5-2023

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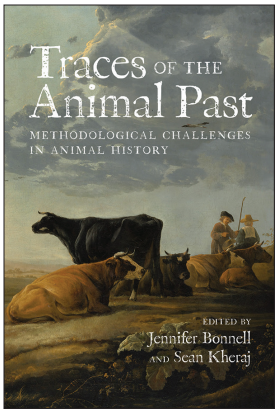

TRACES OF THE ANIMAL PAST: METHODOLOGICAL CHALLENGES IN ANIMAL HISTORY

Edited by Jennifer Bonnell and Sean Kheraj

ISBN 978-1-77385-385-7

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The flies began emerging from the wheat around dusk, giving Margaretta Hare Morris little more than half an hour to observe the tiny, delicate creatures as they flitted from stalk to stalk. Requiring a magnifying glass to see them in any detail, Morris had first observed the flies as flaxseed-like pupa sleepily clinging to the young wheat plants in her neighbour's field a few days prior, but now that they had fully transformed, there were too many and they were too quick to count. The swarms hovered over the wheat field, laying their eggs in the grain to secure a good food source for the next generation.[1]

That summer in 1836, months before what would become known as the Panic of 1837, farmers had discovered something ominous. Wheat fields that showed promise in May had withered by July, producing paltry harvests if any.[2] As this plight spread from field to field and state to state, the price of wheat doubled in most cities, impacting everything from flour to whiskey. Consumers, already shaken by other constrictions on their personal finances, felt this price hike in their growling stomachs.[3]

At the heart of this wheat crisis were the flies, and the most notorious wheat fly was the Hessian fly, named for the mercenary soldiers who fought alongside the British in the American Revolution at the same moment farmers first spotted the tiny, seemingly fragile fly and its devastating

Fig. 7.1 Margaretta Hare Morris, entomologist. Source: Littell Family Papers, University of Delaware Special Collections.

effects. For more than a century, naturalists and then entomologists would debate whether the Hessian fly was truly Hessian.[4] Regardless of their origin, from the 1780s onwards, Hessian fly larvae would occasionally devastate wheat fields, consuming much of the young plants.

The wheat fields near Philadelphia were not immune, and the entomologist Margaretta Hare Morris was eager to study what to her was an "object of peculiar interest."[5] She was so singularly devoted to observing them that she filled countless conversations with excited details about everything she was learning. One friend remarked that "Margaretta's heart is as full of Hessian flies, as ever was a wheat field." After making her own initial set of observations about the fly in June 1836, Morris wanted to compare what she was finding with what the famed American entomologist Thomas Say had published about Hessian flies decades earlier in 1817 in the first volume of the *Journal of the Academy of Natural Sciences*. This was the first article to officially describe the fly and its life cycle. Say even gave the species its official name: "*Cecidomyia destructor* Say." Say's friend

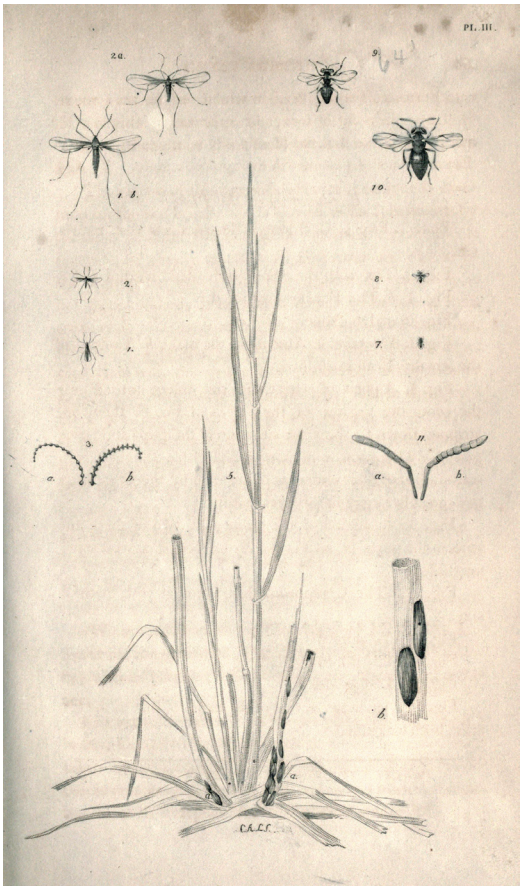

Fig. 7.2 The Hessian fly and its parasite, by Charles Alexandre LeSueur (1817). While there is no known extant image of the *Cecidomyia culmicola* (Morris), it so closely resembled the Hessian fly depicted by LeSueur as to be indistinguishable.

Charles Alexandre LeSueur provided illustrations a few months later in another issue of the journal (Figure 7.2).[6]

Morris was familiar with both Say and LeSueur as they had been her tutors when she was just a teenager. They taught her not only entomology but also drawing, and as she would later recount, they "made a pet" of her because of her scientific promise. Like many entomologists of the early nineteenth century, Morris was mostly self-taught, inspired by early curiosity, though she benefited from the lessons she received from the leading American scientists living in Philadelphia.[7]

Morris had not gone into the fly-infested field looking to prove her teachers wrong. She was there for the "love of the study." Still, as Morris

read Say's article, she could not help feeling that something was off. Say's staccato description of the creatures seemed to ring true enough: "Head and thorax black; wings black, fulvous at base; feet pale, covered with black hair." His language was imprecise but that was also standard for the era, relating the length of one body part to another rather than providing precise measurements, and describing colours as "brownish" or "whitish."[8]

Morris' puzzle, though, came with his vague description of the fly's behaviour. Say began his narrative of their life cycle with a statement that seemed to lack confidence: "The history of the changes of this insect, is probably briefly this—." Appearing to make assumptions based on a limited study, Say went on to describe how the female fly deposited its eggs "between the vagina of the inner leaf and the culm nearest to the root of the plant."[9] This is where Morris had an issue, and it was not with the way female anatomy was being mapped onto botanical physiology. She believed she had witnessed the fly laying its eggs in the head of the wheat, amid the seeds—not in the groove between the leaf and the stem. Had Say been wrong? Or had Morris discovered a completely new fly?

* * *

As someone researching the work of a long-forgotten female scientist, I would love to determine what the fly was that Morris discovered, at the very least for the sake of setting the record straight. She was not the only one to witness a fly that appeared to be the Hessian fly but behaved differently; farmers had also reported similar observations in agricultural journals that summer and during the summers that followed as infestations returned.[10] And while her life's work included far more discoveries and insects than just this wheat fly, the fly was Morris' first step into the public scientific world of presentations and publications, as well as her first vetting. The controversy that ensued ultimately played a role in her erasure from historical memory.

Many of the chapters in this volume look to uncover how we can know more about the lives and histories of animals, despite their being hidden within archival collections. This task becomes even more difficult if the scientist devoted to learning about the creatures has been largely forgotten and is similarly hidden in the archives, which is the case for Margaretta Hare Morris. Despite being well known during her lifetime, her legacy

has mostly been forgotten and her scientific records are, for the most part, hidden in the papers of entomologists she corresponded with. These erasures—of both the fly and the entomologist—in turn reflect not only power structures but also lost opportunities.

That a nineteenth-century woman of science has been forgotten or even deliberately erased is not terribly surprising. There are many hidden figures in the long history of science. Less discussed, however, is how much is lost from the exclusion of talented people because of their race, gender, or class. In this case, opportunities were lost to better understand a fly. If Morris had discovered a previously unknown and unnamed relative of the Hessian fly, the implications were significant. The price of wheat, a major staple crop, fluctuated wildly during infestation years, which resulted in political and economic fallout. Farmers were looking for methods to avoid ruin, and knowing what they were battling was an important first step. Whether they should plant the wheat early or late, plant an entirely new variety, apply some sort of pesticide, or burn the chaff at the end of the season—these were all decisions that required knowing much more about the behaviour of the wheat flies.[11]

There are many barriers that keep us from truly knowing this fly even today. Determining what a fly from the 1830s was in terms of twenty-first-century entomological nomenclature is a difficult feat, partly because the descriptions of the flies and their behaviour were vague at best, and images imprecise or nonexistent. Though Morris herself was a respected scientific artist, invited to illustrate scientific articles, any sketches or paintings of the insect she made do not seem to have made it into the archives.

It is all the more difficult to know this fly specifically because few contemporaries trusted Morris. Wary of making a public statement about her findings, Morris waited several years to present and publish her work—repeating her observations of the flies as the infestations continued. Finally, in 1840, she succumbed to the pleas of her cousin, the chemist Robert Hare, and allowed him to present her report to the American Philosophical Society (APS), the country's leading scientific association. Women rarely sent reports to the APS, but when they did it was typical to have a male member of the society read the paper on their behalf. By the time Morris was ready to share her work, the Panic of 1837 was long over, but it was

clear that any entomological knowledge might help farmers avoid a similar economic and agricultural crisis in the future.[12]

After Robert Hare read Morris' report to the fraternity of male scholars, a committee reviewed her findings and deemed them plausible and significant enough to publish her report in the society's journal.[13] Knowing, however, that it would be another few years before the volume would be printed, they decided to immediately reach out to farmers, given how pressing the issue was. Benjamin Coates, one of the committee members, took the lead and wrote an article on Morris' behalf for *The Farmers' Cabinet*, introducing Morris and her findings to the world, with the APS' endorsement.[14]

The reactions from readers were swift, unkind, and mostly anonymous. One of the most vicious came from a writer who repeatedly referred to Morris as "*Miss Morris*," italicizing her name perhaps to emphasize her gender or at least marital status. Accusing Morris of reviving a long-settled debate, he called into question her scientific skills, claiming that her findings were "opposed by the every-day experience of thousands of observant farmers." What he found most upsetting, however, was that her study had the endorsement of "imposing names" from the APS.[15] In an article for the *Southern Planter*, based in Richmond, Virginia, an author reported on Morris' findings but mostly focused on her gender: "notwithstanding [the Hessian fly's] cunning, he has been unable to elude the feminine curiosity of the lady." Mocking Morris and her scientific skills throughout, he made a plea to readers: "As we know that some of our male friends . . . entertain different views on the subject, we invite them, if their gallantry will permit, to entertain the lists with the lady."[16] By implying that it might not be worth the damage to their honour to even engage Morris in a debate, the author further excluded her as an outsider.

The fact that Morris herself was not a farmer was certainly one issue. Agricultural entomology, as a field, was in its infancy in 1840, and it is clear from the agricultural journals of the time that there was a general distrust of the urban scientists who instructed readers on how best to manage their farms. "Book farming," as it were, received some pushback. The fact that Morris was a woman only compounded this outsider status. These journals, however, were an important space for vetting and spreading agricultural information through the reprinting of articles in

geographically diverse journals, and if the information she provided about the fly's behaviour and appearance was swatted down before it ever spread, that information would fail to reach many readers.

Farmers may not have trusted Morris for not being a farmer herself, but entomologists hardly trusted her either. In the mid-nineteenth century, entomologists—like other scientists—were forced to depend on the observations of others to make sense of species that were not available for them to see with their own eyes. Careful drawing and painting skills, as well as specialized jargon and descriptions of anatomy, were integral for communicating with other naturalists if specimens could not be sent. Peer review and the support of institutions like the American Philosophical Society were even more vital. But even if the observer's drawings were perfect and the description precise, even if he or she used a microscope to amplify observational skills, trust remained central. And most entomologists did not trust Morris.[17]

The entomologists most interested in and critical of Morris' findings were Thaddeus William Harris and Edward Claudius Herrick, university librarians who fit insect studies in after their workdays. At the time that Morris had sent her report to the APS in Philadelphia, Harris was busy writing a book on the insects of Massachusetts. Herrick was the closest thing to an expert on wheat pests since Thomas Say's death several years prior. Performing experiments in his backyard in Connecticut, Herrick helped Harris verify a lot of what was going into the book and the two exchanged letters regularly.[18]

When Harris read the *Proceedings of the American Philosophical Society*, the brief mention of Morris' report caught his eye. Immediately recognizing the threat that it would pose to the accuracy of a large section of his book, Harris breathlessly penned a letter to Herrick to alert him to the controversy. He urged Herrick to publish something quickly that he might then be able to cite in his book, thus putting to rest the egg-laying controversy.[19]

Following Harris' advice, Herrick did just that and published an article in the *American Journal of Science and Arts*. The puzzle was how to publish something that would dismiss Morris without insulting the men at the American Philosophical Society who had endorsed her observations. Herrick did this by arguing that Hessian flies never laid their eggs in the

seed, without ever directly referencing Morris or the APS. Knowledgeable readers would understand what he was doing. By not mentioning Morris' name and refusing to engage with her directly, he avoided elevating her fame or notoriety, while simultaneously excluding her from the fraternity of entomologists. This also erased her from the historical record.[20]

Meanwhile, Thaddeus William Harris finished writing his *Report on the Insects of Massachusetts* in the summer of 1841, feeling all the more confident about his section on Hessian flies now that Herrick's research had been published.[21] Harris, throughout his entire volume, was fastidious in giving credit to the entomologists whose discoveries he relied on. It is in that way that it becomes possible to pick up his subtle tone of disrespect toward Morris, as he suddenly refrained from his more typical offerings of praise and gratitude when discussing her work. Harris described Morris as reviving an "old discussion," implying that it had long ago been settled and discredited. After describing her intervention briefly, he shot it down, writing "The fact that the Hessian fly does ordinarily lay her eggs on the young leaves of wheat, barley, and rye, both in the spring and in the autumn, is too well authenticated to admit of any doubt." He later explained to Herrick that he had only even mentioned Morris' "pretended discoveries" in his book because she had been so warmly defended by the men at the Philosophical Society. His tone and emphasis in the book, though, successfully worked to support Herrick's claims and dismiss Morris', disregarding the possibility that Morris had discovered something that needed addressing in the wheat fields of Pennsylvania.[22]

* * *

One of the ways we might be able to make heads or tails of this debate would be to see the specimens that Morris collected. Modern-day entomologists might then be able to help determine what the fly is known as today. Even in 1841, Morris understood how important obtaining a full set of specimens was for her being trusted. Perhaps her critics would never believe her when she told them what she had seen, but they would have to believe it if they saw it for themselves.

After all of the controversy she had stirred up that winter, Morris was worried that she might lose the support of her local endorsers. Her greatest discovery, therefore, came right in the nick of time. In July 1841,

she caught sight of a female wheat fly laying its eggs among the grains of wheat. The fly, interrupted in the process, began laying those eggs on Morris' finger. Excitedly, she wrote: "I have seen a Tipulous fly in the act of placing her eggs on or in a grain of wheat. This fly and these eggs I have in good preservation." Comparing the fly to the one drawn by LeSueur in 1817, Morris found only minor differences. The male version of the insect looked precisely like those described by Say and illustrated by LeSueur, according to Morris. The female, however, did not. Her body was entirely black or blackish-brown and her wings "destitute of the hair fringe so conspicuous in the male." With the new evidence in hand, she could now confidently assert: "These important facts and specimens may prove my theory correct or that there are two species of this distinctive pest." The next month, Morris submitted an extensive letter documenting her observations to Philadelphia's Academy of Natural Science, another leading if young scientific organization. She also triumphantly submitted the indisputable evidence she had collected. After several summers of gathering infested sheaths of wheat and putting them under bell jars in her library only to find that the flies had died or failed to mature, she finally had a complete set.[23] Unfortunately, this would not be enough.

The specimens that Morris hoped would finally silence her critics were so disregarded and neglected by the scientists at the Academy of Natural Sciences that the flies and eggs were destroyed. The Academy's members did not study them in any way that might officially corroborate Morris' findings. When Morris learned of the fate of her prized collection years later, not only was she disappointed, she was distressed. Finding a full set of the flies required summers of infestation that were not as regular as they had been a decade earlier. Determined to replace what had been destroyed, she had the great fortune of finding and collecting new pupa in 1847 that she happily deposited with the Academy of Natural Sciences. The set, however, was incomplete, and it, too, no longer exists. When I reached out to the entomological curators of the Academy of Natural Sciences, now a part of Drexel University, they reported that they no longer have specimens from that era. Any chance of seeing or testing the creatures that Morris so painstakingly hunted for have vanished.[24]

Still, despite not finding a full replacement set of the fly that she studied for years, in 1849 Morris, with encouragement from the entomologist

Samuel Stehman Haldeman, gave the fly its name: "*Cecidomyia culmicola* Morris." Haldeman suggested using *culmicola* as the fly moved into the culm or stalk of the wheat plant to mature, something that distinguished it from other *Cecidomyia* flies.[25] Morris sent a letter to the corresponding secretary of the Academy of Natural Sciences, officially announcing the name and giving a brief description of its defining characteristics with the promise to donate a full set of specimens as soon as she was able to obtain them.[26]

Morris was never able to get that full set again though. The fly rarely returned with the frequency it once had.[27] Still, in 1852, she was able to send pupa of the *Cecidomyia culmicola* to Thaddeus William Harris to satisfy his request, and his response was likely very satisfying: "you have sent to me the puparia of your *Cecidomyia culmicola*. Any person familiar with the puparium of the Hessian fly cannot fail to perceive that these are totally different."[28] Despite this late verification, despite the fact that Morris gave her fly a name, it still managed to vanish. Part of the reason has to do with the endless published critiques Morris received.

* * *

When Morris had initially submitted her report about the wheat fly, she had been reluctant to make a public statement at all. Years later, after receiving a relentless stream of critiques, something in her had changed. Asa Fitch, an entomologist more than two hundred miles away in New York State, sought to make a name for himself in 1845 by publishing a series of articles about wheat flies in the *American Journal of Agriculture and Science*. Morris was disgusted to find what he had written about her. In these articles that were republished together as a pamphlet in 1847, Fitch catalogued not only the habits of the fly but also the various ways American scientists had described the fly over the previous half century. He included some of Morris' publications in the list, but toward the end he made space to dismiss her account completely, saying "it appears manifest that the lady was widely misled at the very outset of her observations" and claimed, erroneously, that she must have known she was wrong because she stopped publishing on the topic.[29] She had not stopped publishing. Morris fumed over the fact that Fitch had found "every other publication on the subject" but conveniently missed hers.[30]

Initially, Morris decided to ignore Fitch's insult, or, in her words "to pass him by in silence as I had my other opposers," but she was overruled by her friends who encouraged her to stand up for herself. In a polite but fierce letter published in the April 1847 issue of the *American Journal of Agriculture and Science*, Morris wrote that she craved Fitch's indulgence to "point out a slight error in his statement, which has arisen from misinformation." After defending her research and publication record, she put the onus on Fitch to determine what the species of fly actually was, if she was mistaken. Well aware that Fitch and other entomologists like Harris and Herrick questioned her observational skills, Morris pushed back. She emphasized her close inspection of her subjects, writing: "If Dr. Fitch will prove that the flies I so carefully watched for so many years, whose larva feeds in the centre of the straw, as seen by hundreds in this neighborhood, is 'the fly he suspects it to be,' I will acknowledge my error as frankly as I now maintain my difference of opinion." Morris not only emphasized how carefully she observed the specimens, later bringing up her use of a microscope to augment her sight, but she also asserted that her observations were corroborated by "hundreds in the neighborhood" who saw it themselves. Fitch had not only challenged Morris and her scientific authority, in other words, but also local environmental knowledge more generally.[31]

Morris recognized the inequities inherent in why people did not trust her observations. Even with the support of the most elite scientific societies in the country, her research was still being dismissed. She made a plea for the trust given so freely to other entomologists:

> I do not, nor have I ever doubted the statements of gentlemen so learned in the science of Entomology . . . their assurance that they had seen the insect in its different states of egg, larva, pupa, and perfect fly, was sufficient to satisfy me that it was so; I therefore, in all fairness, claim the same indulgence from them and others, when I state that I saw, captured, and glued to a piece of paper, a fly, while in the act of depositing her eggs on a grain of wheat, so like the drawing made by LeSueur, of Say's *Cecidomyia destructor*, that it not only deceived me, but all to whom I showed it.

Morris, called on her critics to push aside any issue with her gender and treat her as an equal. What was at stake was not just whether farmers and scientists would take Morris and her research seriously, but also whether her critics' inability to do so might mean that a tiny, powerful pest would continue to gorge itself in American wheat fields without farmers being able to muster an educated defence. [32]

Morris' defences of her methodology and skills, valuable as they were, ultimately did little to shape the future discussion of her work. The damage done by those who dismissed Morris in print echoed in the entomological literature over the next century and beyond, as they became invaluable references for those making sense of the flies threatening wheat. Morris' discovery of the *Cecidomyia culmicola* was occasionally mentioned in the entomological literature, starting with the second edition of Thaddeus William Harris' *A Treatise on Some of the Insects of New England* (1852). Even Asa Fitch came around, in 1851, and essentially apologized to Morris for dismissing her work, accepting that she likely discovered another species of *Cecidomyia*, though he buried this *mea culpa* in an article directed at a different topic entirely. In addition, Ebeneezer Emmons' *Agriculture of New-York* (1854) includes extensive coverage of Morris' fly. Other entomologists continued to include Morris' discoveries in their bibliographies and announcements of new wheat fly species, both in the United States and abroad.[33]

However, in 1897, something changed. In an extensive article about *Cecidomyia* flies, the French entomologist Paul Marchal dismissed Morris' diagnosis as unsatisfactory and the discussion of its life cycle as problematic, without going into further detail. Perhaps Marchal, relying heavily of Asa Fitch's extensive essay on the fly, was swayed by his initial dismissal of Morris' work fifty years earlier. Whatever the case, after Marchal's denouncement, other entomologists followed suit. In 1900, J. J. Kiefer, another French entomologist, decided that the *culmicola* was likely just a misidentified Hessian fly, and eleven years after that the American entomologist Ephraim Porter Felt followed suit.[34] So in 1954, when H. F. Barnes, a British entomologist who specialized in *Cecidomyia,* wrote in a reference book for agricultural entomologists that continues to be cited that Morris must have been confused, observing several different kinds of flies and conflating them as one species, he had more than a century's

worth of doubters to reference. By 1989, when Raymond J. Gagne wrote *The Plant-Feeding Gall Midges of North America*, he made the decision not to mention Morris or the *culmicola* at all.[35]

Whether Morris was mistaken, or whether her critics' words outlasted her rebuttals, the *Cecidomyia culmicola* has in many ways vanished. As Barnes wrote at the end of his description of the fly: "the name *Cecidomyia culmicola* Morris can only be of historical interest."[36] Without specimens for modern entomologists to reference, any solution to the mystery remains elusive. A 2016 study of Canadian insects estimates that in Canada alone there are 16,000 species of *Cecidomyia,* and over 1.8 million worldwide, with only a tiny fraction of those named. It is likely that the *Cecidomyia culmicola* is now part of the unknown, anonymous masses.[37]

The story of Margaretta Morris and the vanishing *Cecidomyia culmicola* underscores the dangers of not trusting scientists because of their sex (as was the case for Morris), race, or class. Thanks to such social inequities, knowledge was lost and opportunities missed, further revealing the social contingencies in scientific taxonomy and the historical archive.[38] We may never know the *Cecidomyia culmicola* that Morris studied year after year in her neighbour's field, the one that lived under the bell glass on her desk and that she pinned and sent to a number of entomologists around the country. Any attempts to understand this creature—its behaviour, its appearance, its life cycle—continue to be lost because in the 1840s a number of people refused to believe that a "lady entomologist" knew what she saw. The authority they held and hold and the ways their critiques have rippled outward in entomological literature means that the fly and Margaretta Morris have been lost to history, or at least human history. The flies, after all, no matter their name, might still be enjoying the fields of wheat, flitting from stalk to stalk.

NOTES

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2 Henry Green, "The Wheat-Worm," *The Cultivator* (June 1836): 53; "The Harvest Prospect," *The Cultivator* (July 1836): 59; "A Preventive of the Wheat Fly," *The Farmer's Cabinet* 1, no. 5 (September 1836): 73; William Penn Kinzer, "The Cut Worm and Hessian Fly," *The Cultivator* (October 1836): 109; "The Crops," *The Cultivator* (September 1836): 87; J. Hathaway, "Italian Spring Wheat," *The Cultivator* (September 1836): 94; "Enemies of the Wheat Crop," *The Cultivator* (September 1836): 93; "Lime as a Manure for Wheat," *The Farmers' Cabinet* 1, no. 6 (October 1836): 85–85; "Hessian Fly," *The Farmers' Cabinet* 1, no. 12 (January 1837): 185–86; "The Observer—No. 5," *The Farmers' Cabinet* 1, no. 19 (April 1837): 290; "The Observer—No. 6," *The Farmers' Cabinet* 1, no. 20 (May 1837): 306–7; "Wheat—Important Discovery," *The Farmers' Cabinet* 1, no. 23 (June 1837): 359–61.

3 "Price of Flour—Comparative Table," *The Farmers' Cabinet* 1, no. 19 (April 1837): 303; "High Price of Provisions," *Connecticut* Courant, October 15, 1835; Jessica M. Lepler, *The Many Panics of 1837: People, Politics, and the Creation of a Transatlantic Financial Crisis* (New York: Cambridge University Press, 2013), 67–70; Sean Wilentz, *The Rise of American Democracy: Jefferson to Lincoln* (New York: Norton, 2005), 456–57.

4 Philip Pauly, *Fruits and Plains: The Horticultural Transformation of America* (Cambridge, MA: Harvard University Press, 2007), 33–50.

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6 Mary Donaldson to Ann Haines, October 13, 1841, Series II Box 267, Folder 418, Wyck Association Papers, American Philosophical Society; Thomas Say, "Some account of the Insect known by the name of Hessian Fly, and of a parasitic Insect that feeds on it," *Journal of the Academy of Natural Sciences* 1, no. 3 (July 1817): 45–48; Charles Alexandre LeSueur, "Plate III," *Journal of the Academy of Natural Sciences* 1, no. 4 (August 1817): 64–65.

7 M. H. Morris to T. W. Harris, November 6, 1850, TWHP; M. H. Morris to T. W. Harris, September 12, 1847, TWHP; Deborah Jean Warner, "Science Education for Women in Antebellum America," *Isis* 69 (1978): 58–67; Margaret Rossiter, *Women Scientists in America: Struggles and Strategies to 1940* (Baltimore, MD: Johns Hopkins University Press, 1982), 1–28; Kimberley F. Tolley, *The Science Education of American Girls: An American Pursuit* (New York: Routledge Falmer, 2003).

8 M. H. Morris to T. W. Harris, September 12, 1847, TWHP; Thomas Say, "Some account of the Insect known by the name of Hessian Fly;" Charles Alexandre LeSueur, "Plate III."

9 Say, "Some account of the Insect known by the name of Hessian Fly," 47.

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