

silt and clay saved for possible later examination. The sand was separated into fractions with standard screens having openings of 1, 1/2, 1/4, 1/8, 1/16, 1/32 mm. The 1/2 to 1/4 and the 1/4 to 1/8 mm fractions were found to be best suited for study. These fractions were examined under a binocular microscope in reflected light and under a petrographic microscope in transmitted light.

The Wisconsin sand is fresh appearing and consists dominantly of quartz with small proportions of feldspar and hornblende, of occasional grains of heavy minerals and of a very few rounded iron oxide "pellets." Commonly, several grains of feldspar and hornblende are present in any microscopic field. The average mineral content of several samples is shown in Fig. 2. Many feldspar grains retain their cleavage

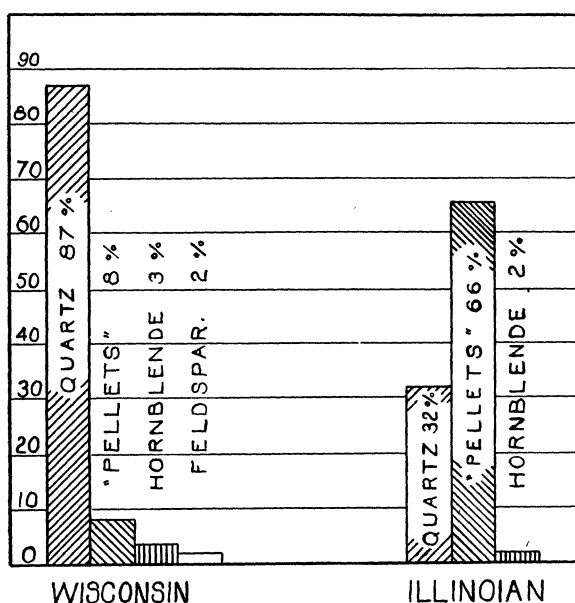


FIG. 2. Chart showing average mineral composition of $\frac{1}{4}$ - $\frac{1}{8}$ mm grains washed from soils derived from Wisconsin and Illinoian till.

faces and most grains are very fresh looking. Many grains are only slightly turbid in transmitted light. The hornblende is rarely rusty and has cleavage faces usually as bright and shiny as those of freshly broken material.

The Illinoian sand is weathered and brown and in the washed samples is easily distinguished megascopically from the Wisconsin sand. Under the binocular the sand is seen to consist of about one third quartz and of about two thirds iron oxide "pellets." The average mineral content of Illinoian material is shown in comparison with that of Wisconsin material in Fig. 2. The quartz is sometimes stained with iron oxide. Feldspar is so rare that several microscopic fields may have to be examined to find one grain.

The feldspar grains are rounded and pitted, and show no distinct cleavage faces. Most grains are very turbid in transmitted light. The hornblende grains are generally rusted and dull.

The iron oxide "pellets" were examined under the petrographic microscope, both in thin sections and as crushed fragments. The "pellets" are of two types: (1) More than 90 per cent. consist of angular grains of quartz silt in a matrix of brownish iron oxide. (2) A few pellets are small grains of quartz surrounded by a thick coating of iron oxide at least as thick as the radius of the core of quartz. Most of the "pellets" are spherical. Most are quite hard, so that considerable pressure is necessary to crush them—as much in some cases as is necessary to crush a feldspar grain. Their hardness is such that they offer little difficulty in the preparation of thin sections when embedded in balsam.

Surface samples so far studied were collected from the localities indicated in Fig. 1. These samples were definitely either of one type or of the other. The boundary between the two types of samples coincided with the boundary between the Wisconsin and Illinoian previously mapped by the use of other criteria. On either side of the boundary, samples collected within 200 yards of each other were as clearly different from each other as samples collected miles from the boundary.

After this method of distinguishing between Wisconsin and Illinoian drift appeared to be valid, based on examination of samples taken several miles from the boundary and of samples on either side of the boundary where it was quite definite, this method was then used in mapping the Wisconsin boundary in the "Davis Basin," just west of the Ashland-Richland county line, in sections 11, 12, 13 and 14, Worthington Township, Richland County, where the Illinoian drift border passes under the Wisconsin drift (Fig. 1). Using other criteria, the location of the Wisconsin boundary across the "Davis Basin" could not be determined more accurately than being within a belt from 1/2 to 1 mile in width because of puzzling topographic conditions and disturbing variations in depth of leaching. After examination of mineral grains washed from soil samples taken in the basin, a boundary was clearly indicated which is believed to be accurate within 100 yards.

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BOOKS RECEIVED

- SOKOLOFF, BORIS. *Vitality*. Pp. 181. Dutton. \$2.00.
VITELES, MORRIS S. *The Science of Work*. Pp. xi + 442. Illustrated. Norton. \$3.75.
WEYL, HERMANN. *Mind and Nature*. Pp. vi + 100. University of Pennsylvania Press. \$1.50.