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Four Historical Landscapes of the Merchant's House Museum Backlot, Manhattan Island, New York, Identified through Pollen Analysis

Gerald K. Kelso and Diana diZerega Wall

The Merchant's House Museum is on Manhattan Island in New York City, at 29 East Fourth Street, between Lafayette Street and the Bowery. It is the sole, remaining, intact 19th-century family home in the city with original, period furnishings. An archaeological study of the Merchant's House backyard was undertaken in 1991–1995 in conjunction with an historical-structure study of the house. This pollen analysis of a soil profile from a central parterre was part of the backlot study.

Le Merchant's House Museum, un musée qui présente la maison d'un commerçant fortuné, est situé au 29 rue East Fourth, entre la rue Lafayette et l'arrondissement Bowery sur l'île de Manhattan à New York. Le musée offre au public la seule maison familiale du 19e siècle intacte à New York ainsi que son mobilier d'origine. Une étude archéologique de la cour arrière de la vieille maison a été entreprise entre 1991 et 1995, en même temps qu'une étude historique de la structure de la maison. Cet article porte sur les analyses de pollen ayant été prélevé des couches stratigraphiques lors des interventions au parterre central.

Historical Background

The Merchant's House Museum is in New York City, at 29 East Fourth Street between Lafayette Street and the Bowery (FIG. 1). It is the sole, remaining, intact 19th-century family home in the city with original, period furnishings. The site first appears in the historical record in the 1630s as part of the tobacco plantation of Wouter van Twiller (FIG. 2). After his death the plantation reverted to the colonial government (Stokes 1926: 133). In 1659 Director-General Peter Stuyvesant granted the plot to an unnamed individual among a group of 13 formerly enslaved persons who had been freed by the Dutch West India Company. This grant was apparently later vacated for unknown reasons because the parcel, including what later became the Merchant's House Museum lot, was given to a white man, named Otto Grim, by British governor Nicolls in 1664 (Stokes 1926: 123). A long subsequent gap in the official records is partially bridged by a 1736 will (probated 1754), in which Richard Perron left the property to his wife and children. The deed for a later sale indicates that this is the same 6.4 acre plot granted to Otto Grim in 1664, and tax records suggest that Perron owned the property, with a house, as early as 1722 (Wall 1991: 4). The property passed through a series of owners and in 1802 was taxed for a house, stable, and ground; for one

house in 1808–1809; two houses in 1810–1814; and one house, which the assessment suggests was new construction, in 1815–1825. It was acquired by hatter Joseph Brewster in 1831, who constructed the Merchant's House Museum building and sold it to merchant Seabury Tredwell in 1835. Members of the Tredwell family lived in the house until the youngest Tredwell child died in 1933. The house was bought by a nephew, George Chapman, and made into a museum (Sharp 1968: 15, 18–19, 75). No documentary data relevant to the configuration and vegetation of the Merchant's House Museum backyard during the Treadwell occupation have survived, but a number of alterations were made to the backlot during the 1930s, 1960s, and 1980s (Wall 1991: 10–11).

Methods

Forty-five contiguous pollen samples were collected in 1 in. increments from the north wall of an excavation unit in the southernmost central parterre (FIG. 3) of the Merchant's House Museum backlot. Thirty-eight of these samples yielded adequate pollen to permit analysis. Pollen extraction followed a variation of the mechanical/chemical procedure developed for arid-lands alluvium by Mehringer (1967: 136–137). Mehringer's first two hydrochloric acid (HCL) washes and his nitric acid (HNO₃) step were eliminated. The



Figure 1. Merchant's House Museum facade. (Photo by Jook Lang, 2006.)

final sodium hydroxide (NaOH) wash was reduced to 0.05% (a few of drops of 5–7% NaOH in a 50 ml test tube). The pollen was identified at 430 power with a compound transmitted-light microscope, and 400 pollen grains were tabulated for each sample, except those in the deepest portion of the column, where only 100–200 grain counts were economically feasible. Pollen concentrations per gram of matrix were computed following Benninghoff's (1962) exotic-pollen addition method as an aid in evaluating pollen-record formation processes. Pollen concentrations were not computed for individual taxa. These

would not be meaningful in the absence of chronological control over sedimentation rate and might be mistaken for pollen-influx data. Dung spores (*Sporormiella* spp.), charcoal fragments, peat-moss spores (*Sphagnum* spp.), and carbon spherules were tabulated, and concentrations per gram of matrix were computed for these palynomorphs as aids in identifying specific cultural activities. These palynomorphs were not included in the sums from which pollen percentages were calculated.

Sediment Description

Two inches of dark brown humus (Stratum 1) capping the sediment sequence (FIG. 4) had been removed before pollen sampling took place. Stratum 2, a dark brown sandy silt, overlies the irregular surface of the Stratum 3 medium-brown sandy silt and constitutes the fill of a pit feature that had been excavated from the surface of Stratum 3 through Strata 4 and 5 into the upper portion of Stratum 6. This suggests that Stratum 2 is a landscaping fill. It contained no datable artifacts. Stratum 3 consisted of a medium-brown sandy silt containing a mix of ceramics, the most recent

of which was a sherd of a type introduced around 1820. Three other pit features starting at the surface of this stratum were noted (Matamoros 1991: 15–16), and the irregular surface of this stratum suggests considerable human activity before Stratum 2 was deposited. Stratum 4 was an orange-brown mottled sandy silt containing no artifacts, while Stratum 5 consisted of red sand lenses. The most recent of the two ceramic sherds found here was of a type introduced ca. 1762. Stratum 6 consists of the same orange-brown mottled sandy silt as Stratum 4. Several sherds of a ceramic type introduced ca. 1795 were

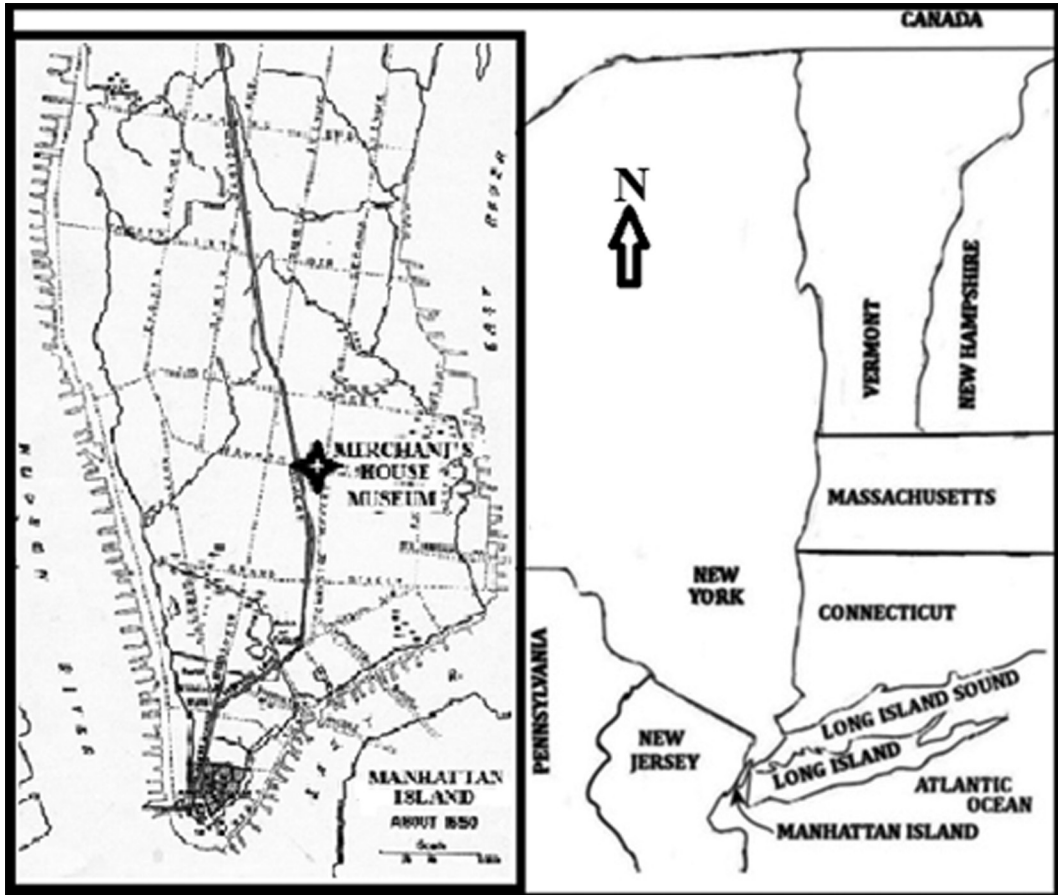


Figure 2. Merchant's House Museum location (Rhys 1911: 134.). (MHM location added by Gerald Kelso, 2013.)

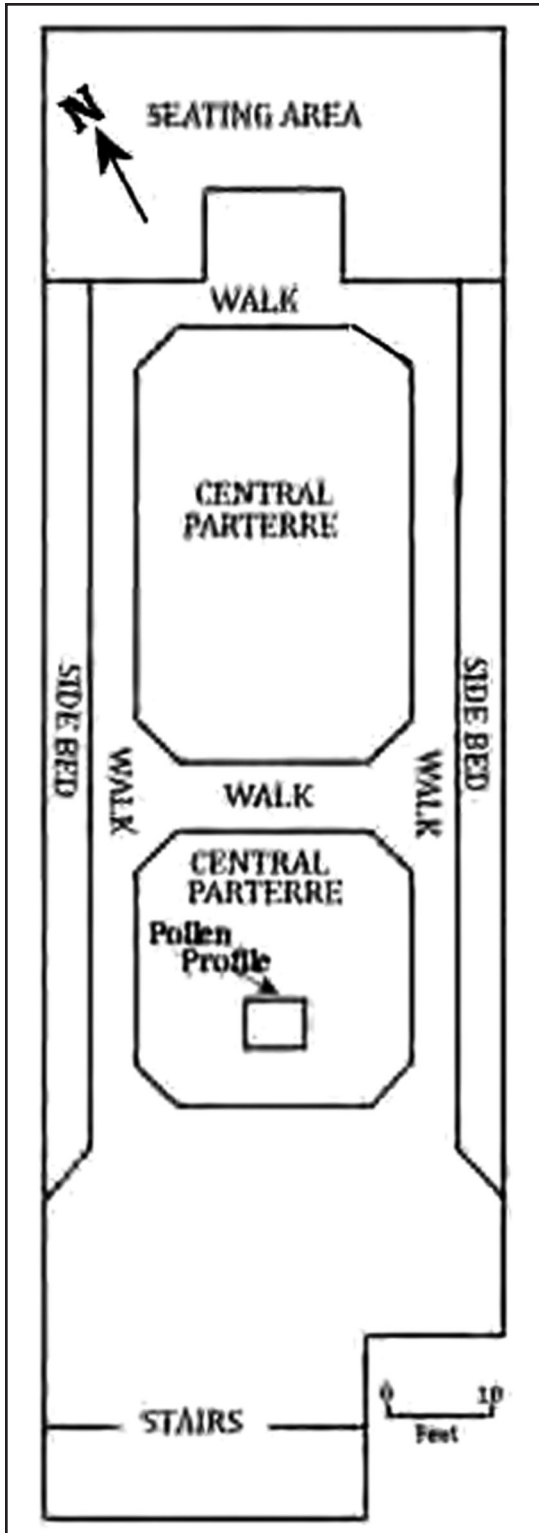
found among the numerous sherds in the upper 4 in. of this stratum, a sherd postdating ca. 1780 was found near the center of the deposit, and sherds introduced during the middle to early 18th century were found near the bottom of the stratum. Stratum 7 at the bottom of the sequence consisted of orange silty clay containing no artifacts and was classified as preoccupation subsoil (Matamoros 1991: 17). It had been partially disrupted, and single sherds of ceramic types introduced ca. 1720 and 1762 were found at the upper boundary of the stratum.

Pollen-Spectra Description

Five pollen zones reflecting significant, culturally driven vegetation changes through time are evident among the Merchant's House Museum pollen spectra (FIGS. 5, 6). The deepest

of these (Pollen Zone One) consists of the high percentage (75.5%) of oak (*Quercus* spp.) pollen in Sample 1. It is accompanied by small percentages of birch (*Betula* spp.), hickory (*Carya* spp.), pine (*Pinus* spp.), cedar family (Cupressaceae), and elm (*Ulmus* spp.), and also ragweed-type (wind-pollinated aster family, Asteraceae) and aster-type (insect-pollinated aster family) pollen.

Pollen Zone Two records the decline in the oak contribution in Sample 2 and above, as chestnut (*Castanea dentata*) percentages increase up through Sample 7, remain high but irregular through Sample 14, and then drop off abruptly. The increase in chestnut percentages is initially accompanied by the appearance of hazel (*Corylus* spp.), alder (*Alnus* spp.), goosefoot/amaranth type (Chenopodiaceae/*Amaranthus* spp. type), grass (Poaceae), black



locust (*Robinia* spp.), and modest increases in the birch, hickory, and pine frequencies. These secondary pollen types mostly decline or level off as the chestnut-pollen contribution increases as one proceeds upward in the zone, and are probably products of release and reapplication of statistical constraint in a fixed numerical sum as the oak percentages decline and those of chestnut subsequently rise. Only goosefoot/amaranth-type and ragweed-type percentages increase parallel to the rise in the chestnut contribution.

Pollen Zone Three is distinguished by the abrupt increase in the grass-pollen contribution between Sample 15 and Sample 26. Brief spikes of high ragweed-type, aster-type, wormwood, dandelion- (*Taraxacum*) type, goosefoot/amaranth-type, parsley-family (*Apiaceae*), and red clover- (*Trifolium*) type pollen percentages are evident in Samples 16 through 18 at the bottom of this zone. The pollen contributions of these herbs decline above Samples 17 to 18, but most remain present in significant percentages into the pollen zone above.

The horizon marker of Pollen Zone Four is a second sudden, larger and more irregular increase in the grass-pollen contributions between Sample 26 and Sample 34. The increase in grass percentages is accompanied by an equally precipitous increase in Eurasian cereal-type percentages and the appearance of sedge (*Cyperaceae*) and broadleaf plantain- (*Plantago major*) type pollen as regular elements in the spectrum. Red clover-type and dandelion-type pollen percentages decline in this pollen zone.

A decline in grass-pollen percentages is the hallmark of Pollen Zone Five in Samples 35 through 38 at the top of the pollen sequence. It is accompanied by decreases in contributions of aster-type, dandelion-type, Eurasian cereal-type, goosefoot/amaranth-type, parsley-family, red clover-type, sedge-family, and chestnut pollen. An increase in the pollen percentages of oak, hazel, birch, pine, white-spruce (*Picea glauca*), and total arboreal pollen parallels the herb decline at the top of the profile, and a small block of heath-family (*Ericaceae*) percentages is evident in the upper two samples.

Figure 3. Field-note plan of the Merchant's House Museum backlot at the time of pollen sampling. (Figure by Diana diZerega Wall, 1995; Computer traced by Gerald Kelso, 2013)

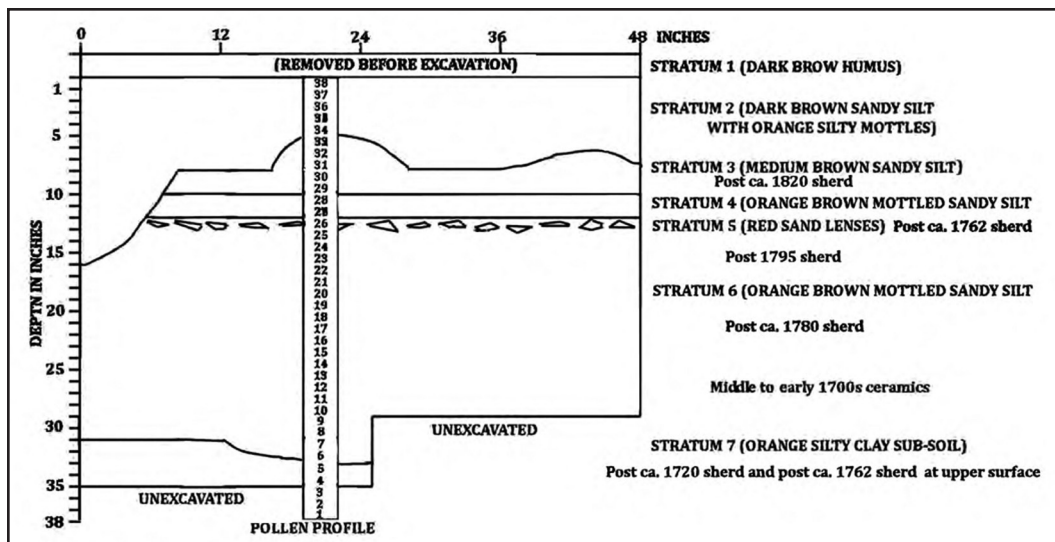


Figure 4. Merchant's House Museum soil profile (facing north). (Figure by Elena Matamora, 1992.)

Pollen-Record Formation Indicators

The pollen spectra of archaeological sites in the temperate zone are subject to the postdeposition modifications in the form of earthworms mixing the pollen in the humus zone (Walch, Rowley, and Norton 1970: 39). It is subsequently percolated downward in rainwater (Dimbleby 1985: 5) and physically degraded by aerobic fungi (Goldstein 1960: 543), by groundwater oxygen (Tschudy 1969: 95), and by repeated hydration and dehydration (Holloway 1989: 131). These processes produce a profile with the highest pollen concentrations at the top and quantities of pollen grains that are too degraded to be identified that increase with depth (Kelso 1993a: figure 1). Eventually a depth is reached at which no identifiable pollen remains. The upper portion of the profile (FIG. 7), Samples 38 down through Sample 26, generally conforms to the normal soil-pollen percolation and pollen destruction described above. Below Sample 26 the proportion of degraded pollen grains increases irregularly with depth. There are two short segments of slightly higher pollen concentrations, but there is no apparent correlation between the pollen concentration and degradation indicators.

Carbon spherules reflect air pollution from fossil fuels (Patterson et al. 2005: 35). These palynomorphs record the shift from wood to

coal as industrial fuel that started during the 1830s and register the continuing increase in coal burning into the early 1950s (Freese 2003). In the Merchant's House Museum pollen spectrum they appear in Sample 27, increase in number up through Sample 35, and then drop off to the top of the profile. A small peak of carbon spherules, comparable in concentrations to those in Samples 27, 28, and 29, also appear just above the chestnut decline in a test of a narrow landscape bed along the east edge of the backlot, and a larger quantity was tabulated at the top of the same sequence (Kelso and Wall 2014: figure 16). Large quantities of *Sporormiella* fungal spores from herbivore dung (Ahmed and Cain 1972) appear in the deeper portion of Stratum 6 and in Strata 2–5, with a lesser peak of the same palynomorph in the upper part of Stratum 6. Scattered peat-moss (*Sphagnum* spp.) spores were noted in the upper part of the profile, and concentrations of this microfossil peak at the top of the sequence (FIG. 6).

Merchant's House Museum Pollen-Profile Discussion

Herb pollen does not travel far into a forest (Janssen 1973: 36, figures 3, 6), and the 75% oak pollen in the single sample of Pollen Zone One at the bottom of the sequence (FIG. 5), together with small percentages of pollen from

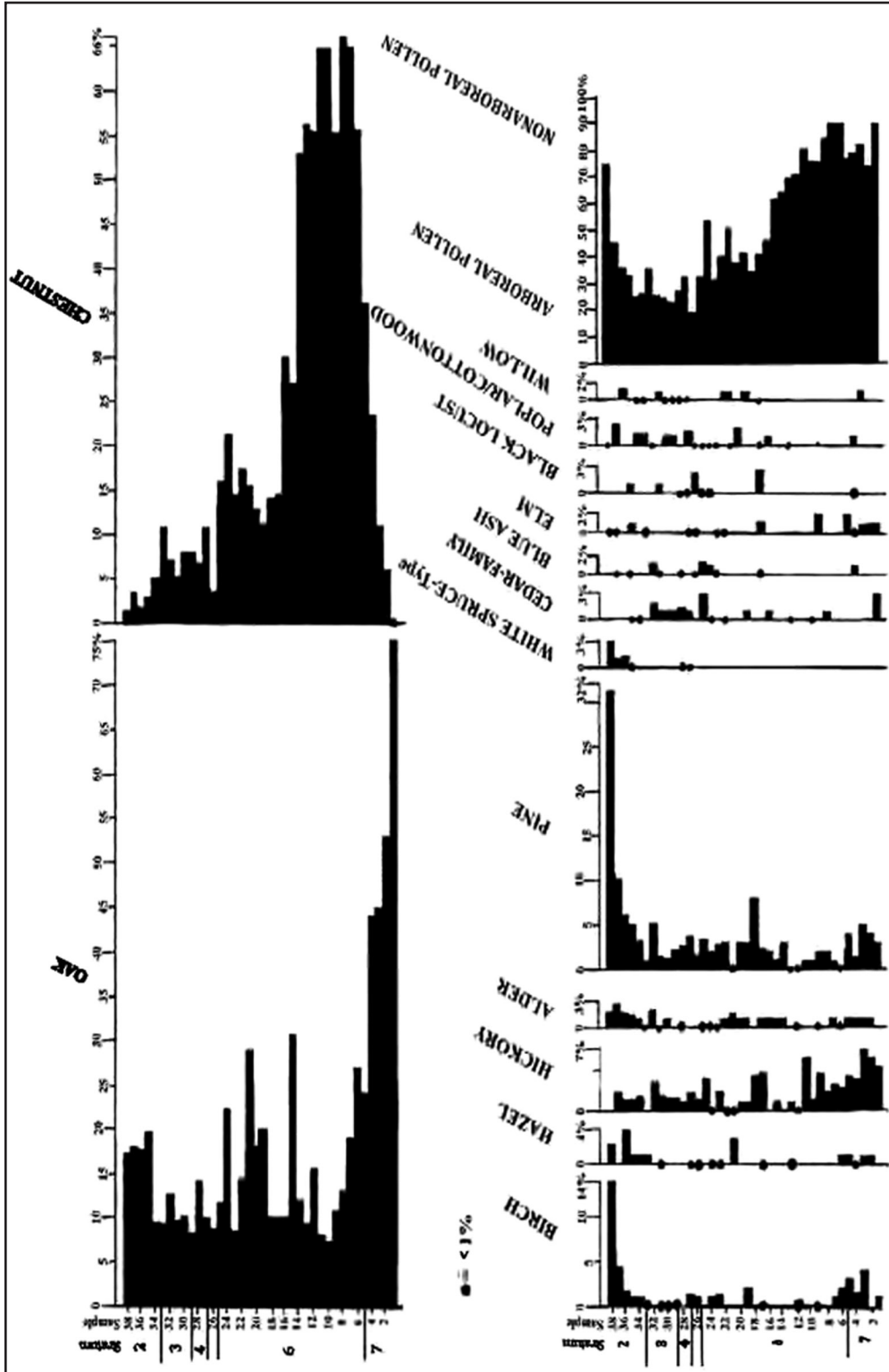


Figure 5. Merchant's House Museum arboreal-pollen spectra. (Figure by Gerald Kelso, 2013.)

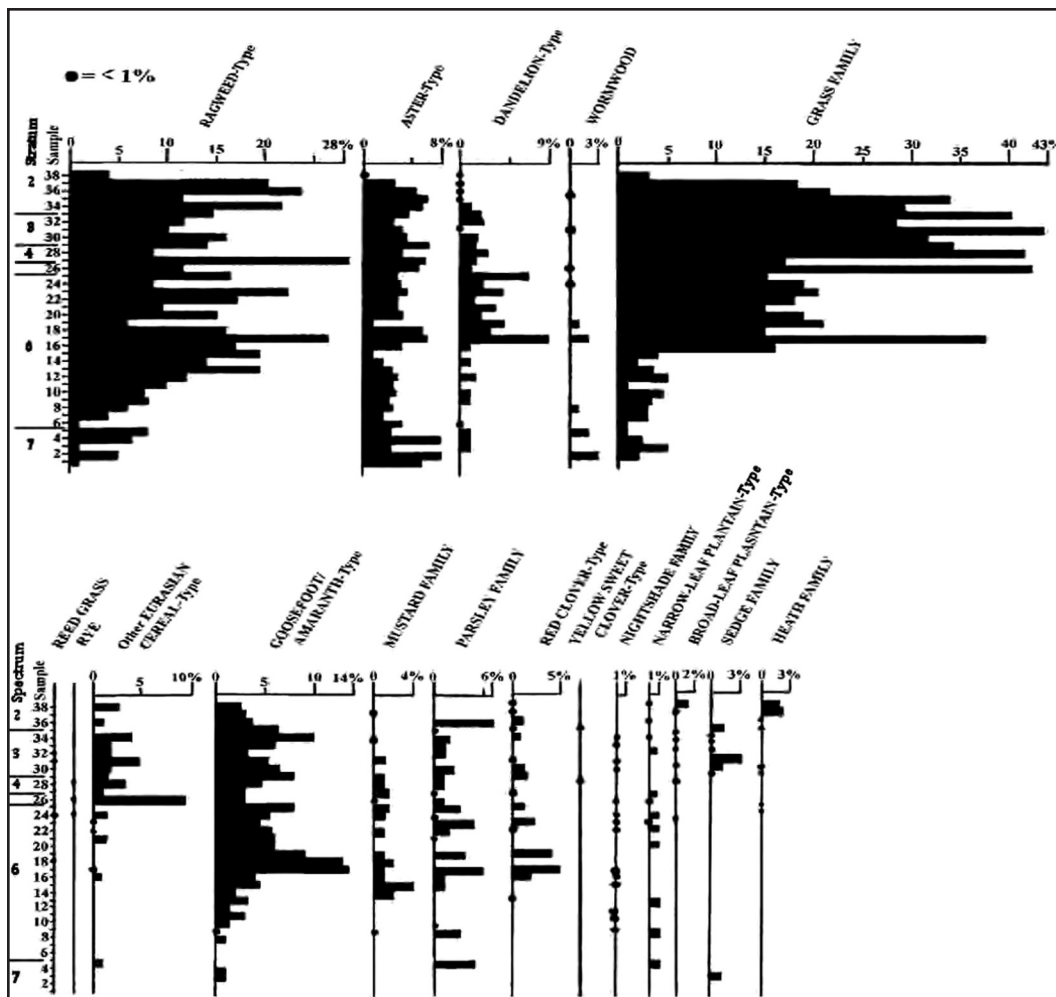


Figure 6. Merchant's House Museum non-arboreal-pollen spectra. (Figure by Gerald Kelso, 2013.)

other arboreal- and herb-pollen types, is consistent with the preclearance pollen spectra of the geographically closest palaeobotanical record (E. Russell 1997: 114). It reflects a local example of the oak-dominated, preclearance forest described by Van der Donck (1968: 19) for New Netherland in general. Chestnut-tree stumps sprout prolifically (Braun 1950: 38; Fowells 1965: 252), and many flower in cleared areas as early as six to ten years after cutting (Hebard 1991: 1). The block of this pollen type, up to 66% between Samples 6 and 14 of Pollen Zone Two, indicates forest clearance by girdling (Smith 1631) or felling the trees with the stumps left in place (Bidwell and Falconer 1941: 8), and the subsequent development of a

sprout woodland. Charcoal (FIG. 8) appears after the oak-pollen contribution declines, peaks in Sample 8, and remains high through Sample 14, where the chestnut percentages decline. This reflects burning of excess wood in the field, as recommended by the New Netherland secretary to the director and council, Van Tienhoven (Bidwell and Falconer 1941: 9).

Ragweeds tolerate the harsh temperatures and moisture regimen of cleared ground better than most other weedy taxa (Bazzaz 1974), and an increase in ragweed-type pollen in lake- and marsh-pollen profiles is generally interpreted as the horizon marker for the advent of European plow agriculture in eastern North America (M. Davis 1983: 179). The steady rise

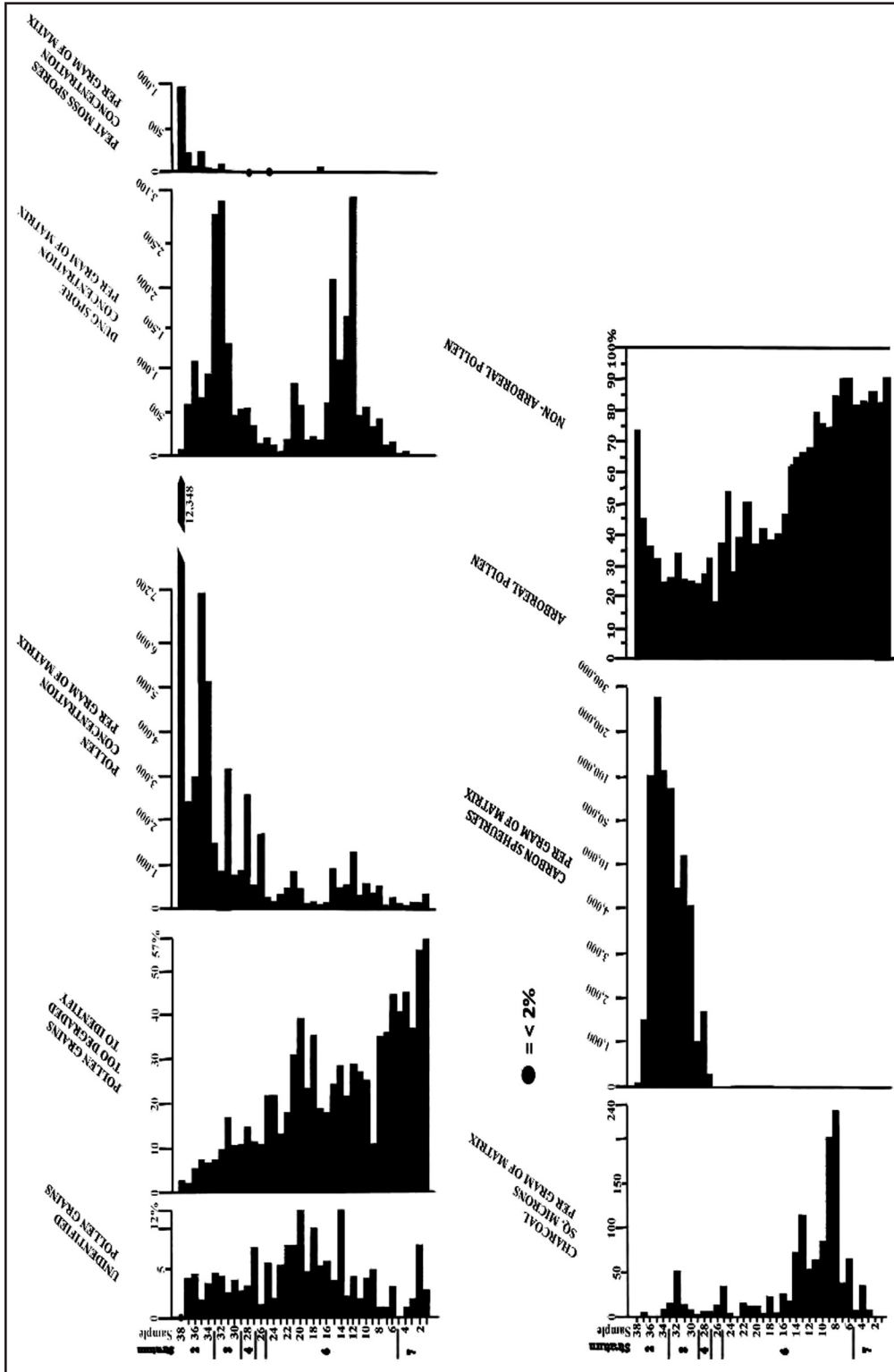


Figure 7. Merchant's House Museum pollen-record formation process indicators. (Figure by Gerald Kelso, 2013.)

in the contribution of ragweed-type pollen from Sample 7 up through Sample 17 (FIG. 9), above the top of the block of high chestnut percentages, suggests continuous soil disturbance in the locus. This might indicate plowing between girdled trees or stumps. Observations made in northern New Jersey during the mid-1790s suggest that this was probably not the case. In that area the practice was to break up the ground as much as possible between yard-high stumps and sow wheat or rye the first year. Maize, reputed to encourage rotting of the stumps by providing shade, was sown the second year. Consequently, the stumps were reported to have decomposed rapidly, and when the ground was clear, the regimen of wheat or rye alternating with maize was followed until the ground would not yield anything. It was then abandoned for new clearings (Strickland 1971: 72–73).

Maize- (*Zea mays*) and rye- (*Secale cereale*) pollen grains are distinguishable from each other and from those of wheat (*Triticum* spp), oats (*Avena* spp.), and barley (*Hordeum vulgare*) by their sizes (Fægri and Iversen 1964: 197). Both are wind transported, but maize, at least, is so poorly dispersed that significantly larger amounts have been recovered from the rows than from the furrows of a prehistoric agricultural field (Berlin et al. 1977: 544). Neither maize pollen nor rye pollen was found in the chestnut-dominated pollen spectra, and only two pollen grains identified by size as

Eurasian-cereal type, other than rye, were noted in the deeper portion of the profile (FIG. 9). This cereal-size pollen could be derived from a number of North American grasses producing larger pollen grains, beardgrass (*Andropogon* spp.) or wild rye (*Elymus* spp.), for instance. Plowing should also have homogenized the ragweed-type contribution, and the chestnut stumps on the future Merchant's House Museum locus flourished, rather than rotting out as they were reported to do on cropland.

Dung spores appear in significant amounts in the chestnut-dominated spectra of Pollen Zone Two (FIGS. 6, 7). These might reflect fertilizer applied to an agricultural field. Van der Donck (1968: 30), however, reported that he "had never seen the land manured, and it is seldom done." Strickland (1971: 72–73), 140 years later, does not mention manure and indicates that farmers simply wore the land out and abandoned it. Between 1748 and 1762, Eliot (1934: 29) complained about the same lack of manure discussed earlier by Van der Donck, and the land depletion and abandonment described later by Strickland (1971: 73). The dung spores among the chestnut-pollen grains probably originated with livestock on the land, rather than with intentionally applied agricultural fertilizer.

Livestock were very important to both English and Dutch colonial era farmers (H. Russell 1976; Cohen 1992), and the presence of

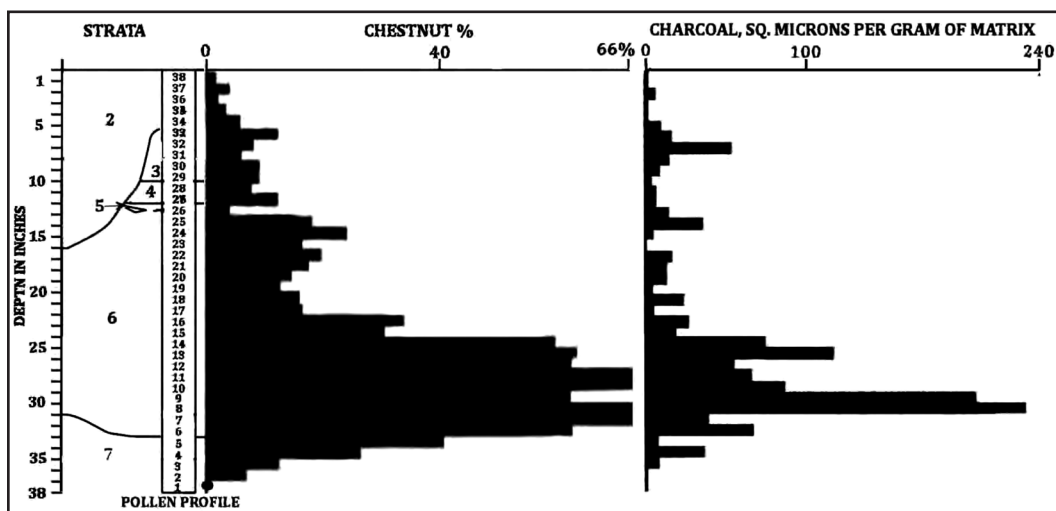


Figure 8. Chestnut-pollen percentages and charcoal concentrations in the profile. (Figure by Gerald Kelso, 2013.)

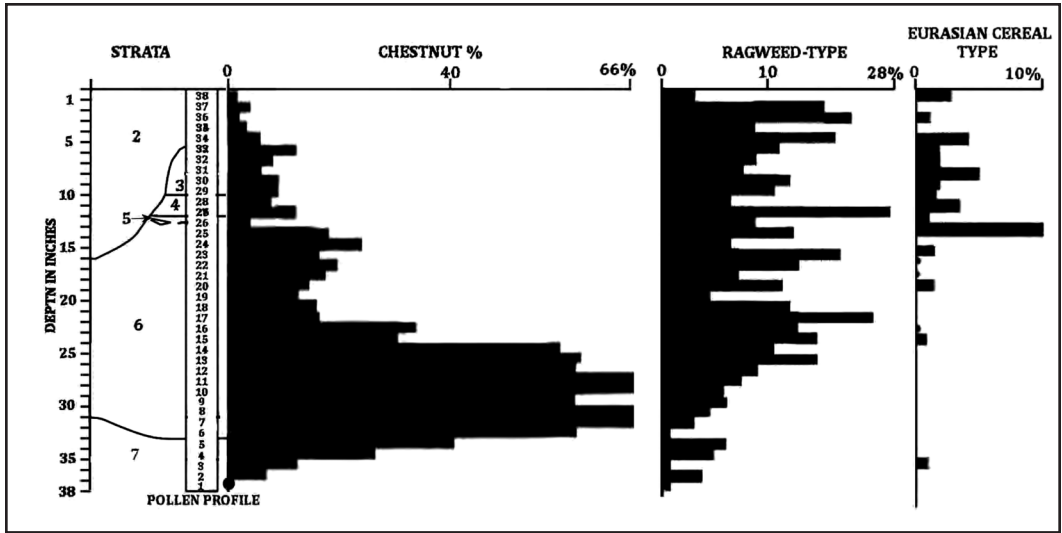


Figure 9. Spectra of chestnut, ragweed-type, and Eurasian cereal-type pollen. (Figure by Gerald Kelso, 2013.)

dung spores in historical era sediment is proportional to the previous abundance of livestock in a locus (O. Davis and Shafer 2006: 41). The quantities of herbivore-dung spores in the deeper portion of the Merchant’s House Museum profile increase upward through the matrix parallel to the chestnut contribution and peak slightly before the chestnut contribution begins its precipitous decline (FIG. 9). This indicates that the chestnut-sprout forest was a grazed woodland, and that the soil disturbance registered in the ragweed-type counts was caused by cattle. A number of nitrophilic plants contribute pollen to the goosefoot/amaranth-pollen category (Behre 1983: 236), and the percentages of this pollen type increase up through deeper Stratum 6 parallel to the rising dung-spore concentrations that reflect escalating manure deposition (FIG. 10). Cattle grazing on a woodlot create a distinct browse line within 5 to 10 years and destroy the trees, facilitating the development of a complete grass sod within 20 to 40 years (Whitney 1994: 167). The precipitous decline of the chestnut-pollen contribution above Sample 14 and the equally abrupt increase in the grass spectrum in Sample 15 do not, however, fit this model of gradual conversion of grazed woodland to pasture. The grass-pollen percentages in the chestnut-dominated portion of the profile should have increased as browsing opened the woodland to light, but

appear to be too low and consistent to reflect progressive development of sod. The peak of dung-spore concentrations and increasing percentages of goosefoot/amaranth-type pollen may reflect the introduction of additional livestock to facilitate final clearance.

Red clover (*Trifolium pratense*) is notable among the “English grasses” introduced to improve grazing during the colonial period (H. Russell 1976: 129–131; E. Russell 1997: 96), and there was a flourishing New England market for “English grass” seed from the 1640s on (Romani 1996: 33). The sudden appearance of this pollen type in Pollen Zone Three, other than a single grain of red-clover pollen in Sample 13, together with the abrupt increase in the grass percentages in Sample 16, suggest that the pollen spectrum of the profile segment between Samples 16 and 26 registers planted pasture after sprout-woodland clearance. The large pollen grains of native grasses, diagrammed as Eurasian-cereal type, that are prominent in grass-dominated Pollen Zone Four above are not well represented here, and their low percentages here support the inference that the grass dominating this profile segment was deliberately planted with seed selected to create pasture.

The goosefoot/amaranth-type, aster-type, dandelion-type, wormwood, parsley-family, and red clover-type contributions peak immediately after grass-pollen percentages

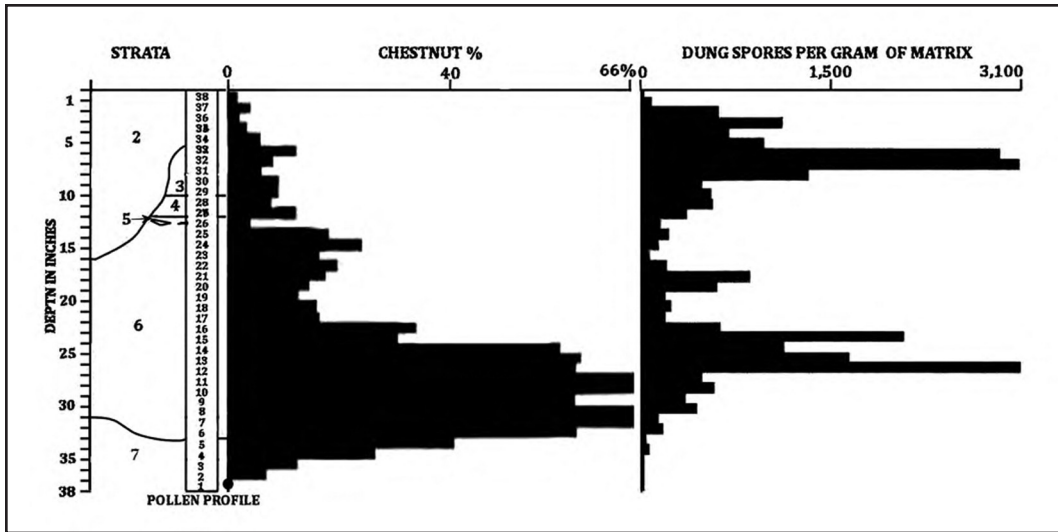


Figure 10. Chestnut-pollen and dung-spore spectra. (Figure by Gerald Kelso, 2013.)

abruptly increase in Sample 16, following a decrease in dung-spore concentrations. The parent plants of these pollen types are all characteristic of ruderal spaces (Muenscher 1955: 430–433, 501), and the brief period of prominence of their pollen suggests a short interval in which the ground was relieved of grazing pressure.

The minor peak in dung-spore concentrations in Samples 20 and 21 (FIG. 11) of Pollen Zone Three indicates some livestock on the plot, and the presence of a stable on the property by at least 1802 (Wall 1991: 5) supports this inference. A ceramic sherd recovered from the deeper sediment in this first grass-dominated portion of the profile was of a type introduced in 1780, while a second sherd from the upper portion of the grass-dominated portion dates after 1795 (Matamoros 1991: 16).

A second abrupt increase in grass percentages (Pollen Zone Four) occurs in the Sample 26 to Sample 28 portion of the profile (FIG. 6). The advent of carbon spherules just above the second increase in the grass contribution (FIG. 12) indicates that the upper block of high grass percentages originated with a plot of grass established during the 1830s. This was lawn created by either Brewster or Tredwell, possibly with sod, as was the case in the sideyard of the upper middle-class Kirk Street Agents' House at Lowell, Massachusetts (Robbins 1979: 16–23). The grass standing here need not have been

tall. Equally high grass-pollen percentages (Kelso 1993a: figure 19) were deposited by the well-kept lawn (Kelso 1993b: figure 9A) photographed ca. 1895 at the Kirk Street Agents' House.

Rapid burial preserves pollen spectra from percolation (Kelso et al. 1998: 71; Kelso 2014: 48), and deposition of Stratum 2 reset the pollen-record formation processes, preserving the pollen spectra of Strata 6 and 7 in place, while renewed percolation, dated by carbon spherules, from the 1830s until sampling in 1991 replaced the original pollen content of Strata 2, 3, 4, and 5 with mostly grass pollen from the surface. The spike of dung-spore concentrations in the middle of this profile segment reflect fertilization of the grass in the parterre (FIG. 10), while the presence of sedge pollen, which generally reflects moist conditions, indicates that the plot was well watered. The presence of pollen resembling that of broadleaf plantain, which is most common on rich, somewhat-moist soils (Muenscher 1955: 409), is consistent with the presence of both sedge pollen and dung spores.

The grass in the center of the backlot and the appearance of a quantity of carbon spherules deep in a side bed, comparable to those deposited in the center of the yard during the 1830s, implies an urban backlot landscape similar to the 1830–1850 layouts of a central grass bed with paths and property-edge flower beds described by Disponzio (1991: 6)

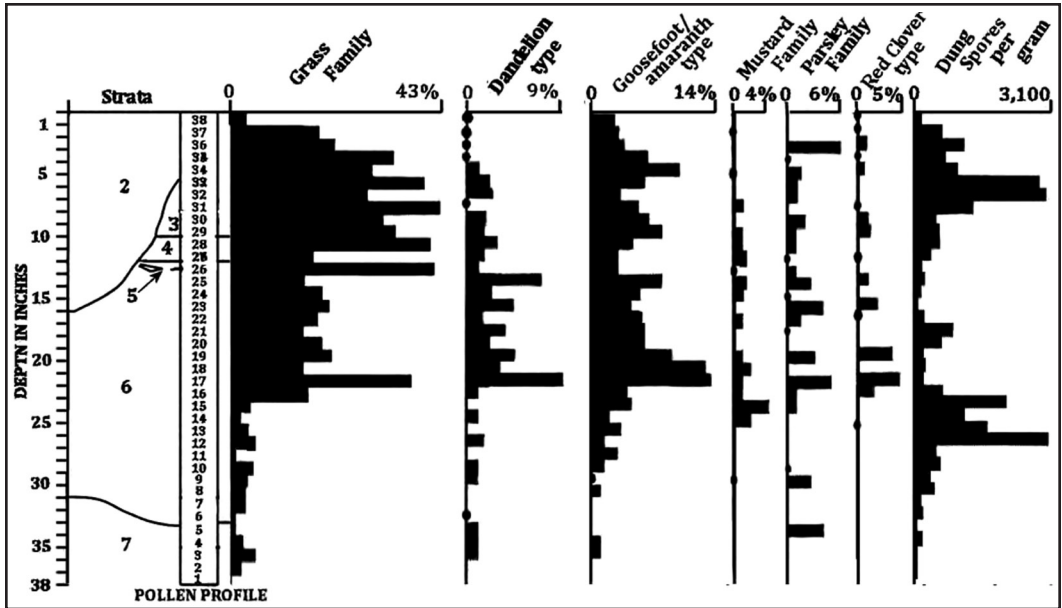


Figure 11. Spectra of grass pollen, other major-herb pollen, and dung spores. (Figure by Gerald Kelso, 2013.)

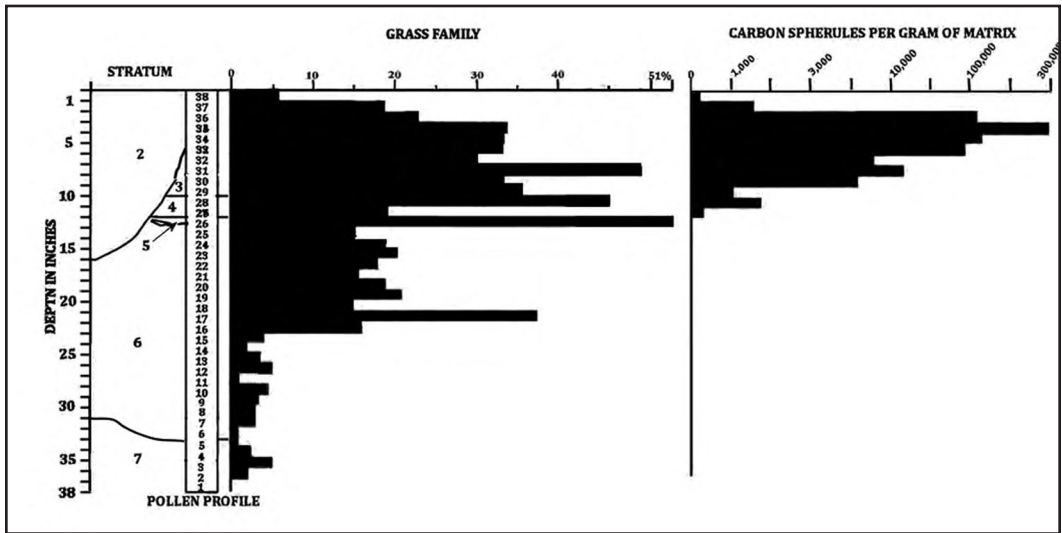


Figure 12. Grass-family and carbon-spherule spectra. (Figure by Gerald Kelso, 2013.)

as common for the mid-19th century. The decreases in the pollen contributions of grass, sedge, and broadleaf plantain (Pollen Zone Five) in the most shallow three samples record landscaping changes since 1960 (Wall 1991: 8), while the progressive decrease in the chestnut-pollen percentages in the upper four samples registers the chestnut blight that appeared in

New York City in 1905 (Anderson 1974). The heath-family pollen near the top of the profile is probably derived from ornamentals recorded on the property during the 1960s and 1980s (Wall 1991: 11, 12), and the spike in peat-moss spores in the same pollen zone reflects landscaping products applied to those ornamentals planted during recent decades.

The Merchant's House Museum Chestnut Pollen in a Wider Context

Small, temporary increases in the chestnut-pollen percentages are visible in a number of historical era lake and marsh spectra from the northeastern United States (Niering 1953: figures 18, 19; Brugam 1978: figures 3, 4; E. Russell et al. 1993: figure 2; Fuller et al. 1998: figure 21). The sampling intervals at which the profiles were collected are too large, the published diagrams of most projects are too small, and the chestnut-pollen data originated too far from the sampling site to identify details of associated changes in the nonarbooreal vegetation. Most peaks in the chestnut-pollen contribution were, however, accompanied by contemporaneous increases in ragweed type (Kelso 1994b: figure 3). The Merchant's House Museum pollen spectra suggest that the transitory periods of prominent chestnut-pollen contributions near the top of northeastern environmental pollen sequences are visible in the regional pollen spectra because chestnut-stump sprouts flower relatively rapidly after the trees were cut, and they reflect temporary, stump-sprouted woodlands that were destroyed by browsing to create pasture during the last step of land clearance.

Summary

The Merchant's House Museum pollen spectrum records an oak-dominated forest that was cleared before the mid-18th century to produce a chestnut-dominated coppice woodland used for grazing. The woodlot was succeeded sometime during the late 18th century by pasture supporting a lesser number of livestock, and the sampled portion of the pasture was converted during the fourth decade of the 19th century to an urban backlot that primarily supported grass.

Acknowledgments

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