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Martha Glowacki's Natural History, Observations and Reflections

Collinson's Rapture (detail), 2011–2012.
Photo Eric Ferguson.

Cover: *Resurgence,* 1996.
Photo Mike Rebholz.

Martha Glowacki's Natural History, Observations and Reflections

Chazen Museum of Art
University of Wisconsin–Madison
March 3–May 14, 2017

This book is published on the occasion of the exhibition
Martha Glowacki's Natural History, Observations and Reflections
at the Chazen Museum of Art, University of Wisconsin–Madison
March 3–May 14, 2017

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Director's Foreword

Martha Glowacki has been an important and influential artist in the region for many years. She was one of the featured artists in the exhibition *Cabinets of Curiosities: Four Artists, Four Visions* presented at the Chazen (then Elvehjem) in 2000. Following the exhibition, the museum acquired her cabinet piece entitled *My Arcadia* (2000) for the permanent collection and it has been a prominent presence in Gallery XVI since the new museum building opened in 2011.

I have continued to follow Martha's career because she—more than many artists today—has a profound interest in the relationship between art and science. Martha is not only a practicing artist; she is also very knowledgeable about the history of science. She has spent countless hours poring over rare old texts on the subject both at the UW–Madison Libraries' rare book departments and other similar collections around the country.

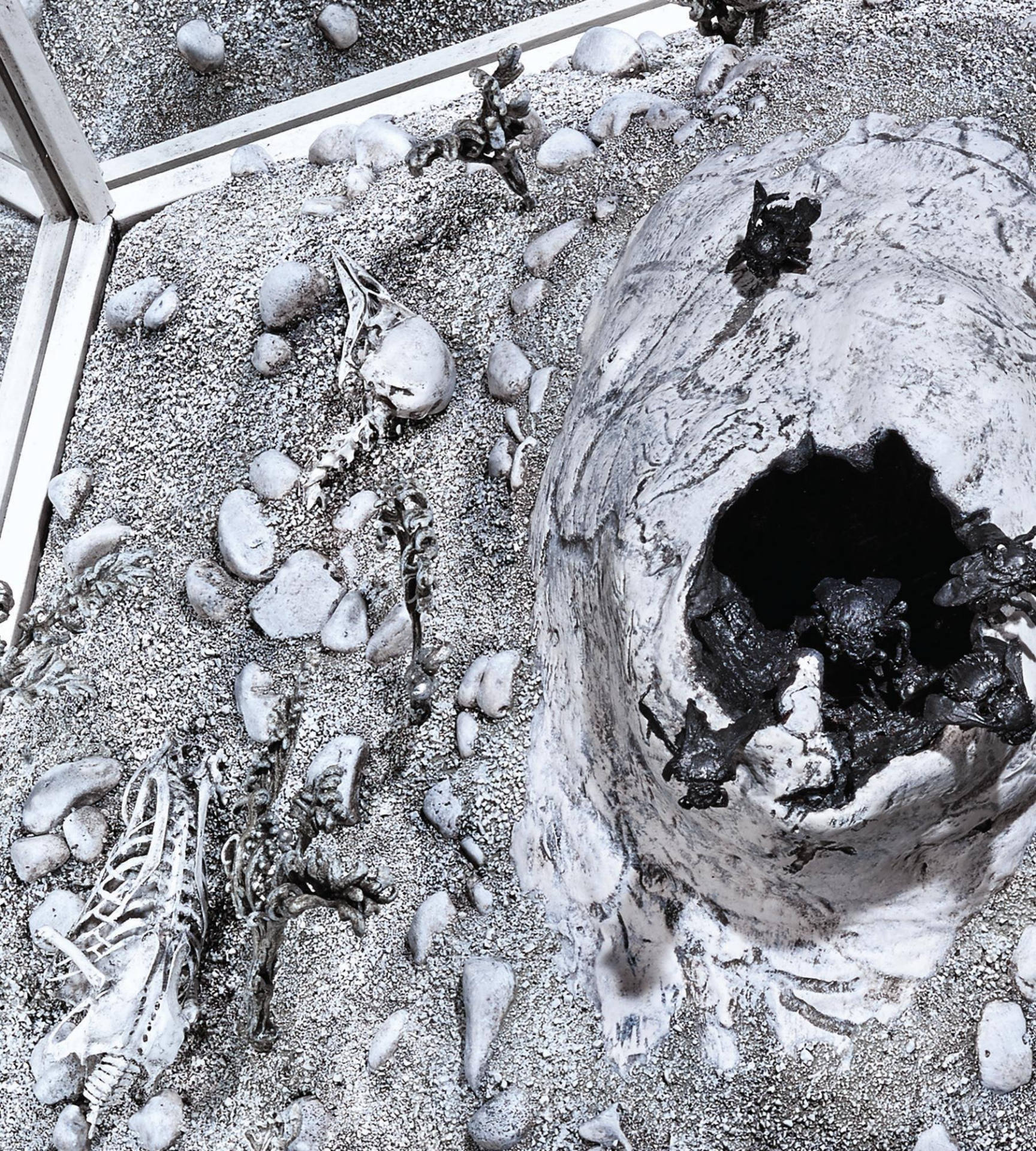
The connection between art and science may be making news today, but the relationship has a long history. When Europeans, particularly in the fifteenth century, following the example set by antiquity, took a renewed interest in the observation of the natural world, the artist was a scientist and the scientist was an artist. This consonance is obvious in the use of geometry and perspective to measure and proportion space by artists such as Leon Battista Alberti and Piero della Francesca, and the exquisite anatomical drawings of Leonardo da Vinci. Especially in the latter, the modern-day art observer can discern how carefully and minutely the artist studied the human body. Leonardo's drawings are both scientifically accurate and exquisite works of art. Leonardo has applied all of his artistic skill to render what he has learned about the anatomy of the human body through careful observation and analysis. Alberti and Piero, like others of their milieu, learned to measure the world accurately and show how people and things related in physical space. For almost a century, art and science were effectively one and the same.

Over time, our scientific knowledge has become more and more specialized and complex. And, artists of the twentieth century have, in large part, turned away from observation and depiction of the physical world. Art and science have separated into two distinct categories of human experience and understanding. No one would disagree with the assertion that our understanding of the physical world today, and its benefits to our society, is far beyond anything even dreamed of during the fifteenth century. However, artists like Martha Glowacki, and even some scientists, are asking, "Was something perhaps lost in the process?"

Martha Glowacki's art merits our attention. It consciously reflects her profound interest in the history of science and engages our own intellectual curiosity: What are these things? How do they work? How were they made? But at the same time her works appeal to our eye. In their own right, they are exquisite and wonderful to look at. It almost doesn't matter what they are or once were. They are beautiful. Knowledge of their origins only adds another layer to our appreciation of them.

Martha, thank you and congratulations.

Russell Panczenko, Director
Chazen Museum of Art



The Resistance to Reification: Martha Glowacki's Casts

A caliper and a pair of scissors are turned toward one another on a table. Though they belong to the same category, "instrument," and appear here similarly rusted yet still sharp, these utensils are placed as if in a dialogue about their different purposes: one promises to gauge growth; the other to sever it. Next to the tools a tray supports a metal-sheened mound of rocky soil, from which sprouts a sapling (Figure 1). Its most bountiful branch, composed of leaves and shoots cast in bronze, is enclosed in an oblong cage. (The longest stalk pokes just beyond the opening at the top of the netlike apparatus, as if to suggest that the plant is outgrowing its enclosure.) On the shiny, gilded mound that grounds the tree, a fissure spreads in a horizontal line. This quiet disturbance to the surface, perhaps suggestive of a resistance to reification, sets the tone of Martha Glowacki's exhibition as a whole. Here, both the impulse to examine or imagine the development of curious specimens and the subtle dangers of controlling wildness are placed on display.

Figure 1. Martha Glowacki (American, b. 1950), *Growing Towards the Light* (detail), 2015–2016, steel, bronze, cast iron, wood, pigments, inkjet prints, size varies. Photo Mike Rebholz.

In the history of art's role in the representation of flora and fauna, the perils of fixity have long been known. Pliny, describing in his *Natural History* the first Greeks to annotate their paintings of plants with descriptions, remarked that representations fail to disclose how plants "change their appearance according to the fourfold changes of the year."[1] Where the phases of ontogeny were spelled out in visual depictions, pictures condensed different stages into a single image that operated diachronically, as in sixteenth-century illustrations of the

Left: *Lacuna* (detail), 2016. Photo Mike Rebholz.

Figure 2. *Aestas/Summer*, from *The Four Seasons*, 17th century, engraving, History of Medicine Collection, Duke University School of Medicine.

Figure 3. Martha Glowacki (American, b. 1950), *Growing Towards the Light* (detail), 2015–2016, steel, bronze, cast iron, wood, pigments, inkjet prints, size varies. Photo Mike Rebholz.

plant "prunus."[2] (Glowacki, with her fabricated botany, also experiments with composites such as these.) When separated into different images, the phases often operated allegorically to relate to the chronological expanse of human life. In a series of seventeenth-century copperplate engravings of *The Four Seasons*, interactive and multilayered prints with flaps cycle through the flowering, bearing fruit, and defoliation of trees, which happens alongside the maturation, reproduction, and aging of a woman and a man (Figure 2).[3] It is haunting to look upon such accelerated processions from pudgy infancy to skeletal remains. Prior to the earthworks of the 1960s, in which landscape was allowed to stand for itself, art was never particularly well suited to documenting slow change.

In graphic media, translations of observations with the strokes of a pen, the washes of watercolor with a brush, or the cuts of an incising knife, stabilized certain features. In order to record, the artist's gaze remained active while the image that he or she attained prohibited the depicted specimen from showing any responsiveness to wind, water, or the sun's rays. As if to rebuff the notion of a page-bound image as immobilizing, in one of her pieces, *Growing Towards the Light*, Glowacki has drawn upon the illustrations of phototropic response in Charles Bonnet's 1754 *Recherches sur l'usage des feuilles dans les plantes* as the basis for her construction of a crank-pulley with a string that can raise the stem of a plant (Figures 3 and 4).[4] The ability of the mechanism to lift and lower the fabricated flower resuscitates the experimentation described in Bonnet's book by responding to the words and static image on the page with a sculptural assemblage that invites interaction. But in the long history of botanical illustration, the absence of a pictorial vocabulary for speaking to vegetal movement located pictures of plants in a peculiar zone; specimens remain both eternally alert and look as though they have hastened to a kind of rigor mortis—as the paradoxical term "still life" (from the Dutch

specimens remain both eternally alert and look as though they have hastened to a kind of rigor mortis

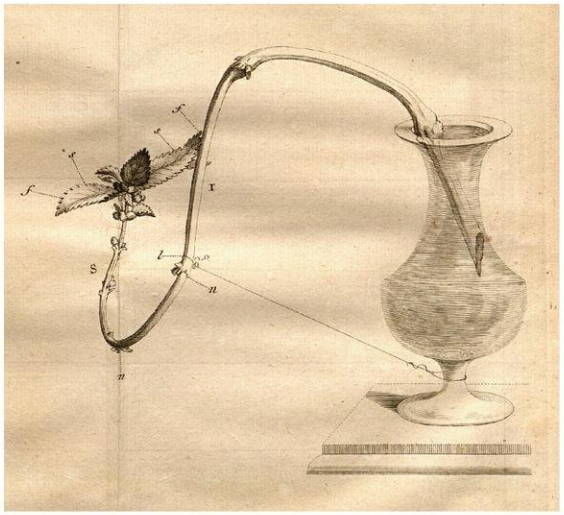


Figure 4. Charles Bonnet (French 1720–1793), *Recherches sur l'usage des feuilles dans les plantes*, 1754, pl. VII.

word *stilleven*, also known in French as "nature morte") encapsulates (Figure 5).

In an attempt to find the right word for what it is that an energetic eye and hand are doing whenever an artist copies nature, the verb "to capture" (a process literalized by Glowacki's oblong cage) seems right. Even if a sampling was not severed from its nurturing source, not harmed, nor even touched, confinement to a pictorial field operates like a kind of trap. This is because static, two-dimensional arts cannot mimic growth.

It is also the case, however, that in the early history of the spreading of knowledge about the physiological characteristics and medicinal properties of plants, the circulation of images and descriptions in an easily reproducible medium led to the perpetuation of bits of false information. Early printed illustrated texts, such as the *Gart der Gesundheit* of 1485, set a standard for decades of reissuings of crude woodcuts, some of which were attached to the wrong names.[5] It was with Otto Brunfels' *Herbarum vivae eicones*, published in three parts between 1530 and 1536, that the claim to have produced original images from the study of samples (boasted by the title, which translates to "Images of

Figure 5. Albrecht Dürer (German, 1471–1528), *Great Piece of Turf* (Das große Rasenstück), 1503, watercolor, pen and ink, 40.3 x 31.1 cm, Albertina, Vienna.

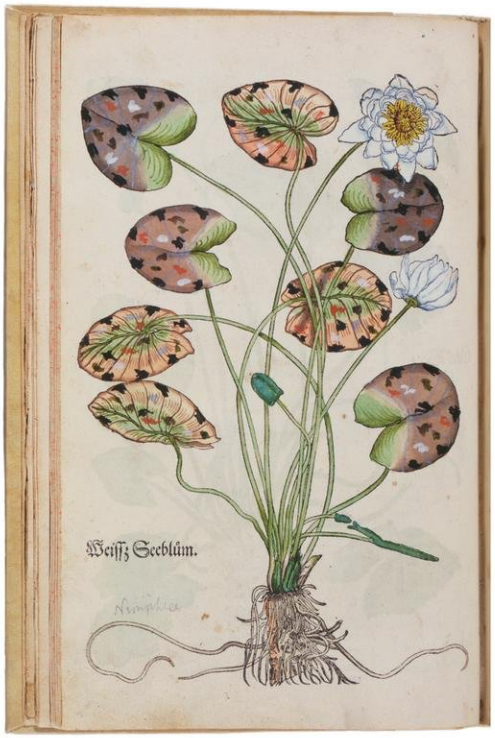


Figure 6. Hans Weiditz (ca. 1495–ca. 1569), *Weissz Seeblum* [Nymphea, waterlily], hand-colored woodcut. In Otto Brunfel (ca. 1488–1534), *Contrafayt Kreüterbuch: Nach rechter vollkommener Art* (Strassburg: J. Schott, 1532). The LuEsther T. Mertz Library, The New York Botantical Garden.

Living Plants"), could be made.[6] The illustrations by Hans Weiditz (ca. 1495–1536) show successive stages of horticultural development through the changing seasons of the year (Figure 6). In order to proliferate his images, Weiditz had to hand his drawings over to a *formschneider* (professional woodcutter), who traced the designs onto the block he would then carve.[7] (Another word for the prototype from which multiple images are made is a "matrix," a term which in Middle English stood for a female animal kept for breeding, or a parent stem of a plant. The root of the word "matrix" is *mater*, i.e. mother. Gender is thus at the root of this multiple-engendering technique.)[8] If representations of specimens serve to convey vegetal life cycles, it is worth remembering that the felling of trees was part of the process of providing a substrate for the circulation of pictures of plants. Cutting, then, has always been a part of sharing botanical knowledge. The scissors on Glowacki's table remind us of this. Proliferation, containment, and curtailing. Wherever the natural world is transformed into a representation through art, these metaphors are never far afield.[9] For centuries of Christian iconographical tradition, the Virgin Mary's physical state and the emotional outcome of her fate found expression in the depiction of plants. The violet of humility, the lily of chastity, and the rose of charity, are just some of these similes, as enumerated by Bernard of Clairvaux.[10]

Far from being bound in a one-to-one correlation of symbol to meaning, as the mariological flowers might suggest, botanical growth structure has provided numerous analogies for human thought, physiological development, genealogical succession, social circumstance, and transcendent hopes. Even the very process of making art by studying nature, then developing original ideas in one's own mind, has been likened to the generative process of plants. It was Albrecht Dürer (patient watercolorist of flora and fauna, as well as wild imaginer of monstrous fantasies), who wrote: "No man can ever again make a beautiful image from his own thoughts,

unless he has filled his mind with such things through much copying [from nature]. This is then no longer to be called his own but has become an acquired and learned art [*kunst*], which sows, waxes, and bears fruit."[11]

While some writers and image makers have thought to draw upon the generative properties of plants, others have found in their rootedness an apt analogy for constriction and impossibility. The French prose poet Francis Ponge described the vegetal organism as passive and captive, waiting for the world to come to it. "HENCE THE ESSENTIAL QUALITY OF THIS BEING," he wrote in all caps, "IMMOBILITY."[12] This sense of the restrictiveness to which plants are subject has led women, victims of racial discrimination, or others injured by social restraints, to describe the inability to achieve the full potential of growth in horticultural terms.[13] In a poem entitled "The Work of Artifice," Marge Piercy describes the dimensions of a bonsai tree, which could have grown eighty feet tall were it not for the pruning of the gardener. Instead, it is nine-inches high. "With living creatures / one must begin very early / to dwarf their growth," she writes.[14] Not all beings can realize the natural expanse of their upward rise, whose vertical ascendancy Plato, in his *Timaeus*, likened to moral rectitude.[15]

Yet because being trimmed back, having samples severed, or feeling bound to the limited circumference of a rhizosphere prevent certain opportunities for natural efflorescence, inventors who have looked to the botanical for metaphors of feelings or circumstance have also brought the unique properties of plants to light. In her analysis of Ponge's poetry, Christy Wampole writes of the "false immobility" of the plant, whose growth takes place unseen and underground: "For the plant is not actually still; it creeps and spreads itself in far more creative ways than the human . . . Roots may provide stability for the plant, but they are by no means anchors, despite the tendency to metaphorize them as such."[16]

Figure 7. Martha Glowacki (American, b. 1950), *Collinson's Rapture* (detail), 2011–2012, wood, cast and fabricated bronze, inkjet prints, glass, pigments, 23 x 17 x 3 in. Photo Eric Ferguson.

To neglect to recognize the fullness of the vegetal potential for radial outreach is a failure of human perception to see anything but an aboveground view.

The play between propagation and stricture, permanence and possibility, abound in Glowacki's work. In a series called *Collinson's Rapture*, where cast and fabricated plants are framed and mounted on the wall, it is *words* that are pinned down (Figure 7).[17] Pieces of the mid-eighteenth-century transatlantic correspondence between Royal Society fellow Peter Collinson and the Philadelphia horticulturist John Bartram are snipped into phrases, tacked like immobilized specimens, awaiting the viewer's study.[18] The process of attempting to

Figure 8. Wenzel Jamnitzer (German, 1508–1585), Silver writing box with animal casts, ca. 1560/1570, silver, 9 x 4 x 2 1/3 in., Kunsthistorisches Museum, Wien.

nurture on British soil the success of seeds indigenous to the New World (sent by Bartram as enclosures with his letters) is captured with the language of anticipation, uncertainty, and joy with which Collinson describes the results of his attempts at cultivating growth: "For I waited almost all my / lifetime for to get this / Rare flower / I Read of it & Seen It / Figur'd in Books, but / despaired of ever / Possessing it." Thus cut-up and displayed, with the insertion of Glowacki's enjambments and pauses, Collinson's correspondence is loosened from its original purpose and allowed to reside in a more lyrical realm. The letter here reads like a visual poem; the final words, "Possessing it," reside alone. They are separated from Glowacki's cast plant and from Collinson's other words that precede it. This placement suggests that verdure may find a way to resist being fully domineered. However ecstatic the British botanist may have been at the success of this one bloom (the word "rapture" in Glowacki's title derives from the Latin *raptura*—which originally meant abduction or rape, but around 1600 the word began to be applied to a state of mental transport), man's desire to obtain and contain nature may ever exceed his grasp.

That there are intimations of death in Glowacki's work cannot be denied. Where graphic technologies such as drawing and printmaking may be seen to perform a kind of mortification because they lack a visual vocabulary for describing growth, one of this artist's preferred techniques—casting from life—demands obliteration of the specimen. The sixteenth-century master of this procedure, Wenzel Jamnitzer, sacrificed not only flowers and stems but also snails and salamanders when he fired his molds (Figure 8). In Glowacki's work, metalized insects and bones not only hint that fidelity to nature is linked to nature's demise; they also operate generatively to suggest how fragility gives way to stability, and vice versa. The inside of her mirror box, *Lacuna*, is scattered

Figure 9. Martha Glowacki (American b. 1950), *Lacuna* (mirror box illusion) (detail), 2016, cast iron, bronze, wood, mirrors, marbleized paper, animal bones, pigments, 42 x 24 x 24 in. Photo Mike Rebholz.

with the bones of birds, emerging shoots, and castings of bees (Figure 9). This landscape recalls something of the exterior of Hieronymous Bosch's triptych, *The Garden of Earthly Delights*. At first glimpse, with its grayish monochrome, our planet may appear to be barren, but in fact what we are seeing is the world coming into being, or, in the case of Glowacki's installation, a wintry sheen with color creeping in, hints of spring's eventual green.

The terrain that Glowacki has created in her *Lacuna* multiplies outward by way of mirroring walls. The expansion would be terrifying were it not that the delicate design of ornithology—the vertebral structure and rib cage are almost lacelike, even where the bones are broken off—draw the eye back to the small skeletons on the mound. One feels grateful to be permitted this view of the frail nature of things that death yields. Standing above the box, the viewer has the sense that she is peering into something private and precious, yet whose boundaries are uncontained. Thus the seemingly bottomless hole at the center of this piece—it has the concavity of a volcano post-eruption, a dark abyss—might read not as devastating but as generous. The void acknowledges the unknowability to the artist of where her viewer's minds may go.

Making available for display the acknowledgment of the privacy of another—this seems to me to be half of Glowacki's art. It is the half that stores in drawers gathered bones, honeycombs, and desiccated corpses

covered in graphite, as well as clippings of hair, tiny tools, jars and jewels, photographs of communion girls wearing white, or darkly dressed women, alone, their hips behind a wall of flowering plants. These treasures may be discovered by opening and closing, peering into compartments—activities accompanied by the mind's free associations or individual remembrances.[19]

The other half of Glowacki's art has to do with the relationship to a particular stimulus—this is the printed book. While it is true that the replicative technology of moveable type and woodblock images codified knowledge, it is also true that innumerable readers understood the contents of natural history texts not as facts but as impetuses, written in the imperative tense: "Try this." "Make."[20] Glowacki is operating in a tradition of scientists and artists—and figures who blurred the distinction between the two—who took what nature offered them and what they found in books as opportunities to test, sample, and diverge. Knowledge, for some, like her, is not what is stored, but what is shared. The impact of such an attitude towards finding, learning, and creating cannot be hemmed in with string and scissors, nor measured by a caliper's limited expanse.

Shira Brisman, Ph.D.
Assistant Professor of Art History
University of Wisconsin–Madison

Notes

1 Pliny, *Natural History*, vol. vii, Book 25, chapter 4, trans. W.H.S. Jones (Cambridge, MA: Harvard University Press, 2014), 140.

2 See for example the "Prunus Sylvestris" depicted in Leonhard Fuchs, *De historia stirpium commentarii insignes* (Basel: In Officina Isengriana, 1542), fol. 404. Sachiko Kusukawa, "Illustrating Nature," in Marina Frasca-Spada and Nick Jardine, eds. *Books and the Sciences in History* (Cambridge: Cambridge University Press, 2000), 92 and fig. 5.4 and Sachiko Kusukawa, "The Uses of Pictures in the Formation of Learned Knowledge: The Case of Leonhard Fuchs and Andreas Vesalius," in Sachiko Kusukawa and Ian Maclean, *Transmitting Knowledge: Words, Images, and Instruments in Early Modern Europe* (Oxford: Oxford University Press, 2006), 78-79. A list of the composite pictures published in Fuchs's text is found in Frederick G. Meyer, *The Great Herbal of Leonhart Fuchs: De historia stirpium commentarii insignes 1542*, vol. 1 (Stanford: Stanford University Press, 1999), 120–122.

3 The unique surviving example of this series is held at Duke University: https://library.duke.edu/rubenstein/history-of-medicine/four-seasons.

4 Charles Bonnet, *Recherches sur l'usage des feuilles dans les plantes* (Göttingen and Leiden, E. Luzac, 1754), plates VI and VII. A reproduction of plate VII is found in one of the drawers of Glowacki's cabinet piece, *What Every Woman Ought to Know.*

5 Shira Brisman, "Sternkraut: 'The Word that Unlocks' Dürer's Self Portrait of 1493," in *The Early Dürer*, ed. Thomas Eser and Daniel Hess (Thames & Hudson; Nuremberg: Germanisches Nationalmuseum, 2012), 194–207.

6 Although in the first Latin edition the authorship of the pictures is anonymous, Brunfels and his publisher, Johann Schott, named Hans Weiditz as the illustrator in the German edition, Contrafeyt kreuterhbuch. For legal disputes over the pirating of Brunfels' text and Weiditz's images, see Joseph Leon Koerner, *The Moment of Self-Portraiture in German Renaissance Art* (Chicago: University of Chicago Press, 1993), 215–217.

7 Weiditz's drawings eventually reached Felix Platter, a doctor of medicine and natural scientist in Basel, who incorporated them into his comprehensive herbarium by cutting the paper of Weiditz's around the outlines. Thus some of Weiditz's annotations, made in pencil on the back, have been truncated and lost. Fritz Koreny, *Albrecht Dürer and the Animal and Plant Studies of the*

Renaissance, trans. Pamela Marwood and Yehuda Shapiro (Boston: Little, Brown and Company, 1988), 228. Walther Rytz, *Pflanzenaquarelle des Hans Weiditz aus dem Jahre 1529* (Bern: Paul Haupt, 1936).

8 Kathryn Reeves, "The re-vision of printmaking," IMPACT 1 International Printmaking Conference Proceedings, University of West England, 1999), 69–75.

9 Victoria Bladen, "The tree of life motif as renaissance cultural rhizome: An interdisciplinary mapping of arboreal imagery in biblical text, early European visual culture and dramatic text (Shakespeare's Titus Andronicus)," in ed. N. Ramiere and R. Varshney, *Rhizomes: Connecting Languages, Cultures and Literatures* (Cambridge: Cambridge Scholars Publishing, 2007), 133–154.

10 Lottlisa Behling, *Die Pflanze in der Mittelalterlichen Tafelmalerei* (Weimar: H. Böhlaus Nachfolger, 1957).

11 Hans Rupprich, *Dürer Schriftlicher Nachlaß*, vol. 3 (Berlin: Deutscher Verein für Kunstwissenschaft, 1969), 295-296. Quoted in Koerner, *Moment of Self-Portraiture*, 163. For a description of Dürer's nature studies in watercolor, see Friedrich Piel, *Albrecht Dürer. Aquarelle und Zeichnungen* (Köln: Dumont, 1983).

12 Francis Ponge, *Tome premier* (Paris: Gallimard, 1965), 92. Christy Wampole, *Rootedness: The Ramifications of a Metaphor* (Chicago: University of Chicago Press, 2016), 9 and 42.

13 Tina Gianquitto, *"Good Observers of Nature": American Women and the Scientific Study of the Natural World, 1820–1885* (Athens: University of Georgia Press, 2007).

14 Marge Piercy, "A Work of Artifice," in *Circles on the Water* (New York: Alfred A. Knopf, 1982), 65.

15 Plato, *Timaeus*, trans. Benjamin Jowett (Blacksburg, VA: Virginia Tech, 2001), 90 a–d.

16 Wampole, *Rootedness*, 40.

17 In another Glowacki series, *The Psychology of Plants*, where the text is drawn from Julien Offray de la Mettrie's *Man, a Plant*, it is the stem of the thistle that is tied down. Offray's text, "L'homme Plante," was published anonymously in 1748. For the English translation of this text, see Julien Offray de la Mettrie, *Man a machine; and, Man a plant*, trans. Richard A. Watson and Maya Rybalka (Indianapolis: Hackett, 1994).

18 For the Collinson-Bartram exchange, see Jean O'Neill, *Peter Collinson and the Eighteenth-century Natural History Exchange* (Philadelphia: American Philosophical Society, 2008) and *America's Curious Botanist: A Tercentennial Reappraisal of John Bartram, 1699–1777*, ed. Nancy E. Hoffmann and John C. Van Horne (Philadelphia: American Philosophical Society, 2004).

19 On the relationship of architecture to mnemonic aids, see Heinrich F. Plett, *Rhetoric and Renaissance Culture* (Berlin: De Gruyter, 2004), 202–207.

20 For a discussion of Paracelsus' instruction "to hasten to experience," see Pamela H. Smith, "Making Things: Techniques and Books in Early Modern Europe" in *Things*, ed. Paula Findlen (London: Routledge, 2013), 174. For instructional texts aimed explicitly at women, see Elizabeth Tebeaux, "Women and Technical Writing, 1475–1700: Technology, Literacy, and Development of a Genre," in *Women, Science and Medicine 1500-1700: Mothers and Sisters of the Royal Society*, ed. Lynette Hunter and Sarah Hutton (Thrupp, Stroud, Gloucestershire: Sutton Publishing, 1997), 29–62.

Figure 2 link
https://library.duke.edu/rubenstein/sites/default/files/rubenstein/flash/fourseasons/4SEASONS.swf

Figure 4 link
https://archive.org/details/recherchessurlus00bonn

Figure 5 link
http://sammlungenonline.albertina.at/?query=Inventarnummer=[3075]&showtype=record

What Every Woman Ought to Know (detail), 2002–2003.
Photo Eric Ferguson.

Anschauung Illustrated
Martha Glowacki's Natural History, Observations and Reflections

Anschauung is one of those German words that is hard to translate with a single English term. To nineteenth-century pedagogues and philosophers its meaning approximated an intuition developed through direct experience or physical encounter, or more broadly a sense-based knowledge of the material world. *Anschauung* is not only difficult to translate, it is difficult to transmit as it reflects an understanding that is not based in text and verse, but on feelings, sensations, sounds, and impressions. It is ephemeral, intimate, immediate, and hard to scale.[1] So much so that educators developed series of *Anschauungunterricht*, sense perception exercises to give children predictable opportunities to hone their abilities to more fully experience and make sense of the world around them. The hope was that these exercises, these object lessons on the material world, would allow children to organize their perceptions and to develop conceptions, abstract ideas, and notions out of these physical experiences and eventually to move from the concrete to the abstract. Educators represented this form of learning as a tree with sensation at the roots stretching into the various branches of abstract thought, including "Perception of Order," "Cause and Effect," and "Power of Judgment." This visual metaphor suggested that ideas grew out of direct sensory engagement, and were not possible without it (Figure 1).[2]

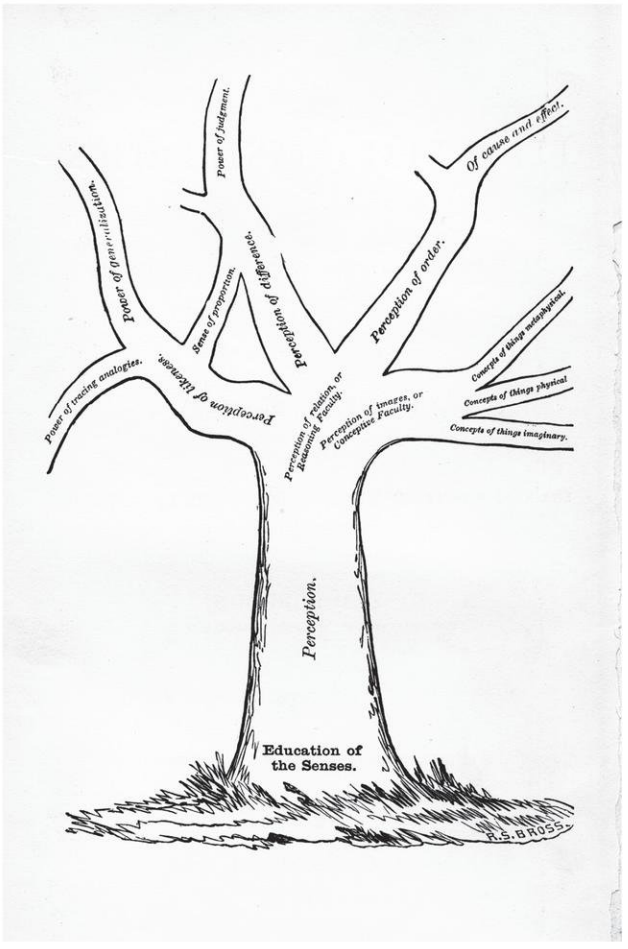


Figure 1. E. A. Sheldon, *A Manual of Elementary Instruction: For the Use of Public and Private Schools and Normal Classes; Containing a Graduated Course of Object Lessons for Training the Senses and Developing the Faculties of Children* (New York: Ivison, Blakeman, Taylor & Co., 1862), Frontispiece.

This historic understanding of how one engaged with the material world suggested the importance and challenge of conveying the empirical evidence that supported scientific discovery and discourse. If direct observation

Trained as a metalsmith, Glowacki connects her metalwork to collected and modified found objects, building complex sculptures that appear related to historic machines and furniture forms.

and personal experience were to be vital tools for studying the natural and social worlds, ephemeral things had to be captured, described, rendered, and represented: the growth of a plant, the flap of a bird's wing, the way an eye sees, and perhaps even the way a person experiences the world.

Martha Glowacki (b. 1950) works through the problem of representing historic modes of perception in her sculptures and installations. Like scholars of the natural world dating back to antiquity, she struggles to make the process of capturing and recording natural and social—itself a false distinction—histories legible and tangible. Her art makes the idea of *Anschauung*—the process and history of sensing and experiencing—material. Trained as a metalsmith, Glowacki connects her metalwork to collected and modified found objects, building complex sculptures that appear related to historic machines and furniture forms. Her work, spanning more than four decades, investigates how the hard-to-capture is represented. For Glowacki, the means of scientific representation, like prints, the experimental device, and the cabinet, present narratives about ways of thinking and experiencing the world. These tools are not conduits to a deeper, static reality, but questions to be addressed and, in a way, her primary medium. Glowacki takes these intellectual forms as her inspiration to help viewers understand the epistemological possibilities of representing things that cannot be fully fixed on paper, emphasizing that all representation is inevitably interpretation.

By examining three categories of her material-grounded intuition we can explore the logic that links her work. I will consider her prints representing experiments with living things, various modes of capturing images and moving objects, and the metaphorical potential of the cabinet. In each of these cases Glowacki is engaging with ideas about how the material world is presented—and how these media both limit and create what we are able to see of the world. Glowacki is identifying and creating traces, things that survive and things that are recreated, as ways of documenting the ephemeral. The scientific illustration, the camera obscura, and the layered traces of stop-motion, and the collector's cabinet or cabinet of curiosities all suggest their own sets of epistemologies or ways of organizing knowledge and offer their own potential for *Anschauung*. In considering these three categories I am not suggesting change over time in her oeuvre or engaging with different ways of understanding science from the seventeenth through nineteenth centuries. Instead I am tracing thematic threads that run through many of her works and make her work relevant for exploring the poetic possibilities of empiricism and scientific investigation more broadly.

Scientific prints are a key source of inspiration for Glowacki, for whom they have been the point of access not only to modes of representing and explaining specimens, but also experiments and ways of sorting and displaying objects in museums. Eighteenth-century works related to the study of how plants grow are the foundation for Glowacki's three-part series *Growing Towards*

Figure 2. Martha Glowacki (American b. 1950), *Growing Towards the Light* (detail), 2015–2016, steel, bronze, cast iron, wood, pigments, inkjet prints, size varies. Photos Mike Rebholz.

the Light (2015–2016).[3] While it had been a long-held belief through observation and intuition that plants grow towards the sun, in the eighteenth century scientists worked to quantify this through a series of experiments.

The three plant tables—scaled so that viewers can imagine themselves in the position of a scientist examining the specimens under consideration in their own lab space—present three different views of cast and fabricated polychrome bronze plants. Glowacki positioned the experiments atop century-old sheet steel tables that she treated to look like wood. The sculptures continue the aesthetic of the scientific engravings that inspired them, formed in clear lines in metal. This sets up relationships between the metal of the sculptures and the metal of the copper plates into which the images were inscribed.

In plant table one, metal flowers are in a glass vase in a wooden case and stretch out of its open side towards a light source. They are to be compared to identical flowers, positioned outside the shade of any box, growing straight up and in all directions. In this case, the sculpture represents two different moments in time, two different situations for the vase of flowers (Figure 2).

Figure 3. Martha Glowacki (American b. 1950), *Growing Towards the Light* (detail), 2015–2016, metal tables, steel, bronze, cast iron, wood, pigments, inkjet prints, size varies. Photo Mike Rebholz.

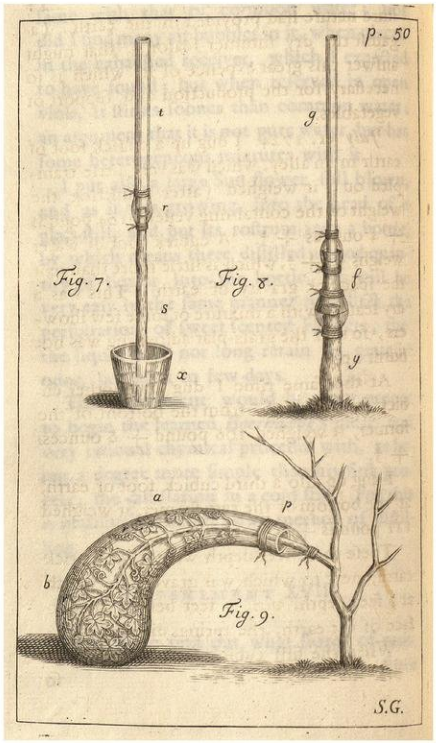


Figure 4. Hales, Stephen. *1677–1761. Vegetable staticks, or, An account of some statical experiments on the sap in vegetables: being an essay towards a natural history of vegetation: also, a specimen of an attempt to analyse the air, by a great variety of chymio-statical experiments, which were read at several meetings before the Royal Society.* Two volumes. London: Printed for W. and J. Innys ... and T. Woodward ..., 1727–1733.

Figure 5. Martha Glowacki (American b. 1950), *Growing Towards the Light* (detail), 2015–2016, steel, bronze, cast iron, wood, pigments, inkjet prints, size varies. Photo Mike Rebholz.

Similarly, plant table two offers a point of comparison, rather than asking viewers to imagine the contrast between placing cut flowers in or out of a box, and the observations that might allow, the work is linked to a round gear that suggests viewers may actually help the plant reach towards the light in a prescribed way. Its set path suggests that replicating an historic experiment is mechanical and merely allows for the observation of a carefully controlled action (Figure 3). The experiment must be governed by forces that are defined in order to quantify the movement of the flower, but such a formula limits one's experience of the phenomenon within rigid parameters.

Finally, in plant table three—echoing Glowacki's earlier work *Archetype* and *Resurgence* (1996)—part of a living plant is contained in what was a glass bottle in historic experiments, but is rendered as a cage in Glowacki's work. The plant may grow towards the light but is contained, limited and controlled by the structures through which it is viewed (Figures 4 and 5). In this complex and darkly beautiful work Glowacki is exploring the limits of both the experimental process and its representation. The work is about the methodical study of plants and trying to understand how viewers can explain what they see—what their sensory experience or intuition may tell them, as opposed to the details a scientist has chosen to record. Rendering this in metal makes the plants that are supposed to be moving and growing just as static as the prints that captured these experiments. Glowacki inevitably comments on the trouble of transmitting and translating direct experience.

Glowacki also studies the actual process of observing. Her plant tables take for granted that we can see the sculpture and engage with it. *Deconstructing Flight: An Homage to Étienne-Jules Marey* (2017) and *Rational Recreations: The Camera Obscura* (2016) question what we see—or what we think we see—not just what can be done with or is allowed by those perceptions.

Figure 6. Martha Glowacki (American b. 1950), *Rational Recreations: The Camera Obscura* (detail), 2016, Camera: wood, glass, lens, bronze, cast iron stand, size varies. Photo Mike Rebholz.

In *Rational Recreations: The Camera Obscura* (Figure 6), like in the plant tables, Glowacki invites viewers to empathize with historic scientists or users, to sit on the piano stool and to gaze into the camera at three objects that may be seen across the gallery. Inspired by the frontispiece in William Cheselden's *Osteographia, or the Anatomy of the Bones* (1733), the items to be viewed inside of the machine are visible, hanging upside down across the gallery: a white wooden birdcage, an arched window and a parrot. The camera works by allowing a viewer to look inside, focus the lens and to view the hanging assemblage right side up. This level of participation allows the viewer to under-

Figure 7. Martha Glowacki (American b. 1950), *Deconstructing Flight: An Homage to Étienne-Jules Marey* (detail), 2017, mixed media installation, size varies. Photo Eric Tadsen.

stand how looking through something, in an attempt to "fix" it as a two-dimensional image, transforms it. Viewers also get to watch participants and witness the process of looking as something active, offering a visual surprise or joke when the gallery display is inverted through the camera's lens.

Deconstructing Flight: An Homage to Étienne-Jules Marey (2017) makes this interest in understanding the technology of vision even more apparent by attempting to capture the motion of a bird's wings through stop-motion photography. Glowacki transformed the taxidermy cockatoo by containing it in a harness that echoes one used by Marey to study the displacement of air and designed a pair of fabricated bird wings for a human model. The installation investigates different kinds of movement—animal, human, light, the eye—and the problem of representing this movement. The large model wings are actually crafted from piano felts and a piano's interior mechanism, suggesting the rhythmic transmission of movement into sound, from moving sculptural wings to static projected images (Figure 7).

Glowacki is helping viewers see that the process of representing motion is both arbitrary and aestheticized—and like the plant that must be cranked in a specific way, along a specific track, is recorded in a prescribed way. It challenges the possibility of accurately representing the true sense experience of a thing or process—turned upside down by a lens to allow for accurate tracing or transformed into a series of points and lights these installations reflect the impossibility of transmitting a direct sense experience.

The collector's cabinet and specimen cabinet have been important reasoning tools for Glowacki. Like scientific prints depicting specimens or experiments, cabinets and their representations suggest a way of ordering and creating knowledge that offers a specific view of the world. Historically, cabinets were tools for bringing sense expe-

Figures 8 and 9. Martha Glowacki (American b. 1950), *My Arcadia*, 2000, mixed media, wood cabinet, 79 x 62 x 34 in., Elvehjem Museum of Art General Endowment Fund purchase, 2000.88.

riences into homes and classrooms in orderly, structured ways. Glowacki has long pushed on this form of material rhetoric to explore the limits of representation.

My Arcadia (2000), in the permanent collection of the Chazen, employs the tools of the scientific cabinet to order more intimate concepts related to the artist's autobiography. It moves beyond what is perceived to what may be understood or implied (Figure 8). Individual things take on their own logic and feel sturdier when they are sorted in a cabinet. The drawers contain historical images, bones and specimens arranged to suggest a range of personal interests and tangentially related narratives designed to fascinate and engage through close looking and the act of physically pulling out drawers—whether to reveal a desiccated cat or a dismantled daguerreotype. On top of her cabinet, three bell jars contain metal plant sculptures that suggest an alternate cycle of life: a tree that has been heavily pruned to inspire new growth, a carefully manicured plant, and another that has died, but has bees on it to suggest the possibility of new beginnings (Figure 9).

Figure 10. Kelloggs & Comstock, *The life & age of woman. Stages of woman's life from the cradle to the grave*, 1848, hand-colored lithograph, Library of Congress, Prints and Photographs Division.

This cycle is less linear than the traditional *The life & age of woman. Stages of woman's life from the cradle to the grave*, (1848) suggesting that external interventions may offer new life, that beauty and symmetry is not natural but deliberate, and that rejuvenation is always possible (Figure 10). These scenes suggest ways of controlling not merely describing nature. Working in a similar way, *What Every Woman Ought to Know* (2002–2003), is a cabinet that presents an historic view of the strictures that shaped women's lives, from historic makeup and a dramatic and somehow dark model of a bustle, to photographs and documentation of physiological studies (Figure 11). The form of the cabinet with its drawers suggests that these items are meaningful and sorted as traces or documents of important phenomena, and make the viewer acutely aware of how controlled the sense experience it offers may be. These wondrous things provoke curiosity about the authorship of its creator. Her point of view is represented through its drawers—in effect, it gives access to her own sense experience of the selected and created things. These cabinets could inhabit an historic interior, but their contents could only exist in the context of Glowacki's exploration of the power of historic and scientific modes of meaning making. They offer access to a kind of sense impression that suggests an intuition about the artist and her take on the world, even as they make clear the limited and particular function of the cabinet as an analytical tool.[4]

The scale of Glowacki's work encourages viewers to use her sculpture—gazing through lenses, turning cranks, and opening drawers. Viewers look closely, touch, think, and empathize with historic thinkers who struggled with conveying sensory experience. The problem of

Figure 11. Martha Glowacki (American b. 1950), *What Every Woman Ought to Know* (detail), 2002–2003, altered wood cabinet, mixed media, 78 x 30 x 23 in. Photo Eric Ferguson.

Anschauung, of knowing what we know through intuition, of having the hope of developing more complex ideas through empirical observation and material engagement, permeates Glowacki's work.

In *Lacuna (mirror box illusion)* (2016), Glowacki transforms a late nineteenth-century fish tank into an endless world, as its title suggests, into an empty and unfilled space, through mirrors that surround a bleak, sculpted and cast landscape featuring a bottomless hole. Fish tanks, unlike orderly cabinets or structured experiments, served to bring living animals inside, to domesticate nature. Yet here, nature is endlessly self-referential and impossible to capture (Figure 12). Looking closely at *Lacuna*, the bleak grays and emptiness give way to something hopeful: green tips come to life to suggest the possibility of something new, a possibility that you need to see, to experience through the visions of science

Figure 12. Martha Glowacki (American b. 1950), *Lacuna (mirror box illusion)* (detail), 2016, cast iron, bronze, wood, mirrors, marbleized paper, animal bones, pigments, 42 x 24 x 24 in. Photo Mike Rebholz.

and of knowing that Glowacki has created. The subtle greens and small metal bees, like those perched in the seemingly dead dome on *My Arcadia* (Figures 8 and 9) are not details present in static and clean scientific engravings. Yet, they inhabit Glowacki's translations of the ways modes of scientific representation present the natural world: viewers look closely at her work and develop their own intuitions that even metal plants have the potential for regeneration.

Glowacki's work reveals the metaphors, artistry, and implications necessarily present in scientific investigation. These revelations are not intended to critique historic experimenters and collectors who were attempting to understand and order impossible-to-capture sense impressions. Rather, her work allows viewers to connect and to empathize with these thinkers by looking through her creations at layers of represented experience. Glowacki's work exposes her strong intuition about the importance of both scientific discovery and its inevitable gaps—lacunas that require an artist's material intuition to be made apparent.

Sarah Anne Carter, Ph.D.
The Chipstone Foundation

Notes

1 Julian Rohrhuber, "Intuitions / Anschauungen", *Faits Divers*, No 1 (July 3, 2007), http://wertlos.org/faits_divers/files/faits_divers_01.pdf, accessed online: October 30, 2016.

2 Sarah Anne Carter, *Object Lessons: How Nineteenth Century Americans Made Sense of the Material World* (Forthcoming from Oxford University Press, 2017).

3 Charles Bonnet, *Recherches sur l'usage des feuilles dans les plantes*, pl. VII. Leiden : E. Luzac (1754). Stephen Hales, *Stephen Hales, 1677–1761. (17271733). Vegetable staticks, or, An account of some statical experiments on the sap in vegetables: being an essay towards a natural history of vegetation: also, a specimen of an attempt to analyse the air, by a great variety of chymio-statical experiments, which were read at several meetings before the Royal Society. Two volumes. London: Printed for W. and J. Innys ... and T. Woodward ..., 1727–1733.*

4 Joseph Goldyne and Thomas Garver, *Cabinets of Curiosities: Four Artists, Four Visions* (Madison: Elvehjem Museum, 2000) 55–63.

The Psychology of Plants, 2015.
Photo Mike Rebholz.

Martha Glowacki's Natural History, Observations and Reflections

Once more my deeper life goes on with more strength,
as if the banks through which it moves had widened out.

Rainer Maria Rilke

One of the imperatives, if not *the* imperative, for any artist is to understand their own path to inspiration, to know how to get to the "deeper life." My ideas for creative work come primarily from observation and analysis of the natural world, both through my own experiences and from studying the experiences of others. Sometimes an intuition sparks an idea; at other times, reading and research send me in a new direction. The work in this exhibition interweaves ideas that come from this dance between intuition and intellectual study.

Since I was a young child, one of my greatest pleasures has been walking outdoors in parkland or rural areas. Out of thousands of hours of walking, I vividly remember a handful of instances when a sensory impression—a quality of the light, the sound of wind, the movement of a flock of birds settling in the dry corn stalks in front of me—made me realize my profound connection to the natural world. The knowledge was like an electric current passing through me with the message that "you are part of all that surrounds you, this is you and you are it."

This is the closest that I have come to a mystical experience. I have chosen to interpret these experiences as both a path to understanding my place in the world and as a call to action as an artist. Imparting this connection and concern for nature is my creative river, my voice.

The challenge is to turn these intuitions into a visual narrative that expresses meaning. Using natural forms and processes, I have gradually built a personal vocabulary that symbolizes abstract ideas concerning the transience and fragility of nature. Turning this base layer of knowledge gained from experience into a higher layer of conceptual understanding is a task shared by all creative people, whether artist, historian, scientist, or philosopher.

In turn, my own interest in observation has led me to study the ways that other people have observed and reflected on the world around them. I'm particularly interested in what I term the history of natural history. This includes the history of collecting and museums, as well as the history of the scientific book. I am very fortunate to live near a world-class collection of books from the history of science, housed in Memorial Library's Special Collections vaults at the University of Wisconsin–Madison.

My first explorations in Special Collections were to do research on the history of cabinets of curiosities and

early museums. Although I often couldn't read the text because I don't know how to read Italian, French, or German, I could appreciate the illustrations. This led to a fascination with the development of scientific illustration, a fascination that has greatly enriched my own art work.

At first, I was primarily interested in the aesthetic qualities of the illustrations. I am attracted to their visual richness, to the quality of the paper and printing, to the ways that the illustrators often combine a literal depiction of natural phenomena with abstraction. I am also intrigued by the unexpected ways that many of these illustrations mesh beauty with morbidity, or by their odd juxtapositions of text with inscrutable processes.

The illustrations have fueled my interest in learning more about the history of scientific discoveries and thought. They have influenced that way that I look at the world around me: what I notice when I'm walking in the woods, what I collect, and how I develop ideas and metaphors.

The work that I have made for *Martha Glowacki's Natural History, Reflections and Observations* results from my lifetime of direct observation and intuitive experience in nature, enriched by the study of recorded observations made by others.

I am grateful to many people who have helped me to develop this exhibition. I would like to thank Lynn Nyhart, Robin Rider, and Micaela Sullivan-Fowler, who have encouraged my interest in the history of science and facilitated my research work. David Appleyard, Jim Dietz, and Gregory Vershbow have shared their expertise, helping to develop the work in the show. My catalogue essayists, Shira Brisman and Sarah Carter, have generously given their time and shared their analytical skills by writing about my work. Finally, this show would not have been possible without Russell Panczenko's support. I thank him and the Chazen staff who have worked with me to make this show a reality.

Martha Glowacki

Deconstructing Flight: An Homage to Étienne-Jules Marey, (detail), 2017. Photo Eric Tadsen.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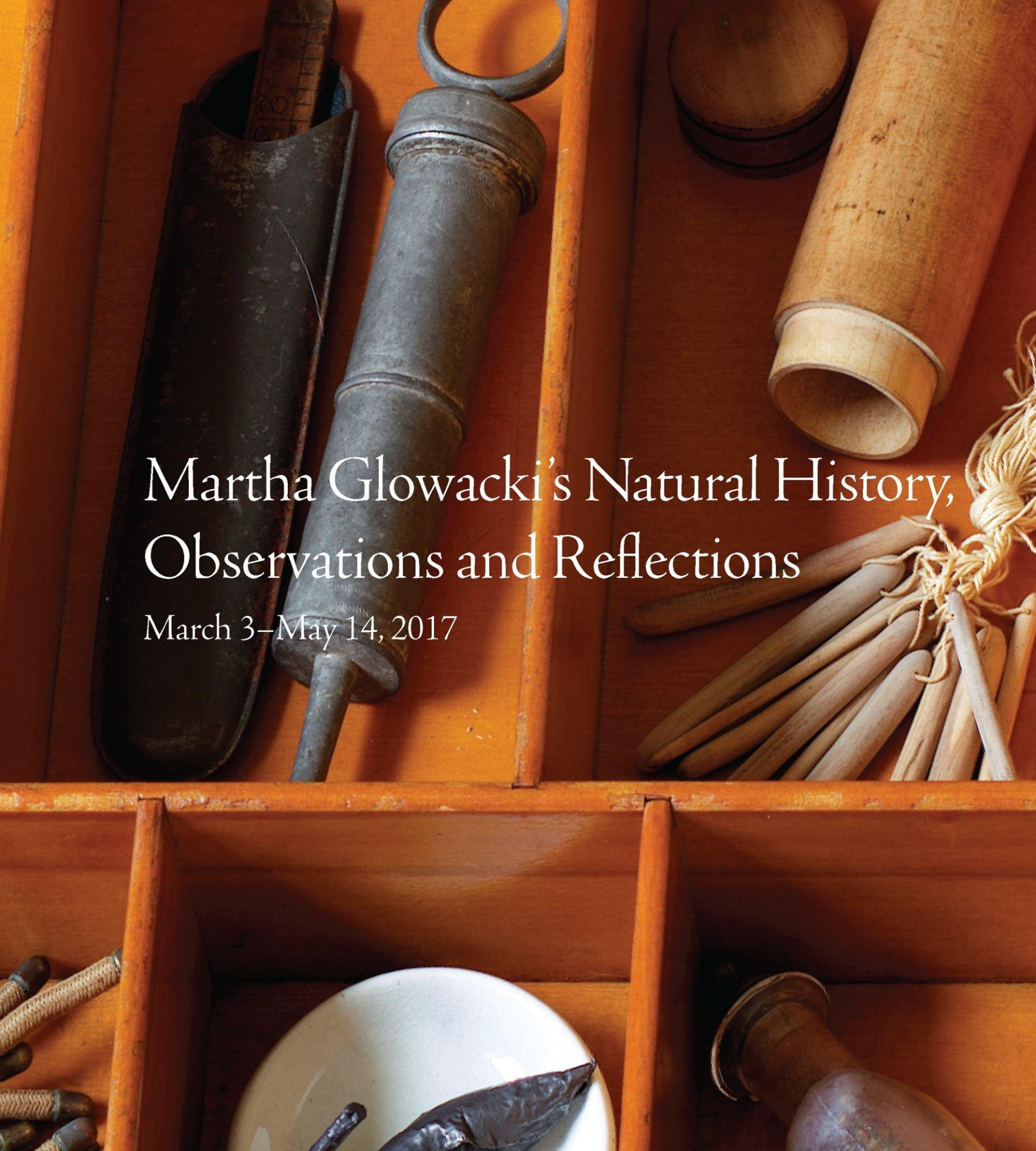
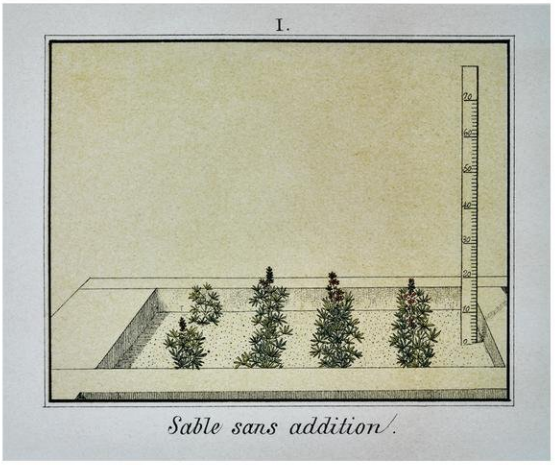
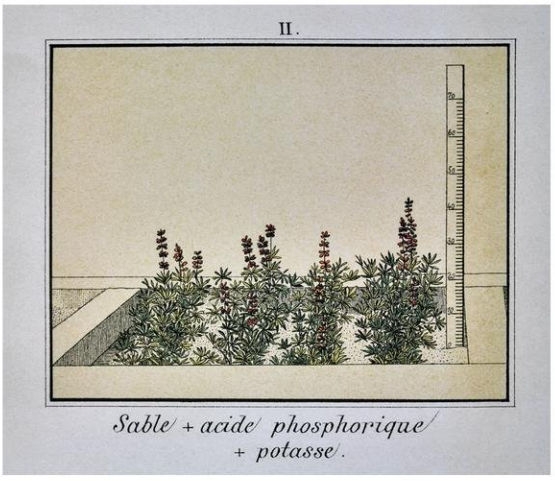


Martha Glowacki's Natural History, Observations and Reflections

March 3–May 14, 2017

Growing Towards the Light, 2015–2016, steel, bronze, cast iron, wood, pigments, inkjet prints, size varies. Photos Mike Rebholz.


I.
Sable sans addition.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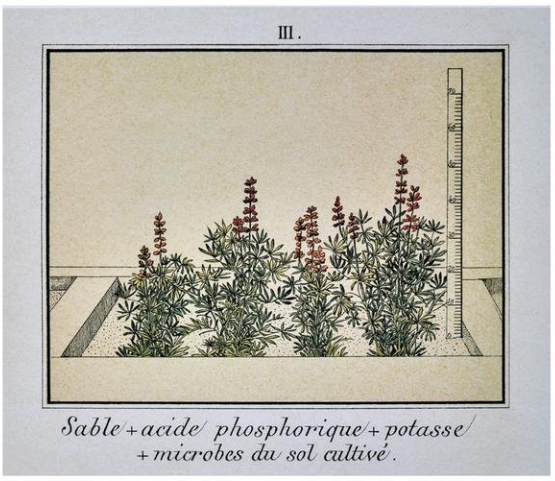

III.
Sable + acide phosphorique + potasse
+ microbes du sol cultivé.

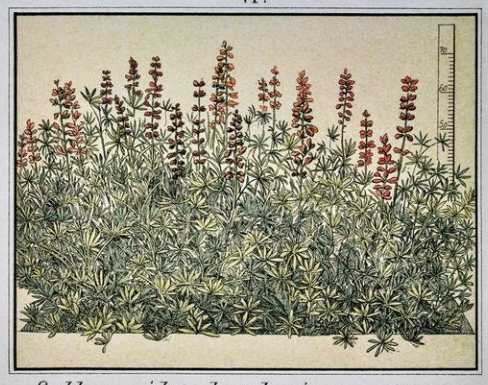
IV

Sable + acide phosphorique + potasse + azote nitrique.

V.

Sable + acide phosphorique + potasse + azote ammoniacal.

VI.



Sable + acide phosphorique + potasse + azote organique.

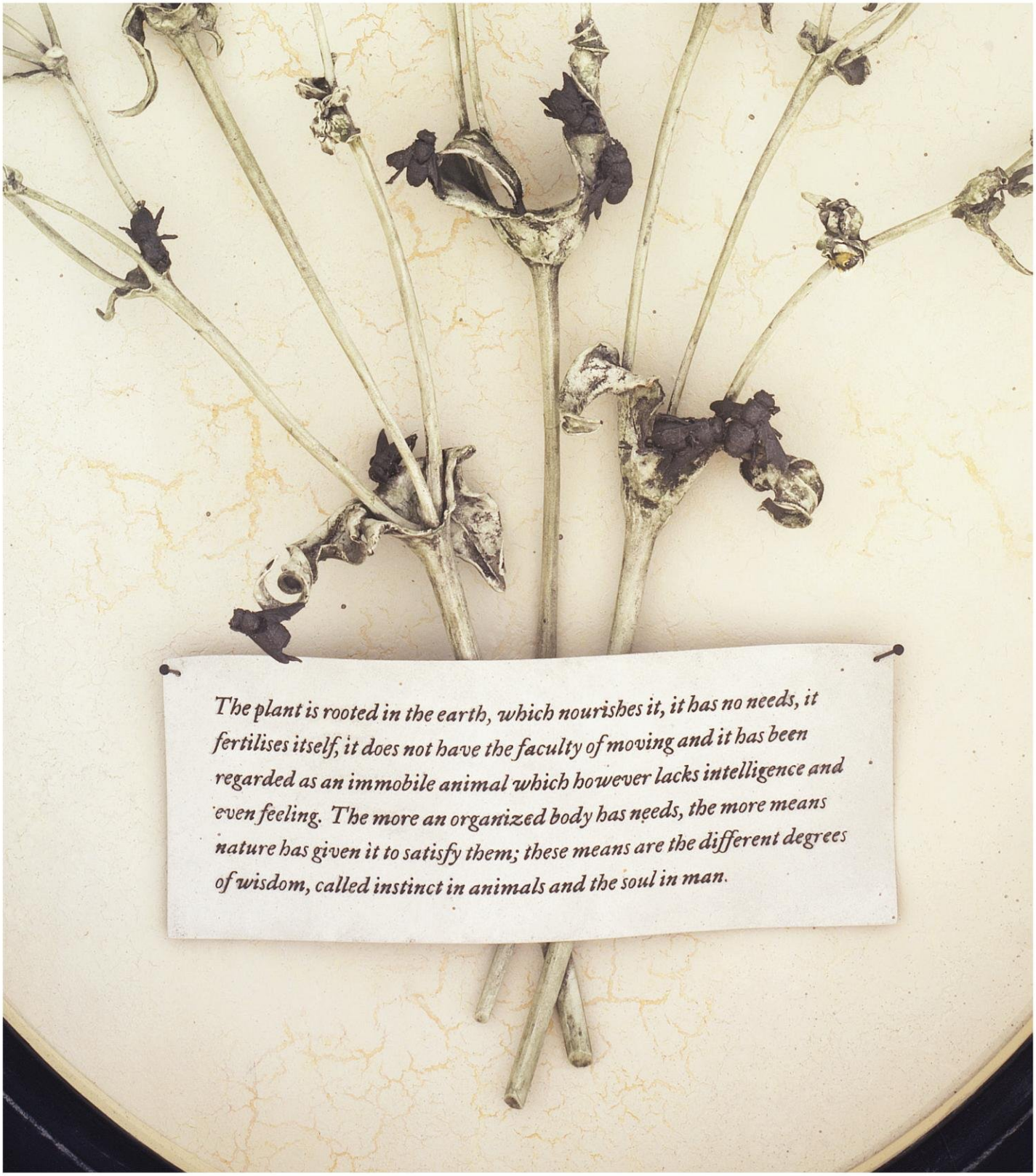
The Psychology of Plants, 2015, wood, cast and fabricated bronze, glass, tintype, pigments, each of three oval sections is 23 x 17 x 3 in., arched rectangle is 18 x 14 x 3 in. Etched text excerpted from *Man a Plant* (1748), Julien Offray de la Mettrie (1709–1751). Photos Mike Rebholz.


What a difference there is between the plants of our species and those which cover the earth's surface! They rival the stars and form the bright patchwork of the meadows, but they experience neither pain nor pleasure. How evenly balanced everything is! They die as they have lived, without feeling it. It would not have been fair for those who live without pleasure to die in pain.


The earth is not only the plants' nurse; it is also in a way their dressmaker. It is not satisfied with suckling them, but also clothes them. With the same juices that nourish them, it can spin garments to cover them. Such is the corolla I have mentioned, which is decorated with the most beautiful colours. The corolla of man, and above all woman, consists in garments and different ornaments, during the daytime, for at night they are flowers almost without any covering.


The plant is rooted in the earth, which nourishes it, it has no needs, it fertilises itself, it does not have the faculty of moving and it has been regarded as an immobile animal which however lacks intelligence and even feeling. The more an organized body has needs, the more means nature has given it to satisfy them; these means are the different degrees of wisdom, called instinct in animals and the soul in man.


Not only do plants have no soul, but in addition, this substance would have been no use to them. As they have none of the necessities of animal life, no sort of anxiety, no cares, no steps to take and no desires, any trace of intelligence would have been as superfluous for them as light for a blind man. In the absence of philosophical truths, this reason, combined with our senses, is evidence against the souls of vegetals.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Collinson's Rapture, 2011–2012, wood, cast and fabricated bronze, inkjet prints, glass, pigments, 23 x 17 x 3 in. each of three parts. Etched text taken from a letter dated August 4, 1763, written by Peter Collinson, a British wool draper and plant collector, to American botanist John Bartram. Photos Eric Ferguson.


my Botanic Genius carried
Me into a Garden
on a flutter my Eyes was
ravished with the Sight
of this flower and my Heart
leaped for Joy——that
I should find it at last
where I expected to find
Nothing——


what art thou talking of
Think Man & Know how
Value so great a Rarity
wait two years
As thou grudgest the Time
& so little Esteems it I
shall be Careful where I
cast my Pearls


my Botanic Genius carried
Mee into a Garden
on a Sudden my Eyes was
ravished with the Sight
of this flower and my Heart
leaped for Joy—that
I should find it at last
where I expected to find
Nothing—

what art thou talking of
wait two years
Think Man & Know how to
Value so great a Rarity

As thou grudgest the Time
& so little Esteems It I
shall be Carefull where I
cast my Pearls another time

For I waited almost all my
lifetime for to get this
Rare flower

I Read of it & Seen It
Figur'd in Books, but
despaired of ever
Possessing it—

my Botanic Genius carried
Mee into a Garden
where I expected to find
Nothing—

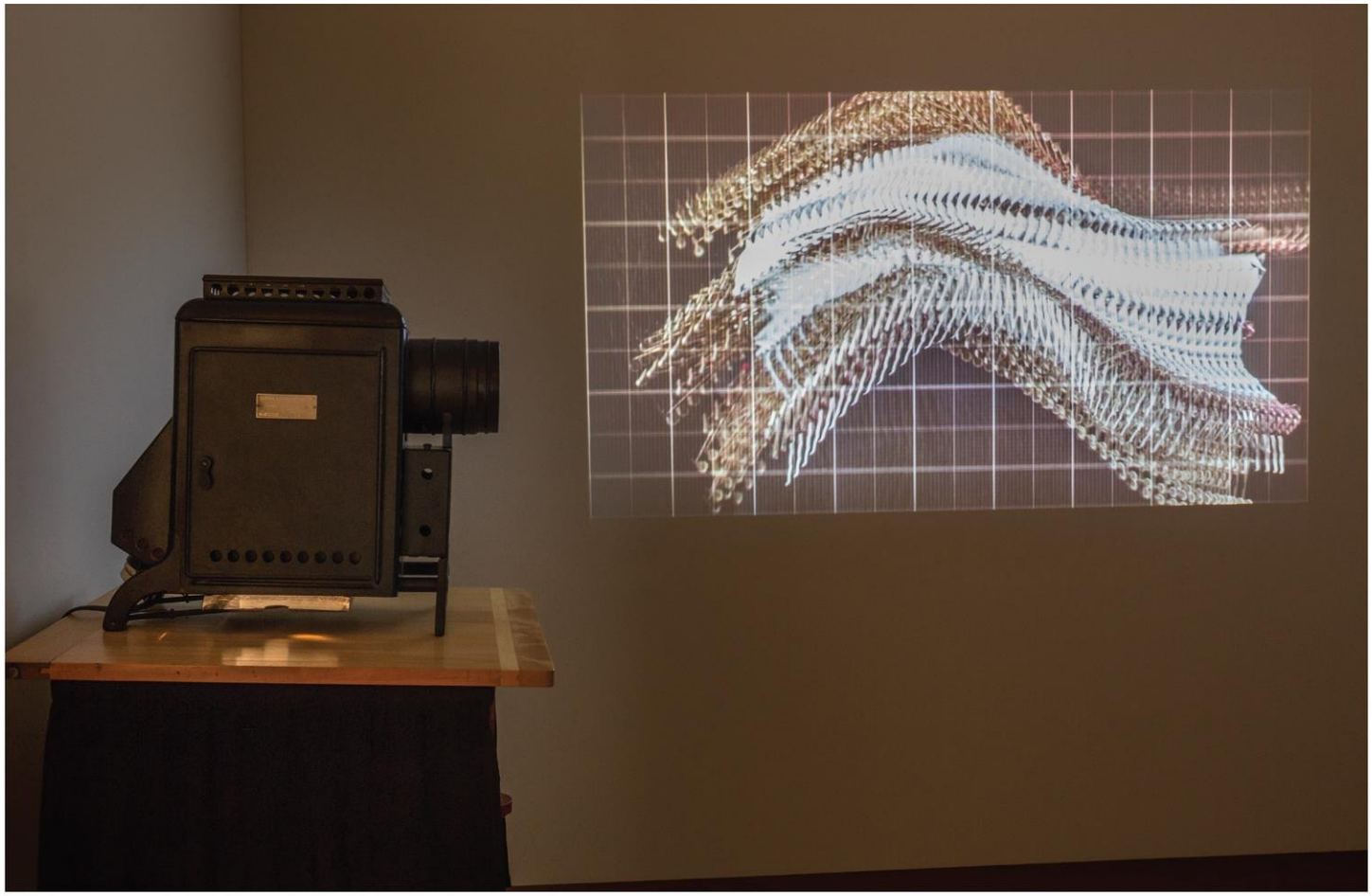
on a Sudden my Eyes was
ravished with the Sight
of this flower and my Heart
leaped for Joy—that
I should find it at last

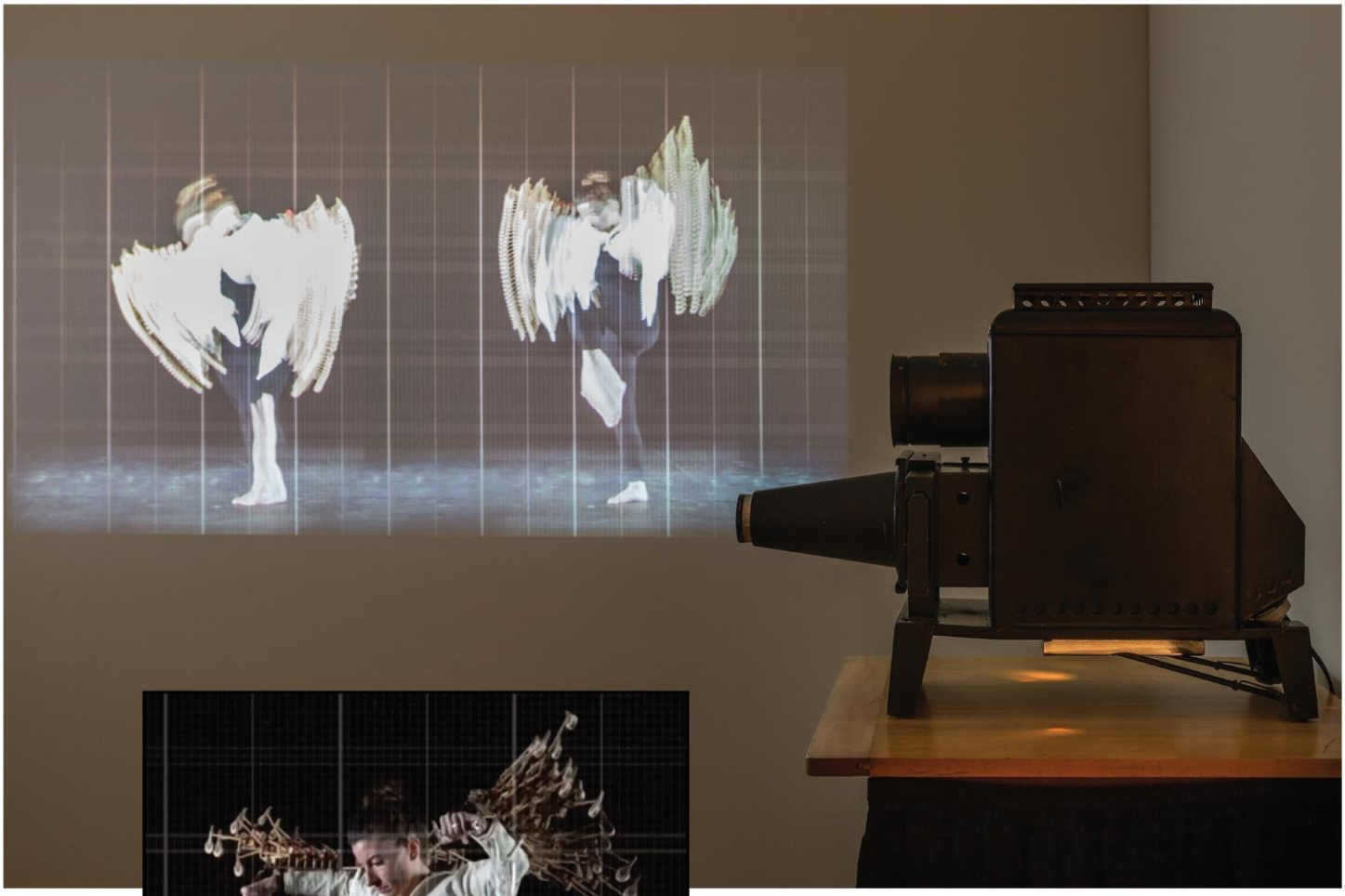
What Every Woman Ought to Know, 2002–2003, altered wood cabinet, mixed media, 78 x 30 x 23 in. Photos Eric Ferguson.


Muscle of crying with hot tears
Muscle of lust
Muscle of irony
Muscle of sadness, of disgust, and complementary to aggressive expression
Muscle of disdain or doubt
Muscle of fear, fright, and torture, and co
Muscle complementary to irony and
Muscle complementary to evident feelin
Muscle complementary to wrath and fu
Muscle complementary to aggressive or
Movement complementary to recollect
Movement complementary to ecstasy
Movement complementary to defianc
Movement complementary to sadnes
Muscle of contempt and complement
Muscle complementary to doubt and
Disdain or Disgust
m. depressor an
plus palpebral pa
orbicularis oculi
Doubt
m. mentalis plus the
fibers of m. orbicularis
Contempt or Scorn
palpebral part of m.
orbicularis oculi plus m.
depressor labii inferioris
Fright
m. frontalis plus m.
platysma
Sad reflection
superior part of m.
orbicularis oculi plus m.
depressor anguli oris
Agreeable reflection
superior part of m.
orbicularis oculi plus m.
zygomaticus major
Ferocious joy
m. process plus m.
zygomaticus major plus m.
depressor labii inferioris
Lasciviousness
m. transversus plus m.
Sensual delirium

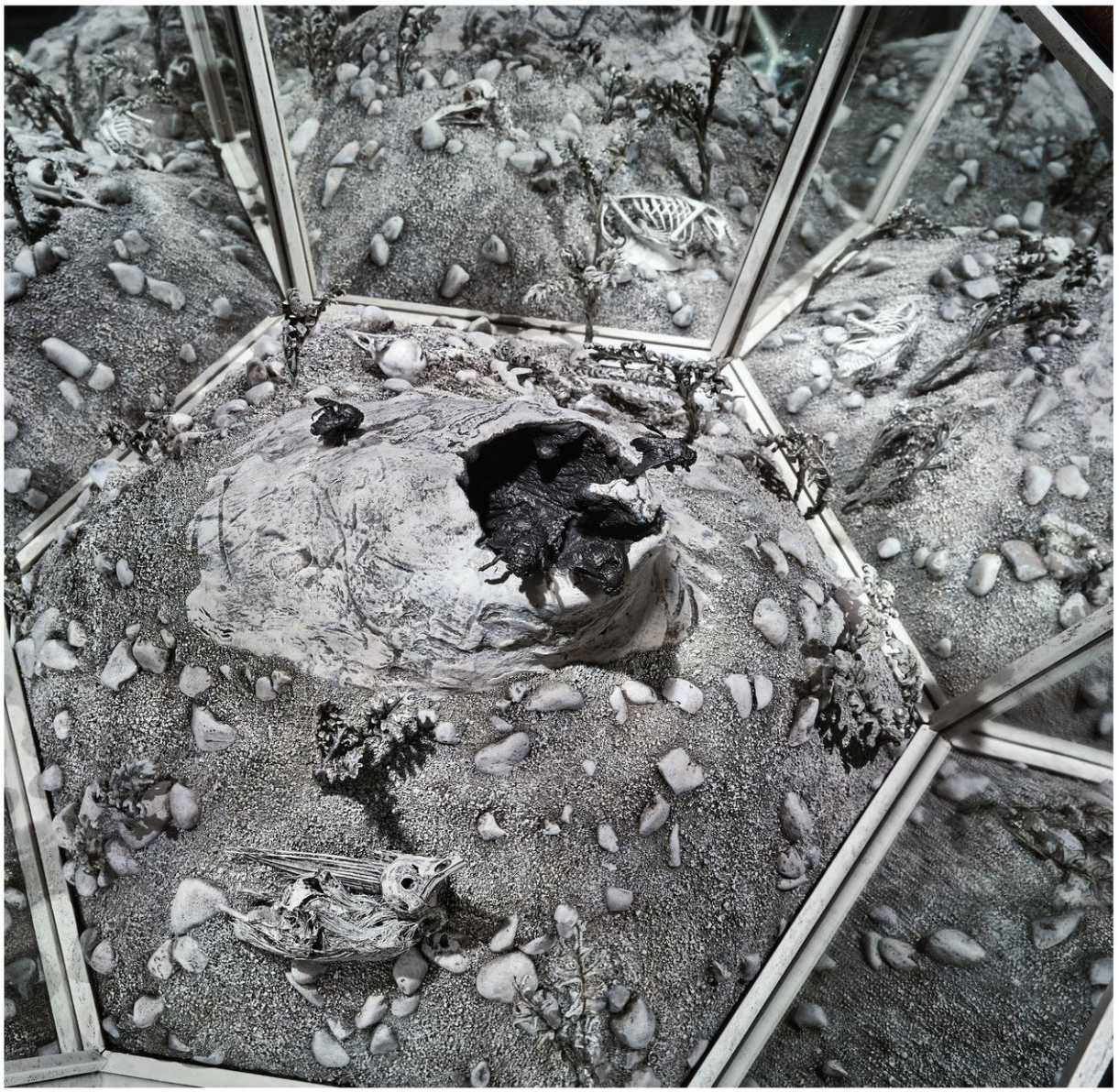
Archetype (left) and *Resurgence* (right)
1996, cast iron, glass, bronze,
wood, pigments, 19 x 19 x 9 1/2 in.,
collection of Paula and David Kraemer.
Photo Mike Rebholz.

Deconstructing Flight: An Homage to Étienne-Jules Marey, 2017, mixed media installation, size varies. Projected images by Gregory Vershbow. Photos Eric Tadsen.

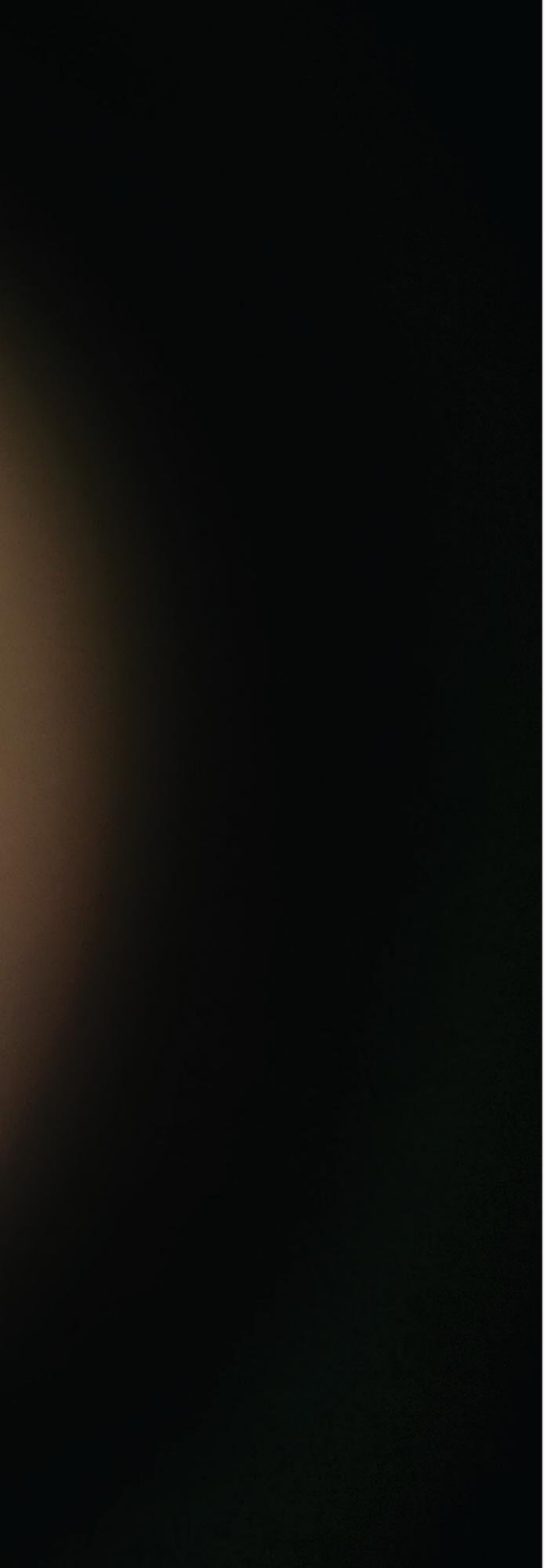




Lacuna (mirror box illusion), 2016, cast iron, bronze, wood, mirrors, marbleized paper, animal bones, pigments, 42 x 24 x 24 in.
Photos Mike Rebholz.



Perspective Box for Wenzel Jamnitzer, 2012, wood, cast iron, bronze, inkjet prints, glass, silk, 64 x 29 x 24 ½ in. Photos Mike Rebholz.



Rational Recreations: The Camera Obscura, 2016, camera: wood, glass, lens, bronze, cast iron stand, hanging object: taxidermied parrot on branch, found wood bird cage, window sash, pigments, size varies. Cabinetry by Jim Dietz; optical design by David Appleyard. Photos Mike Rebholz and Eric Tadsen.

Collecting Natural Philosophy: The Thordarson Collection

In December 1926 the *American magazine*, a glossy monthly produced by the Crowell Publishing Company, profiled Chester Thordarson with an article by Neil M. Clark entitled "The flare of the northern lights started Thordarson on his quest." Readers learned that Thordarson, as "a child in Iceland, ... began asking questions about the aurora borealis—Later, he came to America, where he could no longer see the lights in the sky; but his habit of seeking information remained with him, and made him a world-famous inventor in the electrical field." Thordarson, a largely self-educated inventor and business owner, stood as an example for those who wished to improve themselves: "Lack of schooling is a handicap an earnest man can overcome." Although Thordarson often credited his reading—and his books—in helping him overcome a lack of formal education, Clark's article mentioned only briefly Thordarson's appetite for books: "We were sitting ... in the magnificent library Mr. Thordarson has collected."[1]

But Thordarson was not only surrounded by his books at the time of the interview: his collecting must have been much on his mind. His papers at the Wisconsin Historical Society Archives contain bill after bill from antiquarian book dealers, and autumn 1926 found him especially busy building his collection. In his collecting he enjoyed the advice of J. Christian Bay, then librarian at the John Crerar Library in Chicago, and the services of dealers like Walter M. Hill of Chicago, who often served as intermediary with antiquarian book dealers elsewhere. Thus a statement from Hill dated November 1, 1926, reveals numerous purchases from dealers like Bernard Quaritch and Maggs Bros., both of London. From their wares Thordarson had selected scores of titles, many from the realm of seventeenth- and eighteenth-century natural philosophy. In such volumes Thordarson learned (in the words of Francis Hauksbee, demonstrator or curator of experiments at the Royal Society of London under Sir Isaac Newton's presidency) that "there's no other way of Improving Natural Philosophy, but by Demonstrations and Conclusions founded upon Experiments judiciously and accurately made."[2] Such sentiments resonated with Thordarson's own approach to learning physics, sparked by an elementary textbook he had read as a boy,[3] as he explained to Clark: "An experiment, the book says, is a question that we place before Nature; and she always answers in a most direct way."[4]

Although the Thordarson Collection, now at the heart of the Department of Special Collections in Memorial Library, is perhaps best known for its holdings of illustrated natural history—Edward Donovan's charming fishes and insects, Audubon's magnificent volumes, exotic parrots as illustrated by Edward Lear, the long-running Curtis' *Botanical magazine*—Thordarson's acquisition of works on experimental natural philosophy came naturally to someone fascinated by electricity and experiment. Many such titles found their way to his shelves in the latter months of 1926. From Bernard Quaritch in London came William Gilbert's important Latin treatise on the magnet (1600), an exception to Thordarson's

preference for buying only works in English (or Icelandic). Thordarson also asked Hill to order from Quaritch two slim titles that built, if in polemical fashion, on Gilbert's work: Mark Ridley's *Short treatise of magnetical bodies and motions* (1613) and William Barlow's *Breife* [sic] *discovery of the idle animadversions of Marke Ridley* (1618). Benjamin Wilson's *An essay towards an explication of the phaenomena of electricity, deduced from the aether of Sir Isaac Newton* (1746) also came from Quaritch; Tiberius Cavallo's *An essay on the theory and practice of medical electricity* (1780), ordered by Hill from Robinson, explored electrotherapeutics. L'Art Ancien supplied George Adams' late eighteenth-century *Essay on electricity*, whose readers could also avail themselves of "scientific instruments, made and sold by George Adams."

I have been able to pair our own collection records with bills in the Thordarson archives at the Historical Society and with Maggs Bros. catalogues in Special Collections[5] to track Thordarson's success in adding to his holdings of natural philosophy. These sources show that Thordarson snagged from a two-part Maggs catalogue ninety-one titles on a wide range of topics, including Scandinavian travel, fishing, road technology, increase and preservation of timber, almanacs, and insects, along with books on astrology and astronomy with distinguished provenance and manuscript annotations. The total bill, more than $1,900, also included numerous works on natural philosophy: path-breaking titles as well as textbooks; publications from the early years of the Royal Society, dedicated as it was to "the improving of natural knowledge"; works by eighteenth-century heirs to Newton's legacy; early translations of signal works in other languages; and both popular and research books by professors of natural philosophy in great British universities in the nineteenth century.

Maggs' stock in this area was impressive, and English books from the fifteenth through eighteenth century were right up Thordarson's alley. *Mathematical discourses concerning two new sciences relating to mechanicks and local motion* (1730), as "done into English" nearly a century after it first appeared, brought Galileo's writings to Thordarson's library. The copy of Hooke's *Micrographia*, one of the most expensive books Thordarson acquired from Maggs in 1926, was described as "A Magnificent Copy bound by Dusseuil in full crimson morocco, gilt backs, g. e. ... From the library of Louis Henri, Comte de Loménie, with his Arms in gold on sides" (it sold for $74—those were the days!). Maclaurin's *Account of Sir I. Newton's philosophical discoveries* (1748) complemented the edition of Newton's *Opticks* (1704) that Thordarson acquired, also via Hill in 1926, from the dealer Featherstone.

In the *New experiments physico-mechanical, touching the spring of the air, and its effects* (1662), also acquired from Maggs, Robert Boyle exploited a "new pneumatical engine" (the air pump), "punctually relating what [he] carefully observ'd." George Sinclair's prolix *Natural philosophy improven* [sic] *by new experiments* (1683), likewise from Maggs, extolled the merits of the "mercurial weather-glass" (barometer), hygroscope, and diving bell. Thordarson also acquired from the Maggs catalogue a late eighteenth-century title by self-styled "professor of animal magnetism" John Bell, who showed "how to magnetise and cure different diseases, to produce crises, as well as somnambulism, or sleep-walking ... to make apparatus and other accessaries [sic] to produce magnetical facts: also to magnetise rivers, rooms, trees, and other bodies."

Those titles deemed rare when the University of Wisconsin bought Thordarson's library from his heirs[6] have ended up in Special Collections. Many have since found productive use in teaching and research projects from history of science to literature, from art history to studies of material culture. Thordarson titles with intriguing subjects and striking illustrations will also figure, alongside his natural history books and works

from the Historical Collections of Ebling Health Sciences Library, in an exhibit on view February 6–June 2, 2017, in Special Collections—*Natural History :: Natural Philosophy*—designed to complement *Martha Glowacki's Natural History, Observations and Reflections* at the Chazen Museum of Art (March 3–May 14, 2017) and the Burdick-Vary Symposium "New Illuminations: Art-NATURE-History" organized by Prof. Lynn Nyhart through the Institute for Research in the Humanities (March 3–4, 2017). The checklist that follows identifies the titles on display in Special Collections; we invite you to explore the wealth of our holdings of science and natural history, following Thordarson's lead in asking "questions of nature" both in our exhibit and in our reading room.

Robin E. Rider
Curator of Special Collections
Department of Special Collections, Memorial Library
University of Wisconsin–Madison

Notes

1 Neil M. Clark, "The flare of the northern lights started Thordarson on his quest," *The American magazine* (December 1926), 36–37, 183–190. About Thordarson's book collecting, see, for example, Jens Christian Bay, "Bibliotheca Thordarsoniana," *Papers of the Bibliographical Society of America*, v. 23 (1929), 1–17; and Ralph Hagedorn, "Bibliotheca Thordarsoniana: The sequel," *Papers of the Bibliographical Society of America*, v. 44 (1950), 1–26.

2 Francis Hauksbee, *Physico-mechanical experiments on various subjects* (London: Printed by R. Brugis for the author, 1709), Preface, a[i] recto.

3 A translation (1852) into Icelandic by *his m*aternal uncle Magnús Grímsson of *Elementar-Naturlehre* by Johann Georg Fischer.

4 Clark, "The flare of the northern lights," 184.

5 Catalogues 477 and 481 (1926), entitled *English literature & printing from the 15th to the 18th century*, parts I and II.

6 E.g., Gilbert Doane, "Chester H. Thordarson and his books," *Library news: A staff bulletin*, v. 1, no. 3 (Sept. 1956), 4–5; John Neu, "The acquisition of the Thordarson collection," *U.W. Library news*, v. 11, no. 3 (March 1966), 1–6; Dennis A. Hill, "The Rare Book Department of the University of Wisconsin-Madison: Origins and early developments, 1948–1960," *Transactions of the Wisconsin Academy of Sciences, Arts and Letters*, v. 72 (1984), 40–48, which recounts the circumstances of the University's acquisition of Thordarson's collection.

Natural History :: Natural Philosophy
February 6–June 2, 2017

An exhibit in Special Collections at Memorial Library to complement *Martha Glowacki's Natural History, Observations and Reflections* at the Chazen Museum of Art

Bibliographical details are provided here in considerable detail, although not all volumes for any given title may be on display. The University of Wisconsin–Madison Library Catalog contains more information.

From the holdings of the Department of Special Collections, Memorial Library:

Accademia del cimento (Florence, Italy). *Essayes of natural experiments: Made in the Academie del cimento, under the protection of the most serene Prince Leopold of Tuscany.* Translated by Richard Waller. London: Printed for B. Alsop, 1684.

Accademia del cimento (Florence, Italy). *Saggi di naturali esperienze fatte nell'Accademia del cimento sotto la protezione del serenissimo principe Leopoldo di Toscana.* Second edition. Florence: Nuova stamperia di Gio. Filippo Cecchi, 1691.

Accademia del cimento (Florence, Italy). *Saggi di natvrali* [i.e., *naturali*] *esperienze fatte nell'Accademia del cimento sotto la protezione del serenissimo principe Leopoldo di Toscana.* Naples: Stamperia di B.M. Raillard, 1714.

Adams, George, 1750–1795. *An essay on electricity: Explaining the principles of that useful science, and describing the instruments, contrived either to illustrate the theory, or render the practice entertaining ...* To which is added, a letter to the author, from Mr. John Birch, surgeon, on the subject of medical electricity. The fifth edition, with corrections and additions by William Jones .... London: Printed by J. Dillon, and Co., for, and sold by W. and S. Jones ..., 1799.

Adams, George, 1750–1795. *An essay on electricity: In which the theory and practice of that useful science, are illustrated by a variety of experiments, arranged in a methodical manner. To which is added, An essay on magnetism.* London: Printed for and sold by the author, at Tycho Brahe's Head ..., 1784.

Audubon, John James, 1785–1851. *The birds of America; from original drawings.* Four volumes. London: Pub. by the author, 1827–1838.

Barlow, William. *A breife discovery of the idle animadversions of Marke Ridley, doctor in phisicke upon a treatise entituled, Magnetical advertisements.* London: Printed by Edward Griffin for Timothy Barlow ..., 1618.

Barlow, William. *Magneticall advertisements, or, Divers pertinent observations, and approved experiments concerning the nature and properties of the load-stone: Very pleasant for knowledge, and most needfull for practise, of travelling, or framing of instruments fit for travellers both by sea and land.* London: Printed by Edward Griffin for Timothy Barlow ..., 1616.

Bell, John, professor of animal magnetism. *The general and particular principles of animal electricity and magnetism, &c.: In which are found Dr. Bell's secrets and practice, as delivered to his pupils in Paris ... &c. &c.: Shewing* [sic] *how to magnetise and cure different diseases, to produce crises, as well as somnambulism, or sleep-walking ... to make apparatus and other accessaris to produce magnetical facts: also to magnetise rivers, rooms, trees, and other bodies ....* [London]: Printed for the author, 1792.

Blackwell, Elizabeth, active 1737. *A curious herbal: Containing five hundred cuts, of the most useful plants, which are now used in the practice of physick, engraved on folio copper plates, after drawings, taken from the life.* Two volumes. London: Printed for J. Nourse, 1739.

Bonnet, Charles, 1720–1793. *Recherches sur l'usage des feuilles dans les plantes: Ct sur quelques autres sujets relatifs à l'histoire de la vegetation.* Göttingen, Leiden: E. Luzac, fils, 1754.

Boyle, Robert, 1627–1691. *New experiments physico-mechanical, touching the spring of the air, and its effects* .... Oxford: Printed by H. Hall ... for Tho. Robinson, 1662. Parts two and three have separate title pages with different imprint: London: Printed by J.G. for Thomas Robinson, Bookseller in Oxon, 1662.

Brodie, William. Professor [John] Playfair's lectures on natural philosophy. Manuscript lecture notes. Edinburgh, Scotland, 1818–1819.

Buffon, Georges Louis Leclerc, comte de, 1707–1788. *Histoire naturelle, generale, et particuliere, avec la description du Cabinet du roy* .... In six series, some by other authors. Paris: Imprimerie royale [etc.], 1749–1804.

Catesby, Mark, 1683–1749. *The natural history of Carolina, Florida, and the Bahama Islands: Containing the figures of birds, beasts, fishes, serpents, insects, and plants* .... Revised by Mr. Edwards. Two volumes. London: Printed for Charles Marsh ... Thomas Wilcox ... and Benjamin Stichall ..., 1754.

Cavallo, Tiberius, 1749–1809. *The elements of natural or experimental philosophy.* Four volumes. London: T. Cadell and W. Davies, 1803.

Desaguliers, John Theophilus, 1683–1744. *A course of experimental philosophy.* Two volumes. London: Printed for John Senex ..., W. Innys and Richard Manby, ... and John Osborn and Thomas Longman, 1734–1744.

Desaguliers, John Theophilus, 1683–1744. *De natuurkunde uit ondervindingen opgemaakt.* Two volumes. Amsterdam: By Isaak Tirion, 1751.

Donovan, Edward, 1768–1837. *The natural history of British fishes: Including scientific and general descriptions of the most interesting species, and an extensive selection of accurately finished coloured plates, taken entirely from original drawings, purposely made from the specimens in a recent state, and for the most part whilst living.* Five volumes in three. London: Printed for the author, and for F. and C. Rivington ... [and others], 1802–1808.

Donovan, Edward, 1768–1837. *The natural history of British insects: explaining them in their several states, with the periods of their transformations, their food, oeconomy, &c.: Together with the history of such minute insects as require investigation by the microscope* ... Sixteen volumes. London: Printed for the author, and for F. and C. Rivington ..., 1792–1813.

[Du Châtelet, Gabrielle Emilie Le Tonnelier de Breteuil, marquise.] *Institutions de physique.* Paris: Chez Prault fils, 1740.

Du Pinet, Antoine, active 16th century. *L'histoire des animaux à quatre pieds: Recueillie de Gesnerus & autre bons & approuvez autheurs.* Paris: Chez Guillaume Macé ..., 1619.

Faraday, Michael, 1791–1867. *Experimental researches in electricity.* Three volumes. London: R. and J. E. Taylor, 1839–1855.

Ferguson, James, 1710–1776. *An introduction to electricity* .... Third ed. London: Printed for W. Strahan and T. Cadell in the Strand, 1778.

Ferguson, James, 1710–1776. *Lectures on select subjects in mechanics, hydrostatics, hydraulics, pneumatics, optics, geography, astronomy, and dialling.* Third edition. With notes, and an additional volume, containing the most recent discoveries in the arts and sciences, by David Brewster. Edinburgh: Stirling & Slade, and Bell & Bradfute ..., 1823.

Fischer, J. G. *Elementar-Naturlehre.* Translated into Icelandic by Magnús Grímsson. Copenhagen: S.L. Möller, 1852.

Flaugergues, Pierre-Gilles-Antoine-Honoré, 1755–1830. Memoire sur le rapport du thermometre [sic] d'esprit de vin de M. de Reaumur avec le thermometre octogesimal au mercure. [1820.] Manuscript.

Hauksbee, Francis, 1666–1713. *Physico-mechanical experiments on various subjects.* London: Printed by R. Brugis for the author, 1709.

Franklin, Benjamin, 1706–1790. *Experiments and observations on electricity: Made at Philadelphia in America.* Fifth edition. London: Printed for F. Newbery ..., 1774.

Galilei, Galileo, 1564–1642. *Mathematical discourses concerning two new sciences relating to mechanicks and local motion, in four dialogues* .... Translated by Thomas Weston. London: Printed for J. Hooke ..., 1730.

Gilbert, William, 1544–1603. *De magnete: Magneticisque corporibus, et de magno magnete tellure: physiologia noua, plurimis & argumentis, & experimentis demonstrata.* London: Excudebat Petrus Short, 1600.

Gravesande, Willem Jacob 's, 1688–1742. *Mathematical elements of natural philosophy confirm'd by experiments, or, An introduction to Sir Isaac Newton's philosophy.* Second edition, "carefully review'd and corrected by the translator" [J. T. Desaguliers]. 2 volumes. London: Printed for J. Senex and W. Taylor, 1721–1726.

Gravesande, Willem Jacob 's, 1688–1742. *Mathematical elements of natural philosophy, confirm'd by experiments; or, An introduction to Sir Isaac Newton's philosophy.* Fourth edition. Translated into English by J. T. Desaguliers. Two volumes. London: Printed for J. Senex, W. Innys, and J. Osborn and T. Longman, 1731.

Guericke, Otto von, 1602–1686. *Experimenta nova (ut vocantur) magdeburgica de vacuo spatio* ... Amsterdam: Apud J. Janssonium à Waesberge, 1672.

Guillemin, Amédée, 1826–1893. *The applications of physical forces.* Translated by Mrs. Norman Lockyer, and edited with additions and notes by J. Norman Lockyer. Guillemin. London: Macmillan and Co., 1877.

Hales, Stephen, 1677–1761. *Vegetable staticks, or, An account of some statical experiments on the sap in vegetables: being an essay towards a natural history of vegetation: also, a specimen of an attempt to analyse the air, by a great variety of chymio-statical experiments, which were read at several meetings before the Royal Society.* Two volumes. London: Printed for W. and J. Innys ... and T. Woodward ..., 1727-1733.

Hales, Stephen, 1677–1761. *La statique des vegetaux, et l'analyse de l'air: Experiences nouvelles lûes à la Societé Royale de Londres.* Translated by Buffon. Paris: Chez Debure l'aîné, 1735.

Herschel, John Frederick William, 1792–1871. *Preliminary discourse on the study of natural philosophy.* New edition. London: Printed for Longman, Brown, Green & Longmans, 1851.

Hill, John, 1714?–1775. *The sleep of plants, and cause of motion in the sensitive plant, explain'd: In a letter to C. Linnaeus, Professor of Botany at Upsal* [sic]. London: Printed for R. Baldwin ..., 1757.

Hooke, Robert, 1635–1703. *Micrographia, or, Some physiological descriptions of minute bodies made by magnifying glasses: With observations and inquiries thereupon.* London: Printed for John Martyn ..., 1667.

Hooker, Sir William Jackson, 1785–1865. *Exotic flora: Containing figures and descriptions of new, rare or otherwise interesting exotic plants, especially of such as are deserving of being cultivated in our gardens: Together with remarks upon their generic and specific characters, natural orders, history, culture, time of flowering, &c.* Three volumes. Edinburgh; London: Printed for W. Blackwood and T. Cadell, 1823–1827.

Hooper, William, M.D. *Rational recreations: In which the principles of numbers and natural philosophy are clearly and copiously elucidated, by a series of easy, entertaining, interesting experiments* ... Four vols. London: Printed for L. Davis ... [and others], 1774.

Ingenhousz, Jan, 1730–1799. *Experiments upon vegetables, discovering their great power of purifying the common air in the sun-shine, and of injuring it in the shade and at night. To which is joined, a new method of examining the accurate degree of salubrity of the atmosphere.* London: Printed for P. Elmsly and H. Payne, 1779.

Jacquin, Nikolaus Joseph, Freiherr von, 1727–1817. *Icones plantarum rariorum.* Three volumes. Vienna: Prostant apud Christianum Fridericum Wappler [etc.], 1781–1793 [i.e., 1781–1795].

Jonstonus, Joannes, 1603–1675. *I. Jonstons Naeukeurige beschryving van de natuur der viervoetige dieren, vissen en bloedlooze water-dieren, vogelen, kronkel-dieren, slangen en draken.* Translated by M. Grausius. [Amsterdam: I.I. Schipper], 1660.

Lear, Edward, 1812–1888. *Illustrations of the family of Psittacidae, or parrots: The greater part of them species hitherto unfigured: Containing forty-two lithographic plates, drawn from life, and on stone.* London: Published by E. Lear, 1832.

Ledermüller, Martin Frobenius, 1719–1769. *Amusement microscopique: Tant pour l'esprit, que pour les yeux* .... Three volumes. Nuremberg: Se grave et se vend chés [sic] A.W. Winterschmidt; imprimé chés De Lanoy, 1764–1768.

Linné [Linnaeus], Carl von, 1707–1778. *Flora Lapponica* .... *Additis synonymis, & locis natalibus omnium, descriptionibus & figuris rariorum, virbus medicatis & oeconomicis plurimarum.* Amsterdam: Apud Salomonem Schouten, 1737.

Lister, Martin, 1638?–1712. *Historiae sive synopsis methodicae conchyliorum et tabularum anatomicarum editio altera.* Oxford: E typographeo Clarendoniano, 1770.

MacLaurin, Colin, 1698–1746. *An account of Sir Isaac Newton's philosophical discoveries: In four books.* London: Printed for the author's children, and sold by A. Millar ... [and 6 others], 1748.

Marcet, Mrs. Jane, 1769–1858. *Conversations on vegetable physiology: Comprehending the elements of botany with their application to agriculture.* Boston, New York: Published by Crocker & Brewster ...; J. Leavitt ..., 1830.

Martin, Benjamin, 1705–1782. *The philosophical grammar: Being a view of the present state of experimented* [sic] *physiology, or natural philosophy* .... Fourth edition, with alterations, corrections and very large additions by way of notes. London: Printed for John Noon ..., 1753.

Martin, Benjamin, 1705–1782. *An essay on electricity: Being an enquiry into the nature, cause and properties thereof, on the principles of Sir Isaac Newton's theory of vibrating motion, light and fire, and the various phænomena of fourty-two capital experiments: With some observations relative to the uses that may be made of this wonderful power of nature.* Bath: Printed for the author ... [and others], 1746. Bound with other related titles, including Martin's *A supplement, containing remarks on a rhapsody of adventures of a modern knight-errant in philosophy.*

Merian, Maria Sibylla, 1647–1717. *Der Raupen wunderbare Verwandelung und sonderbare Blumen-Nahrung* .... Two volumes in one. Nuremberg: Johann Andreas Graffen [etc.], 1679–1683.

Musschenbroek, Petrus van, 1692–1761. *Essai de physique.* Trans. Pierre Massuet. Two volumes. Leiden: Chez Samuel Luchtmans, 1739.

Musschenbroek, Petrus van, 1692–1761. *The elements of natural philosophy: Chiefly intended for the use of students in universities.* Two volumes. London: Printed for J. Nourse, 1744.

Newton, Isaac, 1642–1727. *Opticks, or, A treatise of the reflexions, refractions, inflexions and colours of light; Also two treatises of the species and magnitude of curvilinear figures.* London: Printed for Sam. Smith, and Benj. Walford, printers to the Royal Society ..., 1704.

Newton, Isaac, 1642–1727. *Philosophiae naturalis principia mathematica.* London: Jussu Societatis Regiae ac Typis Josephi Streater; prostat apud plures bibliopolas, 1687.

Nollet, abbé Jean Antoine, 1700–1770. *L'art des expériences, ou, Avis aux amateurs de la physique: sur le choix, la construction et l'usage des instruments: Sur la préparation et l'emploi des drogues qui servent aux expériences.* Three volumes. Paris: Chez P. E. G. Durand ..., 1770.

Ocean flowers and their teachings. By the author of "Wild flowers and their teachings." Bath: Binns & Goodwin, 1846.

Philosophical transactions, giving some account of the present undertakings, studies, and labours of the ingenious, in many considerable parts of the world. London: C. Davis, Printer to the Royal Society of London, 1665–1775. Succeeded by *Philosophical transactions of the Royal Society of London.*

Ridley, Mark. *A short treatise of magneticall bodies and motions.* London: Printed by Nicholas Okes, 1613.

Saussure, Théodore de, 1767–1845. *Recherches chimiques sur la végétation.* Paris: Chez la Ve. Nyon, 1804.

Sigaud de La Fond, Joseph Aignan, 1730–1810. *Description et usage d'un cabinet de physique expérimentale.* Two volumes. Paris: Chez P. Fr. Gueffier ... et chez l'auteur ..., 1775.

Sinclair, George, d. 1696. *Natural philosophy improven* [sic] *by new experiments* ... [Edinburgh]: To be sold by Gideon Schaw bookseller ..., 1683.

Smith, James Edward, 1759–1828. *Exotic botany: Consisting of coloured figures, and scientific descriptions, of such new, beautiful, or rare plants as are worthy of cultivation in the gardens of Britain; with remarks on their qualities, history, and requisite modes of treatment.* The figures by James Sowerby. Two volumes. London: Printed by R. Taylor and Co., 1804–1805.

Sowerby, James (1757–1822). *English botany, or, Coloured figures of British plants, with their essential characters, synonyms, and places of growth: To which will be added, occasional remarks.* Thirty-six volumes. London: Printed for the author, by J. Davis, 1790–1814.

Spallanzani, Lazzaro, 1729–1799. *Fisica animale e vegetabile.* Three volumes. Venice: Presso Giammaria Bassaglia, 1782.

The botanical magazine, or, Flower-garden displayed: In which the most ornamental foreign plants, cultivated in the open ground, the green-house, and the stove, are accurately represented in their natural colours .... London: Printed for W. Curtis, at his botanic-garden ... and sold by all booksellers ..., beginning with volume 1 (1787).

Thornton, Robert John, 1768?–1837. *Temple of Flora, or, Garden of the botanist, poet, painter, and philosopher.* [London: Dr. Thornton, 1812.]

Trembley, Abraham, 1710-1784. *Mémoires pour servir à l'histoire d'un genre de polypes d'eau douce* .... Leiden: Chez Jean & Herman Verbeek, 1744.

Vredeman de Vries, Hans, 1527–ca. 1604. *La perspective. Contenant la theorie, practique, et instruction fondamentale, illustrée de plusieurs belles ordonnances d'architecture, comme de temples, palais, galeries, iardins, marchez, à l'antique et moderne, clairement expliquées pour tous architectes, ingenieurs et amateurs* par Jean Vredeman Frison et augmentee. Amsterdam: Chez Jan Jansson, 1629 [date altered to 1652].

Ward, Thomas, active 1688–1735. *The bird-fancier's recreation: Being curious remarks on the nature of song-birds, with choice instructions concerning the taking, feeding, breeding and teaching them, and to know the cock from the hen: Also the manner of taking birds with lime-twigs, and the preparations necessary thereto: With an account of the distempers incident to song-birds, and the method to cure them.* London: Printed for T. Ward, and sold at his house at the Bell and Bird-Cage, 1728.

Wilson, Benjamin, 1721–1788. *An essay towards an explication of the phaenomena of electricity, deduced from the aether of Sir Isaac Newton: Contained in three papers which were read before the Royal-Society.* Dublin: Printed for George and Alexander Ewing ... and William Smith ..., 1747.

From the Historical Collections of Ebling Health Sciences Library:

Camper, Petrus, 1722–1789. *The works of the late Professor Camper, on the connexion between the science of anatomy and the arts of drawing, painting, statuary* .... London: Printed for C. Dilly, 1794.

Cheselden, William, 1688–1752. *Osteographia, or the anatomy of the bones.* In fifty-six plates. London: [Publisher not identified], 1733.

Lavater, Johann Caspar, 1741–1801. *Essays on physiognomy, designed to promote the knowledge and the love of mankind.* Illustrations executed by, or under the inspection of, Thomas Holloway. Translated by Henry Hunter. Three volumes in five. London: J. Murray [etc.], 1789–1798.

Marey, Étienne-Jules, 1830–1904. *La machine animale. Locomotion terrestre et aérienne.* Third edition. Bibliothèque scientifique internationale. Paris: Baillière, 1882.

Ruysch, Frederik, 1638–1731. *Opera omnia anatomico-medico-chirurgica, huc usque edita, quorum elenchus pagina sequenti exhibetur.* Four volumes. Amsterdam: Apud Janssonio-Waesbergios, 1721–1727.

Exhibit co-curated by Robin E. Rider and Micaela Sullivan-Fowler.

Back: *Archetype,* 1996.
Photo Mike Rebholz.

Chazen Museum of Art