The Origin of Wye Marsh

by

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Pollen Analysis

Laboratory Procedure

Samples were taken at 10 centimetre intervals, and the pollen grains extracted from their muddy matrix by the method described by Faegri and Iversen in 1975. For each level a microscope slide was prepared by suspending the pollen in silicone oil. Each slide was then placed on the stage of a binocular microscope and viewed at a magnification of either x250 or x500, depending on the difficulty of identification. A pollen count was recorded for each genus of pollen, making regular traverses of the slide.

Pollen Diagrams

With the pollen grain-counting complete, a diagram was prepared in which each pollen type is plotted as a percentage of the total pollen count, and the percentage is shown at the bottom of each column. The depth of the core is shown at the left in centimetres. The name of each genus is given at the top of the columns.

For the sake of greater clarity in this study, we decided to separate the tree pollen from the pollen of the marsh plants and to prepare a pollen diagram for each. The development of the forest cover is shown by the "Wye Lake forest pollen" diagram (Figure 4).

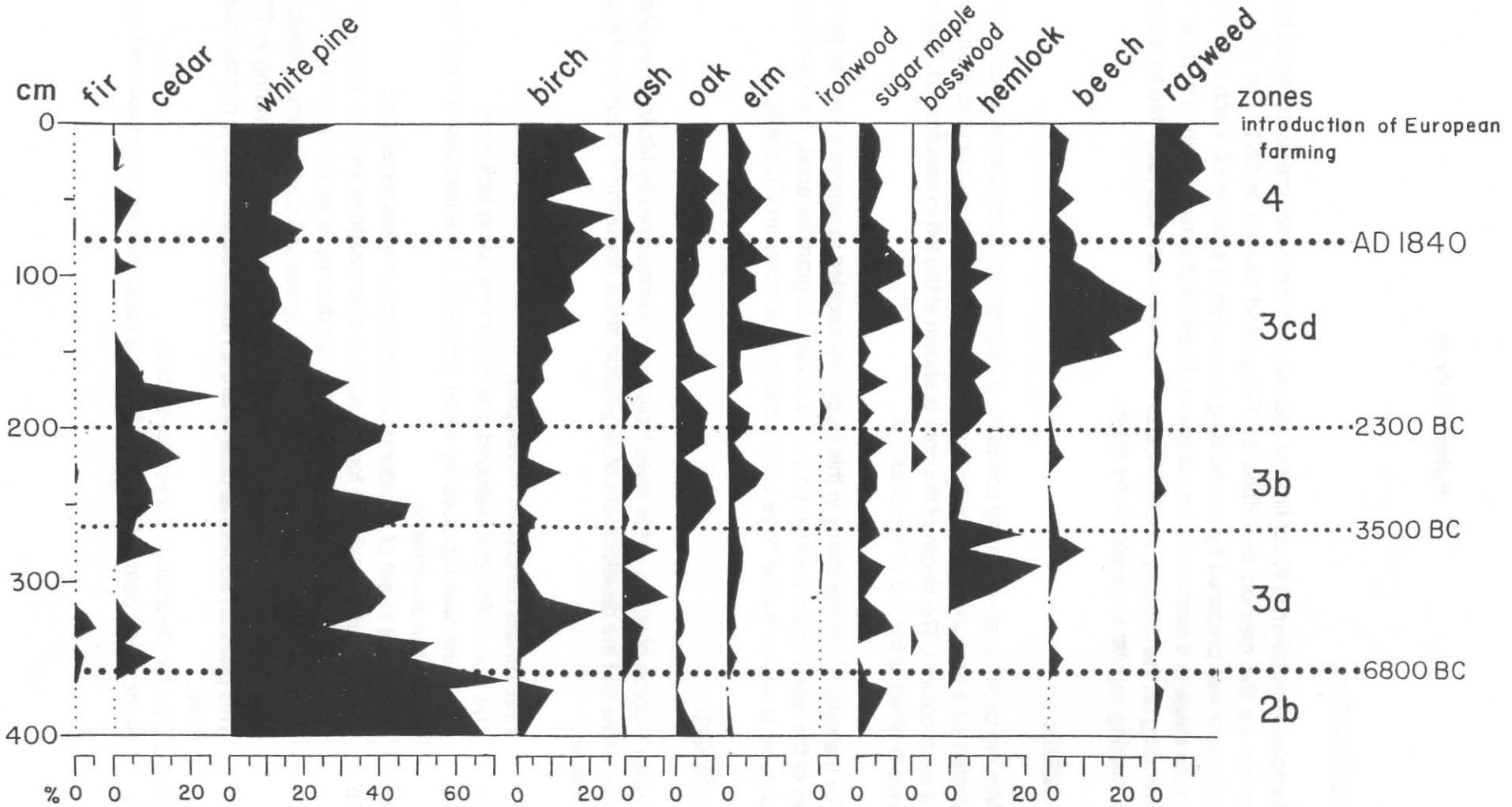
The Zone System

Pollen records of all the kettle lakes have been summarized by McAndrews (Appendix II), and they show that the development of vegetation since glaciation in Southern Ontario has been as follows:

1. First Tundra conditions developed.
2a. The Boreal Forest developed, the major tree being jack pine.
2b. Jack pine was replaced by white pine with a few deciduous trees appearing among the evergreens.
3a. The Mixed forest of deciduous and evergreen trees developed.
3b. This zone is remarkable for the sudden decimation of the hemlock by a pest, in the same way that the elm was recently destroyed by the Dutch elm disease. It spread throughout the eastern United States and Canada and is reliably dated as having started about 3500 BC, with the Hemlock recovering in 2300 BC. This gives an additional date where an actual carbon date is not available in the core.
3c & d. The full Deciduous Forest developed.
4. Agricultural deforestation resulted in a rapid invasion of grasses and ragweed.

FIGURE 4

Wye Lake forest pollen



Discussion of the Wye Lake forest pollen Diagram - Figure 4.

As in all pollen diagrams, pine trees are greatly overstated because the pine is the most prolific pollen producer of any tree. While the population is overstated, the shape of the curve is significant.

Note that in the Wye Marsh core there are no zones 1 or 2a, the zones of the Tundra and the early Boreal Forest. This is because the early Wye River eroded those sediments away.

2b. **360--402 cm.** The white pine evergreen forest developed with a few birch, oak and sugar maple trees included. At the end of this period, the rising waters of Georgian Bay flooded into the mouth of the Wye River and the Early Marsh came into existence in 6800 BC.

3a. Rising temperatures produced a reduction in white pine and the growth of the early Mixed Forest, including birch, ash, oak, elm, ironwood, maple, hemlock, and beech.

3b. **270--200 cm.** In 3500 BC the hemlock was decimated by a pest, and did not recover until 2300 BC. During this time the Early Marsh was inundated by the rising waters of Georgian Bay, reaching a depth in the Wye Marsh basin of forty feet.

3c.&d. **200--75cm.** With a further reduction of white pine and an increase in the deciduous trees, the full Deciduous Forest developed. The falling water levels brought the Modern Marsh into existence in approximately 2000 BC.

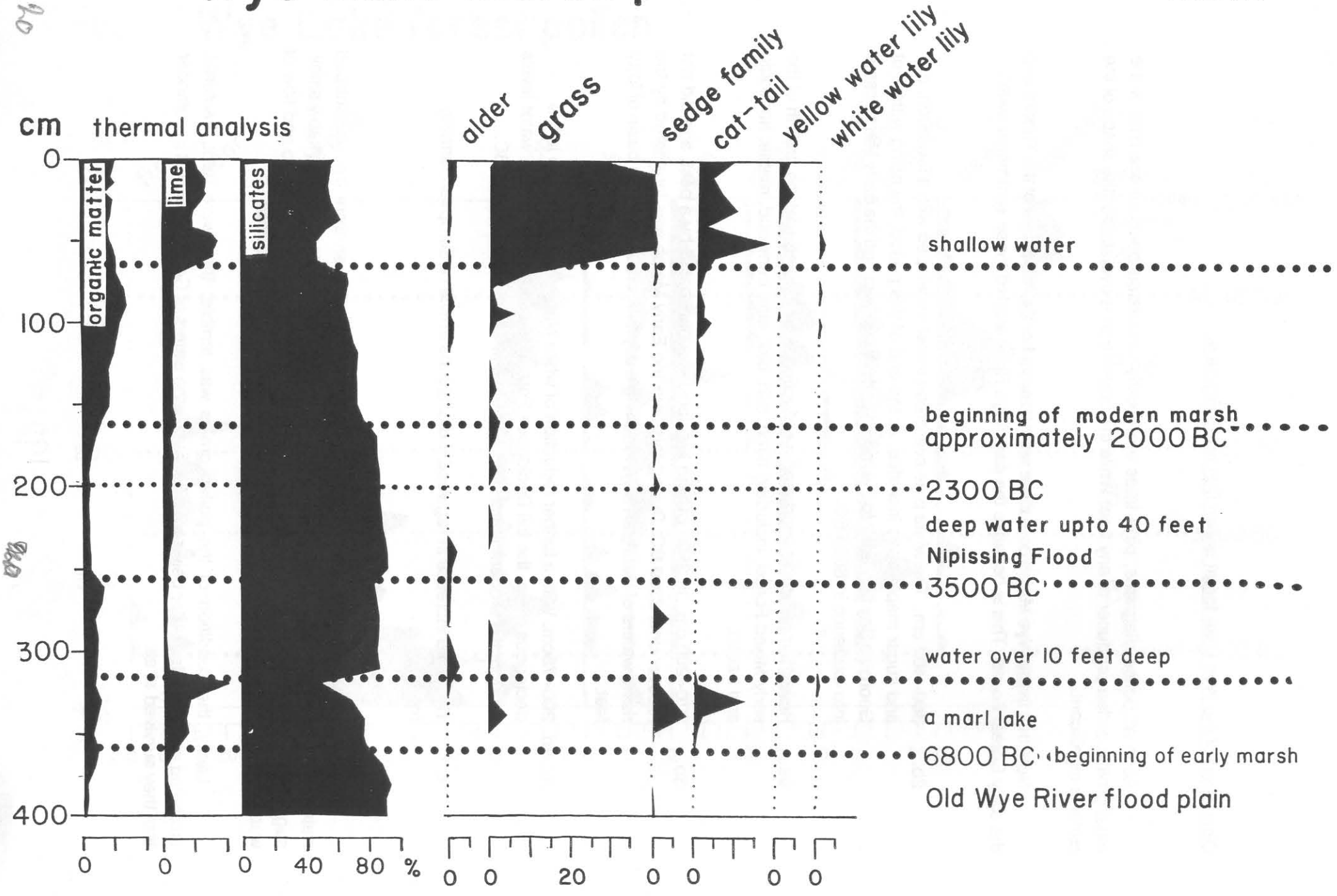
4. The rapid increase in ragweed indicates the arrival of European farming methods.

When the Wye Marsh core is compared with any core taken from the undisturbed waters of a kettle lake, the amount of sediment accumulating in each zone is remarkably small, suggesting that the waters of the marsh were always being disturbed by the ebb and flow of waters in and out of Georgian Bay.

Lastly, the condition of the pollen grains was terrible: they were bent, fractured, crumpled and corroded. After being rolled about by the waters of Georgian Bay, it is a wonder that they survived at all.

Wye Lake marsh pollen

FIGURE 5



Discussion of the Marsh Pollen Diagram - Figure 5.

All of the dates derived from the study are shown on this figure. The earliest date was determined by carbon dating while the remaining dates were derived from other pollen diagrams where events such as the hemlock crash have already been carbon dated.

While the forest pollen diagram shows the development of the forest growth around the lake, the Marsh Pollen reflects the development of the plants produced by the marsh. We have also summarized the information contained in the preceding sections of the study.

On the left are the three curves of the Thermal Analysis diagram. The Organic Matter curve shows the increase of organic matter in the core below 250 cm during the time of the early shallow water marsh; then between 250 cm and 175 cm the sudden decrease caused by the deep water lake; and finally the great increase of plant life in the Modern Marsh.

The Lime curve shows the deposition of marl in the Early Marsh while the water was still less than 10 feet deep; then the sudden drop that accompanied deep water; and finally a steady increase in the deposition of marl in the Modern Marsh.

The Silicate curve shows the major impact of the sediments brought in from Georgian Bay.

Referring to the pollen record we see the growth of grass (probably wild rice), sedges, cat-tails and pond lilies after 6800 BC. Alder came in with deepening water, and a little sedge, but marsh plants are all but absent from the record from 3500 BC on during the deep water inundation from Georgian Bay. Grass, cat-tails and pond lilies reappear strongly in the Modern Marsh.