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Sternthal Books
18 Fallbrook Rd.
Montreal, QC, H3X-3X4

t. +972545594985
isternthal@gmail.com
www.sternthalbooks.com

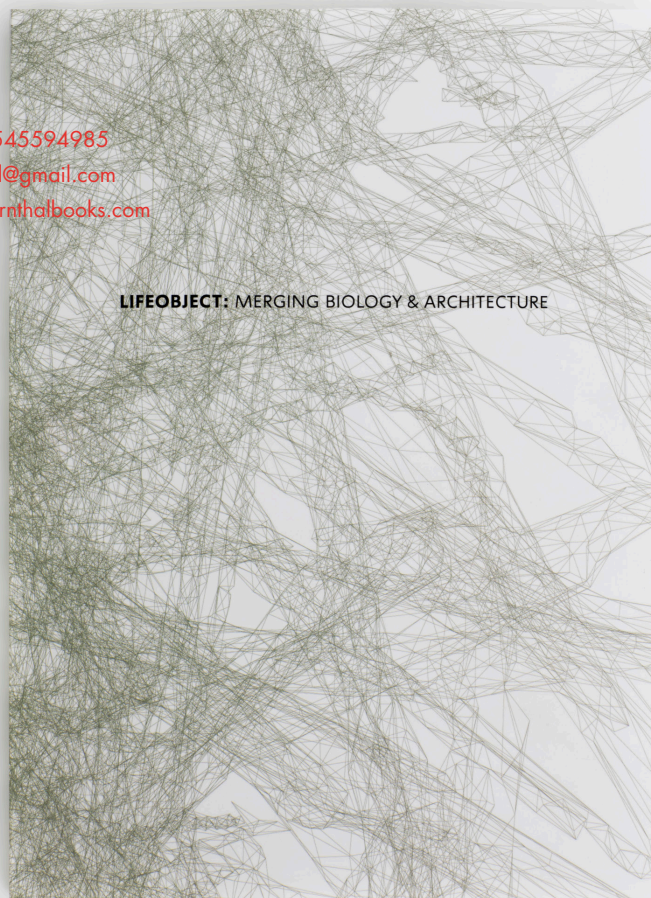
LIFEOBJECT: MERGING ARCHITECTURE & BIOLOGY

Presented at The Israeli Pavillion's
Exhibition at The 2016 Venice Biennale
For Architecture

The LifeObject book and exhibition examines the influence of biological paradigms on the world of architecture, including the future implications of transposing and merging these two seemingly divergent disciplines. As opposed to biology, which focuses on concepts relating to life and ongoing change, architecture is traditionally perceived as a field of inert entities, focusing on the ability of buildings to survive trans-generationally and serve as sites which preserve the past. The exhibition examines new relationships being formed between man and his environment which invalidate the binary distinction between nature and culture and re-frame the architectural environment as part of a wider ecology.

The platform established by the exhibition is expressed through four sections of informational typologies which are interwoven throughout the book, ranging from case studies to theoretical elaborations. Their dispersal throughout the book suggests a multiplicity of possible relationships between the various topics and fields dealt with in the exhibition.

Curated by Dr. Yael Eylat Van Essen, Arielle Blonder,
Noy Lazarovich, and Benaya Bauer



The theoretical section is comprised of five articles that deal with the various aspects underlying the relationship of man to environment.

The core of the book consists of a series of texts that deal with the LifeObject, these texts relate to the structural and material elements of the installation, as well as to the research and design methodologies that frame it. The second part of the exhibition consists of seven studies created by teams of architects and scientists who were invited to propose speculative scientific-architectural scenarios, using biological paradigms, to relate to local and global planning and architectural questions.

Interspersed throughout the book are fragments of a biological-architectural phrase book, which constitutes a conceptual envelope for the exhibition and the book. In its framework, biological concepts receive architectural interpretations stemming from both local and global examples.



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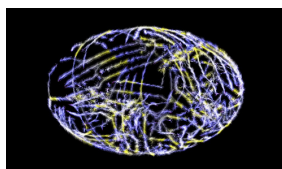


11 Preface

13 LifeObject, Merging Biology and Architecture Yael Eylat Van-Essen / Theory

33 Behave

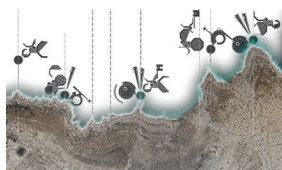
ShaGa Shyovitz Architects, Erez Livneh



Behave is a holographic microscope that analyses the breath of spectators, measuring oxygen, carbon dioxide and breath tidal volume. An algorithm programming the behavioral patterns of bacteria uses these biomarkers to simulate the growth, organization and material deposition of a bacterial colony, constructing a virtual biofilm that interacts in real time with sensorial inputs.

39 Dead Sea Resurrection Project

Dan Eytan, Ruth Lahav, Boaz Tadmor



The Dead Sea Resurrection Project is a collaborative project between architecture and biology, which links the lake's degeneration to TTTS, Twin to Twin Transfusion Syndrome, where identical twins relying on the same source of nutrients stop receiving balanced blood supply due to an anomaly in the fetal blood vessels. Creating the analogy between TTTS and the lakes' current predicament opens up a host of new approaches to tackling this pressing environmental crisis.

45 Mergence and Emergence: a Biological Model for Reading Israeli Architectural and Political Space

Ayelet Zohar



Israeli architectural space consists of two foundational realities. One of them is the settlement movement built upon previously uninhabited natural environments, with a second strategy based upon the forceful destruction and annexation of Palestinian villages and towns. In order to articulate these two architectural practices Ayelet Zohar borrows the outlines of two central biological strategies of mimicry, a visual strategy based on resemblance and assimilation into the environment into shed light into the survival strategies embedded within Israel's early architectural practices.

63 Out of the Wild: Challenging Israel's Comfort City

Els Verbakel

63 Diffraction Of Urban Crystals, Haifa

Dr. Arch. Einat Kalisch Rotem &
Madlan Prof. Dan Shechtman



Crystallography and modern urban planning both emerged at the turn of the 20th century. Whereas crystallography advanced into a new era of complexity and possibility, using electric microscopes to unearth previously unseen patterns within crystal formations, urban planning is still struggling to develop new devices capable of identifying the complex patterns within contemporary urban space. This collaborative project seeks to apply the noble prize winning research of professor Dan Shechtman in crystallography towards the field of urban planning, in order to create new tools capable of recognizing and analyzing spatial behavior patterns through the synthesis of big data.

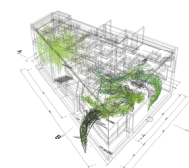
71 Live It

"Commons" | Envisioning the new public space, Uri
Shavit, Oded Katz



The degradation of the Netanya sandstone cliffs has placed coastal infrastructure, buildings and human lives at risk. The never-ending conflict between natural processes and urban life requires us to redefine a new balance between the natural and the artificial. 'Live It' is a TechnoArt installation that enables viewers to feel, experience, and interact with sustainability and resiliency through a mediated nature-urban encounter. A large image of Netanya's Kurkar cliff's morphology, from a LiDAR (Light Detection and Ranging) scanner covers the pavilion's entire wall. Visitors are invited to use their smartphones to scan a barcode, which will open an immersive 360 degree animated video on their device.

PART II - THE LIFEOBJECT



81 A Matter of resilience

Arielle Blonder

LifeObject is an architectural installation that transposes the resilient properties of a bird's nest, through scientific analysis, into a spatial form rich with new architectural perspectives. At the core of the installation are free-form volumetric airy surfaces undulating in space that are composed out of over 1500 slender and light components, inspired by twigs; relying on tension only, they form a light-weight, porous and resilient structure. The LifeObject combines smart, composite and biological materials in the formation of a 'living structure.'

91 **A Biomimetic Application of the Sparrow's Nest in Architecture**

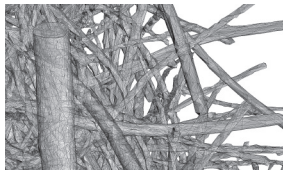
Bnaya Bauer



The LifeObject installation is based upon a biomimetic approach, derived from a complex scan of a bird's nest, made of twigs that are woven together, all elements in the nest are bent in the building stage, thus creating a cohesion system based on tension with no relation to external forces that might shape the structure in future. The second principle demonstrates that while the twig's bending creates a tension induced force that keeps them in place, their spatial adjournment occurs through their integration.

101 **'FRP Twigs': Embedding Fabric Materiality**

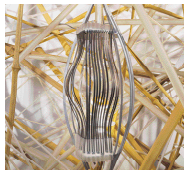
Arielle Blonder



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111 **The Breathing cycle and Smart Materials**

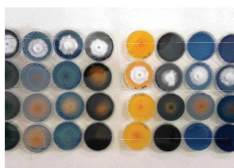
Noy Lazarovich



The Breathing Cells are eleven smart units dispersed within the LifeObject that react to the visitor's presence and change their shape, revealing glass spheres containing biological materials that are camouflaged behind a screen of shape memory alloy strips. The breathing cells are an autonomous ecosystem that lives inside the LifeObject. The visitor's presence activates the system, triggering a reaction in the shape memory alloy, which opens to reveals each capsule.

123 **Biological Materials - Cabinets of Curiosities**

Noam Attias



The biological materials featured in the breathing cells are natural organisms which have the potential to transform building. Applying genetic engineering and biomimetic methods towards existing biological components or organisms can shift their functionality far beyond their original role in the organism or ecosystem, into the fields of advanced materials, applied towards diverse fields, including novel architecture methods.

137 **Urban Angiogenesis/Bio Smart City 3.0**

Knafo Klimor Architects, Ronit Satchi-Fainaro



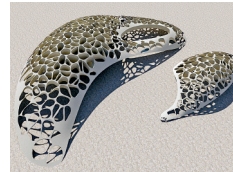
Bio Smart City 3.0 is a dynamic installation that applies the biological process of angiogenesis - through which new blood vessels form from pre-existing ones - in order to explore new methods of preventing urban over-densification.

143 **Constructing a Niche: Learning From Animal Architects?**

Eva Jablonka

149 **Nanocellulose, Desert Shelter**

NCArchitects, Guy Austern, Laboratory for Nano-Biotechnology, The Hebrew University of Jerusalem



the nanocellulose desert shelter project explores the architectural potential of nanocellulose, a state-of-the-art material composed of recycled natural fibers, in the design of an educational and cultural center for the bedouin community in Israel's negev desert.

155 **The evolution of Biological Dimensions in Israeli Architecture**

Yasha J. Grobman

163 **The Breathing Building**

Farah Farah, Moti Bodek, David Elad



The breathing building proposes a bio-inspired building ventilation and air conditioning system that mimics the breathing process, where the nasal passage naturally conditions the inhaled environmental air. the proposed project presents a dynamic structure which is the outcome of a joint collaboration between architects and bioengineers. Anchored in the mediterranean sea off the coast of Ashdod, the

Phrasebook

Rhizome; Variations; Resilience; Hybridity; Ecosystem; Death; Resuscitation; Apoptosis; Paraaite; Genotype, Phenotype; Emergence; Memory; Differentiation; Control; Scar; Symbiosis; Commensalism; Hierarchical Material; Self-Organization; Adaptability; Composite Materials; Fibers; Synthesis; Movement; Feedback; Intelligence; Reflex; Hypertrophy; Mitochondria; Fold; Budding; Isomers; Gangrenous Necrosis; Tumor; Transportation; Immune System; Autoimmune Diseases; Metabolism; Skeleton; Liquid Crystals; Membrane