2006: A Vegetal Odyssey - Tak Pham

Published in Esse magazine, Plants - no. 99 (press review / personal copy)

“How can Arabidopsis thaliana, a small wild weed, carry the future of humans into space?” This is one of the guiding questions in a three year research residency that artist collective Soft Turns undertook at the School of Environmental Sciences at the University of Guelph. The collective, formed of long-time collaborators and partners Wojciech Olejnik and Sarah Jane Gorlitz, has taken an interest in plants as a continuation of its ongoing curiosity about the subtle relationship between the foreign and the familiar within our immediate everyday experience. The multi-channel video installation *Fluorescence* (2015) marks the collective’s first exploration of botany on a microscopic scale. It features an image montage of plant cells, excerpted from eight editions of the textbook *Biology of Plants* (1970–ongoing). The images are illuminated by the light emitted from a laptop screen at an intensity level close to the minimum required for natural photosynthesis to occur.

Fluorescence provokes an uncanny reckoning with our knowledge of the plant realm and the extent to which human technology, innovation, and artificial interferences have exerted their visualization power in order to magnify these microscopic images. Through the iridescent footage of the plant cells, Soft Turns suggests a dormant potential in plants that could propel a quantum leap in the sciences, as well as knowledge of how plants were and have been used as a means to understand and subsequently colonize different parts of the world. In 2016, Soft Turns landed on Arabidopsis thaliana, a small, agriculturally insignificant weed that has played a key role in humans’ drive to colonize space.

ARABIDOPSIS THALIANA

A relative of cabbage and mustard, the small, nondescript flowering Arabidopsis thaliana (A. thaliana) is commonly considered a weed. It is also the first plant to have had its genome fully sequenced and the first to complete a life cycle in space. The plant’s small size and genome (135 mega-base pairs) and its short life cycle provide the necessary tenacity and flexibility for research that will lead to an understanding of the molecular biology of many other plants, making it the lab rat of experimental botany. A. thaliana’s life cycle lasts about six weeks. In this time, the plant goes through the full cycle from seeding to maturing, flowering, and decaying. It takes about three weeks for the stem that produces flowers to grow. A. thaliana’s flowers can also self-pollinate to produce viable seeds for future plants. Starting in 1987, with the opening of the Third International Arabidopsis Conference at Michigan State University, research on A. thaliana has emphasized the great potential of the plant’s genome and behaviour for further research into the future survival of humankind.[1] A. thaliana has become a model plant, to which equivalent genes and behaviours in other plants are compared. For example, understanding A. thaliana’s defence mechanism against pathogens can provide valuable data for development of disease-resistant plants in other species.[2] In 1982, after failures with growing other plants, cosmonauts aboard the Soviet Union’s Salyut 7 space station thought to try A. thaliana because of its tenaciousness, but also in part because they liked its taste in salad. In 2006, nineteen years after the conference at Michigan State University, sixteen hundred A. thaliana seeds travelled on the space shuttles Discovery and Atlantis to the International Space Station (ISS).[3] This time, the plant was researched for “the tropic influences of gravity and light on plant growth… helping to find a way to grow crops for long missions to the Moon and Mars.”[4] Despite its relatively humble nature, A. thaliana has significant potential that commands attention and interest from multiple disciplines. The plant stands in for a larger pool of genomes of all earthlings. A completion of its life cycle in a pure phototropic environment such as space broadens our understanding of how photosynthesis occurs on Earth, and, ultimately, of how to create viable conditions in space for agricultural activities.

THE CRITICAL ZONE

On Earth, “critical zone” is a term that some researchers and environmentalists use to focus attention on the interconnectedness of the environment immediately above and below the surface of the planet, within which most life exists. The term promotes recent movements in scientific methodology to seek a deeper understanding of the complex and fluid interactions of the many actors within ecosystems — in contrast to past approaches, many of which isolated individuals or elements for study outside of their environment. Within this framework, the vitality of a plant reflects the vitality of the environment, its soil, air quality, humidity level, and other factors. Humans used to be a chain in this sophisticated link, until we created powerful machines a few hundred years ago to dominate the environment. Floating untethered in the dark void of space, leaving behind a severely ravaged Earth, we now yearn to re-create another version of our planet elsewhere. We feel the need to repeat the cycle of colonization, extraction, consumption, as if it is the only way humankind knows how to survive. With A. thaliana and other subsequent plants completing their life cycles on the ISS, our critical zone seems to have extended over 690 kilometres above ground into the exosphere.

FAILED COPY

In winter 2018, Soft Turns closed out 8eleven Gallery in Toronto with an exhibition titled *PLANT/PIXEL*. In the main room of the semi-basement art gallery, the collective covered the lower half of all walls with substrates from what would be good candidates to replace soil in space. In preparation for the exhibition and with guidance from researchers working with aeroponics and

green-roof technology at the University of Guelph, Soft Turns spent several months salvaging potential material and compatible alternatives from junkyards around Guelph and Toronto. Olejnik and Gorlitz brought home computer boards, porcelain toilet parts, and many other substrates extracted from everyday objects. The materials were then crushed manually into granular particles that resembled soil. The substrates rubbed onto the wall demarcate the line of the surface of Earth cutting through the gallery. Below this line, the new soil creeps into the cracks and nooks of the rough surface. Above it, pasted onto the wall, are photographs of A. thaliana at different levels of processing, using a resizing glitch created by enlarging and shrinking images by tiny amounts hundreds of times. The transfer is not clean. The photos are dipped in a sludge of substrate material before being affixed to the wall. As a result, some retain the full image, while others are left with flakes of the image. Intermingling with the transfers are CMYK dots from a similar photographic processing of an environmental scan of the room. The gallery ceases to just be a host for the artistic intervention and becomes an environment subjected to the same conditions as the plant under study. In a separate room, botanical models of A. thaliana latch onto the walls, ceiling, and floor, with beads and droplets of water suspended between the leaves to suggest a zero-gravity condition, as the models turn toward the only two light sources in the room: windows filtering light coming from the main room and two TV monitors lying in the back of the room emitting LED light. Flickering on the monitor screens are stop-motion videos of other plants affected by the same digital distortion process seen in the main room. In *PLANT/PIXEL*, Soft Turns uses the technique of copying that is common in both visual art practice and scientific gene-sequencing research to hypothesize the near-extraterrestrial experience on Earth via the case study of A. thaliana. Like the scientists, Soft Turns sorts alternative substrates, creates a study model of the plants, and attempts to duplicate it. Despite the collective's, and the scientific community's, effort to understand the plant completely — by, for instance, sequencing its full genome—the plant nevertheless resists. There is always something unexplainable; something our current ways of understanding cannot comprehend; something our techniques cannot capture. The image transfers are imperfect. The digital copies are glitched. Each time the process repeats, a bit more of the information gets lost (or is added, appearing as if from nowhere). Our inability to consistently make exact copies of a plant suggests that the essence of the plant lies outside itself. It extends to the complex integrated system to places where its roots reach and its pollen travels. The plant's non-individualism forms an ideological resistance that reveals the limit of knowledge that empirical research methodology poses, especially in botany, in which plants are individually classified and examined. After separating its genetic characteristics from its habitat conditions, the plant is modified and weaponized to become an invasive tool that can be deployed into foreign places — the New World then and space now. But plants are agile and adaptable. Notwithstanding our ignorance, plants are still able to communicate with their new environments and find ways to work collaboratively with the new conditions. The shorter a plant's lifespan, the more resilient it can become with each subsequent generation of offspring. Plants are actively negotiating their survival without our noticing, or ever needing our intervention. As such, A. thaliana does not fail to copy itself; rather, it evolves to respond to whichever new environment it is in. After enough occurrences, mutations start to appear, permanently altering the source of the knowledge that we have of the species. In this process, the reactivation of the original object through copies halts, and the unique existence of the entity is regained. Soft Turns' research on A. thaliana suggests that it would probably take more than a complete genome repository of the plant for humans to find a way to survive in space. As a species, we are obsessed with empirical data and the idea of complete comprehension without acknowledgment of the phenomena that are changing around us. The more we continue to play God in a destructive game of re-creation, the further we excommunicate ourselves from the intertwined tentacle network with other earthlings. It is a losing game if we continue to pursue something that keeps evolving and mutating over and over. It is not only the plant or the A. thaliana that we are up against, it is the constantly changing environment to which it connects.

1 — David W. Meinke, J. Michael Cherry, Caroline Dean, Steven D. Rounsley, and Maarten Koornneef, "Arabidopsis thaliana: A Model Plant for Genome Analysis," Science Magazine 282 (October 23, 1998): 662–82.
2 — <www.nsf.gov/bio/pubs/reports/arabid/ chap1.htm>
3 — Stephen Pincock, "Arabidopsis in Space, The Scientist, November 1, 2006, .
4 — Ibid.