ORIGIN OF THE LOESS OF THE PALOUSE REGION, WASHINGTON

THROUGHOUT east-central Washington, especially that region known as the Palouse wheat country, is a large area underlain by basalt, which is a part of the Columbia lava plateau. Above this basalt is a covering of very fine sand, which has a thickness as great as 250 feet and more.

This fine sand has the characteristics of loess. When exposed in highway and railroad cuts, it stands with a vertical face, and in drying it shows vertical cleavage. It is composed of fine quartz sand, whose grains average 0.05 mm in diameter. The sand grains are sub-angular. The formation is iron stained and contains small concretions and tubelets of iron oxide. This loessial formation has two phases: one phase is massive, the other laminated, that is, stratified in thin, well-defined layers. These two phases are identical in composition, but differ in structure.

From a study of the field conditions, the writer has reached the following conclusions in regard to the origin and occurrence of the Palouse loess:

(1) That the loess was derived from the retreat of the continental ice sheet of pre-Spokane age, possibly Iowan or Illinoian.

(2) That the loess was deposited in shallow, sluggish, ephemeral sheets of glacial water to a depth of about 250 feet on the surface of the flat-lying basalt before the period of Pleistocene deformation.

(3) That a mature type of topography was developed on the surface of the loess.

(4) That a period of deformation followed, during which the region was elevated.

(5) That, following the uplift of the region, rejuvenation of the major streams came into evidence, developing deep canyons which were cut, first through the loess and then through the hard, underlying basalt.

(6) That later, recent action of the wind shifted the water-laid loess, modifying its laminated structure to the massive type, and causing surface features to be developed characteristic of aeolian deposition.

(7) That mud flows have subsequently developed on plowed hillsides during the rainy seasons of the year, modifying much of the surface covering so that the underlying laminated material has been largely lost to view.

Owing to the modification of the original loessial deposit by the surface action of wind and water, the underlying laminated phase is exposed only in widely separated localities, where deep road cuts have recently been made. This laminated phase is considered by the writer to be the original loessial deposit.

The writer proposes the name Palouse Formation to these sedimentary beds. The fertile soil of the Palouse region is largely a residual modification of the Palouse formation and has locally been redeposited by wind and surface wash.

RAY C. TREASHER

STATE COLLEGE OF WASHINGTON,
PULLMAN

THE STEM OF MAGNOLIA AS A LABORATORY TYPE

THE general cellular structure of the woody, dicotyledonous stem is commonly illustrated in general botany courses by such forms as *Tilia, Aristolochia, Menispermum, Ricinus, Liriodendron,* etc. Each of these has certain limitations and disadvantages. To be most desirable for teaching vascular anatomy to elementary students, it would seem that a stem should have the following characteristics: (1) It should be generalized—not so highly specialized as many of the forms in common use; (2) its various groups of tissues should be easily recognizable; (3) the vascular bundles should be especially distinct and clearly delimited by broad medullary rays; (4) the annual rings should be well defined; (5) the stem should exhibit several different kinds of mechanical tissues; (6) the protoxylem should be persistent and easily distinguishable from the secondary xylem.

None of the stems ordinarily studied and figured in the text-books combine all these features, although some are very desirable in certain ways. In endeavoring to find a stem which might approach the ideal type described above, we have examined a great many forms, but none has given greater satisfaction than *Magnolia.* In the young twig the bundles stand out with diagrammatic clearness; they are equally as well defined as in the woody climbers usually studied. The protoxylem is as conspicuous as in *Ricinus.* The phloem areas are particularly well differentiated, a feature lacking in many stems. Sieve tubes and companion cells are as distinct as in the classic corn stalk. A few bast fibers occur among the conductive elements of the phloem, but most of them are localized in separate groups just outside of the phloem, as in *Aristolochia.* Stone cells and collenchyma occur in the cortex, the former showing very clearly the characteristic pitting. The epidermis is highly cutinized. Epidermal hairs occur on the young stem in abundance.

A notable disadvantage of *Magnolia* is that sections of older stems are cut with difficulty, owing to the hardness of the wood. Young twigs may be cut freehand with a fair degree of facility, but older ones must be handled by special treatment. We have used only *Magnolia grandiflora,* but suppose that other species would be equally as desirable.

A. W. HAUPT

UNIVERSITY OF CALIFORNIA
SOUTHERN BRANCH