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Wax, Wings, and Swarms: Insects and Their Products as Art Media

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Abstract

Every facet of human culture is in some way affected by our abundant, diverse insect neighbors. Our relationship with insects has been on display throughout the history of art, sometimes explicitly but frequently in inconspicuous ways. This is because artists can depict insects overtly, but they can also allude to insects conceptually or use insect products in a purely utilitarian manner. Insects themselves can serve as art media, and artists have explored or exploited insects for their products (silk, wax, honey, propolis, carmine, shellac, nest material), body parts (e.g., wings), and whole bodies (dead, alive, individually, or as collectives). This review surveys insects and their products used as media in the visual arts and considers the untapped potential for artistic exploration of media derived from insects. The history, value, and ethics of insect media art are relevant topics at a time when the natural world is at unprecedented risk.

INTRODUCTION

The Value of Studying Cultural Entomology and Insect Art

Cultural entomology: study of insects' influence on the arts and humanities; activities that "humans practice for the nourishment of the mind and soul" (41, p. 33)

Shellac: processed from lac bug resin; not to be confused with lacquer or true lacquer, most of which is of plant origin

Encaustic: art of painting with heated, pigmented wax (traditionally beeswax)

Carmine: coloring made from cochineal or kermes bugs that has been purified and prepared (boiled, insoluble matter removed, etc.)

Dye: water-soluble, liquid coloring agent

Ethnoentomology: studies of insect–human interactions in so-called traditional societies; not synonymous with cultural entomology, according to Hogue (42), because it includes survival practices

No review of human culture would be complete without art, and no review of art would be complete without the inclusion of insects. Cultural entomology, a field of study formalized in 1980 (41) and ambitiously reviewed 35 years ago by Charles Hogue (42), clearly illustrates that artists have an inordinate fondness for insects. Insects are too numerous, diverse, pervasive, colorful, and marvelous to be ignored by artists. From the engraving of a cricket on the bone of a now-extinct bison (6) to a cockroach controlling a robot (79), artists have explored or exploited our six-legged neighbors as symbols, as metaphors, as literal subjects, or for their bodies or bodily products in works of art throughout history and across cultures. So extensive is the influence of insects on art that art history could be studied through the lens of insect art, whether it be art since antiquity (8, 52, 60), contemporary art (4, 22, 34–36, 53, 87, 107), art with a regional focus (23, 26, 74, 94, 110), from a taxonomic point of view (67), in light of environmentalism (55), or with respect to the artist (57–59, 111). I define insect art as art that uses insects, depicts insects, or conceptually pertains to insects (**Figure 1*a–e***). A narrower definition of insect art might exclude incidental uses of insect media, in which an artist does not clearly use a medium for reasons that explicitly or conceptually relate to insects (e.g., shellac coating a plaster sculpture, beeswax in an encaustic painting, or carmine used to dye a textile; **Figure 1*e***).

Since Hogue's landmark review, the *Annual Review of Entomology* has published articles on several topics that Hogue would identify as relevant to cultural entomology (24, 56, 63), but few reviews of cultural entomology, ethnoentomology, or entomology's connections or relevance to the arts have been published anywhere since. We consciously or unwittingly forge connections with insects in every aspect of our existence, and reporting how insects affect human culture could have important implications for peoples' appreciation of insects, for invertebrate conservation, and for diversifying who practices the science of entomology. Cultural entomology could promote entomology as a broader discipline relevant to anthropology, archeology, politics, economics, religion, language, dance, music, and the arts in all of its forms. The study of insect art can promote our understanding of our history and our relationship with nature. Moreover, the connections that we make with insects, artistically and otherwise, could help reduce our destructive tendencies to the natural world and, consequently, to ourselves (55). Insects have had a far-reaching influence on the history of art, and, although the practice of including actual insects or their products in art is widespread, it has largely been overlooked or ignored.

Aim of This Review

My objective in this review is not to offer a comprehensive overview of insect art. It is not about depicting insects—abstractly, fantastically, whimsically, or realistically. This review is about exploring the diversity and potential of insects as art media. I borrow and redefine a term, "insect media art" (79, pp. 198–99), to refer to insect products, bodily parts, or entire bodies used as art media (**Figure 1*a*,*c*,*e***) and devote most of this review to insect media art that is explicitly or conceptually relevant to insects (**Figure 1*a*,*c***). Due to space constraints, I restrict my survey to insect media used in the visual arts. I only briefly mention arachnids (51), and I do not discuss media theory. The history of film and photography is crawling with insects, but I include only examples where this medium is the remaining evidence of an art project featuring insect media.

ART MEDIA

All art changes with time, and a work's vibrancy and longevity depend on its physical constitution and interaction with the environment. Like all art media, insect media can be ephemeral, transient,

volatile, or unpredictable, like the fading cochineal in paintings by Van Gogh (30, 66) and Renoir (16), or can outlast us all, as with the structural colors of iridescent beetle elytra. To understand the technical aspects of a work of art is to better appreciate its history and to know how to care for it (33). The value of using insects or their products as art media can depend as much on the utilitarian nature of the materials as it does on the conceptual intentions of the artist.

Cochineal: pigment made from raw, dried, pulverized cochineal bugs

TRACES

Let us begin with an impression. Adam Cohen and Ben Labay practice gyotaku, the traditional Japanese method of inking and pressing fish against paper, and extend the practice to insects (*Inked*

(*Caption appears on following page*)

Figure 1 (*Figure appears on preceding page*)

Examples within the visual arts of works that do or do not depict insects, explicitly or conceptually, and do or do not include insect media (insect product, body part, or whole body). Insect art can be defined broadly (*a–e*; *black border*) or narrowly (*a–d*; *brown border*). This review focuses on any visual art using insect media (*a*, *c*, *e*; *red border*). (*a*) *Helmet in dragonfly shape* (seventeenth-century Japan) explicitly depicts an insect and is composed partly of silk. (*b*) *Stag Beetle* (Albrecht Dürer, 1505, watercolor and gouache) depicts an insect, but was not made using an insect medium. (*c*) *Of Insects and Men #3* (Marlène Huissoud, 2016) was made with insects in mind and with honey bee propolis. (*d*) *Emperor Justinian Receiving the First Imported Silkworm Eggs from Nestorian Monks* (Karel van Mallery, ca. 1595) is conceptually relevant to insects but includes no insect medium. (*e*) *Festival Banner Showing Krishna Rescuing and Marrying Rukmini* (detail of 800-cm-long banner, ca. 1800, India) lacks any explicit or conceptual depiction of an insect, but was embroidered with silk and dyed red with carmine and lac. (*f*) *Winged Victory of Samothrace* (ca. 200–190 BCE, marble) neither depicts an insect subject nor was made with insect media. Images courtesy of (*a*) Minneapolis Institute of Art (open access), (*b*) J. Paul Getty Museum's Open Content Program, (*c*) the artist, (*d*, *e*) Metropolitan Museum of Art's Open Access program, and (*f*) Lyokoï88, CC BY-SA 4.0, via Wikimedia Commons; Musée du Louvre (image cropped).

Animal). Although these impressions and the following examples lack significant remnants of insects or their products (i.e., they are technically not insect media art), *Inked Animal* uses insect bodies to create art, just as the examples discussed below depend on insect behaviors.

Ink: solution containing a coloring agent (e.g., dye or pigment) used for drawing, writing, or printing

Insects flit, scramble, and maneuver in telltale ways, and some artists have intentionally immortalized these paths for posterity. The Ngali tribe of Central Australia has a grasshopper totem and once decorated a churinga (sacred object) with symbolic grasshopper paths and tracks (96). Artists have followed ants with pencil (Katharina Meldner; 72), with red oil pencil (Yukinori Yanagi; **Figure 2*a***), and digitally (Edhv's 2D and 3D design pieces) and recorded a moth's attraction to light by rapid-prototyping the flight path (Geoffrey Mann, *Attracted to Light from the Long Exposure series*, 2005). Artists also record tracks by manipulating insects as living brushes by painting portions of their bodies and orchestrating their perambulations across a canvas (Steven Kutcher, insect footprint art; **Figure 2*b***) or by allowing insects to move through paint (Rebecca

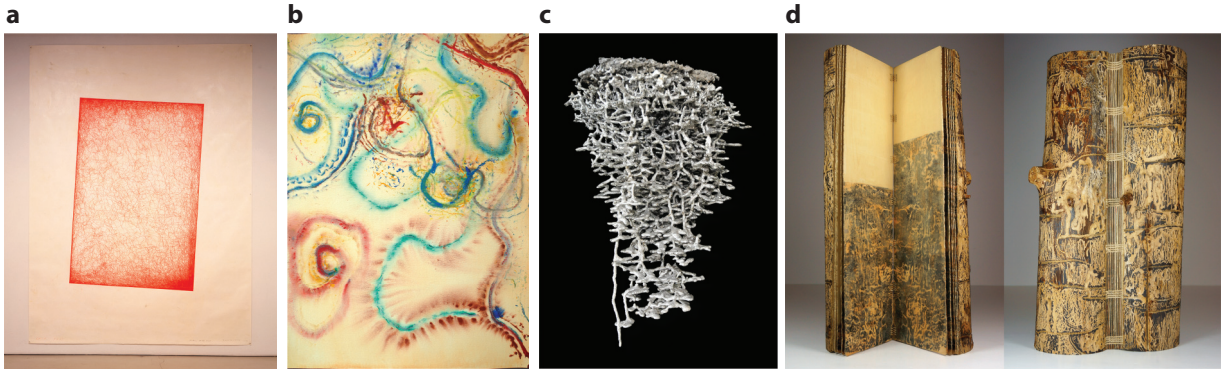


Figure 2

Traces. Although these works were not made from the bodies or bodily products of insects (with the exception of panel *a*, which was coated with beeswax for protection), they represent artistic recordings or realizations of traces left by insects. (*a*) *Wandering Position – Alcatraz* (Yukinori Yanagi, 1997, ©Yanagi Studio) follows the path of one harvester ant (*Pogonomyrmex* sp.) with a red oil pencil. (*b*) *Starry Night* (Steven Kutcher, 2004) marks the paths of two or three hissing cockroaches (*Gromphadorhina portentosa*) across a canvas; their tarsi and ventral abdomens were daubed with paint at the start of their journey. (*c*) Aluminum cast of a nest of fire ants (*Solenopsis invicta*) (Walter Tschinkel, 2012; photo by Charles F. Badland). (*d*) *Bark Beetle Book Volume XIV: Ars datum est* (Suze Woolf, 2017) is a split log with galleries made by fir engraver beetles (*Scolytus ventralis*) and pages visualizing destruction of timber areas using rubbings of beetle-bored logs. All images are used with permission from the artists.

O'Flaherty's education-focused maggot art) or charcoal (Alison Reiko Loader, *Caterpillar Cartography*, 2017). Traces can also take the form of tunnels, channels, cavities, and galleries, as excavated by ants or bark beetles. Walter Tschinkel pours molten metal down ant nest entrances and excavates the resulting casts, which serve as scientifically informative art pieces (103, 104) (**Figure 2*c***). Beetle larvae often leave galleries in trees that might be considered art in their own right (**http://www.ambrosiasymbiosis.org/calligraphy/**); Ann Savageau has created bark beetle totems, and Suze Woolf is creating a series of *Bark Beetle Books*, most of which preserve or record from beetle larvae's actual galleries (**Figure 2*d***).

Silk: proteins with highly repetitive amino acid sequences, stored as liquid and secreted as fibers by insects, spiders, and millipedes (20)

Sericulture: industry of cultivating mulberry trees and rearing silkworm moths to produce cocoons (100)

Pigment: dry, particulate, insoluble material used as a coloring agent

PRODUCTS

Insects have evolved an array of glandular secretions and exudates from head to tarsus, and some of these bodily products have been exploited by humans, including artists. In this section, I discuss the most notable products and their applications in art.

Silk

"The spider as an artist," as Emily Dickinson put it in the poem *Cobwebs*, is responsible for strange and marvelous contributions to art history, from delicate cobweb art (13) (note that some works were actually made from silk of the ermine moth, *Yponomeuta evonymella*; 11) to a tapestry spun by over one million spiders (49, 61). It is insects, however, that have dominated silk art for millennia.

Silk has evolved 23 times within Insecta (99), yet only silks from moths (Lepidoptera) have made inroads to industry. Dozens of wild species from several moth families in India, East Africa, and Madagascar contribute to sericulture (100), and moth cocoons from various species are traditionally used for nonsericultural purposes by cultures around the world (81). One species, *Bombyx mori*, bred for 4,700 years, overshadows all others. Utterly dependent on humans, the domesticated silkworm moth produces most of the silk used in fashion, in the fiber arts, and as canvas. Larvae use a pair of modified salivary glands in the head to secrete fibroin fibers, glued together with sericin, which is removed in sericulture by immersing cocoons in hot water (46). Silk is strong, lightweight, and elastic. It takes dyes, resists creasing, insulates well, and can be used as a canvas for printing and painting. Silk may contribute to the majority of insect art, of which this review showcases only a few historical examples (**Figure 3*a***, **Supplemental Table S1**). A search for "silk" in the Metropolitan Museum of Art's online database presently offers 36,322 results. As an example of how diversely silk can be used in art, Jen Bervin produced a book with the image of a silk cocoon printed on silk; a poem printed on a silk biosensor; and glass containers with cocoon, skein, scroll, and liquid silk fibroin (*Seven Silks*, 2018). Kazuo Kadonaga (see 19) and Xu Bing have explored aspects of sericulture in their work since 1986 and 1994, respectively, by allowing *B. mori* larvae to spin within certain constraints or in certain contexts (**Figure 3*b*,*c***), and Marlène Huissoud uses cocoons discarded by the eclosed adults in her sculptures (**Figure 3**).

Supplemental Material >

Wax

Wax, being malleable, easily melted or pigmented, and insoluble in water, offers multifarious uses to artists, including as sculpting, casting, and mold-making material. Wax is used as a painting medium, binding agent, or protective coating. Like silks, waxes are secreted by many different insects, but one species generates the vast majority of wax used by artists—in this case, western honey bees (*Apis mellifera*).

If creation of honeycomb by honey bees (*Apis* spp.) is "the most wonderful of all known instincts" (21, p. 216), then the wealth of waxworks in art reflects the value of this insect product.

(*Caption appears on following page*)

Figure 3 (*Figure appears on preceding page*)

Insect art using insect bodily products. (*a–c*) Silk. (*a*) *Insects and Grasses* (Yamamoto Baiitsu, 1847). (*b*) *Silkworm Book: The Analects of Confucius* (Xu Bing, 1998) "investigates the significance of silk and paper as mediums in practicing calligraphy" (@xubingart) with live *Bombyx mori* larvae (installation view at Asia Society Museum, NY, ©Xu Bing Studio). (*c*) *Silk No. 3 ABC* (Kazuo Kadonaga, 2006) offered viewers an opportunity to witness 50,000 silk-spinning *B. mori* larvae create a work independent of the artist's "arbitrary" vision. (*d*, *e*) Wax. (*d*) *Hive helmet* (Barrett Klein, 2020) is armored with beeswax and beeswax foundation and adorned with honeycomb (*Apis mellifera*). (*e*) *The Glass Dress, Lady in Waiting, with shoes and handbag* (Aganetha Dyck, 1992–1999) is the culmination of years of comb-building by honey bees on an object placed within a hive. (*f*) Propolis. *Cocoon Cabinet #5* (Marlène Huissoud, 2017) is composed of abandoned *B. mori* cocoons coated with *A. mellifera* propolis. (*g–i*) Carmine. (*g*) Vial of Armenian cochineal (*Porphyrophora hamelii*) carmine, donated to Harvard Art Museum's pigment collection after use in (*h*) *Red/Red* (Aslı Çavuşoğlu, 2015), depicting the interdependence of insect and plant. The Armenian cochineal fades beside a more resilient Turkish red pigment (seen on the facing page), hinting at the relationship between the Turkish and Armenian peoples (A. Çavuşoğlu, personal communication). (*i*) *RED: A lost scene from In Search of Goliathus Hercules* (Jennifer Angus, 2016) is a carmine-dyed tale of sleepy cochineal bugs, complete with emergency vial of cochineal. (*j*, *k*) Paper. (*j*) *Mandala* (Ann Savageau, 2009) is part of a nest paper triptych (*Dolichovespula maculata*). (*k*) *House* (Alastair and Fleur Mackie, 2008) is composed of approximately 300 abandoned, pulped wasp nests, made into sheets and cut to match the coordinates of a wooden doll house kit (235 × 125 × 100 cm). For additional examples of insect media art using products, see **Figure 1*a*,*c*,*e*** and **Figure 5*b*** (waxy cyst covering) and **5*f*** (caddisfly silk). Images courtesy of (*a*) Metropolitan Museum of Art's Open Access program; (*b*) © Museum Associates/LACMA; (*d–k*) the artists; and photographers (*c*) Kazufumi Oizumi, (*e*) Peter Dyck, and (*b*) Sahir Uğur Eren.

Egyptians entombed figures fashioned out of beeswax. The human anatomical wax models produced for La Specola, in Italy include waxes secreted by scale insects (*Ceroplastes ceriferus* and *Ericerus pela*) (38), but Gaetano Giulio Zumbo, considered the greatest of the anatomical wax sculptors, combined substances with pure beeswax to achieve the translucency of human tissue (9, 38). Sculptures by Edgar Degas, Joseph Beuys (83), Wolfgang Laib (*The Passageway*, 1988), and Kiki Smith (*Honeywax*, 1995) were made with beeswax (**Figure 3*d*,*e***). Beeswax is the traditional ingredient of encaustic painting (54), practiced in ancient Greece and Rome and continued by James Ensor, Diego Rivera, and Jasper Johns. Barbara Walton, one of many encaustic painters who have depicted honey bees in their work (**Supplemental Table S1**), describes beeswax as the most versatile and "the most pure, natural and sustainable of the waxes in addition to having an intoxicating and sensual aroma" (**https://barbaraewalton.com**).

Supplemental Material >

The honeycomb itself, unmelted and unadulterated, attracts artists who aspire to collaborate with colonies of honey bees. Apisculptures rely on honey bees to build comb on sculpted forms (Garnett Puett, Tomáš Libertíny, Bärbel Rothhaars; 12), prints (Ladislav Hanka), paintings, or embroidered works (Ava Roth); in modified hives (Hilary Berseth, Ren Ri); or on found objects, which the bees can transform in unpredictable ways (Aganetha Dyck; see 78 and **Figure 3*e***).

Beeswax produced by stingless bees (Meliponini, Apidae) is softer and has a lower melting point than that produced by honey bees, so stingless bees combine the wax with resin or other materials when constructing their nests (97). This nest material was responsible for the troves of pre-Columbian gold artifacts of Mexico and Central America, which were cast using the lost wax process (89). The lost wax process dates to at least the third millennium BCE in the Middle East (76) and was used for Greek, Etruscan, and Roman bronze works. Javanese batiks were reported to use *Trigonula iridipennis* wax, and the Worróra of Australia protected rock paintings by creating semicircles of stingless bees' wax as guards against rain. Aboriginal Australians also used beeswax to sculpt objects for rituals, sorcery, and love magic (17). Cubans have used *Melipona beecheii* wax to produce lithographic inks and lithographic pencils (89).

Honey

Producing wax requires the consumption of fuel. Honey bees collect nectar or the sweet secretions of other insects as their fuel, converting this to honey using glandular secretions in the honey-stomach (73). Honey's properties make the sticky substance a useful binder in art. Greeks

may have used honey in wall paintings in the Palace of Nestor (Pylos, before 1180 BCE; 10), and honey is still used to bind particles of pigment in some watercolor formulas. M. Graham & Co. report that honey allows for high pigment loads and produces smooth washes, and their paints remain moist due to honey's hygroscopic nature (**https://www.vangoghgenova.it/honey-in-watercolor-paint.html**). Pure pragmatism aside, honey has also been the main attraction of art pieces, most notably in works by Joseph Beuys. Beuys' *Honey Pump at the Workplace* (1977) transported two tons of honey for 100 days through transparent tubes in Kassel, Germany, creating a pumping, circulating structure analogous to our own circulatory system (98).

Propolis: honey bees' mixture of plant exudate, beeswax, and saliva, used primarily to fill gaps in the nest or hive

Carminic acid: primary coloring agent in cochineal; used by insect as defense against predators

Propolis

Yet another product of honey bees is their resinous, gap-filling propolis. Marlène Huissoud experiments with unconventional materials for her art and design, and her work with propolis appears unique to both the world of art and the world of design. Huissoud has found success applying basic glass blowing and engraving techniques to propolis, which, with its lower melting point, requires a modified kiln and more time to manipulate (**https://www.marlene-huissoud.com**; **Figure 3*f***).

Coloring Agents: Carmine, Lac, and Insect Gall Ink

Of all the natural red dyes, the most brilliant come from scale bugs (superfamily Coccoidea), historically the only source of insect-derived pigments or artistic finishes. The bodies of female bugs are dried and pulverized, and in the case of kermes and cochineal bugs, this extract is used to produce carmine—a substance of such crimson allure that it featured largely in the history of art and commerce, both in the old and new worlds. Phoenicians traded kermes (primarily *Kermes vermilio*) extensively throughout the Eastern hemisphere, and *Porphyrophora* spp. (especially Polish kermes, *Porphyrophora polonica*) colored Siberian and central Asian textiles (82). Armenian cochineal (*Porphyrophora hamelii*) decorated illuminated manuscripts produced in Armenian monasteries. Armen Sahakyan, at the Mesrop Mashtots Institute of Ancient Manuscripts, may be the only living person who can create the red ink from fourteenth-century recipes, as seen in a recent series of works by Aslı Çavuşoğlu (Y. Parlar, personal communication; **Figure 3**). The bug is endangered in Armenia, and the knowledge of how to extract the color is lost to neighboring Turkey, where the bug is plentiful. Çavuşoğlu uses Armenian cochineal in some pieces and Turkish red pigment in others and describes the pieces as relevant to the "coexisting nature of the plant and insect relations, hinting at a possible analogy between Turkish and Armenian people" (A. Çavuşoğlu, personal communication).

Harvesting these scale insects was laborious, so when Spanish conquistadors hauled back tons of cochineal (*Dactylopius coccus*, although *Dactylopius confusus* was also cultivated in Peru; 90), which had been used since at least the second century BCE, the old world was taken by storm. Cochineal, being deep crimson, easy to use, and plentiful, became the dye of choice for artists soon after it arrived in Europe; later, it was used heavily by some impressionists. The bugs had been artificially selected in the Americas to evolve larger bodies containing more carminic acid. Andean dyers developed techniques of adding a mordant to help bond carmine to animal hair (carmine bonds to silk and mammal hairs better than to plant fibers), with other additives to shift the bright pink to a range of hues (82). The practice of experimenting with cochineal to achieve different hues continues today with the work of textile artists like D.Y. Begay (*Palette of Cochineal*, 2013), and traditional dyes and materials are exhibited in installations by Elena Osterwalder (*Amatl Installations*). Jennifer Angus used cochineal to color the walls of an entire gallery space (*In the Midnight*

Garden, 2015) and produced a tiny carmine-dyed book (**Figure 3*i***) for the collaboration *Insect Dreams Cabinet* (2018). It took centuries for anyone to recognize that the source of scale-derived dyes was not berries or worms (18, 82), so from the perspective of this review, any insect-dyed work prior to the discovery that cochineal is an insect would constitute insect media art lacking explicit or conceptual relevance to insects (**Figure 1*e***), unless another insect species or insect-related subject was depicted.

Dyes made from scale insects fade when exposed to light (80). Particles that once contained cochineal pigment molecules can fall apart and become translucent, resulting in dramatic changes to the color palette of classic paintings (16). Other coloring agents are relatively permanent. Lac insects (commonly *Kerria* spp. and *Paratachardina* spp.) are harvested with the lac that they secrete because their bodies produce a dye (**Figure 1*e***), and colors prepared from this dye are considered light fast (50) or at least "rather more permanent than those from cochineal" (80, p. 206). As with carmine dyes, historical (7, 14) and modern (50) recipes exist for using lac dye, as does advice for which paint media are best used with lac dye. A permanent ink used in drawings by Leonardo Da Vinci, Rembrandt, Dürer, and Van Gogh (2) that is still in use today because of its permanency comes not from the bodies of insects, but instead from tannic acid found in high concentrations in plant galls caused by gall wasp larvae (e.g., *Andricus kollari*, *Cynips quercusfolii*).

Lacquer: liquid or paste derived mostly from plants (with insect exceptions) that dries to form semitransparent protective or decorative coatings (64)

Saliva: proteinaceous oral secretion (47)

Insect Lacquers

Female lac bugs (commonly *Kerria lacca*, Kerridae) produce a resinous, protective secretion of lac that has been processed into shellac for over 3,000 years. Shellac has been used as a protective coating, a decorative finish (e.g., on Tibetan armor), a lithographic ink, even a minimalist smudge in Edward Ruscha's *Shellac (Master Mixed orange)* (1969). Shellac can be worked and reworked in layers and is suspected to outlast lac dye (see above) in greatly aged historic relicts (7). Giant margarodid scale bugs (*Llaveia axin*) were used to produce comparably fine, durable finishes in the Mayan civilization (64), but the source of this lacquer was fat from within females' exceptionally large bodies.

Stains

House flies (*Musca domestica*) leave stains, a combination of oral regurgitate (saliva) and feces. Place over 200,000 flies together and feed them sugar–watercolor mixtures with select hues in mind and the resulting canvases that they land on become works reminiscent of pointillism. John Knuth's fly paintings result from careful planning and understanding of his dipteran subjects (**https://www.youtube.com/watch?v=jHEXAsflhbA&t=6s**).

Nest Material

Saliva is a key ingredient when paper wasps (Vespidae) construct nests. Most paper wasps combine saliva with masticated plant material to form textured, colorful nests, which they typically abandon in temperate areas as the seasons change. Entire nests appear, albeit infrequently, in art, as does nest paper. Nests can be electroplated (Ashlyn Bapst), cut and arranged (Ann Savageau; **Figure 3*j***), applied to surfaces as papier-mâché (e.g., wearable art by the author), or pulped and made into raw material. For one of their wasp works, Alastair and Fleur Mackie fed approximately 300 abandoned nests into a paper mill, from which they constructed a doll house (**Figure 3*k***). The most self-referential work in this category was made by Kristian Brevik, who constructed a paper wasp out of wasp nest paper (*Paperwasp*, 2013).

Mud dauber wasps and potter wasps combine saliva with mud to construct their nests, and these can be fired in kilns (e.g., as Jorge Hernández does; see **http://www.attesedizioni.org/eng/artisti_designer/j_hernandez/page_01.html**) and glazed (V. Sansone and R. Boscarino, personal communication).

BODY PARTS

The words "insect" and "entomology" both etymologically refer to "cut up" or "divided into segments." The following are examples in which artists have used segments, pieces, or bits of insect anatomy in their art.

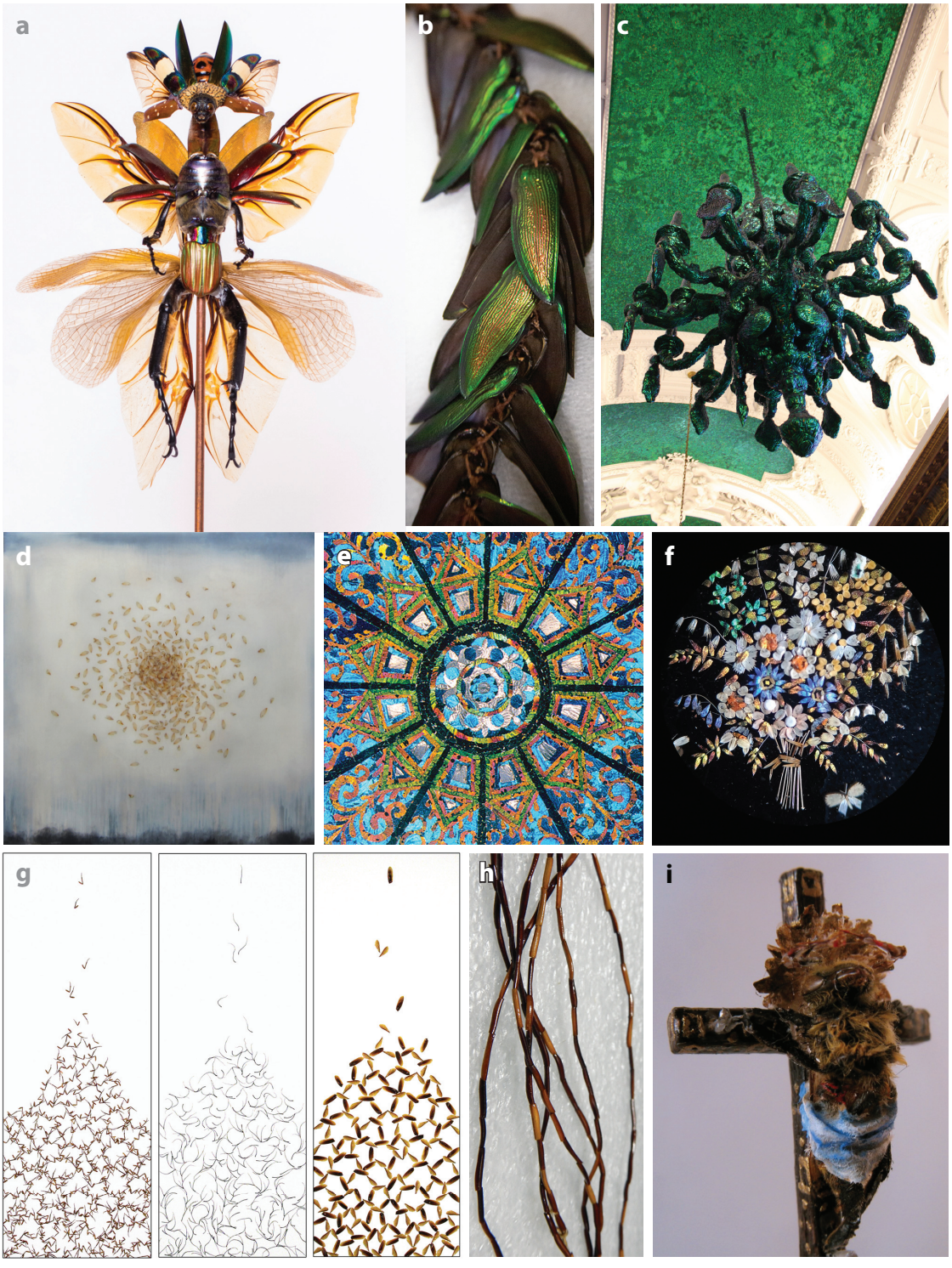
Body Segments

Body segments can be swapped, interspecifically rearranged, or combined with other items to form fantastical chimaeras, as created by Cedric Laquieze (**Figure 4*a***), Jim Rittimann, Emmanuelle Dupont (*Phalaenopsis*, 2008), Tom Friedman (*Dead Fairy*, 2004), Anna Werzowa (*Cybugs*, 2011), Lisa Murch (*Species*, 2005–2008), and Jennifer Angus. Maohou (hairy monkey) artists (e.g., Cao Yijian) assemble creatures with cicada exuviae and magnolia buds, a folk art practiced in China since the Qing dynasty. Donna Conlon constructed hyper-appendaged mutations (*Nature Improvement Project*, 2007), and insect–human doll and insect–toy figurine hybrids are the brainchildren of Laurent Gauthier and Amy Swartz, respectively.

Wings

Structurally, aesthetically, or symbolically, wings have been the feature of choice in insect media art and have been embroidered in textiles, adhered to canvases, and strung as jewelry. Beetle elytra appear most frequently in traditional arts because of their durability and beauty. The structural colors of jewel beetles (Buprestidae, commonly *Sternocera aequisignata* or *Chrysochroa fulgidissima*) and other beetle families have elytra suitable for embroidery in Indian textiles; the singing shawls of Pwo Karen hill tribes of Thailand and Myanmar; and various forms of adornment from Amazonia, Central America, and Mexico to Australia and New Guinea (86; **Figure 4*b***). Pieces of beetle elytra were used to represent emeralds in Indian paintings (71). The Tamamushi jewel beetle shrine of Japan (ca. 650) is the oldest known use of beetle wings and was once decorated with 9,000 elytra (3). The allure of elytra has not been lost on contemporary artists, and buprestids are flaunted on catwalks, as well as being strung with home-spun silk in embroidery by Michael Cook. Jan Fabre is the best known of the elytra artists, and he has coated everything from coffins (31) to the ceiling of the Royal Palace in Belgium (**Figure 4*c***) with *S. aequisignata* elytra.

Butterfly wings, referred to as "living pointillism" by Charles Hogue (40), are more delicate than beetle elytra and have been the preferred feature for collage work by Jean Dubuffet and, later, Damien Hirst and Lori Precious (**Figure 4*e***), among others. The Yukpa of Venezuela and Colombia use hind wings of beetles and dragonflies as necklace ornaments (85). Joris Hoefnagel adhered actual insect wings within an illuminated manuscript to accompany his highly realistic painted insects [*Painted Dragonflies with Real Wings Attached*, from *Animalia rationalia et insecta (Ignis)*, *vol. 1*, *pl. LIV*, 1575/1580], a practice found in Vienna, Munich, and the manuscripts of Philip of Cleves (48). André Masson affixed (what appear to be) neuropteran wings to paper (*Street Singer*, 1941), and Stan Brakhage pressed insect wings between splicing tape for one of his experimental films (*Mothlight*, 1963). Mayme Kratz embeds cicada wings in urethane (**Figure 4**); Judith Klausner adheres honey bee, cicada, and other wings to her arrangements; and Fabián Peña uses tiny pieces of cockroach wings (*Periplaneta americana*) as tesserae for his mosaics. Elsabe Dixon is leading an



(*Caption appears on following page*)

Figure 4 (*Figure appears on preceding page*)

Insect art using insect body parts. (*a*) Insect chimaera: a "fairy" (Cedric Laquieze) assembled from insect parts. (*b–e*) Wings. (*b*) Ear ornament of beetle elytra (*Euchroma gigantea*) strung together with a tuft of toucan feathers [detail, feathers not visible; acquired 1930; Awajún (Aguaruna), a Shuar subtribe, Amazon Region, Brazil]. (*c*) *Heaven of Delight* (Jan Fabre, with help from 29 assistants, 2002) colors the Hall of Mirrors in the Belgian Royal Palace with 1.6 million metallic green elytra of the jewel beetle *Sternocera aequisignata*. (*d*) *Pale Dream* 7 (Mayme Kratz, 2010) includes epoxy resin–embedded cicada wings. (*e*) *Butterfly wings* (detail; Lori Precious, 2003) is a stained glass–inspired mosaic of butterfly wings. (*f*) Wing scales: *Bouquet of flowers with butterflies* (detail; Henry Dalton, ca. 1875–1900) is a microscopic arrangement of diatoms and individual scales from butterfly wings. (*g*, *h*) Appendages. (*g*) *Pit drawings* (Catherine Chalmers, 2003) are arrangements of American cockroach (*Periplaneta americana*) legs, antennae, and wings. (*h*) Necklace of ant leg segments strung on tucum fiber (acquired 1968–1969; Nambikwara, Niyahlósú band, Mato Grosso, Rio Camararé, Aldeia Camararé, Brazil). (*i*) Armament: *Apis Ignota*, *Operaria Alvi* (Judith Klausner, 2009) wears a crown of thorns composed of honey bee stingers. Images courtesy of (*a*, *d*, *e*, *g*) the artist; (*b*, *h*) the author, taken with permission in the collections of The Field Museum of Natural History (catalog #48807 & 190825); (*c*) photographer Gerry Bates; (*f*) photographer Eva Hausam and The Museum of Jurassic Technology; and (*i*) photographer Brendan Dolan-Gavitt and the artist.

artistic response to the invasive lanternfly (*Lycorma delicatula*) by creating art using its wings. John Kalymnios and Anna Werzowa have each created insect wing-flapping installations driven by motor and by fan, respectively. Tessa Farmer creates microscale fairylands by attaching hymenopteran wings to creatures that one writer has speculated might be the "missing link between the human and the insect world" (70, p. 75).

Wing Scales

Wing scales are the namesake of Lepidoptera, and the often dramatically colorful scales can brush off with ease. Lepidochromy is a practice of transferring moth or butterfly wing scales onto paper prepared with adhesive (29), best known from nineteenth- and twentieth-century examples. Transfer of scales can be followed by drawing the body or, as in the most ambitious publication of lepidochromy, by hand-coloring engravings of the body (25).

Henry (Harold) Dalton transferred not a wing's worth of scales but individual butterfly wing scales (and diatoms) to produce still-life micromosaics on microscope slides during the last quarter of the twentieth century. Dalton transferred each scale with a boar bristle, positioned it by breathing through a tube, and adhered it in place by crushing a portion of the scale against a glass slide (**https://www.mjt.org/exhibits/dalton/dalton.html**; **Figure 4*f***).

Appendages

Wings are partly responsible for insects' outrageous evolutionary success, but other bodily outgrowths are worth noting, including in art. Legs and antennae appear in Catherine Chalmers' cockroach collages, salvaging components of American cockroaches (*P. americana*) that perished naturally in her care (**Figure 4*g***). Legs also appear as *Flylashes* (2010) on Jessica Harrison's eyes and are used as weapons wielded by Tessa Farmer's minute fairies (e.g., *Unwelcome Visitors*, 2014). Leg segments, being beautiful and durable, can be strung on fiber for jewelry. The Yukpa use the femora of large beetles, especially *Podischnus agenor*, as bead separators (85), and the Niyahlósú band of Nambikwara in Brazil have strung necklaces of ant leg segments (**Figure 4*h***).

Armaments

The horns of large rhinoceros beetles (Dynastinae, Scarabaeidae) are fashioned into necklaces in South America (85). Another armament, of sorts, comes in the form of modified egg-laying devices. Judith Klausner saw the opportunity to comment on sacrifice, martyrdom, and altruism, symbolized by honey bee stingers forming a crown of thorns (**Figure 4*i***): "I extracted stingers

from dead honey bees, which was tougher than I thought it would be. I had to crush the abdomen and root around in the wreckage for a tiny sliver and extract it with forceps. I used the stingers as the thorns in the crown of thorns, attached around a circlet made from one of my hairs" (J. Klausner, personal communication).

WHOLE INSECTS

Glorious body forms, shapes, colors, and behaviors, so exquisitely evolved, make insects aesthetically wondrous works unto themselves. Without cleaving the segmented bodies or extracting their products, artists have incorporated the entire bodies, dead or alive, into their work.

Displaying the Dead

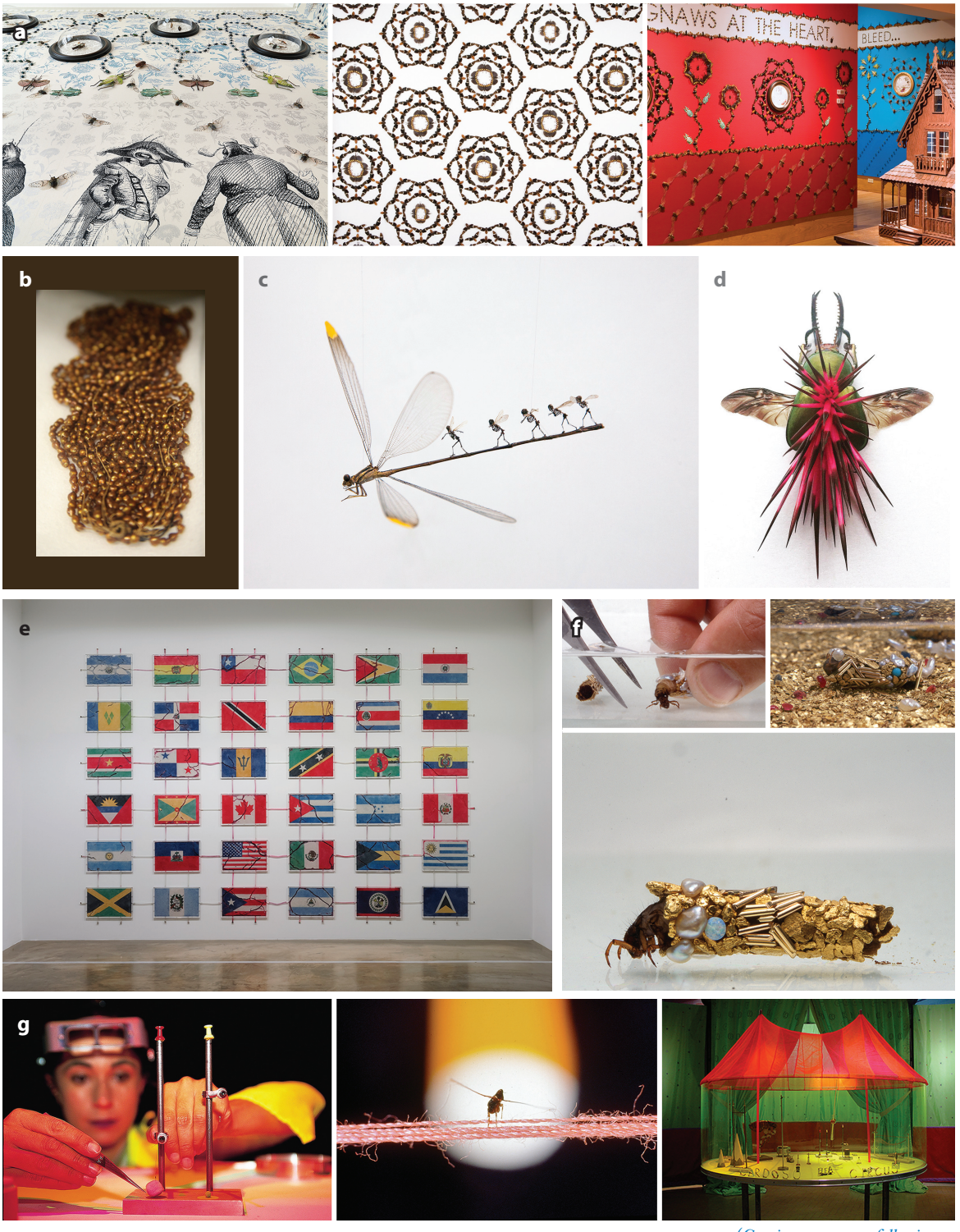
Insect carcasses appear as traditional adornments throughout the world, including in Jivaro headdresses in Ecuador (85). The Zulu of southern Africa have strung necklaces of the encysted bodies of immature scale bugs (*Margarodes* spp.), referred to as ground pearls or ant eggs because they are found underground, sometimes in ant nests (102) (**Figure 5*b***). Intact insects were also displayed in European cabinets of curiosity, have augmented dioramas in natural history museums, and exist within modern and contemporary art. Some artists have preferred to work with unmodified insects, aesthetically arranged together [John Hampson, Jacques Kerchache (95), and Christopher Marley (68)] or in patterns on a grand scale [Sarah Hatton's *Bee Works*, Damien Hirst's butterflies, and Jennifer Angus's room-sized Wunderkammers (2; **Figure 5*a***)]. Others have integrated insects into collages [Pablo Picasso's *Composition au papillon*, 1932 (67, p. 90), and works by Alberto Faietti (32), Laurent Gauthier, the Art Guys (69), Magnus Muhr, Jo Whaley (108), and Barbara Norfleet (77)] or incorporated insects into sculptures or installations [Jan Fabre, Ann Brodie, Slinkachu (93), Klaus Enrique, and Tessa Farmer (70; **Figure 5*c***)].

Insects can be modified in minor ways (Jenny Kendler's *Companion for Utopians I*, 2013), painted with elaborate designs (Akihiro Higuchi), radically mutated [Jan Fabre (31), Adrienne DeLoe (**Figure 5*d***)], turned into gear-laden techno-cyborgs (Mike Libby), implanted with a web server (Garnet Hertz's *Fly with implanted webserver*, 2001), or smuggled into a museum and equipped with sidewinder missiles and satellite dish (Banksy's *Withus Oragainstus*, 2005). Posing dead insects in anthropomorphic scenarios [Ricky Boscarino (62), Dick Webb (37), Kevin Clarke] is a practice reminiscent of the clothed fleas in Mexican folk art (70, p. 72) or Ladislaw Starewicz's early nineteenth-century stop-motion animations with insects (88).

Working with the Living

Click beetles (Elateridae) and fireflies (Lampyridae) have been captured and used as living, bioluminescing adornments, and small chains have tethered other so-called living jewels to clothing in India, Sri Lanka, and Mexico (86). The following are examples of modern and contemporary art in which live insects were on display—engaging in normal behavior, used in (non)traditional practices, manipulated in a collaborative sense, or given control over human technology.

Normal behavior. Observing insects can be a new experience for many art gallery visitors, and artists have brought colonies of ants indoors (*Antics*; 51) and honey bees to parks [Garnett Puett, *Apiscaryatid*, 1986; Pierre Huyghe, *Untilled (Liegender Frauenakt)*, 2012], displayed dermestid beetles in a diorama (Ryan Taber and Cheyenne Weaver, *In Search of a Myopic's Lietmotif, Mal'Aria*, 2005), and given a synchrotron peepshow of honey bees' innards (Trish Adams, *Honeybee Raree Box*, 2015). Granted, all of these examples, like Mark Thompson inviting honey bees to cover his



(*Caption appears on following page*)

Figure 5 (*Figure appears on preceding page*)

Insect art using whole insect bodies, dead or alive. (*a–d*) Art using dead insects. (*a*) Views from *Hunters and Hunted* (2012), *A Terrible Beauty Chapter 1* (2005), and *A Terrible Beauty Chapter 2* (2006) by Jennifer Angus. (*b*) Necklace of ant eggs or ground pearls (*Margarodes* sp. nymphs, enclosed within their cysts; acquired ca. 1893; Zulu, southern Africa). (*c*) *The Perilous Pursuit of a Python* (Tessa Farmer, 2013) detail, with fairies made out of plant roots and insect wings riding atop a damselfly. (*d*) *Mutation 1* (Adrienne DeLoe, 2019), mixed media with sawtooth beetle (*Lamprima adolphinae*). (*e–g*) Art using live insects. (*e*) *America* (Yukinori Yanagi, 1994, ©Yanagi Studio) connects flags composed of colored sand in plastic boxes with tubes, allowing ants to disperse the sands and break down symbols of political separation. (*f*) Caddisfly larvae (Trichoptera) use silk to construct a case made of gold spangles and semiprecious stones after Hubert Duprat removed their less lustrous original cases. (*g*) *Cardoso Flea Circus*, with Professor Cardoso/Queen of the Fleas (María Fernanda Cardoso, 2000); *Ctenocephalides felis*, tight rope artist (1997); and circus arena made by the artist. Images courtesy of (*a*) the author, (*b*) the collections of The Field Museum of Natural History (catalog #28750.1, photo taken with permission), (*c*) New Art Gallery Walsall and the artist, and (*d*, *e*, *f*, *g*) the artist.

head (e.g., *Immersion*, 1972; 5), involve some significant manipulation of insects' environments. Normal behaviors take conceptual twists when artists entice leaf-cutter ants to carry tiny flags and symbols of peace (Donna Conlon, *Coexistence*, 2003) or flower petals to a giant sculpted queen (Catherine Chalmers, *The Chosen*, 2012) or when ants redistribute the colored sands forming flags and other arbitrary symbols of perceived power (Yukinori Yanagi; **Figure 5*e***). Caddisflies (Trichoptera) construct cases using silk glands, but of gold and semiprecious jewels instead of sticks and stones, in Hubert Duprat's insect collaborations (27; **Figure 5*f***). Aki Inomata followed suit, giving snips of haute fashion to bagworm moths (Psychidae) for them to sew into their cases. "*girl, girl, girl. . .*" (2019) features female bagworms in a statement about gender issues, tweaking a traditional Japanese pastime in which children give the bagworms strips of colored paper (**https://www.aki-inomata.com/**). Catherine Chalmers forces viewers to confront what is normal or acceptable when cockroaches are painted, adorned with feathers, or subjected to (fabricated) scenes of anthropomorphic executions (15).

Traditional practices. Sericulture is at the core of silk-covered works by Kazuo Kadonaga and Xu Bing, including series featuring live, silk-spinning larvae (**Figure 3*b*,*c***), and Tera Galanti displays the sad state of extreme domestication as male silkworm moths fail to fly to nearby females (*Hope and Futility*, 2006). The flea circus, a dying pastime, was painstakingly revived by María Fernanda Cardoso for live audiences (**Figure 5*g***). Recreational, staged insect battles were alluded to in *Combat Cricket Case* (Jana Sterbak, 1997) with live crickets and gruesomely realized in *Theater of the World* (Huang Yong Ping, 1993), which pitted animals, including large insects, against each other.

Collaborations. Interspecific communication is an ethologist's dream, and artists have experimentally explored such aspirations with midges (Ursula Damm, *Insect songs*, 2018), fruit flies (Damm, *Drosophila Karaoke Bar*, 2018), and crickets (Evgenija Wassilew, *Dissonate*, 2010; Amy Youngs, *Cricket Call*, 1998, and *Holodeck*, 2007).

Control over technology. The reins of control over human technology, when handed to insects, can offer an element of surprise. Vibrations made by honey bees within a remote hive control the sounds and lighting of Wolfgang Buttress' *The Hive* (2015). The massive sculpture can flicker or flash, depending on bees' reactions to the time of day and weather. In Garnet Hertz's *Cockroach Controlled Mobile Robot #1* (2004), a single hissing cockroach (*Gromphadorhina* sp.), positioned on a trackball, can remotely control a robot's movement. When the robot approaches an obstacle, a light flashes in front of the cockroach, and if the (negatively phototropic) cockroach attempts to scurry away, the trackball signals to the robot to evade the imminent threat.

FUTURE PROSPECTS FOR INSECTS AS ART MEDIA

Most insects have never crossed artists' minds or graced their palettes. The wonder and utility of insects or their products present vast unchartered territory to the artist. For each insect species, described or undescribed, there is a unique evolutionary history, ecological niche, behavioral repertoire, bauplan, and innards. Within every scientific venture lies the potential for artistic replication, interpretation, or reinvention. The only barriers to producing insect media art involve access to insects of choice, and, importantly, the ethics of exploiting fellow animals.

Traces

Traces can be mysterious, foreboding, or evocative—perfect fodder for art. The future of recording or managing insect traces is boundless because insects leave hints of their presence almost everywhere. Silverfish (Zygentoma) ingest books, leaving circuitous paths, ostensibly censoring text as they go. Mealworms chew through polystyrene (112). Other insects can devour keratin, leather, or even lead (65). Insect activity could be traced in novel substrates, within a host's body, or by imaging internal processes.

Products

Glands abound in insects, and insects' bodily constituents are far from completely catalogued or chemically understood. Hymenoptera and Embioptera spin silk, yet I am unaware of any art using silk from these orders (aside from honey bee brood comb fortified by larval silk) or, likewise, using the wax of fulgorid bugs or the spittle of spittlebugs. Thomas Eisner (28) cleverly rendered visible the abdominal defensive sprays of bombardier beetles, which artists could view as a reference for visualizing an array of insect chemical defenses. There are unexplored color-producing fluids and pigments that reside within the bodies of insects. Thousands of coccoid species might provide benefits for artistry, if not industry. Are any of these coccoid secretions, or the tobacco juice regurgitates of grasshoppers, light fast? There seems to be potential to elaborate on the practice of offering paper wasps colored paper to produce deviant nests, or of using termite nest material in art. Engineering and design efforts are exploring uses of chitin, the polysaccharide that fortifies insect exoskeletons, as a bioplastic (39) and the material of choice for future spacecraft (45). The lines drawn among science, technology, and art are often blurred, particularly when it comes to experimenting with products like silk (**https://www.media.mit.edu/groups/mediated-matter/projects/**). If silk is not strong enough for artistic applications, or not the desired color, then you can feed *B. mori* larvae carbon nanotubes (106) or slip dye into their food (75)! Some designers are contemplating natural printing by honey bees on the scale of buildings (43).

Body Parts

It may appear that artists have exploited every anatomical feature of insects, but insect armaments rarely appear in art, nor does iridescence from nonelytra sources.

Whole Insects

Artists can explore traditional methods for preparing insect specimens for display (109) or consider modern technical approaches. Science is revealing strange ways in which insects can be altered, including bioengineering insects to fluoresce when a heat-sensitive protein is activated and even laser-etching a pattern on a butterfly wing (84). Cyborgs and remotely controlled insects are no longer science fiction (91). Catherine Chalmers wonders if we could "engineer [cockroaches] to

look like a favorite insect, or mammal, or perhaps the kitchen wallpaper" (15, pp. 88–90). Lower-tech options include luring insects with pheromone or sugar water to form living symbols or words, as described by Katherina Meldner (72), or passively coloring insects (101).

BIODIVERSITY OF INSECT MEDIA ART

Countless works by innumerable artists have been coated in shellac, colored with carmine, or created using silk, and most encaustic paintings use beeswax. Although the hidden, incidental use of shellac, carmine, silk, and beeswax dominate insect media art, it is the intentional use of insect media that may be most compelling and that makes up all of the examples in **Figures 2–6** and **Supplemental Table S1**. I surveyed art by 165 artists (or teams of artists) that intentionally includes insect traces, products, body parts, or entire bodies (**Supplemental Table S1**). I then analyzed works by 121 of these artists (see **Figure 6** for details), which summed to 164 examples of insect media art, each example lumping together works grouped by artist, insect order, and the category of insect use (e.g., all of Damien Hirst's works of art with butterfly wings were counted as one example of insect media art); 65 examples were in the category of insect "products," 33 in "body parts," 33 in "dead," and 33 in "live" (**Figure 6**). Calculations exclude work by artists who have used more than three insect orders. By excluding these, and by binning artists' works into examples, as described above, the influence of one artist on the survey's calculations is limited (87 of 121 artists are represented only once; 72%). Of the 15 insect orders reported (12 eligible for analysis), Hymenoptera comprised the greatest proportion of examples (66 of 164; 40%), followed

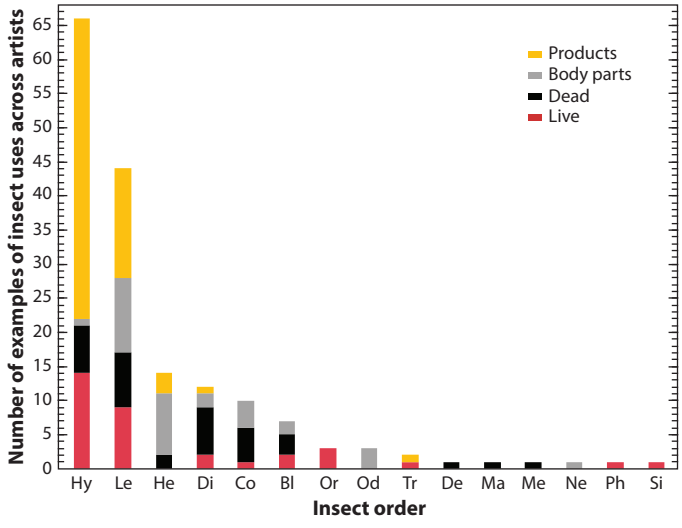


Figure 6

Number of examples across artists in which different orders were used live, dead, for their body parts, or for their products. Survey includes 164 examples of insect media art by 121 (of 165) artists (or teams of artists), each example lumping together works grouped by artist, insect order, and the category of insect use. All works relate to insects explicitly or conceptually (**Supplemental Table S1**). Artists whose work features only insect traces are excluded ($n = 8$), as are the remaining artists who have worked with more than three orders of insects ($n = 34$) or whose works include only anonymous insect orders ($n = 2$). Dermaptera, Mantodea, and Siphonaptera are included in the graph but are excluded from calculations in the text because the artists using these insects have used more than three insect orders. Abbreviations: Bl, Blattodea; Co, Coleoptera; De, Dermaptera; Di, Diptera; He, Hemiptera; Hy, Hymenoptera; Le, Lepidoptera; Ma, Mantodea; Me, Megaloptera; Ne, Neuroptera; Od, Odonata; Or, Orthoptera; Ph, Phasmida; Si, Siphonaptera; Tr, Trichoptera.

Supplemental Material >

by Lepidoptera (44 of 164; 27%). *Apis mellifera* honey bees accounted for the most examples—a total of 45 of the 66 uses of Hymenoptera—and *B. mori* accounted for 14 of 44 uses of Lepidoptera. Hymenoptera and Lepidoptera contributed to two-thirds (67%) of the examples of insect media art that explicitly or conceptually featured insects.

If number of extant species correlated with extent of insect use in art, then beetles would dominate. If proximity to insect multitudes were the primary catalyst compelling humans to include insects in art, we might expect ants, flies, or ectoparasitic orders to dominate insect media art, yet the western honey bee and the domestic silkworm disproportionately capture the attention of artists. It is no coincidence that a bias favored the two insect species with the most extensive history of exploitation by humans. Different associations can develop from our connections with or dependence on insects, so even with respect to these two species, artists' reasons for using them can vary tremendously or represent a complex mix of incentives. Despite artists' overwhelming attention to Hymenoptera and Lepidoptera, diversity within insect media art undoubtedly exceeds 15 orders, but examples beyond those reported in this review are expected to be scarce or hidden among work by artists who have used multiple insect orders.

ETHICS

Now that we have pondered some insect media art possibilities, it is important to consider the ethics of using organisms—any organisms—in the creation of art. Insects breathe, reproduce, respond to external stimuli, learn, and communicate, and some can live decades. The question of what it means to be sentient, to be conscious, or to feel pain are all contentious and unresolved when it comes to insects. Human-induced extinction rates are increasing alarmingly (105), and each loss, aside from having ecological consequences, means lost potential to appreciate an insect, including artistically. It is imperative that humans, including artists, practice responsible, sustainable use of insects or insect products for the sake of preserving insect diversity and abundance, respecting their implicit value, realizing their known and unknown ecological roles, or investing in future anthropocentric attributes (material or medical). Ethical codes of conduct vary in arbitrary ways across political boundaries, so abiding by local laws or guidelines for handling animals is the absolute moral minimum that one should adopt when producing insect media art. Where artists and purveyors of art draw their lines is, however, relative. When asked what questions they receive most frequently about their art, 7 of 12 respondents whose work is featured in this review cited questions related to how their insects were acquired or about the treatment of the insects. This concern is explicitly addressed on some of the artists' websites (**Supplemental Table S1**), usually within the context of sustainability. Some use insects found dead (Farmer, Kratz), acquired from their own colonies (Chalmers), or salvaged from state-run extermination efforts (Peña), and others use insects harvested from the wild (Angus), farmed (Laquieze, some of Hirst's works), or recovered from restaurants [Fabre, at least as reported for *Heaven of Delight* (92; **Figure 4*c***)]. Huissard makes a point of using silkworm moth cocoons without killing the inhabitants. Notable exceptions to this mindfulness about the treatment of insects exist, and some can inspire outrage, like Huong Yong Ping's staged insect battles in *Theater of the World* (1993), or not, even as thousands of insects died in Damien Hirst's *A Thousand Years* (1992) or Mark Dion's *The Great Munich Bug Hunt* (1993). A sobering response to Hirst's critics comes from Giovanni Aloi (1), reminding us that most art has hidden animal sacrifices—ox gall (bovine gall bladder extract) in watercolor, egg in tempera, squid ink for sepia, rabbit collagen for canvas glues, and hair from various mammals for brushes—and that art can stimulate a reassessment of our relationship with nature. Insect media art can inspire us to reassess, for example, the value of nature by promoting awareness of biodiversity.

Supplemental Material >

CONCLUSIONS

This review introduces the history, value, and breadth of insect media art, including the many ways in which artists have harvested, studied, exploited, or collaborated with insects for their potential uses. It also considers the ethics associated with this art and speculates about untapped potential for future artists wishing to explore, experiment with, and exhibit the peculiar, the utilitarian, and the marvels around us, bound in the bodies of the most diverse lineage of life on Earth. Far from comprehensive, as a survey, this review offers a starting point to uncover a hidden wealth of insect use in art. As an interdisciplinary topic, the study of insect media art can be as much a foray into material science, biomimetics, insect morphology, or behavior as it can be into art history. Science and the arts have the potential to mutually benefit from exchanges relevant to insect media art, including, as with any truly interdisciplinary venture, cultivating the possibility for novel discovery. Art offers a potent capacity to evoke emotions, provide perspective, or inspire humans to act, and art—from prehistoric to contemporary—owes a surprising debt to insects and the products that they yield.

DISCLOSURE STATEMENT

The author is not aware of any affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this review.

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I dedicate this article to the memory of Sue Hubbell, who wrote about the wonders of arthropods with respect, grace, humor, and clarity. Her discovery of "Bug Art" (44) exposed me to the underappreciated world of insect media art. I am especially grateful to all of the artists who shared their work or their personal approaches or perspectives related to creating insect art. Lynette Korenic, Robin Rider, Yavuz Parlar, Penny Gullan, Demian Kondo, John Abbott, and Alex Wild provided information, and Christopher Philipp and Daniel Le generously gave me access to relevant artifacts from the collections of the Field Museum of Natural History. Kevin Tougeron, Steven Kutcher, Mary Glasper, Abe Packard, and Dosha Klein gave helpful feedback on an earlier draft of this manuscript, as did two anonymous reviewers and Production Editor Caitlin Barbera.

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