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Introduction

During the course of an investigation of the bedrock geology of western Story County, Iowa, our attention was directed to the occurrence of some unusual Pleistocene deposits. These deposits consist of calcareous silts, which from the viewpoint of mineralogy, textural analysis, physiographic expression, and paleontology embrace most of the criteria by which loess is generally described or recognized. These deposits in Story County have been described as loess by Beyer (1898, and 1899).

The most apparent but unusual feature of these deposits is their vertical and lateral gradation into till or alluvial material. Similar deposits are now known to occur also in Boone County.

Only one of these deposits has been extensively studied, and the purpose of this report is to outline the progress of our investigation and to discuss some of the problems presented by these deposits.

Location of area. The silts, described in this report, are known to extend along the course of Onion Creek from the NW¼ Sec. 32, upstream through section 29, and into the SE¼ section 30, T84N., R24W., Story County, (see figures 1 and 2).

Stratigraphic Relationships

Till-Silt contact

The stratigraphic relationships, as we visualize them, are shown on the panel diagram (fig. 3).

The contact of the silts with the overlying Cary till shows variable relationships. At many localities in Boone County the silt grades upward into the till through an alluvial section of silt, sand, and gravel that has a maximum thickness of 10 feet. In Story County on Onion Creek near Hole 1 (fig. 2) the silt grades upward into the till through a transitional unit which is about 2½ feet thick. This transition is characterized by a gradual increase in sand and pebbles, but with a gradual disappearance of gastropods. Along the same creek but near hole 3 the contact is quite sharp. Along the course of the stream (see holes 5 and 14) the silt grades laterally into till. Hole 13 and the adjoining exposure exhibit an aggregate thickness of till which almost equals the total thickness of the section revealed in hole 1. Only till is exposed over a distance of approx-

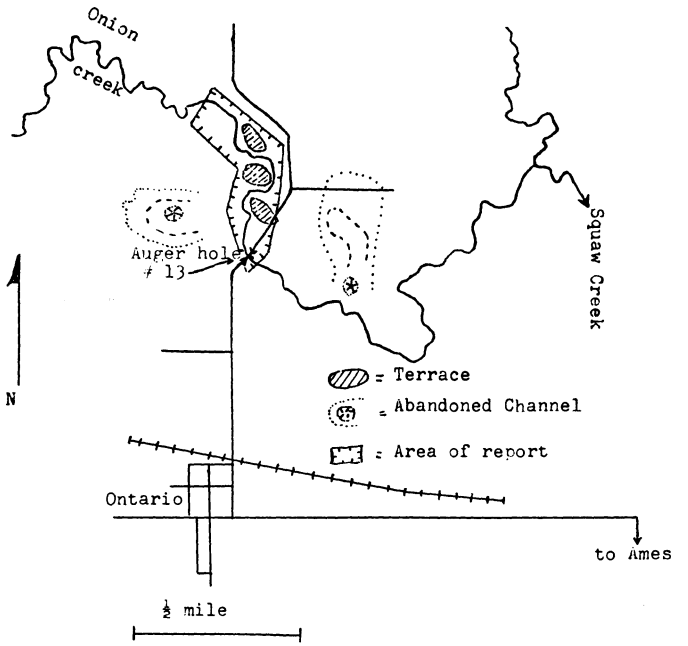


Figure 1. Location Map.

imately 1 mile downstream from hole 13. At the lower end of this traverse, the Cary till lies directly on the St. Louis dolomite without any intervening silt. Upstream from hole 15, through a distance of about three-fourths of a mile, auger holes and exposures have not revealed any silt. However, beyond this in the SW¼ of section 30, T.84N., R.24W., near the northeast margin of an abandoned channel that surrounds an isolated hill, one can observe gastropod-bearing silts in the present stream bed.

This succession seems to suggest that the silts were deposited, in part, contemporaneously with the adjacent Cary till, and that they are somewhat lenticular in shape.

Silt

The silt on Onion Creek has a maximum known thickness of about 40 feet. The exposed section of silt that adjoins hole 1 is bedded. The textural bedding is accentuated by an occasional ½-inch layer of mudstone, and a distinct 1½-foot pebbly band near the base of the exposure. This portion of the section has a few pebbles distributed throughout. Some of these pebbles have a diameter as large as 1 inch, and some even exhibit striated surfaces. Both the size and frequency of occurrence of the pebbles decrease downward into the upper most part of the holes.

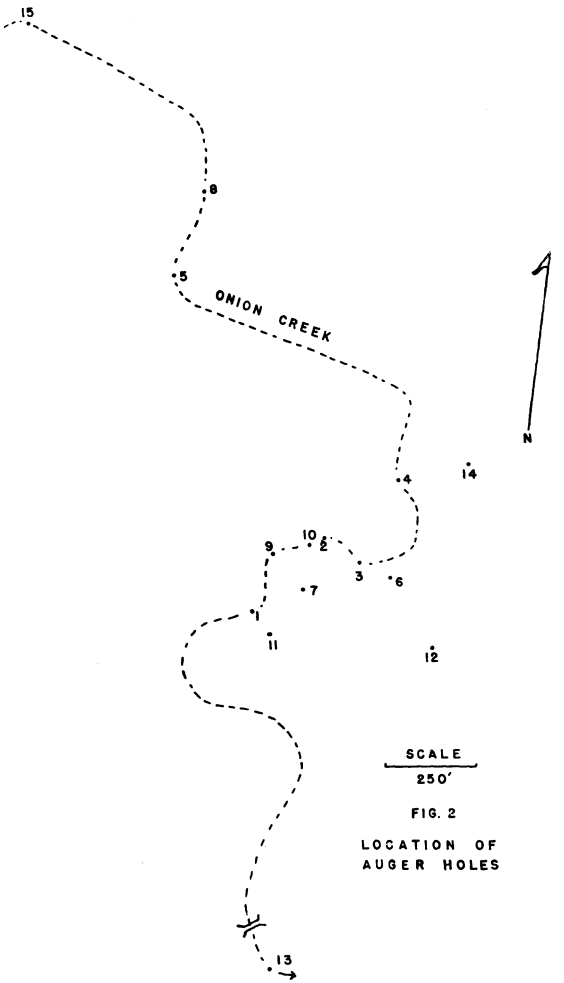


FIG. 2

LOCATION OF AUGER HOLES

In order to compare the subsurface relations, holes 1, 7, 9, and 15 will be used as the standard, because they reveal throughout a less variable lithology than adjoining holes. Hole 1 (fig. 4) does reveal interbedded sands and gravels in the lower 3 feet of the hole, however, no other hole penetrated to a comparable depth.

In contrast to this rather uniform deposit, in hole 2 (fig. 3 and 4) seven feet below creek bed, and in hole 10, thirteen feet below creek bed, one encounters a heavy textured, pebbly, weakly calcareous unit. The pebbly unit has a maximum thickness of 13 feet in hole 2. It thins to 7 feet in hole 10, and was not recognized in hole 9. This change occurs through a lateral distance of 155 feet. This unit is interbedded at top and bottom with the silt by a ½-foot

transition unit which consists of interbedded layers of silt, sand, and gravel.

The succession in hole 3 is predominantly silt throughout; however, at depths of 11 to 11½ feet below creek level, sand increases to about 20% of the total. This ½-foot layer may represent the extension of the pebbly unit of hole 2. If so, the 13 foot pebbly unit of hole 2 has thinned to ½ foot through a lateral distance of 122 feet.

At the present, we do not know enough about the shape of the pebbly unit to determine the nature of this deposit.

At 15 feet below creek level in hole 4, the silt is separated into an upper and lower division by a 2-foot band of argillaceous, slightly calcareous material. A similar unit occurs at a comparable depth in hole 8; however, the thickness is 3½ feet. We do not know whether the argillaceous and pebbly units constitute a continuous deposit.

Characteristically, the material below the pebbly band is an almost uniform silt to the depth of penetration; however, some degree of bedding is suggested (see fig. 5).

The pebbly unit has a calcareous content in the vicinity of 7%, whereas the silt has 12 to 15% carbonate equivalent. Why the pebbly unit should be less calcareous than the adjoining silt deposits is a problem. This difference seems minor; however, in the field, this difference is sufficient to give a non-calcareous reaction in the pebbly unit, but a calcareous reaction in the silt.

The interbedding mud in the exposure adjoining hole 1, although less than ½ inch thick, is also less calcareous than the adjoining silt. This inverse relationship of increasing argillaceous-decreasing calcareous content must be related to a primary cause.

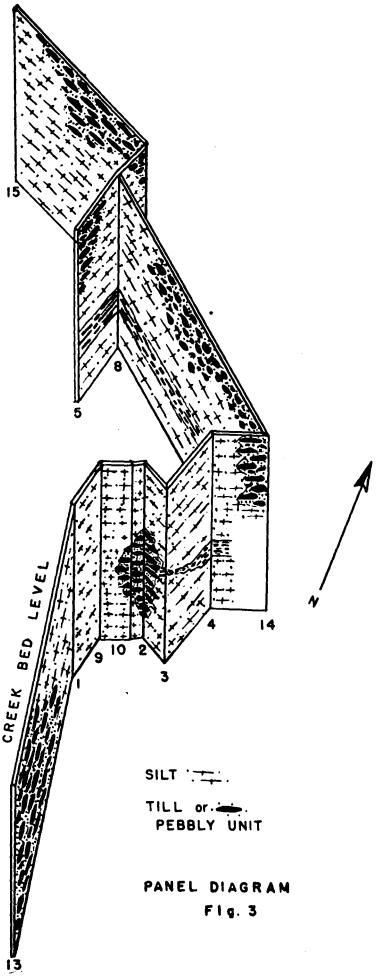
Paleontology

This deposit contains a variety of both plant and animal remains. The study of these remains has not been completed, yet some interpretations of the assemblage can be made. In decreasing abundance the fauna consists of the following groups; terrestrial and aquatic pulmonate gastropods; arthropods, including ostracods, copopods, insects, mites, and centipedes. A few pelecypods are also present. The gastropods and pelecypods are of the type that are generally reported as occurring in loess. The flora consists of wood, pollen, and some questionable *Charophyta* and *Elodea*. The last two plants are aquatic forms.

Terrestrial gastropods predominate throughout the section, however, the changing ecological requirements of the entire assemblage

allows us to recognize three zones. These zones are established from the four-inch auger hole No. 1. The remaining auger holes have a one-inch hole, therefore because of the limited sampling we are unable to demonstrate conclusively that this zoning can be applied throughout the extent of the deposit.

The lower zone extends from the base of the hole up to a depth



PANEL DIAGRAM
Fig. 3

of 12 feet below creek level. This lower zone is distinguished by an abundance of the slug, *Deroceras*.

The medial zone extends upward from the lower zone to about creek level. The fossils within this zone are predominantly *Succinea, Discus,* and the Pupillidae. The types of animals which ab-

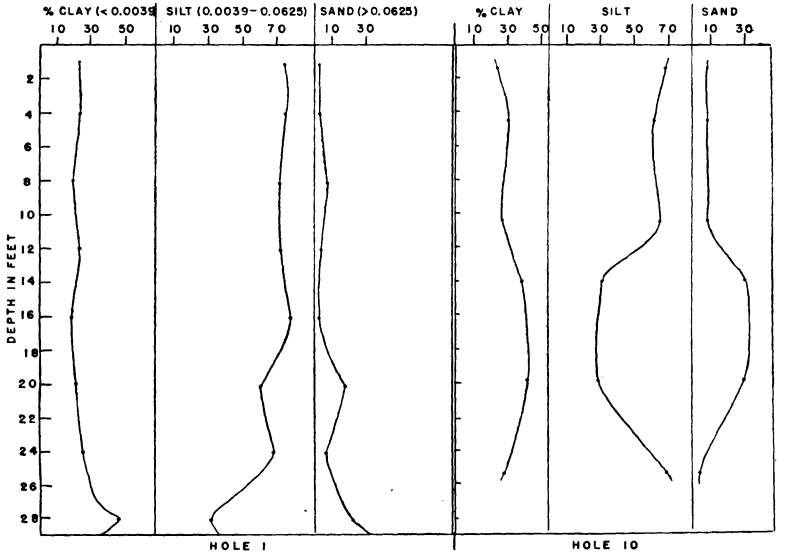
solutely require a very moist habitat are quite rare within this zone, although one aquatic form was recovered.

The upper zone extends from near creek level up to the till contact. This zone has a variety of aquatic snails such as *Lymnaea, Gyralus,* and *Valvata.* Ostracods are most abundant in the lower portion of this zone, but they are present throughout this zone. The aquatic plant, *Elodea* is also most abundant in this zone. Likewise, the copopods were recovered from this zone.

Among the unusual animal remains recovered, but which have little bearing on the zoning, are ants, mites, centipedes, spiders, beetles, rodent teeth, and a small vertebra.

Ecology

Many of the terrestrial snails found in this deposit have a wide range of habitats. Although such forms as *Succinea, Discus,* and the Pupillidae, may be found in upland areas, most of them prefer localities with considerable ground debris, and moist surroundings. Flood plains are reported by Baker (1939) as being a favored habitat. The slugs particularly need moist surroundings in order to survive. From this it would appear that the lower zones indicate sediment accumulation under moist conditions, but with the possibility that the medial zone accumulated under dryer conditions than that of the lower zone.



ONION CREEK
HYDROMETER AND SIEVE ANALYSIS
FIGURE 4

The aquatic snails and the pelecypods of the upper zone are of the type that are most commonly found in small ponds, lakes, or small streams. The ostracods are of the type which prefer quiet, perennial, alkaline water. A floodplain where lush vegetation and standing ponds of water might occur seems to meet the ecological demands of the fauna of this zone.

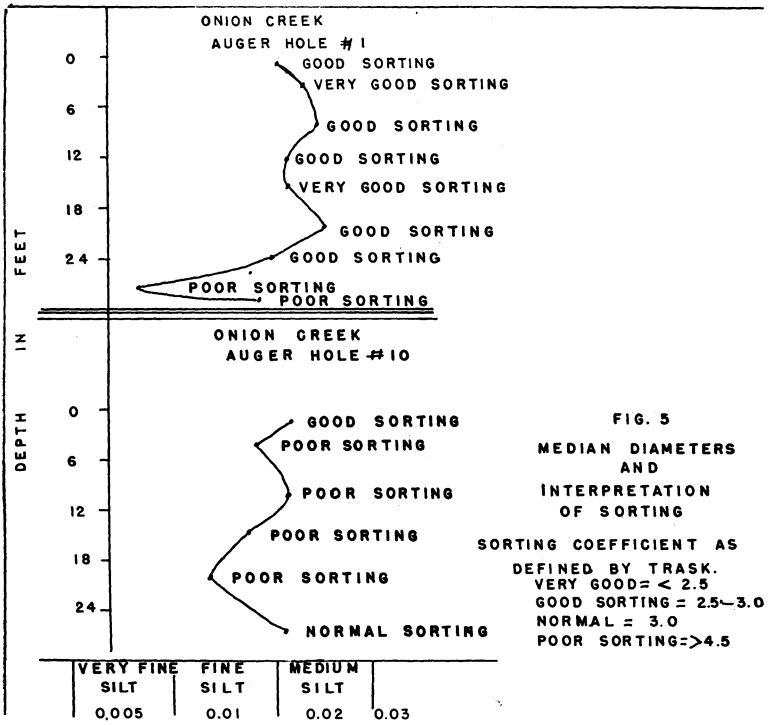
Summary

A Cary loessoid deposit from the Onion Creek area, Story County, Iowa is described. Some of the more significant findings are as follows:

(1) The present data indicates a lens-shaped deposit which has a maximum thickness of 40 feet. The particle diameters range from clay to pebbles, but silt predominates throughout.

(2) Within this loessoid lens other lenses occur. These lenses are characterized by their slightly calcareous content, and by having varying amounts of pebbles, sand, or clay.

(3) The nature of the contact between the silt and the overlying till varies. Some contacts are sharp, but others are gradational. Laterally the silt grades into till.



(4) Three ecological zones are tentatively recognized. These contain a great variety of aquatic and terrestrial organisms, but pulmonate gastropods predominate.

(5) The fauna favors some type of near aquatic or alternately aquatic and terrestrial environment.

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