10. CONSULTANT CONTRIBUTIONS

BLUEBERRY HILL'S HISTORICAL record was fleshed out by supplementary contributions from three consultants, who provided information about geology, soils, and pollen record.

The soil record helped archæologists define natural strata in which cultural materials were imbedded. Pollen defined changes over the millenia in vegetation around the site. Geological investigators developed a yardstick that made it possible to link the soil record, the pollen record, and the archæological findings into a single narrative.

GEOLOGY

The geomorphological record provides the most complete account of environmental change through time. A proposed centerline passed through two bay basins, the Blueberry Hill site, and the floodplain of the Saint Jones River. Detailed geomorphological studies were conducted by the University of Delaware Department of Geology along this line for the bay basin most distant from the site, the site itself, and the floodplain (Daniels 1993, appendix 1, this volume).

Hand-auguring and coring, supplemented by ground-penetrating radar, were used to develop a detailed subsurface stratigraphy. Particle size analysis was used to compare strata in the floodplain, basin, and archaeological site. Radiocarbon dating was used to provide temporal control. Using these analyses, Daniels (1993:53-83) has defined a number of discrete time periods in the history of the study area.

PRIOR TO 21,000 B.P.: The study area exhibited a ridge and swale topography suggesting an aeolian origin. The basin formed sometime before 20,960 B. P., and appears to have been associated with an adjacent dune-like feature. Prevailing winds probably came from the southwest.

In the floodplain, sediments dating before 46,700 B. P. were apparently deposited in an open water environment. Colluvial deposits at the base of Blueberry Hill were deposited in the floodplain during this time period, but there is little evidence of water-borne sediments.

Daniels suggests that extensive reduction of vegetative cover would be necessary to produce the ridge and swale topography exhibited in the project area during this time period. The colluvial deposits in the floodplain suggest that this loss of cover was accompanied by periodic severe storms.

21,000 TO 15,000 YEARS B.P.: Clayey-silt sediments accumulated in the basin, which was filled with water during this time period, although the presence of mud cracks indicates episodes of drying. There is no evidence of deposition in the floodplain.

15,000 TO 10,300 YEARS B.P.: Although there is no evidence for sediment accumulation in the basin, there is an increase in deposits typical of point bar formation in the floodplain. There is a suggestion that wetter conditions prevailed, with more complete vegetative cover and less severe storm events.

10,300 TO 2,800 YEARS B.P.: During this time period, approximately one meter of aeolian deposits filled the basin. Accretion in the floodplain was, however, reduced. The presence of extensive amounts of charcoal in these sediments indicates that forest fires were frequent. Aeolian sediments appear in the floodplain after about 8,800 years B.P., and before 5,680 years B.P., contributing to the conclusion that climatic conditions were generally warm and dry. There is evidence, however, of an episode of extremely dry conditions.

2,800 B.P. TO EUROPEAN SETTLEMENT: Sediments in both the basin and the floodplain during this time period contained a high percentage of organic debris. Daniels suggests that this period was marked by an increase in precipitation, but without an increase in large storms.

EUROPEAN SETTLEMENT TO PRESENT: Farming activities following European settlement have significantly altered the landscape in the project area. Mottling in the basin deposits indicates that water table levels have fluctuated. Sedimentation in the floodplain increased, in part a result of clearing for lumber and cultivation. The construction of mill ponds along the St. Jones River has resulted in increased flooding of the floodplain.

POLLEN

Grace Brush of The Johns Hopkins University analyzed the pollen in two cores from the floodplain (Brush 1993, appendix 2, this volume). Many deposits contain little or no pollen, and deposits are not present for all time periods, so that small scale changes in vegetation are not identifiable.

At about 10,000 B.P., the pollen profile is dominated by pine (including spruce and fir), wood fern and club moss. Sphagnum moss is abundant, and hemlock, birch, alder, and maple are present. Sedges also are abundant. The pine pollen at the bottom of core PC-17 exhibits a wide range of sizes indicating that several species are represented.

This pine-dominated zone is followed by a hickory and walnut zone, accompanied by chestnut, holly, sycamore, black locust and elm. Herbaceous forms include members of the blueberry family, arrowhead, members of the parsley family, grasses, and arrowwood. Brush interprets this as characteristic of the middle to more recent Holocene. There is a suggestion that drier periods, indicated by hickory, blueberry and goldenrod, may have alternated with wetter periods, indicated by walnut and cattail. However, the lack of resolution caused by the low level of deposition after 8,800 B.P. makes this difficult to interpret.

In both cores, the presence of ragweed in the upper 25 cm. indicates post-European settlement. The pollen in this zone represents a Coastal Plain vegetation, and includes oak, hickory, walnut, holly and elm.

SOILS

John E. Foss of the University of Tennessee visited the site three times, describing the soil profiles for six excavation units. Soil samples were taken for three profiles. Particle size analyses and chemical analyses were performed for these profiles (Foss, Lewis, and Timpson 1992, appendix 3, this volume).

The soil descriptions indicate the presence of four major soil horizons in most profiles, an A horizon corresponding to Archaeological Zone I, a Bw horizon corresponding to Archaeological Zone II, a C horizon corresponding to Archaeological Zone III, and a paleosol corresponding to Archaeological Zones IV and V. In some profiles, divisions within these master horizons could be distinguished.

The paleosol at the base of the excavated profile represents an early Holocene or Pleistocene surface that had weathered for 7,000 to 8,000 years before deposition of the overlying C horizon. Thin lamellae have formed in the C horizon, indicating a period of weathering lasting perhaps 1000 to 2000 years. The Bw horizon displays some iron translocation and weak structural development. The A horizon varies considerably in thickness across the site. Chemical analyses provide evidence of pollution in this horizon.