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Artifact from Deposits of Mid-Wisconsin Age in Illinois

Abstract. *Discovery of an artifact of human manufacture imbedded in Roxana loess, classed as Altonian substage of the Wisconsin stage of the Pleistocene, of an age of 35,000 to 40,000 years, contributes to the determination of the age of man in the New World.*

An artifact of almost undeniable human manufacture (Fig. 1) has been discovered in west-central Illinois (SW¼ NW¼ SE¼ sec. 19, T5N, R3E, Fulton County), well-imbedded in the nearly vertical face of a fresh road cut. If the artifact is the same age as the stratum where it was found, 35,000 to 40,000 years (*1*), it is extremely important in determination of the age of man in the New World.

Because this is an isolated artifact and because the road cut was made by heavy machinery, there is, of course, the unlikely possibility that the specimen was dragged from another area or fell from the surface above and was pushed into the face of the cut by the machinery. A thin scattering of archeological materials attributable to Archaic occupation (10,000 to 3,500 years ago) on the surface adds some credibility to this possibility. Due to the sheerness and fresh condition of the cut at the time of discovery, however, it would appear to be impossible that the artifact fell from the surface and lodged after completion of the cut. Another equally implausible possibility is that the specimen was intruded by natural means (for example, burrowing animals, uprooting of trees) from the bottom of the Peoria loess 1.1 meters above, which dates after 20,000 years ago.

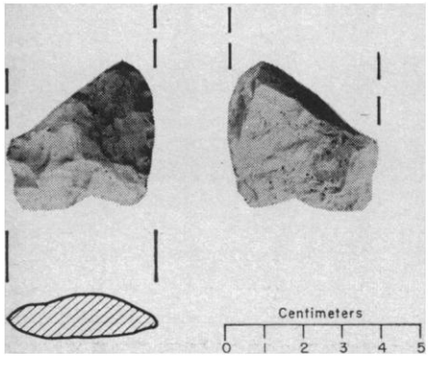

Fig. 1. Obverse, reverse, and cross-section of artifact.

The artifact, one end of which is broken by an old fracture, is plano-convex, well-trimmed, and percussion flaked; and the material is a rather poor-grade gray chert which occurs as pebbles in the local glacial tills.

The Pleistocene stratigraphy in the road cut was studied, the deposits were sampled, and the fractions of the samples of diameter less than 2 microns were analyzed by x-ray diffraction. The stratigraphy at the locality and significant data from the x-ray analyses are shown graphically in Fig. 2. The stratigraphic units are characteristic of the Illinois Valley region and have been described in detail through this part of Illinois (*2*). The Peoria loess consists of yellow-tan massive silt with a relatively deep surface soil at the top. It has been leached of carbonate minerals except in the lowermost 50 centimeters, which contain a minor amount of dolomite (determined by acid in the field and checked by x-ray diffraction). In the lowermost 30 centimeters is a crenulate zone of charcoal flecks; the peaty zone that is typical of the Farmdale is not present in this locality. The Roxana silt consists of loess in the upper two-thirds (zones II to IV) and sandy silt grading downward into sandy, pebbly silt at the base (zone I). The Roxana has been entirely leached of its carbonate minerals and contains a soil at the top and one or more soils in the basal part. Below the Roxana silt is a strongly developed Sangamon soil at the top of Illinoian till; this soil grades downward into typical, calcareous, Illinoian till in the lower part of the cut.

The age of the stratigraphic units has been determined by numerous radiocarbon dates, both on snail shells and on wood, in western and central Illinois. Several ages from the lower part of the Peoria loess have ranged from 17,000 to 20,000 years ago. A large number of dates from the Farmdale peats and silts fall in a range between 22,000 and 27,000 years ago. Although Farmdale peat does not occur in this section, its stratigraphic position is between the Peoria loess and Roxana silt. For the Roxana silt, two ages from the upper part of zone II and the lower part of zone III in southwestern Illinois, determined from snail shells, were 35,000 ± 1,000 and 37,000 ± 1,500 years (samples W-729 and W-869), and ages for peat in a comparable stratigraphic position in

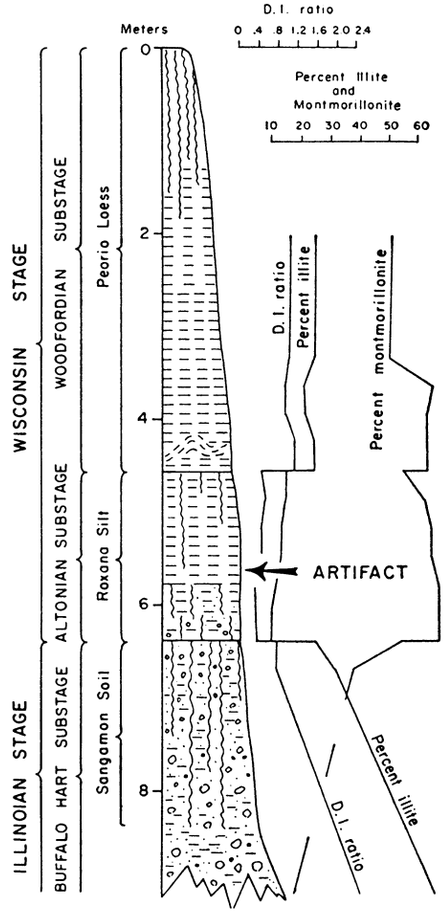

Fig. 2. Stratigraphic succession at the site of collection. The diffraction-intensity ratio (*D.I. ratio*) and percentages of illite and montmorillonite in the fraction of particles less than 2 microns in diameter are shown graphically.

northern Illinois have been determined at 35,000 ± 2,500 and 38,000 ± 3,000 years (samples W-1450 and I-847). Because the stratigraphic position in which the artifact occurred was just above zone I in the Roxana loess and below the bulk of zones II to IV, its inferred age is in the range of 35,000 to 40,000 years.

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Immunodiffusion: Detection of a Murine Leukemia Virus (Rauscher)

Abstract. *Homologous and heterologous antiserums from several species of animals have been prepared against the Rauscher murine leukemia virus. The Ouchterlony technique, adapted to very small quantities, has been used to demonstrate at least two or three antigens in Rauscher virus preparations. Both infected-host materials and tissue-culture fluids were used as antigens. When monkey antiserum was used, one of the Rauscher virus antigens cross-reacted with an antigen in the virus strains isolated by Friend and Moloney, but there was apparently no reaction with the Moloney virus when guinea-pig antiserum was used.*

Several techniques have been applied to the problem of detection of murine leukemia viruses. When the Rauscher virus (*1*) was used as a model, methods based on infectivity (*2*), electron microscopy (*3*), and fluorescent microscopy (*4*) yielded some useful results. Infectivity assays, however, require a great deal of time, electron microscopy requires special apparatus and skills not always available, and fluorescent microscopy identifies viruses present within cells. The need for a test for rapid identification of virus in extracts of tissues and cultures may be met by the highly specific immunological technique of double diffusion, as described in this report. Several different antigenic preparations and several different heterologous antiserums as well as a homologous antiserum were used. The technique offers potential not only as a method for virus detection, but also as the most refined method available for the further delineation of the antigens of the various strains of murine leukemia virus.

Antiserums against the Rauscher virus were prepared in adult rhesus monkeys, Hartley guinea pigs, Race III rabbits (*5*), and in Balb/c mice. In general, the course for immunization consisted of a primary intraperitoneal inoculation of ten-times-concentrated plasma, obtained from Balb/c mice infected with the Rauscher virus and emulsified with an equal quantity of complete Freund's adjuvant. This was followed 21 to 28 days later by the subcutaneous inoculation of a small —0.10 to 0.25 ml—inoculum of the virus extract without adjuvant. Serum was obtained 7 to 10 days after the booster inoculation. The homologous antiserum was prepared similarly except that Formalin-inactivated virus in cell-free extracts of spleen from infected Balb/c mice was used (*6*). Control serums included those of Balb/c mice inoculated with adjuvant and saline, with extract of normal Balb/c spleen and adjuvant, or normal Balb/c serum. In all of the heterologous antiserums the following steps were used to remove antibody that might be reactive with normal plasma or with antigens, other than the virus, which were contained in the inoculum. After inactivation at 56°C for 30 minutes, Forssman antibody was removed by absorption with thrice-washed sheep erythrocytes until no reaction was demonstrable by hemagglutination. Serums were then absorbed with erythrocytes from normal Balb/c mice until no reaction was demonstrable by hemagglutination. This was followed by absorption with normal Balb/c plasma until an excess of Balb/c plasma could be demonstrated by double diffusion and no reaction occurred with the normal Balb/c plasma.

Antigens tested included the following preparations of Rauscher virus: ten-times-concentrated plasma from Balb/c mice infected with Rauscher virus (RP-10×), and a similar preparation from normal Balb/c mice as a control (NP-10×); one-hundred-times-concentrated preparations of the tissue-culture fluids obtained from a line of spleen and thymus cells grown from a Balb/c embryo, a part of the cells having been inoculated in vitro with the Rauscher virus (JLS-V5) and a part, as a control, not inoculated with Rauscher virus (JLS-V6) (*7*). Fresh 50-percent plasma from Rauscher-infected mice showing palpable spleens and fresh extracts from the palpable spleens were also tested. Other than Rauscher virus preparations, we tested one-hundred-times-concentrated plasma from Balb/c mice infected with Moloney virus (MP-100×) and a ten-times-concentrated plasma preparation from Balb/c mice infected with Friend virus (FP-10×). Moloney virus from cells infected in vivo and propagated in vitro, as described by Manaker *et al.* (*8*) and called MT-77, was concentrated 1000-fold and used as an antigen.

The Wadsworth-Crowle modified Ouchterlony technique was used (*9*). After the addition of the reactants to the gel composed of 0.85 percent ionagar, the preparations were kept at room temperature in a humidified chamber and were examined after intervals of 48 and 72 hours. Neat removal of the plastic template was greatly facilitated by chilling the preparations at 0° to 4°C for 30 minutes prior to its removal. Soaking the gel on the slide for 10 minutes with the barbital buffer recommended by Crowle made the precipitin lines more prominent. All tests were conducted in duplicate or triplicate. A permanent photographic record was made of each slide.

The RP-10× was tested with the heterologous and the Balb/c antiserums. All of these serums had neutralizing activity for Rauscher virus, as measured by the 120-day assay technique (*6*).

The monkey antiserum revealed at least two, and probably three, antigens in the RP-10×, one line of which cross-reacted with a similar preparation from Friend virus, and a hundred-times-concentrated preparation of Moloney virus. No reaction was obtained with concentrated normal plasma (Fig. 1*A*). This monkey antiserum revealed more than one band in both the