seals to be submitted to the Council at a later meeting. The committee was directed also to consider Society buttons in general and in detail.

The next meeting of the Society will be held in Chicago some time during Convocation Week of the A. A. A. S., Dec. 27–Jan. 1.

AGRICULTURAL METEOROLOGY.

I should like to present the following suggested line of work for the consideration of the Committee on Agricultural Meteorology. If it meets with approval perhaps some work of this nature can be started.

Three methods of ascertaining the effect of the weather on plant growth and yield are mentioned by Prof. Smith in the BULLETIN OF THE AMERICAN METEOROLOGICAL SOCIETY for February, 1920. The following suggestion is related primarily to the first, or laboratory, method. Some work has already been done along the line of growing plants under controlled conditions and certain relations deduced therefrom, but there are many interested in this kind of experimentation who lack facilities for controlling the various climatic components of the plant's environment.

This problem of ascertaining the exact relationship between the behavior of a given plant and such conditions of its environment as soil and air moisture, soil and air temperature, wind movement and radiant energy, although extremely difficult, is very important. No given intensity of a single climatic component has the same effect on all phases of growth. The optimum temperature condition for the germination of a seed is not, in all probability, the optimum temperature for the setting of fruit or for the growth from the seedling stage to that of flower bud formation. A few simple climatic components of an environment during each natural phase of growth can be studied under practically controlled conditions, however, without the use of expensive apparatus. For example, plants like wheat, rice and buckwheat can be grown in solution cultures in a greenhouse and measurements of temperature and atmospheric moisture recorded and radiation approximations made. In this manner a large number of variables that are usually present in field experiments are either eliminated or made constant. The use of a nutrient solution makes it much easier to secure similar root environments for plants grown under different climatic conditions than if soil cultures are used. Differences in growth can then be attributed to differences in the climatic complex rather than to differences in the root media as would be the case if soil were used. Furthermore, several good nutrient solutions have already been worked out for a number of economic plants and this knowledge can now be used in climatic studies. Also, an experiment carried out in a greenhouse practically excludes wind and rain, thus further reducing the number of climatic variables. The less the number of variables in a given environment the more easily can true relationships be worked out. In short, the method is that of eliminating or making constant all but two or three conditions that influence growth to any marked extent. These two or three conditions are then measured, but not controlled. It is, of course, necessary to use plants or seedlings which are as nearly alike as possible so that the results for different seasons may be comparable. The components most influential in lengthening and shortening a particular phase of growth can thus be easily studied without much laboratory equipment.

This laboratory method of studying two or three of the main climatic variables during a definite developmental phase of plant growth at different seasons

of the year should give very interesting and important data. It also would be in keeping with the field studies of Dr. Hopkins. Laboratory conditions are to a large extent artificial, but such modifications of natural conditions should facilitate the work of correlating a plant process or group of processes with simpler environmental complexes.—*Earl S. Johnston.*

I notice from the June issue of the BULLETIN that there is an important need for systematic meteorological observations in different parts of the country in connection with a detailed record of the development of farm crops.

It occurs to me that many such records may have been made, and the results coördinated with crop growth, and the results never brought to the attention of the Committee, or to the Central Office of the Weather Bureau.

For instance, in Mississippi, a complete coöperative record has been maintained for a number of years at Agricultural College, the seat of the Experiment Station, and mostly kept by men connected with the Experiment Station. Professor Ewing made some intensive studies in cotton breeding, using a number of extra instruments, including a photographic sunshine recorder that was loaned by the Weather Bureau.[1] When I left Mississippi, Prof. Ewing was connected with the Mississippi Delta Planting Co., Scott, Miss., where he was doing similar work. They had at Scott a complete coöperative equipment and two extra rain-gages.

At the Branch Experiment Station at McNeill, Miss., Prof. C. E. Ferris has kept a coöperative record for a number of years, and he has doubtless made other records also. Likewise, at the Branch Experiment Station at Stoneville, Miss., there is a precipitation record.

I have referred to these matters merely to suggest that inquiries might lead to the gathering of considerable information that has heretofore had only a limited circulation.—*William E. Barron.*

In regard to the suggestion of Dr. A. D. Hopkins in the BULLETIN OF THE AMERICAN METEOROLOGICAL SOCIETY for June, 1920, relative to experiments to determine the best time to plant crops, I would suggest that for spring planting the seasons differ so much that, in my opinion, the temperature of the air alone is not sufficient to determine this date. The temperature of the soil at a depth of probably 3 inches should also be considered.

I would suggest that a general period, the earliest and latest dates when the crop should be planted, then the planting in this period should proceed only when the temperature for the past week has averaged —— and the temperature of the soil ——. At any rate the condition of the soil should be considered in some definite way in these experiments.

One of the serious causes of poor stand in corn in this region, as it has seemed to me, has been the too early planting. By that is meant planting in the first early warm days, before the soil is warm enough to favor germination, and before the season is sufficiently advanced for a reasonable expectation of favorable temperature conditions. The result is that frequently the seed remains in a cold soil so long that some seeds lose vitality entirely and others partially. The result is an impaired stand and a lower crop yield.

Some experiments along this line were conducted at the Nebraska Agricultural Experiment Station more than 30 years ago These seemed to indicate that the early planting, so favored by most Nebraska farmers, was not as important as had been generally considered. It is, however, important that the corn be planted as early as the conditions will allow and provide for continuous healthy growth, with reasonable certainty.

In experiments of this nature it seems to me that the danger is the omission of consideration of some factor that may be important in determining the result. I would also like to include the test of moisture in the soil during the experiments.

It is not supposed that every farmer will attempt extensive observations of this nature before he plants in the future. But one person for a locality could do it: the county agricultural agent, for example, for his county. Intensive work of this kind is a probability of the future.—*G. A. Loveland.*

[1] Abstract of results will appear in the June, 1920, issue of the *Monthly Weather Review.*