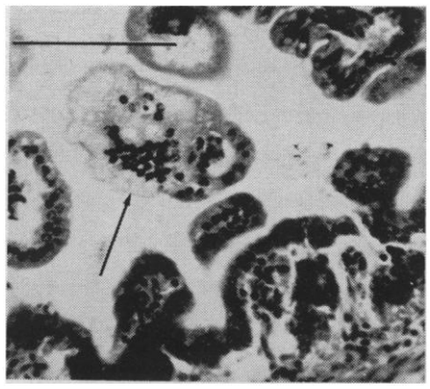

Fig. 1. Small intestine, infant mouse. Arrow indicates a multinucleated "balloon cell." Line at upper left represents 100 μ.

tral vessels and connective tissue of the villus is not understood at present. Inflammation is lacking throughout the tract; however, in long-lasting infections it may occur because of secondary bacterial invasion.

For study of the experimental disease CFW mice were used, and the methods of preparing intestinal suspensions and filtrates, of infecting animals *per os*, and of holding, handling, and breeding animals in filter cages were the same as those employed in studies of EDIM virus infection (*2*). Routes other than the oral resulted in sporadic "takes" and could not be used to obtain meaningful results.

Incubation period, severity of disease, and mortality rate vary with the dose of the agent and with the age at which it is fed. The shortest periods noted were 36 hours to onset of signs and 48 hours to death in infants less than 10 days old. Mice fed at 16 days

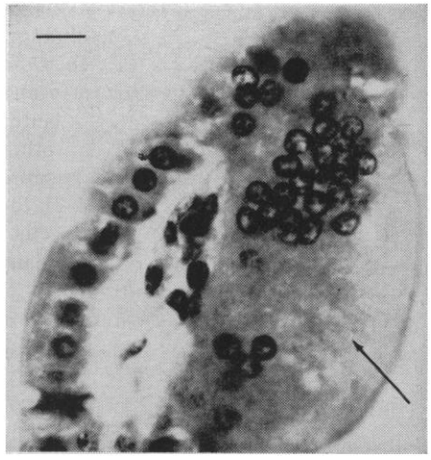

Fig. 2. Small intestine, infant mouse. "Balloon cell" (arrow) with normal appearing epithelium at left. Line at upper left represents 10 μ.

of age can react with death and gross pathology 4 to 6 days later. In these older animals, feces are pasty and soil the coat, but there is apparently no tendency toward rectal impaction as in EDIM virus infection (*1*). On autopsy the intestines appear chalky gray in color. Mice are susceptible until at least 1 year of age, but the infection after weaning and in adults is inapparent.

In mice younger than 10 days the new agent is found mainly in the intestinal tract. In two animals of 20 tested, however, it was also found in the liver in low titer. The titer attained in intestines and contents of infants has been found to be not greater than 10^8 ID_{50}/g, whereas in EDIM virus infection it is not unusual to find a concentration of 10^{10} ID_{50}/g. In adult mice fed a single dose *per os* of 5×10^8 ID_{50}, the agent was shed constantly in feces for 15 days, beginning on the day after feeding.

Immunologic identification of the agent cannot at present be made with mouse serum; the same holds for EDIM virus (*3*). Hyperimmune rabbit sera, however, serve to differentiate it from EDIM virus. Whether the new agent is related to any other agent has not yet been ascertained.

Seitz filtrates of an intestinal suspension of LIVIM were passed through Millipore filters of 10-, 50-, 100-, 300-, and 450-mμ pore diameters. After this treatment, the agent passed without significant loss through the 300- and 450-mμ filters, but it could not be detected in filtrates passing through the others. The same results have been obtained with EDIM virus which, in electron micrographs, measures 65 to 75 mμ in diameter (*4*).

The new agent is susceptible to heating at 50°C for 30 minutes. Indeed, at least 99-percent infectivity may be destroyed when a filtrate is held at 4°C for 24 hours. Whether or not this is solely the function of temperature remains to be seen, for the virus is also sensitive both to ether and sodium deoxycholate. Incubation at 4°C for 24 hours with ether resulted in less than 1 percent survival of the agent when compared with an untreated control. Incubation with 1 : 1000 deoxycholate at 37°C with normal rabbit serum resulted in a reduction in titer of 2.3 log when compared with an untreated control.

Thus far the new agent has failed to multiply in L cells, mouse embryo, rhesus kidney, HeLa tissue cultures, Ehrlich ascites tumor in vivo, and the chorioallantois of the chick embryo. Furthermore, agglutination of the following red cells in phosphate-buffered saline at *p*H 7.2 could not be demonstrated: sheep, mouse, guinea pig, rabbit, chicken, and human type O.

On the basis of its apparent size, its lack of growth on bacteriologic media, and its reproducibility by passage in mice, the agent described is assumed to be a virus. Further experimentation will be necessary to characterize it completely and to differentiate it from other known agents. It is described here as an apparently new disease of infant mice.

LISBETH M. KRAFT*
Department of Pathology,
Yale University School of Medicine,
New Haven, Connecticut

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* Present address: Public Health Research Institute of the City of New York, Inc., Otisville Branch, Otisville, N.Y.

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Animals Used as Food by Late Archaic and Woodland Cultural Groups in New England

Abstract. Remains of vertebrates and invertebrates found at several New England Woodland sites confirmed results and conclusions of earlier investigators, and further indicated that amphibians and reptiles were not used much as food, if so used at all. Vertebrate remains found at Late Archaic sites indicate the presence of a largely contemporary fauna. Failure of Late Archaic people at sites studied to use mollusks in quantity as food may have been determined by cultural barriers, and not by lack of availability.

Since the middle of the last century investigators have been identifying remains of animals found in shell heaps and other sites of former human habitation in New England. Until two decades ago this investigation had involved only sites assignable to the Woodland cultural period. Animal remains at sites of an earlier vintage were not identified, even though some of these sites were found by amateurs.

The study reported here was undertaken to determine, among other things, animals used as food by successive cultural groups in New England. Ani-

mal remains found in several Late Archaic and chronologically later Woodland sites in Rhode Island and Massachusetts, and Woodland sites in Maine, were identified and compared. Results confirmed previous findings regarding Woodland sites. Nearly every edible and available marine, fresh water, and terrestrial invertebrate and vertebrate was used as food. Even though some interesting distributional records were established, and some species now extinct or no longer found in New England were identified, most species still occur in the vicinity of the site at which they were found. Mainland affinities of faunas formerly present on Block Island, Rhode Island (*1*), and the island of Martha's Vineyard, Massachusetts (*2*), were confirmed. Most species used as food were available throughout the year, while others were only seasonally available, depending on hibernation or migration habits. Marine mollusks and white-tailed deer (*Odocoileus virginianus*) were the most popular items in the diet of these people. It is interesting to note that remains of amphibians and snakes were not identified in this study, or in any previous study.

Vertebrates found at Late Archaic sites are, for the most part, assignable to a contemporary fauna. The Indian dog (*Canis familiaris*), remains of which were found at several sites, became extinct in New England sometime after the coming of Europeans (*3*), and the sea mink (*Mustela macrodon*), found only at the Wapanucket No. 6 site in Middleboro, Massachusetts (Fig. 1), has been extinct at least 60 years (*4*). Wapiti (*Cervus canadensis*), remains of which were found at a Late Archaic site in Scituate, Rhode Island, have not been known to occur naturally in New England within historic times (*5*).

Other vertebrates identified—fish, turtles, birds, mammals—occur today in the vicinity of sites at which they were found, or have occurred there within the last century. Too few remains were found to warrant conclusions as to which species were used most frequently for food. However, it is interesting to note that mollusks were apparently not used much for food, if they were used at all. The valves of one quahog (*Venus mercenaria*), filled with red ochre, were found at the Wapanucket No. 8 site (a segment of the Wapanucket No. 6 site), but remains of mollusks were not found at any other Late Archaic site studied. Remains of several marine mollusks had been identified at the Boylston Street fishweir site (*6*) in Boston, roughly contemporaneous with the Wapanucket No. 6 site (*7*) as based on radiocarbon dates from both sites. However, it was not established that these mollusks were used as food.

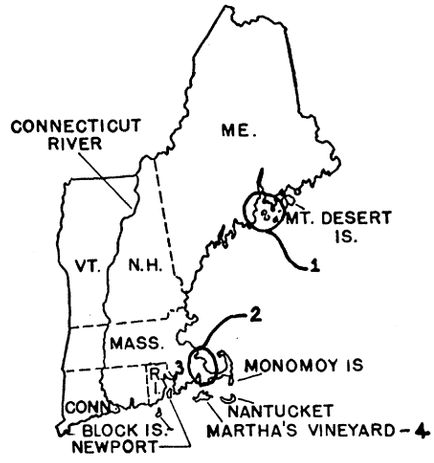

Fig. 1. Locations of Maine, *1*, and Massachusetts, *2*, Woodland sites studied, the Wapanucket No. 6+8 site, *3*, and the Lagoon Pond site, *4*.

Remains found at the Lagoon Pond site on Martha's Vineyard (Fig. 1) further indicate that mollusks were not a popular food item with Late Archaic people in southern New England. At this site, artifacts assignable to the Late Archaic cultural period were found only in a yellow soil stratum beneath the shell stratum, whereas artifacts assignable to the Woodland cultural period were confined to the shell stratum (*8*). Radiocarbon measurements of charcoal from the middle of the yellow soil stratum, and from the bottom of the shell stratum, indicate that this site was occupied by Late Archaic people until at least about 500 A.D., and that mollusks were not used as food until about 900 A.D., by Woodland people only.

It is improbable that Late Archaic people living at the Lagoon Pond site did not use mollusks for food because they were not available. Both geological and biological lines of evidence (*9*) indicate that portions of the continental shelf were emergent during early post-Wisconsin times, and that Martha's Vineyard was a portion of the mainland until somewhat less than 5000 years ago. There were, then, neither physical nor climatic barriers (*10*) to the establishment of terrestrial and freshwater mollusks there and in the rest of southern New England. Moreover, in the 3000 years or so following separation of Martha's Vineyard from the mainland, marine mollusks must have become well established around the island as well as on newly established shores of the mainland. Remains of various marine animals at the Wapanucket No. 6+8 site suggest that the shoreline of southern New England at the time of occupation of the site (about 2300 B.C., based on radiocarbon measurements of charcoal from hearths and firepits) was similar to that today, and that marine mollusks were easily available.

It would be of interest to determine if Late Archaic people lived at the edge of the formerly emergent continental shelf, and if so, to determine whether or not marine and freshwater mollusks were used as food. If these people did use mollusks, it is difficult to imagine why they did not influence their brethren living more inland to do the same, as movements inland took place during resubmergence of the continental shelf. Evidence found to date suggests that cultural barriers prevented Late Archaic people from eating mollusks. It would be of equal interest to determine factors stimulating the relatively recent adoption (by Woodland people) of mollusks for food.

JOSEPH H. WATERS

Bronson Museum,
Attleboro, Massachusetts

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