be mapped to show agricultural differences and not soil differences. This, however, is not in accord with field practice. It was suggested that the word "phase" might be left out and the descriptive terms (broken, etc.,) be used alone following the soil type name. However, this did not seem to meet the situation, and the subject of phases seems open for further consideration.

(4) How are some terraces to be distinguished from upland and some from bottomland?

Only in California, according to Professor Marbut, has the separation of terraces been satisfactorily accomplished. Difficulty is always experienced along this line. The separation from bottom land should not be based on overflow at all, but on soil profile and formation.

(5) Does levee construction change bottom land to terrace, and, if so, when?

Levee construction will not change bottom land to terrace, according to Professor Marbut. The question still remains, why not, - if the soil changes similarly to the change occurring when terraces are formed naturally.

(6) How much wash from upland will make a colluvial phase or a colluvial soil?

Professor Marbut says there is no such thing as a colluvial soil type. The Bureau instructions supplied recently to the field men evidently need revision for they include a colluvial soil.

(7) Should the same type be mapped when the soil is of different geological origin?

Soils should be mapped regardless of geological origin on the basis of soil differences. This is now the idea of the Bureau of Soils. Professor Whitson emphasized the desirability of separating soil types based on agricultural conditions, crop adaptations, etc. Professor Marbut believed this impossible and insisted that separations on the

basis of soil differences must be the foundation of agricultural separations.

(8) Can a type, typically having a loess covering, occur without that loess covering?

Professor Marbut explained that loess coverings on drift soils might merely mean a silty covering, and hence would not influence the type name. Loose wording in some reports accounts for some confusion in this matter.

(9) Should soil color be determined when the soil is wet or dry, or in both conditions?

The determination of color is made officially when the soil is dry. The reports should give the color both dry and wet.

(10) How much may subsoils vary without changing the type names?

Professor Marbut believes that subsoils should vary only slightly when they are of the same type.

(11) To what extent can droughtiness serve to differentiate types?

Droughtiness should not serve to distinguish types, except in support of actual soil differences.