

THE CASE OF THE VANISHING BRICK DUST¹

CONTRIBUTION TO KNOWLEDGE OF MARSH DEVELOPMENT

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Since 1932, the Department of Entomology of the Agricultural Experiment Station of the University of Delaware has been engaged in an investigation of mosquitoes. The cost of this research program from 1932-33 to 1956-57, inclusive, approximates \$226,000.00. Results, during this 25-year period, have been summarized in 52 publications authored by 23 individuals. Their combined contributions amount to a 616-page volume embracing all of the important aspects of local biology and control.

One of these publications (Stearns, MacCreary and Daigh, 1940), reports upon work to determine the effect of ditching for mosquito control on the muskrat population of a Delaware tidewater marsh. While this study was in progress (1936-39), the experimental site was visited by many interested specialists in this general field. Such a group, accompanied by the writers, inspected the area on May 5, 1937. Included were: G. H. Bradley, F. C. Bishopp and J. A. Rowe (then with the USDA, Bureau of Entomology and Plant Quarantine); W. S. Bourn (then with the USDA, Bureau of Biological Survey); and A. P. Dachnowski-Stokes (then with the USDA, Soil Survey Division, Bureau of Chemistry and Soils).

For the purpose of frequent and accurate evaluation of the effect of ditching in its many ramifications, the entire acreage (both ditched and unditched sections) had been subdivided into 100-foot-square (or sometimes even smaller) units, and the vegetative cover had been mapped on the

scale of one-sixteenth of an inch to a foot (see Fig. 12, p. 24, Stearns *et al.*, loc. cit.).

Most of the ecologically significant plants common to Delaware's lowlands occurred here. Those of economic value appeared in practically pure stands of varying size; for example, big cordgrass (*Spartina cynosuroides*), saltmarsh cordgrass (*S. alterniflora*), saltmeadow cordgrass (*S. patens*), saltgrass (*Distichlis spicata*), Olney's three-square (*Scripus olneyi*) and several others.

Obviously, information concerning the plants that had been involved in the gradual formation of this marsh over the years would be of considerable value in providing a phyto-historical background for the present. Units 19, 20, 28, 29, 39 and 40 composed a rectangular (200' x 274') relatively homogeneous area, with Olney's three-square, saltmeadow cordgrass and saltgrass dominant and spikerush (*Eleocharis rostellata*) secondary constituents, respectively, in the plant association at that point. Arbitrarily selecting unit 40 and by means of a peat-sampling device, Dr. Dachnowski-Stokes removed a series of soil samples, to a depth of 15 feet (for his dictated descriptions of the same, refer to footnote, p. 19, Stearns *et al.*, loc. cit.). Well-preserved remnants of *S. olneyi* at the 15-foot level indicated (in his opinion) that the species existent ages ago were, in all probability, identical with those of today.

It is a well-known fact that a marsh of this kind develops by accretion; that is, by continued and appreciable accumulations of vegetative-cover debris eventually fixed in place by the mud from tidal waters. At the suggestion of Dr. Dachnowski-Stokes, four bushels of brick dust were spread evenly (as a one-inch layer) over 25 square feet in the center of unit 19 on May 17, 1937; there to remain for 20 years, at

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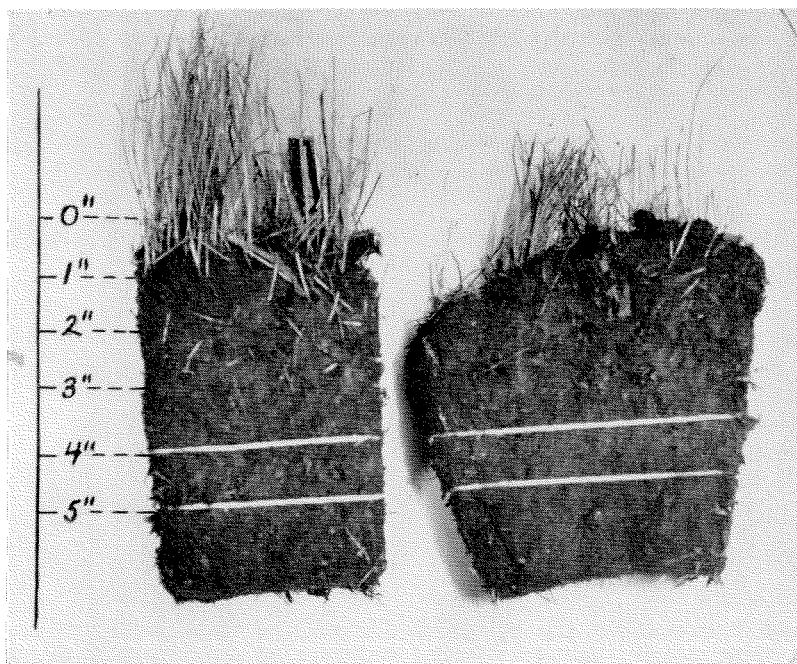


FIG. 1.—Layer of brick dust, four to five inches below marsh surface, July 15, 1957.

which time the position of this distinctive marker in the soil was to be determined as indicative of the rate of marsh build-up.

On July 15, 1957, the situation in unit 19 was viewed again. There had been no discernible change in plant types since 1937. The layer of brick dust was now situated from four to five inches below the marsh surface (Fig. 1), or an increase by external addition in terms of about one inch in every four years.

Apparently, however, the complicated chemical and physical processes responsible for decomposition and stratification (as observed and recorded on May 5, 1937) are sufficiently effective to compensate fully for annual increments of dead growth at the top level. In other words, the ground elevation in unit 19 is now, for all practical purposes, the same as determined 20 years ago.

The present elevation is 5.625 feet above

local mean low water (average of 50 readings on August 30, 1957) compared with an average of 5.686 feet for the four years, 1936-39. The difference (0.061 foot or less than $\frac{3}{4}$ of an inch) is well within the range of instrumental accuracy, when operating on a spongy marsh soil with a very high water table (only 3.52 inches below ground surface; reference: Tables 3 and 4, pp. 30-31, Stearns *et al.*, loc. cit.). The weight of the rodman alone on the highly-saturated unstable substratum at the many elevation points will account for all of the small variations from the average registered in this recent survey.

Literature Cited

- STEARNS, L. A., MACCREARY, DONALD and DAIGH, F. C. 1940. Effect of ditching for mosquito control on the muskrat population of a Delaware tidewater marsh. Del. Agr. Expt. Sta. Bull. 225 (Tech. 26):55 pp.