

# The Dynamic Darwinian Diorama: A Landlocked Archipelago Enhances Epistemology

Adrienne Wortzel

**Abstract.** This paper discusses the relevance of embedding dramatic scenarios and expressive language into methodologies employed in the research and development of biochemical and/or electronic sentient beings. The author demonstrates how integrating imagined modalities into current practices can afford a profound and positive effect on outcomes.

**Keywords:** drama, scenario, empiricism, truth, language

## 1. Introduction

The usages of story-telling and metaphorical prose for explication of both natural and processed phenomena are not unfamiliar to us. In the history of AI stories have evolved at every stage. The Turing test “story” can be retold at any point in time; at this time it could be something like: “George is traveling through a three-dimensional virtual reality environment. Inside this world, in various virtual locations (airport, museum, store, academic institution, art gallery, private residence, corporate headquarters, hospital), George engages in a natural language conversation with two other avatars where he is told that one is human and the other a program. In spite of his astute “testing” for what he considers the limits of a software robot in a virtual environment as opposed to a human, he still cannot reliably tell which is human and which is the “machine.” He wonders how much significance there is in the truth, or if all that really matters is how one’s representation is perceived.

One of the most fertile aspects of Artificial Intelligence is that it draws from so many disciplines computer science, psychology, philosophy, neuroscience, engineering, linguistics, etc. AI is not a “contained” field, but could be considered an “un systemized system” a free flowing cluster of disciplines forming and reforming dynamic nodes and synapses which intermingle, emulating a dynamic neural network of disciplines. Those nodes and synapses could be words or meanings situated in the context of a story and offer up many possible worlds.

Within this network, the use of narrative within the field would not be restricted to either the vernacular of each particular discipline nor to strict adherence to extremely orthodox research methodologies. Truths and opportunities for pockets of discovery could stretch beyond the designated glossary and syntax for a particular scientific field. This “artistic” process would provide an efficacious representational force for displaying truths, without those truths suffering diminished credence.

If we assume, for argument’s sake, that a newborn is not a blank slate, but has all the intuitive knowledge (not Information, but the sense of “knowing) there is in the universe and, that the process of growth and learning for the infant is to slowly register clues as to which bits of knowledge to integrate and grow with and which to discard, then growth constitute trying not to remember discriminately. A storytelling process, embedded in research methodology, could serve the role of “reconstituting” memory in such a way that it preserves the ties to a kind of consciousness that precedes the compartmentalization of knowing, and keep research methodologies open to associations which might otherwise be missed.

## 2. Example by Practice

My practice as an artist includes the invention of narratives nascent to technological research and examining methodologies in order to point to their creative and intuitive nature built on an armature of empirical knowledge. The content of my work

examines, or displays obliquely, aspects of technological research such how humans might relate to machines, and how machines, if they could, would relate to humans. Fictive narrative is embedded in all of my robotic and telerobotic artworks. In these works, every technological phenomenon is layered with context and meaning both in itself, and in its process of coming into being. Through artistic observation and interpretation these layers can be made tangible in art forms such as literature, film, installation and live performance. By working with the issues of artificial intelligence, artists can move away from mere sculptural or choreographic concerns to develop dramatic scenarios, which deal with deeply vital philosophical issues. The armature of these stories is always situated in some real event or text.

## 2.1. Science Stories

"The real history of the bee begins in the seventeenth century, with the discoveries of the great Dutch savant Swammerdam . . . Before Swammerdam, a Flemish naturalist named Clutius had arrived at certain important truths, such as the sole maternity of the queen and her possession of the attributes of both sexes, but he had left these unproved. Swammerdam found the true methods of scientific investigation; ...contrived injections to ward off decay, was the first to dissect the bees, and by the discovery of the ovaries and the oviduct definitely fixed the sex of the queen, hitherto looked upon as a king, and threw the whole political scheme of the hive into most unexpected light by basing it upon maternity."

This quote initially establishes its subject as the history of the science of the bee. As described, that history resonates in the very process it is describing, and then is "dissected" into its chronological parts, culminating in a conclusion which leaps by language, inadvertently, into another realm of, let's say, gender "politics." The language includes the fact that the researchers were startled and compelled to give up a long held belief about the nature of environmental protocols in the hive where a paradigm shift occurs in the research.

That consideration opens the door to investigation of the significance of simultaneously relinquishing belief while developing theories through experimentation. Charles Darwin's scrupulous empirical observations of the natural world bear witness to this phenomenon, as his research and its expression retained simultaneous and subsequent reconsideration of beliefs – he really never knew what he would find, and in spite of hardships and frustrations, he sustained a grand sense of adventure, conveyed to us through his writings. In charting unknown territories, preconceptions could only be considered superficially, as a game, and his continual surprise and astonishment were duly recorded and not separated out of his writings, remaining expressive and communicative.

Language exceeding the boundaries of the designated glossary in each field of research, despite some relaxed standards in naming, is often thought of as distracting or detracting. It is true that the unmitigated use of expressive language and dramatic scenarios could be misleading. I believe it will not be distracting if the language originates concurrently embedded in, and remains true to, the research at hand not literally, but in the same way oral traditions emerge and sustain in the long term with allegiance to continued experience and the intrinsic expository and communicative qualities and capabilities inherent in the "stories."

The following text is typical of signage posted in the American Museum of Natural History

"Giant spiders, worms and beetles live on the ground in the forest, so even though it looks like a dead heap of trash, the forest floor is really alive. In fact, a square foot of dirt in a forest holds four times as many dead insects and animals as the amount of humans there are on all of the earth at any given time. In every moment of time, leaves, flowers, fruits, twigs and dead animals fall on the forest floor. If the pile just grew and grew the forest wouldn't get any light and air and everything would die and the Cycle of Nutrition and Decay would just stop dead in its tracks."

By encapsulating narrative in evolving research one also embeds the philosophy of science as an active element in the process. The goal, however, is not to arbitrarily manufacture paradigm shifts or scientific revolutions, but to amplify existing

methodologies so that research remains “ventilated” – open to combinatory experiments with other disciplines – and, in addition, so that results are resonant with significance in these other fields in a way which feeds back into the research there. This, in turn, opens up new possibilities for discovery and disclosure by eradicating the need to work within the constraints of any paradigm at all. The recursion that makes that makes “no paradigm at all” a paradigm in itself will not apply because investment would be in “process” rather than “product”; the process being a perpetually fluid one of struggle to throw off a paradigm from the moment it displays evidence of a takeover. The removal of paradigm thinking raises the risk of extreme failure as well as the possibilities of success in unexpected quarters. The benefit of this is that both kinds of consequences will perpetually provide more information than a confined and constrained experimental situation locked to a fixed paradigm, even if it is one that emerges from nature. In addition, it benefits because it allows the researcher to deal simultaneously with short-, middle and long-term research goals and to reach out to community where research events provide information relevant to other experimenters.

## 2.2 Applying Personae to Developing Entities

*Sayonara Diorama*, a play I wrote and produced, creates a fictive narrative of a second voyage of the Beagle by Darwin and Fitzroy, thirty years after the first. The known history of the first Voyage, and its subsequent lineage of publications by Darwin, offer a verdant field for examining the power of expressive language in description and developing theory.

In *Sayonara Diorama*, the story is that Darwin and Fitzroy, while at sea, share their intense positions on organized religion. The resonance of their theological simmer rolls over into a quarrel, which triggers a tremendous storm. Simultaneously, Fate is forced its way through a fissure in the earth's core up to the underbelly of a nearby volcano. Appalled at the lateness of the hour for a visit, the volcano blows its stack. Fate, expelled from the volcano's throat, rises up and couches itself like a recalcitrant Buddha on the crest of spewing lava and then collides with the fierce gusts of Darwin and Fitzroy's altercation. A shipwreck ensues. Captain Fitzroy is dispatched to a well-documented island called Heaven. Darwin, however, is tossed to an island occupied by creatures displaying unusual forms of human physiology. These are, in fact, the deformed creatures depicted in ancient sagas and Western European medieval maps, where they are placed at the edge of a flat world standing in for what was unknown.

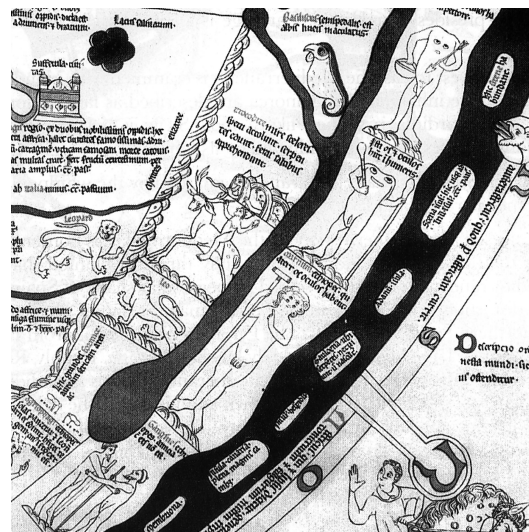


Illustration of the Hereford Mappa Mundi , 1299 – Detail  
 Courtesy of The Dean and Chapter of Hereford and the Hereford Mappa Mundi Trust

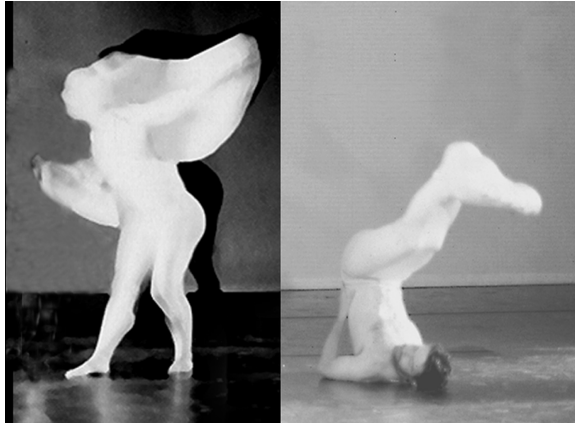
The Darwin character (anagram pseudonym: “Clan-Is-Raw-Herd”), begins examining the creatures, and is startled to find that they, in turn, are examining him. What ensues is an argument over who has the best evolutionary adaptations and how that should reflect their position in the world.

**Clan-Is-Raw-Herd** These creatures are the living expression of the literary conventions of Solinus. As unseen entities sourced in Africa, east of the Nile, he conjured these and marginalized them as gargoyles, demons, monsters, sinners, and unformed and deformed inhabitants of the edge of the flat disc that was then the world. .

I thought them mere mythical paradigms of strangeness for what we cannot actually see or understand. But here they are, as upright as we are,

one with the body of a man but the head of a dog (Cynocephali), one with no head at all but with his eyes, mouth and nose centered in his chest (Blemye), and one whose lower body ends in one limb rather than two (Sciapod).

**Clan-Is-Raw-Herd** (to the creatures): Those who make maps must divide the world into empirical geographical zones in order to examine their position in it. What is unknown must be identified at least as idiosyncratic as emblematic of “not-knowing.” You three of Solinus should not take personal offense at the peripheral territory you are delegated, because in a flat world, all is equal.



Shades of Mr. Panotti and Mr. Sciapod  
Sayonara Diorama

**Blemye:** Tis completely foolish! If there are more men like our perpetual recorder here, whose eyes are not central in their chest close to their hearts as God intended, then why not designate THEM as mythological and monstrous and put THEM at the edge for all time. For to me (he leers at Clan-Is-Raw-Herd) they are strange beyond endurance.

**Cynocephali:** But then, Master Blemye, I must indeed be the missing link indeed between you and this venerable gentleman who sits patiently recording what he see. Certainly, I should be at the center where Jerusalem is now, for I am the link between those who have heads and those who do not.

**Sciapod:** All I know is that I am the only one of you who is rendered safe and dry in rain and snow by my own physiology. If evolution is indeed everything our bearded friend here says it is then certainly my ancestors, who have engineered the most ingenious and useful adaptation of all, who deserve placement as the centerpiece of the world. If inside the edge and outside the edge are as homogenous as he says they are, and do not mean completely different things hierarchically, then why not give the inside up to the ones you have designated Outsiders?

### 3. The AILAB

In 2004 I was the recipient of a Swiss Artists-in-Residence Award to spend six months embedded in the Artificial Intelligence Laboratory, Department of Informatics, University of Zurich (“AILAB”). I came to the AILAB with over 10 years of experience as an artist creating robotic and telerobotic art installations and performance productions, both in physical and virtual networked environments. For these works, I had collaborated with research engineers working in the fields of robotics and related fields in the US.

To a large degree, AILAB researchers develop disparate idiosyncratic robots in their individual labs rendering my tenure there an experiential journey because I spent my time on the premises traveling from one individual research laboratory to another, examining the creatures produced indigenous to each lab. Therefore; both the layout and the environment of the AILAB lent itself to my rendering as a geographical territory of dispersed islands on which singular robotic species evolve in relative isolation. The individual labs became, in my mind, islands in an architectural “galapagos” and I proceeded to create video content as a “re-enactment” of Darwin’s Chapter 17 of the Voyage of the Beagle: *Galapagos*. The resulting work: *archipelago.ch* is a video depicting that journey. Darwin’s prose fits the content of the lab research beyond all reasonable expectations. In the script excerpts for the video below Darwin’s verbatim words are in italics.

The individual labs, depicted as “islands”, both “breed” and sustain creatures

(robots) as they emerge from the research. In the archipelago.ch video, the robot are empirically examined and interpreted by a Darwinian voiceover and sensibility, with some additional contributions from the researchers' papers. Islands in this archipelago are re-named after the researcher residing there. The terrain of their labs replaces flora and fauna with the tools and detritus of each researcher's individual lab. Depiction of isolated robotic parts, particularly those from trial and error experimentation, emphasizes a robot's evolution as a specimen striving for fitness and survival. Latitudes and longitudes in Darwin's text have been changed to those of Zurich, Switzerland.

Why would the words of a 19<sup>th</sup> century experiential naturalist with such keens powers of observation and perception, and such a politicized way with words in presenting a revolutionary theory ten years after the journey, be so appropriate for illuminating 21<sup>st</sup> century robotic research endeavors taking place in a state of the art (and mind) facility? This paper seeks to exposition that question, if not entirely answer it. This experience was personal one, but merits disclosure, because it is what led me to, what I think and hope will be a contribution to the field.

### 3.1. The AILAB Terrain and its Text

The following texts have Darwin's verbatim words in italics, the remainder are my words and in some cases (noted) from the researcher's papers. Where Darwin's text leaves off, the slack is taken up by an attempt to amplify the scenario so that it sows the research projects in a new, personified light. We begin with Darwin's words applied to the lay of the land in the AILab: The geographical details such as longitude and latitude have been changed to match those of Zurich.

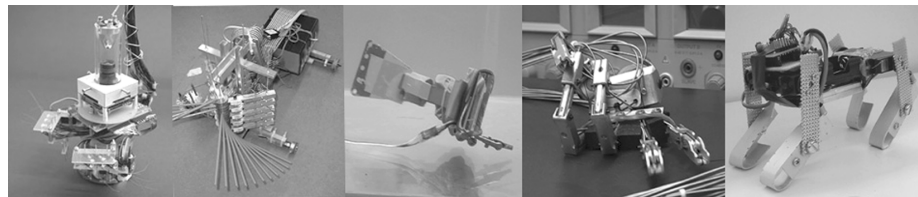
*The natural history of these islands is eminently curious, and well deserves attention. Most of the organic productions are aboriginal creations, found nowhere else; there is even a difference between the inhabitants of the different islands; yet all show a marked relationship with those of the continent although separated from it by a vast and difficult terrain.*

*At this time this archipelago consists of several principal islands, of which some exceed the others in scope. They are situated above the Equator, Latitude 47.38 degrees North, Longitude 8.54 degrees East.*

*The archipelago is a little world within itself, a satellite which at one time had spokes to a continent, whence it has derived a few stray colonists, and has received the general character of its indigenous productions, although within the archipelago the difference is that its islands somehow appear to encourage each emigrated morphology to emerge into something more than it was whence it came.*

*Considering the small size of the islands, we feel the more astonished at the number of their aboriginal beings, and at their confined range.*

### 3.2 The AILAB Islands and Their Respective Populations



Photos, courtesy of AILAB

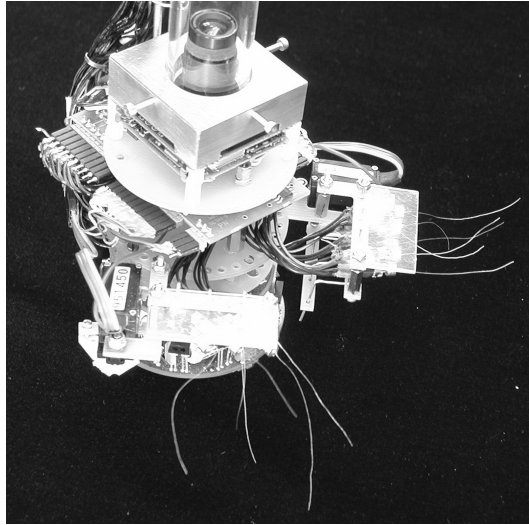
| CREATURE, LEFT TO RIGHT | RESEARCHER(S)                 | LOCATION         |
|-------------------------|-------------------------------|------------------|
| amouse                  | Drs. Simon Bovet; Miriam Fend | St. Simir Island |
| Eyebot                  | Dr. Lukas Lichtensteiger      | St. Lucia Island |
| Fish                    | Marc Ziegler                  | Marcus Cove      |
| Humanoid Hand           | Gabriel Gomez                 | Garcia Cove      |
| Dog                     | Dr. Fumiya Iida               | Fumiya Island    |

**St. Simir Island.** *Of terrestrial mammals, there is only one which must be considered as indigenous, namely, a mouse of the species Archipelagogenesis. Mus, or Amouse), and this is confined, as far as I could ascertain, to Saint SimMir Island, the most easterly island of the group.*

*Although no one has a right to speculate without distinct facts, yet even with respect to this marvelous creature, we should consider that it may be borne of an imported species. For I have seen, in a most unfrequented part of the world below the equator, a native mouse living in the roof of a newly built hovel of similar comportment, and therefore ... transportation of the Amouse's ancestor in a vessel from there to here is not improbable. In fact, its lineage is reminiscent of a division*

of the family of mice characteristic of the Continent in an early stage of its development and *I can hardly doubt that this mouse is a variety evolved via the new and peculiar climate, food, and soil, to which it has been subjected.*

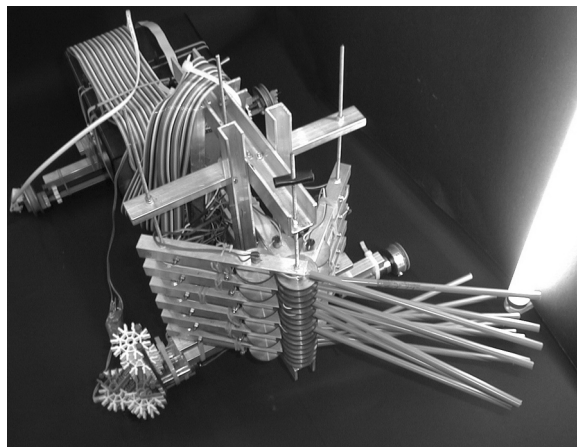
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amouse, photo: Nathan Labhart  
Researchers: Drs. Miriam Fend, Simon Bovet

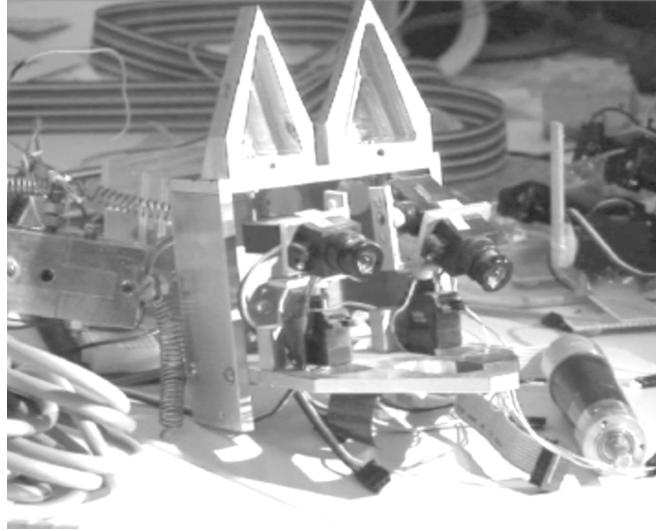
The Amouse here is of particular interest because of the evolution of certain attributes of its whiskers which, in other species I have seen, such as other rodents, seals, opossums, and cats, tend to function as little more than accessories. These latter creatures, which I have observed in other natural habitats, make manifold use of their whiskers, such for hunting in murky water or darkness and detection of movement in air or water, but the detection resolution is usually extremely poor, and therefore unreliable for assurance of the creature's safety and comfort. In the instance of this Amouse, sensitivity is so acute, and of such a high order that we humans can only stand by and watch their operation in awe

**St Lucia Island.** *The Beagle sailed St Lucia Island, and anchored in several bays. . . . The day was glowing hot, and the scrambling over the rough surface and through the intricate thickets, was very fatiguing; but I was well repaid by the strange Cyclopean scene. I encountered a large and heavy creature moving in an extraordinarily straight path, low to the ground, whose very embodiment seemed purposed only to accommodate its sense of sight. No close analysis was required to see the rods and cones of its eye's structure, which were external, rather than internal, to its body. The movement of that eye seemed capable of discrimination; of seeking out particular sources of light formed in streams, to which it responded by reorganizing its rods so that the whole aspect resembled choreography of photosynthesis, the creature responding to light by saluting with this gesture of recognition.*



Eyebot  
Researcher: Lukas Lichtensteiger  
Photo: Courtesy of AILAB

**Fumiya Island.** *We doubled the south-west extremity of Fumiya Island, and were nearly becalmed. The island was covered with immense deluges of black naked lava, which have flowed over the rims of the great crater caldrons like pitch over the rim of a pot in which it has been boiled, or have burst forth from smaller orifices on the flanks and in their descent they have spread over the entire island.*

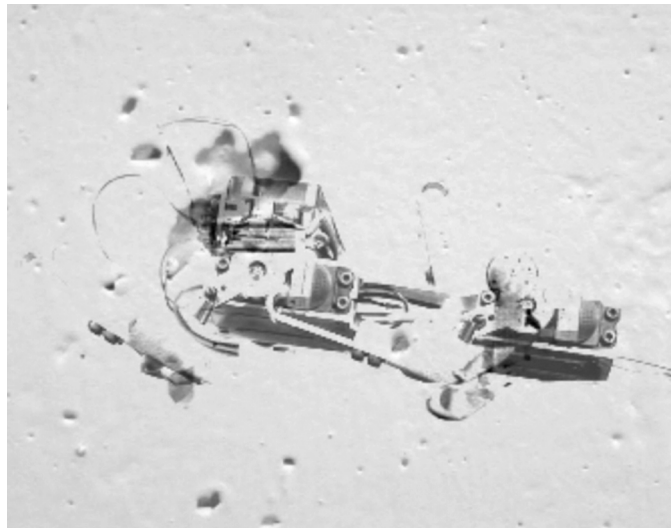


Indigenous Growth: Fumiya Island

*I will now turn to an order of mammal, which gives the most striking character to the zoology of these islands. The species are numerous, and the numbers of individuals for each species are extraordinarily great considering that they are confined only to this island. I am referring to a number of creatures I think belong to the species of Cynocephalus.*

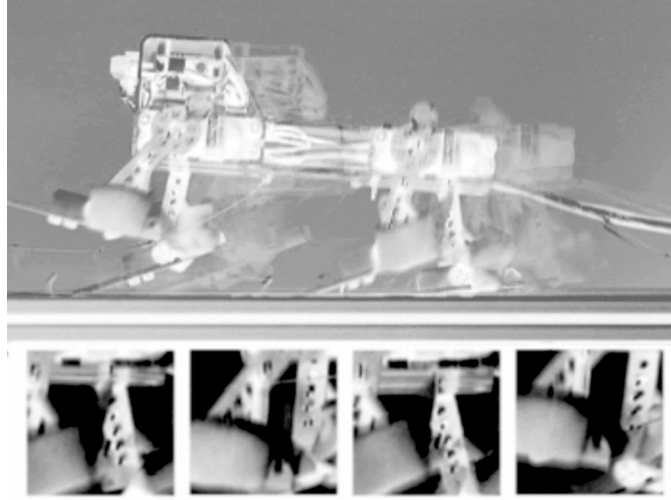
These animals appear fully-grown in varied sizes, from huge to what seems like a miniature size. Examining both the present day animal and the fossils found on the southward flank of the craters, one can really trace the evolutionary history. The larger specimens existing today are an anomaly. In reality through history, the stature of the creatures has generally gone from huge and dinosaur-like to tiny and mouse-like. It is evident that there are actually many levels of the evolutionary selection process ongoing here.

It seems that ancient generations were created out of one homogenous substance, with a skeletal structure that was hard and almost metallic in nature, while the materials constituting subsequent generations become extremely diverse in each specimen, the separate parts of the creature becoming smaller and smaller, enabling the size of the animal to diminish down through the generations to state, I believe, where they emerged as marine life out of the surrounding seas.



Fossil Traces

The island is completely devoid of moisture and it is difficult to discern how these creatures survive. Observing these dogs, it would seem they are a minimalist quadrupedic model of rapid locomotion inspired by some sort of biomechanical paradigm. Albeit, this sounds so artificial and reminiscent of something man-made, this is the only way I can explain how the animal forms its idiosyncratic system of rapid and robust legged locomotion. From my observations, I concluded that the locomotion is induced by spring-like like properties in the muscles of the animal, weight distribution, and body dimensions.



Passive Joints

Based on an anatomical study, we found with respect to the number of passive joints, dimensions of limbs, weight, and properties and locations of muscles, that the creature has evolved from a compromise between nature and a machine-like architecture to incarnate its body structure.

Upon dissection and analysis, it was discovered that the skeleton contains 28 passive joints, each of which has one passive rotational degree of freedom with each joint capable of small translational displacement as well. The passive joints intend to be controlled by a muscle actuation method which incorporates electric stimuli from the nervous system.



Dogs traveling to and from water sources

Still from the video "archipelago.ch", cinematography by Dr. Daniel Bisig

The dogs, *when thirsty, are obliged to travel from one end of the island to the other, as there is a strange system of alternating currents in the rivers of this island. Hence broad and well-beaten paths branch off in every direction from the wells down to the sea-coast. When I landed at Fumiya Island, I could not imagine what animal traveled so methodically along well-chosen tracks. Near the springs it was a curious spectacle to behold many of these creatures, one set eagerly traveling onwards with outstretched necks, and another set returning, after having drunk their fill.*

*When one of them arrives at a spring, quite regardless of any spectator, he buries his head in the water above his eyes, and greedily swallows great mouthfuls, at the rate of about ten in a minute. The animal stays three or four days in the neighborhood of the water, and then returns to the lower country; but they differed respecting the frequency of these visits. The animal probably regulates them according to the nature of the food on which it has lived. It is, however, certain, that these creatures can subsist even on these islands where there is no other water than what falls during a few rainy days in the year.*

The dogs, also have an inexplicable practice of sometimes running in place, as if on a treadmill, and it is remarkable to see this effort of locomotion when there is no discernable goal in sight. It also seems arbitrary when, at a certain time, different in each case, they suddenly stop moving, and stand perfectly still for hours on end. It is possible that their sense of smell is quite acute, and these spells of stationary running maybe be a reaction to some scent that cannot be tracked, but which requires



a bravado performance on the part of the dog, to show that it can even outrun a scent which will always remain elusive.

**Marcus Cove.:** In the evening we anchored in Marcus Cove. The next day, the water being unusually smooth,. In some of the gullies and hollows there were beautiful red and other brightly colored fishes.

Their armature seemed to be constructed of oddly shaped bones, mostly flattened rectangular shales and they did not appear to exhibit any cartilaginous properties, nor do they seem to have any fat external to the bones. These fish are propelled through the water via their oscillation of their exoskeleton, the direction, speed and duration dependent upon the configuration of their tail or fins, and the lack of or preponderance of currents in the water.

**Garcia Cove:** *[W]hat can be more curious than that the hand of a man, formed for grasping, that of a mole for digging, the leg of the horse, the paddle of the porpoise, and the wing of the bat, should all be constructed on the same pattern, and should include the same bones, in the same relative positions?*

#### **4. Summary**

Although the narrative for *archipelago.ch* remains emblematic of the themes of exploration and discovery of previously untouched territory, it also represents a future we, at this time, may not begin to fathom.

In a moment of time when science has obliterated science fiction, and we go forward at varied speeds towards phenomenal technological manifestations, an investment in methodologies that are interdisciplinary and involve more leaps of imagination furnished by associative narratives and expressive language will help us build more creative machines in inventive environments.

“Scientific research is not only about solving problems, and what is more important is finding problems. . . . In particular, for the studies of autonomous adaptive systems, the research domain is very broad, where we need to look through the project from an evolutionary perspective. .... by projecting scientific projects onto Darwin's expedition, which both artists and scientists are interested in, we might be able to find a new way of "understanding" nature. . . “

Fumiya Iida, Researcher,  
Artificial Intelligence Laboratory,  
University of Zurich