

# A CONJOINED FATE

*A painter challenges the divisions between art and science,  
safety and risk, humans and insects*

HUGH RAFFLES

ART BY CORNELIA HESSE-HONEGGER

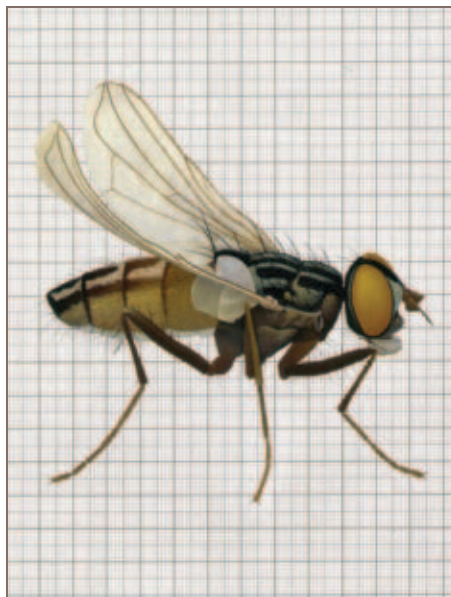
**1** CORNELIA HESSE-HONEGGER is sitting in her apartment in Zürich looking through her microscope. Beneath the lens is a tiny golden-green insect, one of the leaf bugs from the suborder Heteroptera that she has been painting for more than thirty years. The binocular microscope magnifies to eighty times. The centimeter scale in the left eyepiece allows her to map every detail of the insect's body with precision.

Cornelia collected this animal close to the Gundremmingen nuclear power plant in southern Germany. Like most of the insects she paints, it is deformed. In this case, its abdomen is irregularly shaped, a little crinkled on its right side. To me, even under the microscope, the deformity is all but imperceptible. But just think, she says, how such an anomaly must feel if you are only two tenths of an inch long!

What does Cornelia see when she focuses so intently on this creature? She tells me that when she's outside, collecting in fields, at roadsides, and on the edges of forests, she "loses herself in the animal." At these moments, she says, she feels "very connected, extremely connected"; she feels a deep bond, as if, perhaps, she herself had once been such a creature—a leaf bug—"and had a body remembering."

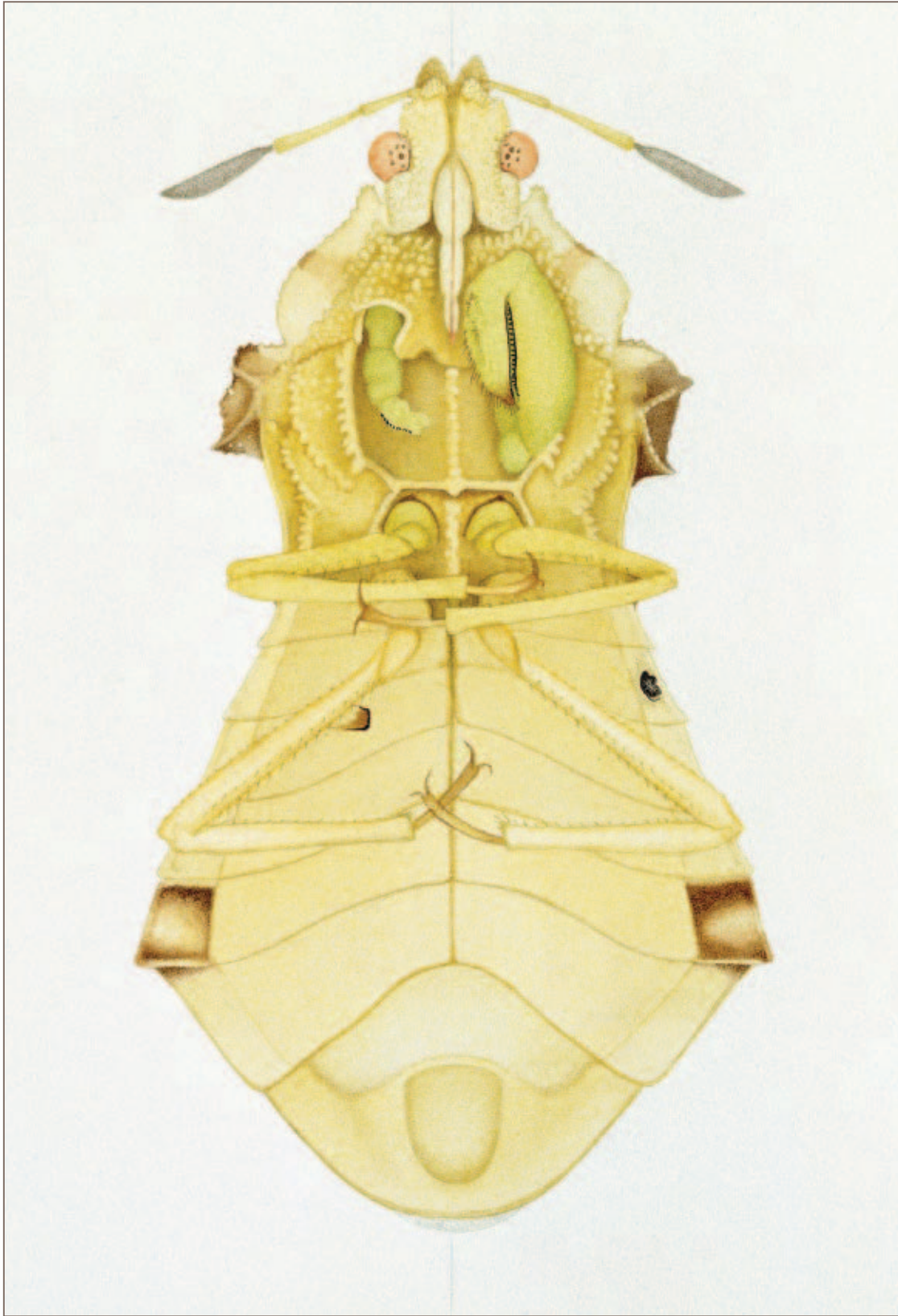
But her painting practice, as she explains it, is almost the opposite of this. When she sits down with her microscope, she no longer experiences the insect as a coevolved being but as form and color, shape and texture, quantity and volume, plane and aspect. Her work becomes as mechanical as possible. ("I want to

be like a laser that goes from one square centimeter to the next. I see it, I show it; I see it, I show it," she tells me.) At times, she introduces a principle of formal randomness, selecting specimens from her collection by chance and abstracting a single structure, which she repeatedly positions at designated points on graph paper, creating an image with no preconceived final arrangement, an image whose aesthetic origins lie squarely in the tradition of concrete art in which she was raised.



One such painting shows a series of eyes from fruit flies, *Drosophila melanogaster*, that had been irradiated by geneticists at the University of Zürich's Institute of Zoology. Although she has chosen not to show the animals' heads, Cornelia uses them as her points of reference, centering each one on corresponding squares of graph paper so that they are situated precisely in relation to the absent bodies to which they belong. But radiation has left the eyes irregularly positioned on

the flies' heads, and as a result, despite the orderliness of the arrangement, the horizontal and vertical lines in the painting are uneven. Cornelia's systematic randomness produces regularity but not uniformity, a graphic expression of an insight central to her understanding of nature, aesthetics, and science: the world, her paintings say, is governed simultaneously by stability and randomness, by principles of both order and chance. The flies' eyes are bizarre. Their size and shape vary dramatically. Several are sprouting wing parts, aberrations that allow researchers to investigate cell behavior—"like someone who studies a train by



ABOVE: Ambush bug from Othello, near Hanford, Washington, USA. Watercolor, 1998.

systematically letting it derail,” as Cornelia puts it. One fly, represented by empty space, has an eye missing entirely.

Cornelia painted that picture in 1987. But she first drew mutated *Drosophila* twenty years earlier, as a scientific illustrator at the Institute of Zoology. In a standard mutagenic protocol, those flies had been fed food laced with ethyl methanesulfonate. The resulting mutations fascinated her so much that she began painting the damaged insects in her own time, experimenting with angle and color, even casting some large heads as plastic sculpture, struggling to make sense of the disturbing world she was being pulled into. At the institute, her job was to draw the varied appearance of the so-called Quasimodo mutants. The animals were crippled and pitifully monstrous, “chaotically” deformed. In preparation for the illustrators, the inner organs of each fly’s head were dissolved with a chemical agent that left the disturbed face as a mask. “The mutants were not to leave me,” she wrote. And, indeed, from that point on her activities would be shadowed by the victims, actual and potential, of induced mutation.

The *Drosophila* image described above was among the last that Cornelia painted before making a collecting trip in July 1987 to Österfärnebo, in Sweden, the site she identified as the place in western Europe most heavily polluted by fallout from the disaster at Chernobyl. That journey signaled the beginning of a new phase in her life, one marked by controversy and not-always-welcome attention.

In their unsettling combination of blank abstraction and bleak outrage, the disembodied eyes are a premonition, an anticipation. When the reactor exploded at Chernobyl, Cornelia was ready. “Chernobyl was just the answer to the question, What is going on here?” she told me recently. She was already a witness. She had seen the diminishing numbers of leaf bugs in her garden. She had seen the monstrous fruit flies. Chernobyl was merely the nightmare exposed to the light of day, the invisible made evident. The laboratory and the world were one.

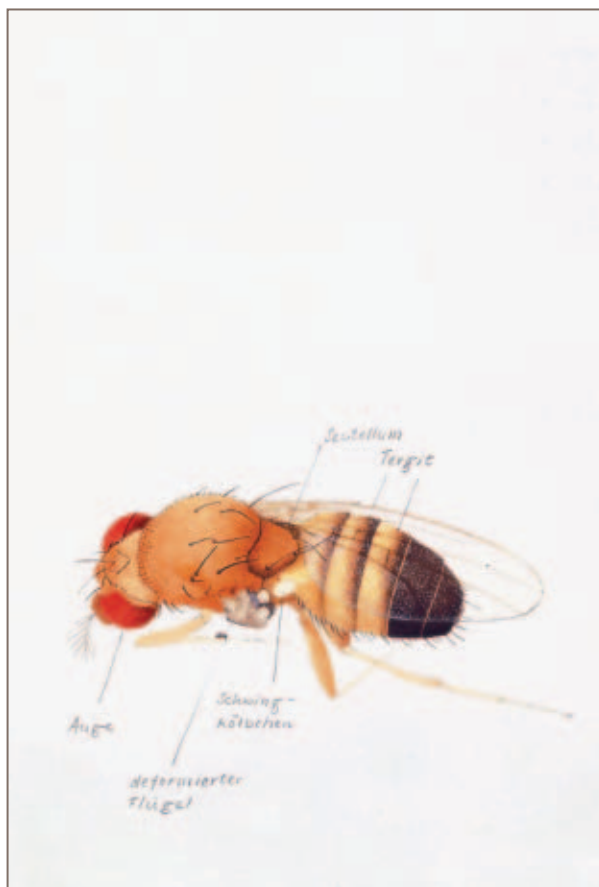
**2.** IN 1976, Cornelia Hesse-Honegger was living in the countryside outside Zürich with two young children, a self-absorbed, neglectful husband, and a passion for leaf bugs. It wasn’t simply the beauty of the insects that attracted her. There was something about their character. (“They have a kind of being aware of certain situations that I find extremely amazing,” she says.) Their idiosyncrasies turned collecting into an obsession (“a kind of addiction”; “to find a leaf bug is fantastic . . . it’s heaven on earth!”). She rapidly grew familiar with the ones that lived nearby

and started to recognize individual differences (“the individual differences are in fact astonishing”) as well as the more acknowledged distinctions among families and species. Summer vacations were spent at her husband’s family’s house in the southern canton of Ticino, rising early while the mist still clung to the landscape, roaming the wetlands, collecting her insects, becoming closer and closer to the local plant and animal life.

Collecting created one kind of intimacy. Discovering the habits of the leaf bugs and uncovering their hiding places (“I know exactly where they will be”) cultivated her sensitivity to their senses (“they’re lazy people!” she told me, laughing), her feeling that they know when she is near, that they feel when her eyes touch them. Through collecting she came to understand their ecology and their character. How could she not? And through

the intense attention of painting, she developed another type of intimacy, becoming expert in their morphology and their variety.

Painting, she insists—reaching back to the sixteenth-century Swiss naturalist Conrad Gesner, to her inspiration, the painter-explorer Maria Sibylla Merian, to the autodidact fossil hunter Mary Anning—is research, not merely documentation. It is a way of achieving multidimensional knowledge of the subject, a way to see it in its biological, phenomenological, and political fullness. Not simply a way to express what we see, painting is a discipline through which we learn to see—to see, that is, in the broad sense of gaining insight. Through painting, she is able to



ABOVE: *Drosophila melanogaster*, Zürich, Switzerland. Watercolor, 1987.



map anomaly, to recognize patterns and relationships across her archive of collecting sites, to realize that she has encountered this deformity somewhere before: Österfärnebo, Chernobyl, Sellafield, Gundremmingen, La Hague. “It’s a discovery of a new world,” she says. “The more I look, the more I dive into this world, the more I can connect.”

It is late in the evening. We have finished dinner and are admiring Galileo’s famous ink washes of the moon, a series of paintings she loves (“*this is art!*”). Galileo made these images in 1610, sketching what he saw through his recently constructed telescope, a novelty that brought an entirely new world into focus. The sense of discovery in these pictures is claustrophobic. They have an urgency about them, as if he drew in disbelief (“what causes even greater wonder . . .” he marveled), racing to capture the unimagined textures before they rotated into shadow, perhaps never to be seen again. Cornelia tells me how Galileo’s colleagues examined these drawings of what he’d seen in the night sky but were unable to recognize the objects he showed them. This was not the moon they knew. How could they trust the view through an instrument they did not understand? They were “seeing blind,” Cornelia says. So set in their thinking, so at home in their world, they looked but they didn’t see, looked but made no sense of what they saw.

After she left her husband and her country garden, after she moved back to Zürich with her children, after Chernobyl, Cornelia published the first of two cover stories in the Sunday magazine of the leading Swiss newspaper *Tages-Anzeiger*. Under the headline “When Flies and Bugs Don’t Look the Way They Should,” she presented paintings of leaf bugs, fruit flies, and ivy leaves she had collected around Österfärnebo and Ticino.

Her account of the trip to Sweden is engrossing. Part detective story, part conversion narrative, part conspiracy, it begins with her struggle to track down information about the radioactive cloud that spread west across Europe from Chernobyl in the

days after the explosion. She finds maps (“miserably inexact”) and identifies the most contaminated places to which she can gain access (“in the evenings, when the children were in bed, I pored over maps and brooded over data at the kitchen table”). Her calculations reveal that the greatest fallout in western Europe was in eastern Sweden (“and that, I decided, was where I wanted to go”).

When she arrives, people tell her—as they will years later at Three Mile Island—about the strange feelings, the inexplicable foreboding they experienced the night the rain cloud broke and

radioactive particles poured down on their town. A local veterinary surgeon shows her clover growing red leaves and yellow flowers instead of the green leaves and pink flowers of earlier years. She finds odd-looking plants everywhere. She collects insects, and the next day, July 30, 1987, she examines them under her microscope. She already knew that leaf bugs were exceptional biological indicators. She had observed in her garden how the precision of their anatomy made irregularities highly evident, how normal variation was generally restricted to their markings, how one bug could live its entire life on a single plant, and how its descendants might remain there too. She realized that by ingesting fluids directly from leaves and shoots, leaf bugs made themselves vulnerable to contaminants taken up by the plant. But in seventeen years of painting them, she had

never seen anything like this. “I felt sick. One bug had a particularly shortened left leg, while others had feelers like shapeless sausages, and something black grew out of the eye of another.” She sees everything as if for the first time.

*Although I was theoretically convinced that radioactivity affects nature, I still could not imagine what it would actually look like. Now these poor creatures were lying there under my microscope. I was shocked. It was as if someone had drawn back the curtain. Every day I discovered more*



ABOVE: Soft bug, Pripjat, Ukraine. Watercolor, 1990.

*damaged plants and bugs. Sometimes I could hardly remember what the normal plant shapes looked like. I was confused and afraid I might be losing my mind.*

She had planned it as a temporary detour. “[Chernobyl] happened and I thought I’d do this quickly,” she told me, “a year, two, maybe three—and then I’d go back to my mutated fly eyes or something. All those paintings [in the magazines] are on cheap paper, the cheapest paper, just from my sketching pad. It wasn’t serious artwork. I was convinced that after I painted the first ones, the scientists would say, ‘Yes, that’s really interesting. Let’s run to those places and collect.’”

She traveled back to Ticino, to the insects she knew so well. Although fallout from Chernobyl had been less concentrated there than in Sweden, the climate was milder. As the contamination rained down, insects in Ticino were already feeding on vegetation that had not yet sprouted farther north. She collected bugs and leaves, and she found three pairs of *Drosophila*, which she brought back to Zürich and bred in the kitchen of her apartment. “I sat in front of the microscope night after night trying to keep up with the rapid propagation,” she wrote. It was a full-time job, but she was “possessed by the need to see and discover.” She prepared special food, cleaned out the jars, accustomed herself to the stench, and tended to the exploding population. The prize, her terrible reward, was quickly apparent: “I was horrified by what I saw.”

**3.** IN OUTLINE, it’s quite simple. The international nuclear regulatory agencies—principally the International Commission on Radiological Protection (ICRP) and the UN Scientific Committee on the Effects of Atomic Radiation—calculate the dangers of radioactivity to human health using a threshold. Although many scientists admit that the mechanisms of radiation damage to cells are poorly understood, that the composition of emissions from nuclear installations vary substantially, and that

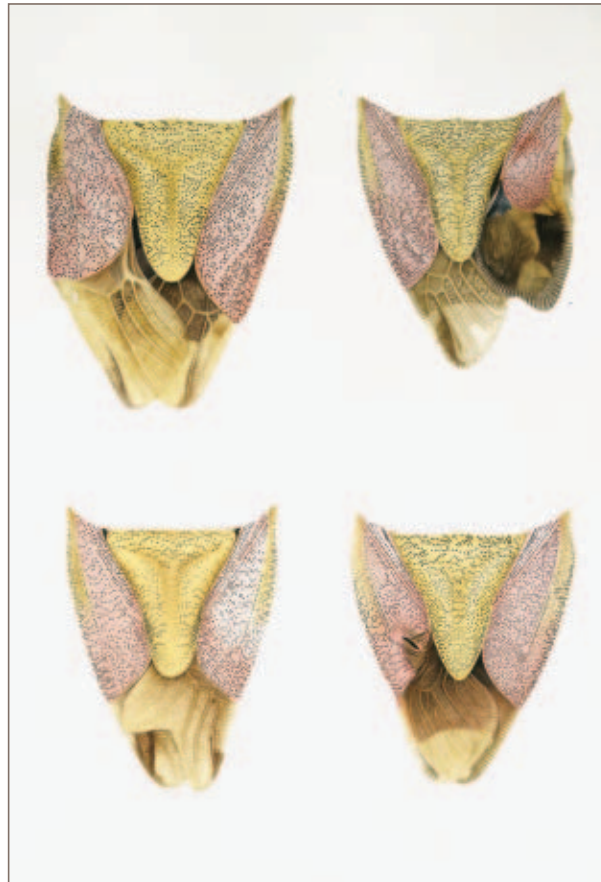
different bodies (not to mention different organs and different cells at different points in their development) respond to contamination in quite distinct ways, the threshold establishes a universal tolerance level below which emissions are considered safe. In the tense days following the disaster at Chernobyl, it was the logic of a fixed threshold that allowed government experts to reassure their nervous publics that the dangers were negligible.

The ICRP derives its threshold from a linear curve extrapolated from rates of genetic (reproductive) irregularities, cancer, and leukemia among the survivors of large-scale nuclear events.

Since those calculations began, the prime data set has been drawn from survivors of the 1945 bombings of Hiroshima and Nagasaki. The initial radiation dosage at those sites was extremely large and distributed in a short period. The resulting curve emphasizes the effects of exposure to artificial radioactivity at high values. Low-level radiation, such as that emitted over long time periods by normally operating nuclear power plants, appears relatively, if not entirely, insignificant, its effects falling within the range of the “natural” background radiation emitted from elements present in the Earth’s crust. The assumption is that large doses produce large effects; small doses, small effects.

A number of scientists unaffiliated with the nuclear industry, and frequently in alliance with citizens’ groups from areas close to nuclear plants, describe an alternative curve. Following work carried out in the 1970s by the Canadian physicist Abram Petkau, they argue that the effects of radiation are best captured not by the official linear curve, in which a double quantity produces a double effect, but by a “supralinear” curve, which registers far higher effects at low doses. In the supralinear curve, there is no safe minimum dose above zero.

These researchers often begin with epidemiology, carrying out their own population surveys downwind or downstream of nuclear installations, looking for statistically significant correlations between localized clusters of disease and sites of low-level



ABOVE: Wings of four tree bugs, La Hague, France. Watercolor, 1999.

radiation emissions. Working from the assumption of a causal relationship between emissions and sickness—an assumption reinforced not only by the epidemic proportions of some of these clusters but also by the secrecy of the industry—their focus is on the identification of the mechanisms by which low dosage disrupts biological function.

For example, Chris Busby, a British physical chemist and antinuclear campaigner, emphasizes two critical but overlooked variables: cell development and the random behavior of artificial radioactivity. Under normal conditions, Busby argues, a cell (any cell) is hit by radiation approximately once a year. If the cell is in its normal quiescent mode, it is fairly robust. However, during times of active replication—a repair mode that can be triggered by various forms of stress—the same cell is highly susceptible to radiation. At those moments, it exhibits considerable genomic instability, and two radioactive “hits” produce a far greater effect than just one. Moreover, Busby says, the ingestion of radioactive materials through food and water has effects quite distinct from those of external exposure. Certain types of internal radiation associated with, for instance, drinking contaminated milk can produce multiple hits on an individual cell within hours. If a cell receives a second hit of artificial radiation while it is in active replication mode, he claims, it is up to one hundred times more likely to mutate.

In Busby’s theory, the level of vulnerability of a cell is exacerbated by the random, discontinuous waves characteristic of artificial radiation. Cornelia explained the randomness of artificial radiation to me using the analogy of bullets: it doesn’t matter how many are fired, whom they’re fired by, or even when and where they’re fired; you need only be hit by one at the wrong time and in the wrong place to suffer its effect. The ICRP linear curve assumes a constant distribution of particles and a predictable effect. If, as many argue, those are invalid assumptions, the levels of environmental susceptibility to the effects of radioactive

contamination are likely to be dramatically elevated—indeed, they are likely sufficient to explain the epidemiological evidence of elevated mortality in human, animal, and plant populations in sites subject to more or less routine radioactive emissions.

Low-level radiation campaigners would no doubt have predicted the experts’ response to Cornelia’s article in the *Tages-Anzeiger Magazin*. Reiterating the official position that the fallout from Chernobyl was too small to induce mutations, scientists stated simply that the explanation must lie elsewhere. Cornelia’s methodology, they argued, did not adequately control for alternative causal factors, such as pesticides and parasites. She offered no comparative baseline, no reference habitat free of contaminants in which a normal rate of variation for the species could be measured. In fact, they pointed out (ignoring the limited character of her claims), she offered no numbers at all, either for dosage or for incidence of deformities. The scientists dismissed her evidence and rebuffed her appeals to their expertise. It was a scenario she would witness repeatedly:



*I showed my bugs and flies to all the professors with whom I had previously worked. I even brought the Director of the Zoological Institute, a professor of genetics, a little tube of deformed living flies. He didn't bother to look at it, and said an investigation would cost too much time and money. He said*

*that since it had already been confirmed that small doses of radiation would not cause any morphological damage, the expense was in no way justifiable.*

From the outside, of course, it seems almost too obvious: her amateur status, her gender, the sensitivity of the issue, the closed character of the industry. Always the same questions: What qualified her to attribute causality to the deformities she found? What qualified her to distinguish mutations induced by radiation from the naturally occurring variation expected in any given population?

ABOVE: Damsel bugs, Paul Scherrer Institute, Switzerland. Watercolor, 1988.

What qualified her to develop her own methodology? What qualified her to feed the hysteria of a public made paranoid by Chernobyl? What qualified her to contradict those who were qualified?

But beyond the scientific community—and, it is important to say, among the few scientists already sympathetic to the anti-nuclear movement—the response was far from hostile. She made radio appearances and received large quantities of encouraging mail. After the first article, the opposition German Social Democratic Party called for an investigation into the local effects of Chernobyl. After the second, the Swiss government, forced to respond to public pressure, agreed to sponsor a doctoral dissertation on the health of heteropterans across the federal territory.

Nonetheless, the antagonism of the scientists unsettled her, and it is probably worth remembering just how controversial nuclear power was in Europe following Chernobyl. The Swiss antinuclear movement was vocal and politically effective, and Cornelia's bombshells exploded in the media just as activists were canvassing for the 150,000 signatures required to enforce a third referendum on the restriction of the industry. The first two votes (in 1979 and 1984) had been narrowly defeated, but this one, held in September 1990, would result in a ten-year moratorium on the construction of new reactors. It was impossible to intervene in this issue and remain innocent. Yet Cornelia appears to have thought of herself still as within the fold of science, if not openly acknowledged as a lay expert then at the least as a fellow traveler contributing through her skills as an artist.

She finds a cicada with a grotesque stump growing from one knee and takes it to a former professor. "Years before," she wrote, "I had collected insects with him for the fauna courses at the university. I had learned from him how to set up a professional collection of insects. It was his schooling that had made me the meticulous scientific illustrator I had become." The professor admits he has never seen this kind of deformity before but dismisses its significance and scolds her like a child for the article

in the *Tages-Anzeiger*. Don't think you are a scientist just because you have drawn pictures for me and my colleagues, he tells her.

It was a decisive moment, and again it seems that—to use her word—she was "possessed," taken over by a visceral conviction of vision, of seeing something invisible to others, seeing the minatory sicknesses of these invisible insects.

I don't want to write a hero story. But let me tell you what she did. On discovering that no one in Sweden was investigating the effects of Chernobyl on animals and plants, she returned to Switzerland and reviewed the criticism of her first article. If, as

the scientists insisted, low doses of radionuclides were not producing these disturbances, there should be none found around the famously clean Swiss nuclear plants. Unsure of what to expect, she traveled to the cantons of Aargau and Solothurn and hiked around their five nuclear installations. The deformed bugs she found at every turn were the subject of her second article in *Tages-Anzeiger Magazin*, a focus of even more controversy than the first. "I believe," she wrote in her conclusion,

*we must pursue [the causes of these disturbances] with the best and most sophisticated methods at our disposal, and with a level of funding I cannot afford. With my illustrations I can only point out changes. I make them visible. With this work I allow myself to point to a crisis in the investigation of the effects of artificial low-*

*level radiation, and further to call for scientific clarification at a broader level. I cannot go further with the means at my disposal. But more detailed investigations are both possible and necessary.*

**4** I'M LOOKING AT a painting of a garden bug from Küssa-berg, in Germany, close to the Leibstadt nuclear power plant in Aargau. The entire neck plate is distorted; the bulging blister on its left includes an unusual black growth. Cornelia's painting is delicate but meticulous. In color—many shades



ABOVE: Scentless plant bug, Würenlingen, Canton Aargau, Switzerland. Watercolor, 1988–1989.



of gold—and at full size (this one is seventeen by twelve inches; some are far larger), it is strikingly beautiful. The composition, unsparing, is typical. On featureless white backgrounds, she emphasizes the insects' architectural properties, their structure and monumentality as well as their decorative surface. The poses are formal and explicitly contrived. She repositions legs and wings to expose deformity; often, for the same reason, she leaves out limbs or body segments or just sketches them in outline.

Leaving behind scientific illustration, which, she explains, relies on nineteenth-century techniques of light and shadow, she adopted the color perspective pioneered by Cézanne and the cubists, creating spatial effects through relations between colors (employing contrasts of intensity, temperature, and value) and—like Goethe, Rudolph Steiner, and Josef Albers—attending to the subjective and relational nature of color perception. Light and shadow, she says, is “historical”: it captures one particular moment, freezing light and, with it, time; color perspective, on the contrary, is timeless, outside time. Then she shows me how, as she paints, she shifts the position of the insect under her microscope so that the finished image is a composite of several angles, again calling up the cubists and their multifaceted renderings of simultaneity.

These watercolors are realistic but not naturalistic (she detests naturalism in painting; naturalism, she tells me, encourages the viewer to focus on the “reality” of the image, on the skill of the artist, on the artist’s “vision”). With rare exceptions, her animals lack all animation. Their physicality foregrounded, they have the aura of specimens. Each painting is a portrait, and each insect is a subject, a specific individual. She tells me, “I like that the insect can be itself. That’s why I choose to paint the individual as it is. I could, for instance, paint one that has five different defects that I find in an area. I don’t do this. I want to show the individual.” On display, the insect hangs, massive, stunning in its detail, supplemented by a label that identifies the date and site of its collec-

tion, as well as its irregularities, and that grounds the atemporal image in time, place, and politics. Sharing much of the visual grammar of the biological sciences, the paintings seem mutely dispassionate, resolutely documentary. But so thoroughly in the world, they shimmer with emotion.

Cornelia once told me how the first time she saw a deformed leaf bug, so tiny, so damaged, so irrelevant, she lost her mental balance, her perspective, her sense of scale and proportion. For a moment, she was unsure if she was looking at herself or the animal. She paused in her narrative. “Who cares about leaf bugs?”

she said. “They’re just nothing.” She was recalling her earlier life, as the teenage daughter of famous artists, describing how she hung back in the shadows, unobserved, as her parents entertained Mark Rothko, Sam Francis, Karlheinz Stockhausen, and other luminaries in New York, Paris, and Zürich (“no one would even see me or recognize me. . . . I would never interfere”). And she was recalling how in twenty years her husband never visited her studio, and how, when her son was born, the doctor came into her room and made a drawing for her to break the news that her child had a club foot, and how, when she saw that first deformed leaf bug in Sweden, it had a crippled foot too. And she was telling me how, when she saw that first crippled insect, in the shock of all those experiences colliding so suddenly with such unanticipated force, she had to fight physically to



stop herself from throwing up.

And just a few moments later, in the failing afternoon sunlight in her Zürich apartment, she said, “In the end, the picture is everything. Nobody sees the insect itself.” And it was my turn to pause, because I didn’t quite know what she meant. It sounded like a lament, a disappointment that her images are too instantly domesticated, reduced to the iconic, that they too easily make the leap from invisibility to enormity, too effectively stand in for human fears, too readily bring self-concern to the fore, so that the individual insect—the one she found (“it’s heaven on earth!”),

ABOVE: Scorpion fly, Reuenthal, Switzerland. Watercolor, 1988.



captured (“they can move very quickly”), killed with chloroform (“I always tell myself this is the last summer”), pinned, labeled, added to the thousands already in her collection, and finally came to know so intimately through microscope and brushes—seems again and again to be overlooked, to have become lost.

But then I remembered Cornelia saying that if she were freed of the compulsion to paint deformities, if she were free to paint whatever she chose, her work would follow the path laid out in the painting of the mutant eyes she completed before her life was interrupted by the journey to Österfärnebo. And I realized that her lament was not only for the loss of the individual insect. In that painting, she offers the insect not as being or subject but as its antithesis: the insect as aesthetic logic, as coalescence of form, color, and angle. This is work that draws explicitly on her background in concrete art, an international movement centered in postwar Zürich in which she received her initial aesthetic training, and in which her father, Gottfried Honegger, was a prominent figure.

Concrete paintings tend toward geometric patterns, high-contrast color blocks, glassy planes, and the refusal of figurative or even metaphorical reference. Kazimir Malevich’s programmatic *White on White* (1918), a white square painted on a white ground, is perhaps the movement’s founding document. Casting themselves as aesthetic radicals breaking with the conservatism of representational art, the founders of concrete art looked to Soviet constructivism, to the geometry of Mondrian and De Stijl, and to the formalism of Bauhaus. Abstract art, searching for a visual language based in symbols and metaphor, is still tied to the object it mimics, is still asking what that thing is, how it can be made sense of, how it can be communicated. For concrete artists, the work should speak of nothing but itself. It should reference nothing outside itself. It should leave the viewer complete interpretive freedom.

It took me a long time to understand the importance of these aesthetics for Cornelia. On the one hand, it seemed clear that her

sensuous attention to the insect contravened their most basic premise: the determination to shatter the connection between art and material objects. Yet I knew from our conversations that in the moment of painting, Cornelia sees form and color, not the independent object. Nor is there anything accidental in the formality of her portraits or the repetition of the poses. All is geometric, the insects located on a grid that she systematically completes. Her method is both highly precise and, in the sense that the outcome is contingent on what is present under the microscope, substantially random. It is not unusual that, after finishing a painting,

she discovers that the insect is deformed in ways she hadn’t noticed before. Her painting practice, she insists, creates a rigorous break, removing her environmentalist politics and her sympathies for the animal from the image, so that the paintings themselves are freed of her presence. “My task,” she told me, “is just to show [the insect] and to paint it, not to judge it.” Viewers, she says, must search for meaning in the picture unburdened by her message.

But, I wondered, with the strength of her commitment to antinuclear politics and to the insects themselves, and with the descriptive labels accompanying the images and all the controversy that has surrounded her work, how could either she or the viewer avoid judgment? “I do think it’s possible,” she replied. “When I sit there and draw, I want nothing else than to be as precise as possible.

It is not simply politics: I have a deep interest in structure in nature.” But what kind of non-object art can be based so strongly in objects? Can her pictures be both “deeply in the world,” as she puts it, and speak of nothing beyond themselves? Isn’t there a contradiction between these twin impulses of her painting: to recognize the individual insect and simultaneously to efface it into an aesthetic logic of form? Yes, she says without hesitation, her work is really neither concrete nor naturalistic. And according to many, it is also neither science nor art. Perhaps, she laughs, that’s why she so rarely manages to sell any of it!



ABOVE: Squash bug, Rohr, Canton Aargau, Switzerland. Watercolor, 1995.

**5.** IN THE YEARS SINCE the *Tages-Anzeiger* articles, Cornelia has devoted herself to investigating the health of heterooperans near nuclear power plants in Europe and North America. She has collected at Sellafield in northwest England (the location of the 1957 Windscale disaster); around the Cap de la Hague reprocessing plant in Normandy; at Hanford, Washington (site of the plutonium factory for the Manhattan Project); on the perimeters of the Nevada Test Range; at Three Mile Island, Pennsylvania; in Aargau during every summer from 1993 to 1996; and as an invited participant on a 1990 tour of the zone surrounding Chernobyl. She lectures, speaks at conferences, organizes exhibits of her paintings in collaboration with environmental groups, and is working on a large-scale project with the group *Strom ohne Atom* (Electricity without Nuclear Power) to document the distribution of eleven types of morphological deformities (missing and misshapen feeler segments, wings of different lengths, irregular chitin, misshapen scutella, deformed legs, and so on) among sets of fifty insects she is collecting at each of twenty-eight locations in Germany.

She has succeeded in forming some important relationships with scientists. At Cap de la Hague, for example, Jean-François Viel, a professor of biostatistics and epidemiology at the University of Besançon who has identified a leukemia cluster among local residents, collaborated on the statistical analysis of her collection. But in general she has become more cynical about enlisting experts and instead responds to critics directly through her research design: her data collection is more systematic, her documentation more rigorous, and her paintings are no longer the rapid sketches of those first frenetic field trips. In interviews and publications, she has begun to explicitly address methodological questions, arguing that there can be no reference habitat on a planet thoroughly polluted by fallout from aboveground testing and emissions from nuclear power plants. She is also careful to point out that she is documenting induced deformi-

ties to somatic cells rather than heritable mutations. (“I cannot say they are mutations because I cannot prove it, and if I cannot prove it, I don’t think I can say it,” she tells me.) In this way, she emphasizes her own expertise, strengthening her intervention in those nonscientific arenas where her talents are valued, publicizing her findings through environmental organizations, mass media, and cultural institutions.

These tactics free Cornelia to act as an environmentalist, to participate in a world in which the politics of scientific proof have been replaced by the precautionary principle, which asserts that a well-founded fear of potential danger is a sufficient basis on which to oppose the deployment of a policy, practice, or technology. They free her from the shadow of science, from having to assert herself against a set of methodological and analytic standards that are always impossible to achieve because they are always institutional—that is, recognized only among those with the requisite credentials (a doctorate, an affiliation, a professional network, a funding history, a publishing record). The irony, of course, is that no one understands her scientific inadequacies better than Cornelia herself. And no one—as the tone of those early articles and her petitioning of professors showed—was more willing to accept the conventional subordinate role of the amateur as the handmaiden of the scientific expert.

But it is not as if acceptance in the art world has been any easier. In a sympathetic essay, the painter and critic Peter Suchin writes that “for one audience Hesse-Honegger’s practice is invalidated by its ‘artistic’ manner, for another it is simply not artistic enough.” In this arena, her work is too assertively realist and too tied to illustration, which, Suchin continues, “many would claim . . . is not ‘art’ but mere technique, a formulaic manner of record-making, largely devoid of the innovative, critical, and transformative qualities frequently associated with artistic production.”

Cornelia’s unwillingness to respect epistemological boundaries seems to make art critics as uncomfortable as it does scien-



ABOVE: Ladybird beetle from Richland, near Hanford, Washington, USA. Watercolor, 1998.

tists. Her paintings insist that it is the boundary itself, rather than its breaching, that is the problem, that science and the visual arts belong together, that their separation is, as Galileo's vibrant lunar washes make clear, an artifact of the historical slicing of knowledge into ever more specialized and ever less ambitious disciplines. She claims scientific ancestors in Gesner, Merian, and Galileo, all of whom understood that active seeing through painting and drawing is the basis of scientific inquiry, that the empirical method begins with the artist's development of a mode of attention grounded in the close observation of nature.

But vision, perception, and attention are just a part of the story. After the publication of her second *Tages-Anzeiger* article, Cornelia traveled to Sellafield. Because contamination from the reactor there was known to be severe, she expected to find a larger number of damaged insects and deformities more serious than those she found near Aargau. But the difference between the sites was insignificant. Soon after, when she visited Chernobyl, she was surprised—and awkwardly disappointed—to discover that even there insect life was no more disturbed than in Switzerland. A period of introspection followed, a moment, it seems, of a more profound breaking with the science in which she had been trained at the Institute of Zoology. “Sitting gloomily in my rooms in England, I had to admit that my work was still based on the beliefs of scientists in Zürich and on a linear, or proportionate, increase of the effects of radiation. I was the one wearing blinders. I'd been looking for evidence that would confirm my own assumptions.”

The solution lay in a return to the principles of concrete art, to its affinity for science as a shared site of rationality, and in particular to its understanding of randomness. Random thinking was something Cornelia had already integrated into her painting practice and her aesthetics. Staring down the lens of her microscope in northwest England, she sees the evidence of her observations again and again contradicting the preconceptions she is imposing on the irradiated landscape. She sees contingency at every turn: “Each nuclear power plant emits its own

nuclear cocktail. Every landscape with its own characteristic meteorological and topographical conditions reacts differently.”

Such symmetry! And what grim satisfaction when it all comes together: the contingency of landscapes and bodies, the concrete aesthetics of chance, and the random behavior of artificial radionuclides. Something like randomness, a combination of contingency and chance, is now an analytic as well as an aesthetic:

*If one wants to systematically explore the relationship between one thing and another, one should not expect to find a neat equation of cause and effect. This is certainly not a revolutionary discovery. Every statistical investigation is based on the random distribution of characteristics. But in my opinion, this is important not only in science and statistics, but also in art. In art I consider it increasingly important to experiment with chance, because the strength of artistic representation lies in perceiving every single thing as a unique event.*



With her growing alienation from mainstream science and her increasing proximity to antinuclear activism come not only a willingness to critique nuclear science as a corrupt enterprise but also a renewed sense of science's epistemological limitations. Some of this grows out of her sensitivity to the vulnerability of the nonhuman universe of bugs, flies, and leaves. Some comes from personal disenchantment. And some seems to derive from lectures she

attended two decades ago by the Austrian physicist and philosopher Paul Feyerabend, famous for arguing against proscriptive method and for the equivalence of multiple ways of knowing. I think I hear echoes of Feyerabend's iconoclastic “epistemological anarchism” when she tells me how scientists conceive too much in linearities, and I think I hear them again when she tells me how they visualize objects as discrete and unconnected, quarantining the issues they study and relieving themselves of the problem of politics, as if both systematic and random connections did not exist, as if the problem of the atom were not deeply

ABOVE: Ambush bug near Three Mile Island, Pennsylvania, USA. Watercolor, 1991.

tied to the problems of clean water, clean air, dying forests, and poisoned food, as if this were not a problem of ways of living as much as ways of knowing.

**6** I FIND AN UPSTAIRS window seat on the double-decker train. Zürich gleams in the morning sunshine, all strong colors, deep shadows, and crisp air. The clouds clear. The train rattles out to the airport. As the city flattens into suburbs and objects beyond the window blur into indistinctness, I begin to think about how Cornelia's portraits dissatisfy her, how they elicit the wrong response. People see only the iconic figure of the insect, she'd told me, never the individual insect itself. They see a biological indicator pathetic in its beauty, a warning sign, a prophecy of a day already dawned.

Yet somehow the portraits also achieve a doubling, a breaching of the lines between human and animal. These intensely direct paintings embedded so strongly in fears of invisible poison and malevolent corporate power enforce identification across the most radical of gaps by insisting on the most fundamental of commonalities—physical vulnerability, mortality—and by evoking a sense of humility in the face of complex beauty. Her portraits and the controversy she generates around them force people to transcend species difference by recognizing a conjoined fate, a common witnessing, a shared victimhood. It is quite unsettling: the eye of the painter and the viewer suspended between the clinical and the empathetic, a loss of stable distinction between subjects and objects, between intimacy and distance, between humans and insects.

Cornelia makes meticulous spiral-bound books of her field trips, just a few copies of each. Over the years they have become more elaborate and now include her photographs of the sites she visits as well as maps, statistical appendices, lists of the collected insects, and color photocopies of her paintings. Interspersed among these is her journal, a day-by-day account of the trip that includes descriptions of her encounters with people, plants, and animals.

At the end of one of these books, she includes a photo of herself standing at the entrance to the Hanford reactor in Washington State. Mindful of the hostility she faces, she calls this image “a document, necessary to make people trust that I was really there.” She looks happy in the picture, the “scientific artist” laughing with the guard who helped her select the best angle for the shot.

She is doing something important, deeply in the world, living with the disappointments, managing the contradictions, feeling part of everything, feeling very connected, showing herself as a whole, very much alive. ✎

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## Correcting the Landscape

Is it important that it was twelve below  
and even though the wrecked jeep belonged to Pat  
it felt like stealing to go through the chain link  
into the deserted scrap yard, jack up  
each corner and switch out his new tires  
with our old bald? It was twelve below.

The snow squeaked underfoot like Styrofoam.  
We were trying to make it in a place  
where everything we thought we needed  
—insulation, wool, tomatoes—  
had to be shipped in from Outside.

There was a raven calling, watery cluck  
echoing the lot. There was us cursing  
the lug nuts, then another sound,  
out of place, high and keen

and you and I startle like any goddamn bird.

I see your head tilt,  
ear to the sky, and while Anne is jumping  
blood back into her toes and Pat is wrestling  
with the left rear, there is within the scene another:  
A peregrine calls and we both look up, catch each other doing it,

then laugh. Because it's not likely a falcon here,  
February in central Alaska. The call sounds again,  
and a few pigeons wheel up, birds that arrived with

the wires and poles. And that's why we hear it,  
set on some timer to cry away rock doves,  
those pushy, urban opportunists without which  
we'd most likely not be here, at the foothills  
of the Chugach, throats cold in the day's short light.

—Elizabeth Bradfield