Between Technological and Organic; Between Science and Fiction—Junctions and Extensions

Nathalie Bachand

> What if technologies were designed to adapt themselves to natural processes and entities, rather than the other way around? Can we envision technologies that are not meant to control nature but rather to take part in an ecosystem, trying to survive while allowing other processes to flow? Can we give artificial agencies the right to make mistakes? Can we allow them to be gracefully weak, imprecise, and hesitant, just as we are?
>
> Sofian Audry, *Art in the Age of Machine Learning*[1]

> … the universe literally makes matter out of information.
>
> Mark Alizart, *Informatique céleste*[2]

An unidentifiable body rests on a building; sounds emanate from objects with organic contours; bio-morphic spheres are animated by hesitant movements and light signals; protean entities progress, inhale and exhale, rather indifferent to our presence.

These are just some of the behavioral elements that characterize a certain body of work by Rosalie D. Gagné. These "acting" works emerged parallel to a practice in which the material had long tended to overflow, to exceed, and in so doing to be contained by supporting structures, wires and iron rods, mesh and fastenings. In these early works, glass, water, and other liquids of unknown origin seem to want to become autonomous, to break free from their material limits. This "living" matter

1. Sofian Audry, *Art in the Age of Machine Learning* (Cambridge, MA: MIT Press, 2021), 15.
2. Mark Alizart, *Informatique céleste* (Paris: PUF, 2017), 96 (my translation): "… l'univers fabrique littéralement de la matière avec de l'information."
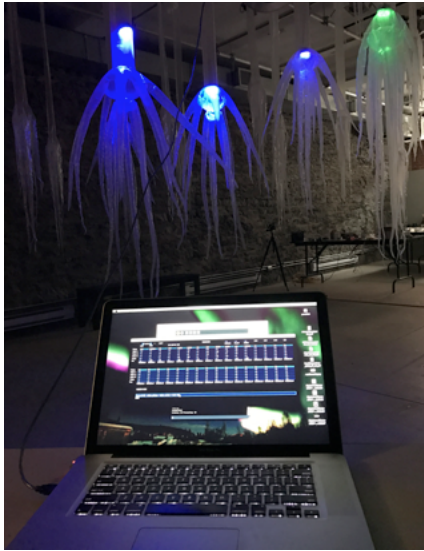
Computer programming used in *Artificial Kingdom IV,* 2020.

clearly wants to organize itself, to exist. We're moving into a register where substances become self-operating systems, and the organic becomes tied to the technological.

This register, long the preserve of science fiction, is now as close to reality as it gets. Biological emulation is already an integral part of our most familiar technologies. Think of the raw material of our screens, synthetic liquid crystals, which exist first and foremost in nature and in our bodies;[3] the "eyes" of our camera lenses; DNA as the carrier of genetic information, which, while not a program, is not entirely foreign to the notion of computer code. We should also mention artificial intelligence, whose recent advances leave no doubt as to its ability to imitate human thought to the point of deceiving us. The interweaving of the technological and the organic is tighter than ever, and these examples are only broad outlines, drawn quickly from what is revealed in the media about laboratory work. On the other hand, there's a lot we don't know.

Then there's the realm of science fiction, creation and art. The term itself says it all: we're dealing with a fictional relationship with science. Anticipation of what's to come is an effective engine of projection. And because science has accustomed us to a certain pace of discovery and innovation, there are always plenty of opportunities to imagine different directions based on the information available. If science fiction is an accepted trend in literature and cinema—Isaac Asimov, Philip K. Dick, and J. G. Ballard come to mind, as do Fritz Lang, Stanley Kubrick, and David Cronenberg, to name but a few—its relationship with contemporary art is rarely labeled. Its presence is instead pervasive, punctual, without being named.

Crossed by the speculative dimension of scientific research, and by the fiction that this research stimulates, Gagné's work creates spaces where the organic meets the technological. The notion of biomimicry, that is, inspiration from the properties of the biological, characterizes this borrowing from the organic and the living. The formal aspect of biomorphism is coupled with a capacity for imitation that is reinforced by the integration of technologies. Works such as *Murmures internes*

3. Kheira Bettayeb, "Nature's Liquid Crystals," March 21, 2018, CNRS News, accessed January 3, 2024, https://news.cnrs.fr/articles/natures-liquid-crystals

(*Inner Whispers*) (2006) (p. 71) and *Alvéole* (*Alveolus*) (2007) have thus emerged, in which the relationship with the living is asserted through electronic devices that result, on the one hand, in a sonic presence and, on the other, in a potential for movement and reactivity. These works mark a turning point toward new biomimetic explorations. They contain junction points where latent elements have crystallized to open up transversal trajectories and constitute extensions that are both parallel and complementary.

What breathes: a mechanic
Artificial Kingdom I-II-III-IV (2009–20)

The overflowing matter of the first sculptural objects and installations finally finds a form of autonomy and agency through the integration not only of electronic devices, but also through the appearance of inflatable structures in Gagné's plastic and visual language. *Alveolus* is the first piece in the series of "breathing inflatables," as the artist calls them. Inspired by one of Buckminster Fuller's many models, it is a hybrid creature, between kinetic sculpture and architectural structure. The three-meter-high work, unfolding in eighteen tentacular protuberances of translucent polyethylene, is reminiscent of the transparent potential of glass, one of the artist's favorite materials. And just as glass can be "blown," polyethylene takes shape thanks to the air produced by a fan, activated by a

Alvéole (*Alveolus*), 2007.

microcontroller. It's also the beginning of a proliferating body of work: the active actualization of matter that has long tended to transcend its own substance. The behavior in question, however, remains purified of intention: the work exists through this quiet, stable breathing. The maintenance of rhythm is also the maintenance of form, whose

Règne artificiel (*Artificial Kingdom*), 2009, Gallery L'Oeil de Poisson, Québec.

Règne artificiel II (*Artificial Kingdom II*), 2010, FOFA Gallery, Concordia University, Montreal.

lightweight movement suggests the possibility, if not of flight, at least of deployment on a greater scale. It is the technological dimension that now controls the work's potential for development: no longer constrained by the inertia of the material, it becomes mechanized and articulated, interactive and autonomous. The imprint of the technological over the organic—whether real or evoked—generates a form of active biomorphism.

   As is often the case with technological developments, the emergence of inflatables in art, design, and architecture is dependent on military research and applications initially reserved for their own use. During World War II, dummy tanks were used by US Army Special Forces to deceive the enemy. A whole battalion of inflatables, including tanks, trucks, and airplanes, accompanied by the re-creation of the sounds of explosions broadcast

over loudspeakers, followed the troops to make them appear far more numerous and powerful than they really were. This "Ghost Army" is an example of the mimetic potential of an inflatable structure.[4] In the right conditions of visibility or invisibility, the lightweight replica becomes the double onto which we project the characteristics of the real object. The versatility of this type of structure, however, means it can go far beyond the reproduction of real objects. Radical architectural collectives such as Archigram in the UK and Ant Farm in the US have explored the utopian potential of these inflatable constructions. Then, as if by natural porosity, art became a privileged territory for creating participatory experiments, such as the *Pneutube* (1968) by

4. See the Ghost Army Legacy Project, https://ghostarmy.org/
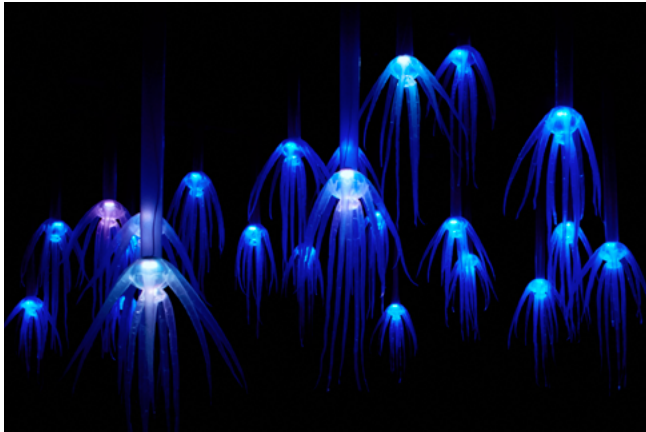
Règne artificiel III (*Artificial Kingdom III), 2017*, Espace de diffusion Parc–Extension, Montreal, Québec.

Règne artificiel IV (*Artificial Kingdom IV*), 2020, Grand Théâtre de Québec.

the Dutch collective Eventstructure Research Group, or politically charged interventions by artists like Hans Haacke or Christo and Jeanne-Claude in the 1960s and 1970s. Notable events have also contributed to the inflatables' status as a cultural phenomenon; let's just think of the Osaka World Expo in 1970, with the imposing Fuji Group pavilion by architect Yutaka Murata.

While the 1973 oil crisis diluted the general enthusiasm that characterized the era—followed by a growing awareness of the harmful effects of plastics—a revival emerged with the emergence of more environmentally friendly technologies in the early 2000s. Gagné's *Règne artificiel* (*Artificial Kingdom*) *I-II-III-IV* series, 2009–20, is part of this resurgence. Consisting of a variable number of inflatable polyethylene elements, each installation in this series unfolds like a gathering of luminous

creatures. Presented in nearly dark environments,[5] it is in the half-light that these works blossom and reveal their complexity. Animated by fluctuating glimmers and breathing through small fans, these installations become more intensely active as visitors approach them. The biomorphic character of this series emanates in particular from the swarming effect of the suspended objects. As I've noted elsewhere in connection with *Artificial Kingdom III* (2017), it's "the air that instills the movement of a mechanical life, a mimesis of subaquatic existence. Suspended overhanging in the darkness, the inflatable polyethylene bodies evoke the hidden nature of the seabed—subterranean movement, meanders

5. With the exception of *Artificial Kingdom I* (2010), which is presented in a white space, accompanied by bluish external lighting.

of the subconscious."[6] The reference to the aquatic universe is articulated in a relationship to the aerial world: the water of the "artificial kingdoms" is merely an idea, yet an effect of presence is undeniable. On the other hand, air is the real material: it is the latter that is the overflowing matter, by definition immaterial.

The vacancy created by this "immaterial" is now filled by electronic and computer devices that activate the works. The notion of interaction between natural and artificial systems occupies a privileged space here. The artist is freely inspired by the so-called reactive architecture movement. Biomimicry then stems more from technological simulation, from functions and behaviors that belong to the living world, than from a formal relationship with matter, as was the case with her early glass sculptures such as *Système circulatoire* (*Circulatory System*), 2000 (p. 63) and *Effet papillon* (*Butterfly Effect*), 2007 (pp. 76–77). The simulation generated by these reactive systems enables us to go beyond simple biomorphic evocation and place the public in the presence of an entity

whose behavior reveals a certain level of autonomy. Nicholas Negroponte's research in the early 1970s leads to the notion of reactive (or responsive) architecture,[7] in relation to cybernetics' exploration of certain spatial design problems. This initial paradigm then extended its territory to computer science itself: reactive programming being the key to this type of system characterized by the qualities of responsiveness, flexibility, and resilience. Whether we're talking about computer programming or architecture per se, this means that what activates a set of elements functions, to a certain extent, like a living organism, and that the induction of a reaction is extended into effects and actions that, in turn, feed this systemic loop. To mention just one: the first robotic sculpture

6. Nathalie Bachand, *Un million d'horizons* (Montreal: Ville de Montréal, Service de la culture, Division du développement culturel, 2017), 53. *Artificial Kingdom III* was presented at Espace de Diffusion Parc Extension in Montreal in 2017, as part of the event titled "Un million d'horizons (1 x 19 = 1,000,000)," celebrating the 375th anniversary of the founding of Montreal by the city's Accès Culture network, through the organization of thirty-two exhibitions presented May 18–September 9, 2017, throughout all of Montreal's boroughs, and of which I was curator.

7. In the 1970s, Negroponte published a number of articles and books, including "The Semantics of Architecture Machines" (with Leon B. Groisser) in *Architectural Design*, August 1970, *The Architecture Machine: Toward More Human Environment* (1970), and *Soft Architecture Machines* (1975). Hai-Jing Liu, has noted that these publications mark "the first attempt to define and produce responsive architectures.… Negroponte proposes that responsive architecture is the natural product of the integration of computing power into built spaces and structures. He also extends this belief to include the concepts of recognition, intention, contextual variation, and meaning into computed responses and their successful and ubiquitous integration into architecture." Liu, "From Nicholas Negroponte to Al Bahar Tower: The Development in Theory and Technology of Responsive Architecture," in *Civil Engineering and Urban Planning IV*, proceedings of the 4th International Conference on Civil Engineering and Urban Planning, Beijing, China, July 25–27, 2015 (Boca Raton, FL, 2016).

ExCroissance #2 (*OutGrowth #2*), 2017, Relais Routier Petit along Highway 20 between Montreal and Québec City.

to be digitally controlled by computer, not unlike behavior-based robotics (BBR) and reactive architecture, Edward Ihnatowicz's *The Senster* (1969–70) is an important landmark in this *parallel* history of art.[8]

What is embodied: a volume
OutGrowth #2 (2017)

Here's another parallel story. A parenthesis in the form of a bridge and a break in tone between science and fiction:

8. For more on BBR, see Michael R. W. Dawson and David A. Medler, Dictionary of Cognitive Science, http://www.bcp. psych.ualberta.ca/~mike/Pearl_Street/Dictionary/contents/B/behbasrob.html

 Mid-August 2017. In an end-of-summer heat wave, I'm driving with my windows open on Highway 20. I've passed Drummondville and the next stop could be St-Hyacinthe. Two minutes later, Relais Routier Petit promises me a meal, exit 152, 3e Rang, Ste-Hélène-de-Bagot. I turn right and leave the highway. In the twilight of almost 8 p.m., I make my way slowly toward the truck stop. A new road sign informs me that "home cooking" awaits me there, and I finally realize that I'm starving. Then something suddenly distracts me from my thoughts: a vaguely luminous shape appears in my blind spot. I see without seeing, in the distraction of my hands steering the wheel toward the service station entrance. I may have been dreaming for half a second
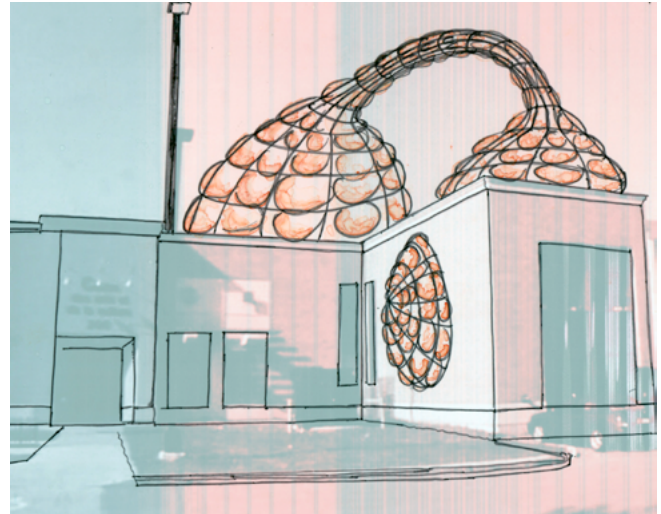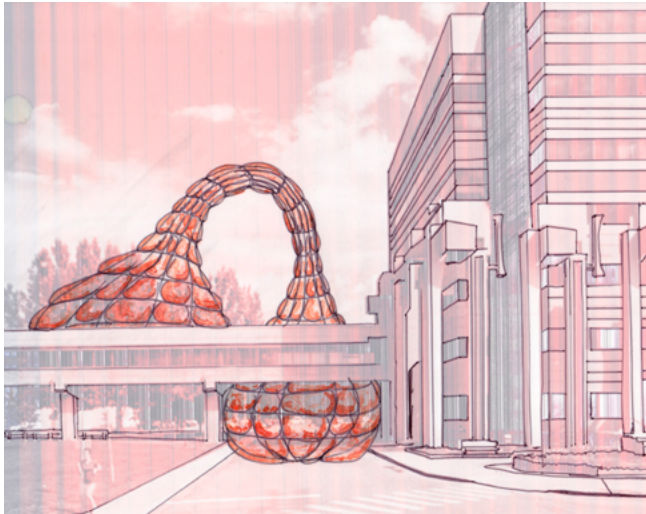
Above and opposite: Preparatory studies for the outdoor ephemeral sculpture *ExCroissance #2* (*OutGrowth #2*), 2017, photograph and felt-tip pen on Mylar paper.

after all. Twilight can be bluffing: the colors change, everything turns orange-pink and then taupe, before the structures and angles disappear. I gather up my scattered thoughts. I turn off the engine and think as I open the car door: check that I haven't seen anything incongruous, grab a bite to eat in this restaurant, think about which of the exhibitions I've just seen in Québec City I'm going to write about…. When, in the distance, on the roof of the building, the disquieting silhouette of an almost organic body stands out, as if luminescent in the almost blue hour. I don't know how long I stand there. Probably just two seconds, into which several disoriented thoughts rush: I really see something; I don't understand what I see; what does this shape refer to; its color resembles that of skin;

what material is it made of, what substance; a light seems to emanate from within, but by what means; it gives the impression of being able to move, but for the moment it remains motionless—fortunately, I say to myself. It's like entering a gallery, an exhibition room: I know the feeling, and yet it's new—that's because it's always, every time new, precisely. From there, the only thing to do is to get closer to get a better look. The only snag here is that this isn't a showroom, and my heart is beating far too fast. Science fiction references keep popping into my head: various scenes from Cronenberg's films; J. G. Ballard's short story collection *Vermilion Sands* (1971); the films *The Stuff* (1985) and *The Blob* (1958 and 1988); *The Twilight Zone*. I absolutely must get out of my torpor: someone in this restaurant

Système circulatoire (*Circulatory System*), 2000, detail.
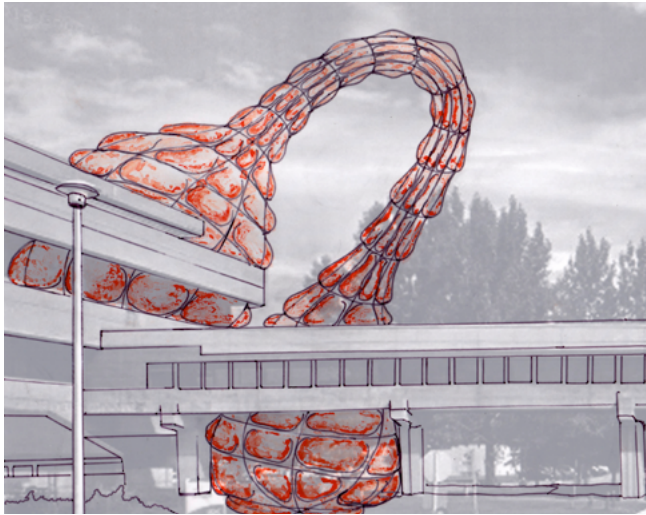
will be able to tell me what's going on. There's a rational explanation for this, there has to be. And now I know exactly what I'm going to write about—I thought, as I let the sun fall asleep behind me.

ExCroissance (*OutGrowth*) *#2* is first and foremost a body, an overflowing volume that returns, formally speaking, to the sources of Gagné's blown glass pieces. More specifically, the sculptures in the *Quinta essentia* (*Quint-Essence*) and *Cuerpos trasmutados* (*Transmuted Bodies*) corpus, from the late 1990s and early 2000s, exemplify the artist's interest in, among other things, the tension generated by the meeting of an expanding bubble of blown glass and a rigid metal structure. It's also an ephemeral intervention in public space, a literal UFO in Gagné's practice. Presented as part of the *Truck Stop* event

in the summer of 2017, the work appeared as a strange prominence parasitizing the Relais Routier Petit building in Ste-Hélène-de-Bagot.[9] Visible from the freeway, the inflatable structure seemed to be sitting on top of two buildings at once, giving the impression of a heavy substance that could possibly move, progress in a certain way—or, more worryingly, absorb the matter of the world on which it has landed. The biomorphic aspect of *OutGrowth #2* is clear here: the organic dimension is emancipated and takes over from the technological, which plays a more discreet role than in the *Artificial Kingdom* series. Nevertheless, the *thing* was sort of bioluminescent—I can still see it standing out against the twilight sky. Was it trying

9. *Truck Stop* was an ephemeral public art trail that unfurled along Highway 20, between Québec City and Montreal, June 17–August 19, 2017. Presenting fifteen original works created by visual artists and collectives in unusual locations, this event was driven by a collaboration between two artistic structures and communities, Centre CLARK (Montreal) and L'Oeil de Poisson (Québec City). https://centreclark.com/fr/evenement/truck-stop/

to communicate via light signals? That's a question I definitely could have asked myself in August 2017.

What communicates: an entity
Morphosis (2018–ongoing)

Language can take many forms. Words, then grammar, syntax, and articulation are evidence that comes to mind. With reactive architecture, it's already a form of communication that takes place between the different elements of a whole. Biomorphism, for its part, has the capacity to induce the idea of a potential for exchange: the evocation of the living can in itself convey the notion of communication. There's also the collective dream that one day mankind will be able to engage with an extraterrestrial life form, a real otherness. While *Out-Growth #2* merely suggested this type of communication with an alien entity, *Morphoses* (*Morphosis*) (pp. 90–91)—a robotic work created in collaboration with Montreal artist and professor-researcher Sofian Audry—concretizes, so to speak, a portion of this latent potential. Indeed, the overflowing matter not only organizes itself but also communicates. The set is made up of three spherical robots, identical in terms of their inner workings and algorithmic constitution. They are, however, covered with distinctive designs of synthetic silicone skins that differentiate them, inspired by Ernst Haeckel's drawings of radiolarians: protozoans found in the upper layers of all oceans. Depending on their particular

morphology, which induces various types of behavior, the spheroid robots move differently: they roll on themselves, but encounter their own levels of difficulty. This behavior is evolutionary: animated by an artificial life, these entities are equipped with adaptive robotic agents that progress and transform over the duration of their interaction, thus creating a certain level of unpredictability.

Exploring the phenomenology of living systems via automated learning, *Morphosis* offers an experience of quasi-communication between us as visitors and three mimesises of beings trying to exist to the best of their potential. The technological aspect functions here as the brain of these creatures, which corresponds to a micro-drive to learn and progress, and which is protected by a semiflexible element of identity, a specific morphology. To this is added a real-time projection of the data emanating from this algorithmic dance. With this project, the artists question the relationship between human and nonhuman life forms, bringing to the fore oppositions between art and science, natural and artificial, material and virtual, and object and process. However, these dichotomies are more about complementarity and interrelation than exclusion. The interdisciplinary movement of cybernetics —previously mentioned in connection with reactive architecture—has focused on this type of reciprocal relationship. The term was introduced by mathematician Norbert Wiener around 1948, and refers to the study of complex systems, mechanisms of

information exchange and principles of interaction between living and nonliving machines.[10] Although belonging to a different era, as well as reflecting research objectives corresponding to a certain pre-digital utopia, which dreamed of systems capable of adapting and self-regulating—recalling the Greek root of the word "cybernetics," *kubernan*, to govern—this inclusive paradigm, drawing on a diversity of scientific fields, remains relevant to the positioning of a work such as *Morphosis*.

If 1969's *The Senster* was one of the turning points in a parallel history of art in which technological developments played an active role, the following decades saw the emergence of numerous works in which communicative and behavioral characteristics as aesthetic elements were to benefit from the exponential growth of computer science. With Christa Sommerer and Laurent Mignonneau's *A-Volve* (1994), for example, programming became a medium in itself. It's a work in which our interactions with a touchscreen evoking a pool of water generate the appearance of digital marine creatures with the ability to evolve and interact with each other. The installation is based on the transformation of information as the foundation of a virtual ecosystem. Whether we're dealing with a device such as *A-Volve*'s, which imitates a form of

evolution, or with systems that have the capacity to evolve through imitation (Imitation Learning or Learning from Demonstration, LfD[11]), these artistic proposals nevertheless come together under the notion of *behavioral aesthetics*, a term introduced by artist and media theorist Simon Penny[12] at the dawn of the 2000s. *Morphosis* is part of this lineage of works that rely on computing and the development of digital technologies—almost in the manner of an ontological relationship.[13]

The question of systems and the mechanics of their cohesion lies at the heart of Gagné's work. This preoccupation has marked the different periods of her production, from sculptural installations incorporating blown glass pieces to the *Artificial Kingdom* series, which is largely based on this notion. Moving from a symbolic sensibility to a more concrete activation of systems, this exploration

11. On the machine learning method, see http://www.scholarpedia.org/article/Robot_learning_by_demonstration
12. "Artist and media theorist Simon Penny came up with the term aesthetics of behavior to describe the kind of work made by the creation of an artificial agent that interacts with the real world." Sofian Audry, *Art in the Age of Machine Learning* (Cambridge, MA: MIT Press, 2021), 13. Penny's robotic work *Petit Mal* (1989–93) is one of his most famous contributions to the field: https://simonpenny.net/works/petitmal.html
13. On machine learning, see Aude Billard and Daniel Grollman, "Robot Learning by Demonstration," *Scholarpedia* 8, nº 12 (2013): 3824, http://www.scholarpedia.org/article/Robot_learning_by_demonstration

10. See Norbert Wiener, *Cybernetics or Control and Communication in the Animal and the Machine*, 2nd rev. ed. (1948; Cambridge, MA: MIT Press, 1961).

takes a particular science fiction tangent with *Morphosis*. Here, we move away from overflowing, organic volumes to embody them in a more organized fashion. Its biomorphic character now responds to a specific behavior, that of moving according to the limitations of modalities of identity, that is, within a certain framework based on its own behavioral vocabulary. Our relationship with these three "bioluminescent" spheres is a form of real exchange that is absolutely new in this production, a priori, very sculptural and independent of our presence. The rather passive interaction to which we were invited in *Artificial Kingdom* gives way to a more targeted participation, in which we are invited to lightly manipulate the objects in order to "help" them continue their rolling trajectory. The aim is to contribute to their learning, and thus to develop an anthropomorphic relationship with these spheres, which could almost be described as entities.

Following Alan Turing's research in the 1950s, "information theorists wondered whether we couldn't understand life in terms of information and programs. The discovery of DNA in 1953 by biologists Francis Crick and James Watson proved them right. Lines of code were discovered to exist in nature. We learned that computing is not a human invention but a property of living organisms."[14] So would the

apparent imprint of the technological over the organic be just a natural inscription? An "impression" already present in matter? Or simply less forced than one might think at first glance. Similarly, fiction sometimes acts as an extension of science, conversely if not reciprocally. These notions—technological and organic, science and fiction—which run through Gagné's practice, act as four junction points of an irregular quadrilateral, whose perimeter is constantly being redefined according to the corpus that emerges from the artist's creation. And in this reconfiguration, the biomorphic organization of matter and the rules that govern it give rise to works that breathe, embody, and communicate—works that inform us of their very existence.

Nathalie Bachand is a writer and independent curator based in Montreal. She is interested in digital technology and its conditions of emergence in contemporary art. She is currently Director of Digital Arts Development at the art center Sporobole (Sherbrooke, Québec). A member of the International Association of Art Critics, she is also the co-founder of SALOON Montréal, part of an international network of women in the arts, and sits on the Board of Directors at Avatar (Québec City).

14. Alizart, *Informatique céleste*, 57–58 (my translation): "les théoriciens de l'information se sont demandés si on

ne pouvait pas comprendre la vie en termes d'information et de programme. La découverte de l'ADN en 1953 par les biologistes Francis Crick et James Watson va leur donner raison. On découvre qu'il existe des lignes de code dans la nature. On apprend que l'informatique n'est pas une invention de l'homme mais une propriété du vivant."