
# 2x200

## Bicycle Exhibition©

Curators:
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מוזיאון המדע ע"ש בלומפילד ירושלים (ע.ר)
متحف العلوم على اسم بلومفيلد القدس
Bloomfield Science Museum Jerusalem

Universum® Bremen

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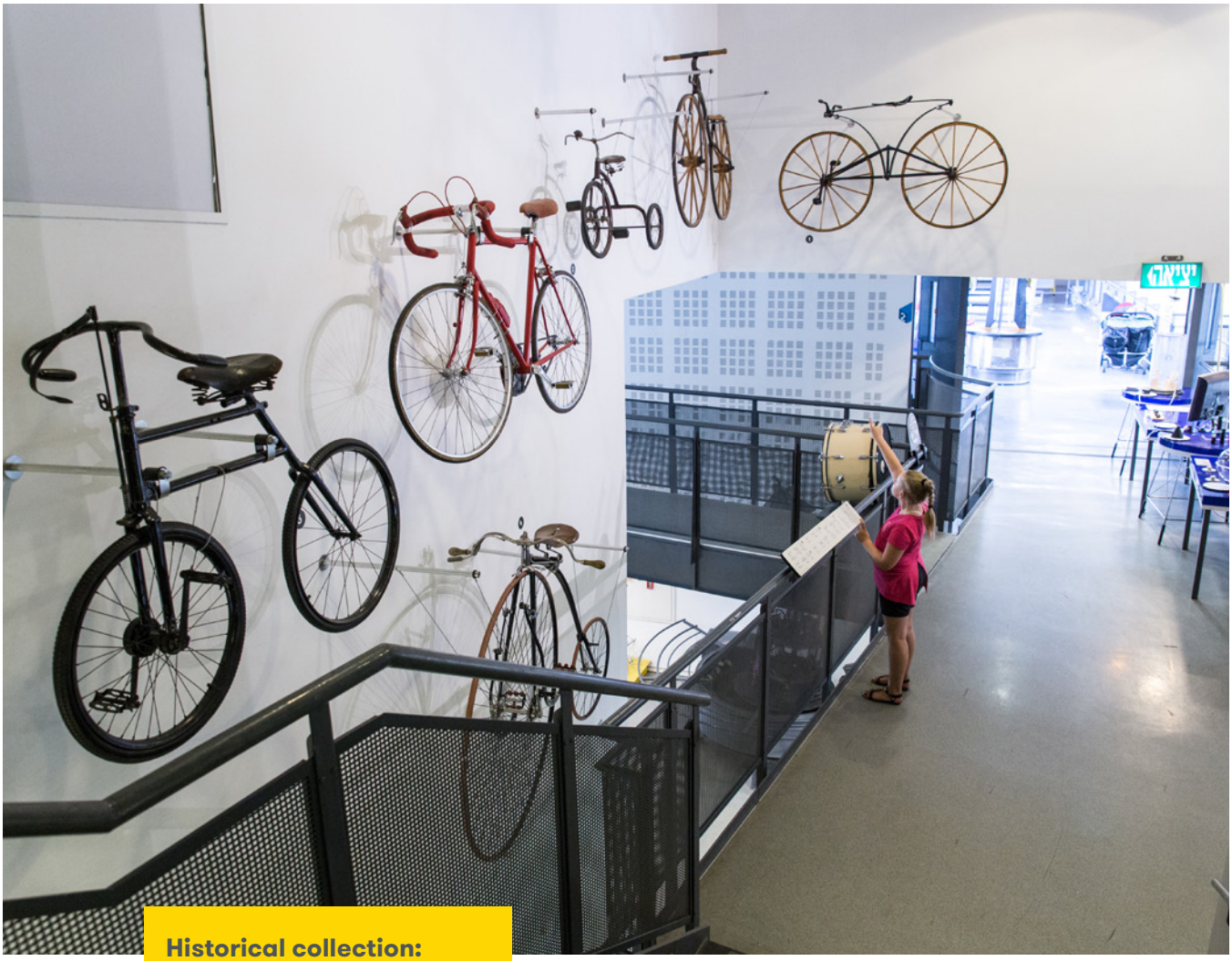
CANADA SCIENCE AND TECHNOLOGY MUSEUMS CORPORATION

# Towards the Exhibition




**Historical collection:**
Ingenium Canada's Museums of Science and Innovation

# Introductory Space


**100 years of development**
**Historical bicycles:** VELORAMA bicycle collection, The Netherlands
**Interactive exhibit:** The Bloomfield Science Museum Jerusalem

## *2x200 Bicycle Exhibition*

Just about everyone knows what bicycles are. Most of us learned to ride them as children, and some of us use them on a daily basis: for sport, as transportation or simply because it's fun.
Despite all this, it seems that few of us have had the opportunity to look at bicycles a little more deeply and to discover their engineering, historic, scientific, social or emotional context.
Do we consider the bicycle's evolution as an extraordinary case of innovation and invention?
Do we view bicycles as a vehicle that has changed, and continues to change, our society?
The exhibition offers three main perspectives on bicycles: the Machine, the Rider, and the relationship between the bicycle's development and social and environmental issues. The exhibition invites visitors to see the bicycle as a pinnacle of human creativity, to revisit the familiar, and meet lesser known aspects of the relationship that formed between people and bicycles since the first bicycle was patented in 1817.

# Machine - Wheels

**200 years of bicycle developments.**
VELORAMA bicycle collection, The Netherlands
**& Contemporary Developments.**

## *The Wheel*

### *Understanding Bicycle Evolution through Wheels*

An interesting way to view bicycles is through the evolution of their wheels.
The two greatest challenges that wheel developers faced were the need to increase travel speed and to lessen the shocks that rocked the riders.
In the first decade since the bicycle's invention, it had no shock absorbing mechanism of any kind. As a result, they were nicknamed "Boneshakers".
In the second half of the 19th century, developers of the High-Wheel Bicycle tried to meet both challenges at once: they constructed one large wheel that could ride more easily over potholes while at the same time enabling a greater speed. Towards the end of the 19th century, John Boyd Dunlop developed the pneumatic tire – a hollow tire made of compressed air, so enhancing the comfort of travel by bicycles and cars to this day.
Wheel developers still come up with new solutions to the same challenges: lighter wheels that 'cut' through the air more efficiently, and wheels that excel at shock absorption.

# Machine - Frames


**Historical frame and bicycles:**
VELORAMA Bicycle Museum, The Netherlands
**Contemporary frames.**

## *The Frame*

### *Strong, Stiff and Resilient*

Many people take the bicycle frame for granted. However, the frame bears the brunt of the immense stresses that are placed upon the bicycle when riding, especially when carrying heavy loads or during adventurous off-road cycling. In this section you can take a close look at these stresses with the Seeing the Stress device; peek into the inner structure of the bicycle frames; and learn about the structure of the tubes, the connections and the varied materials frames are made of. In the Historical Collection you can examine the variety of shapes of past and present bicycle frames.

# Machine - Drive Mechanisms

**Historical bicycles:**
VELORAMA Bicycle Museum, The Netherlands

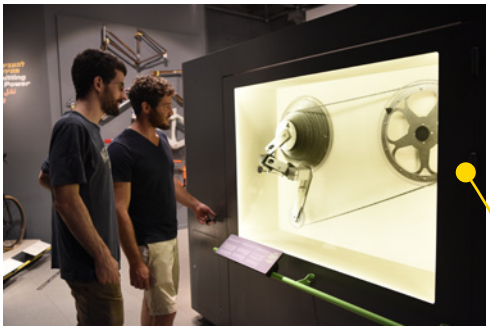
## *Transmitting Speed and Power*

### *On transmission and gears*

One of the greatest challenges faced by bicycle developers is the efficient transmission of the riders' muscle force and leg movements to the spinning of the wheels and bicycle motion.
Mechanical transmission systems have been around for thousands of years However, in the case of the bicycle the challenge is greater. The rate of leg rotation, which is based on muscle power, is limited. To enable a fast ride, on a level stretch or downhill, as well as for uphill riding without too much effort and without needing to stop and change the wheel, it is necessary to have a transmission system that can change gears during the ride.

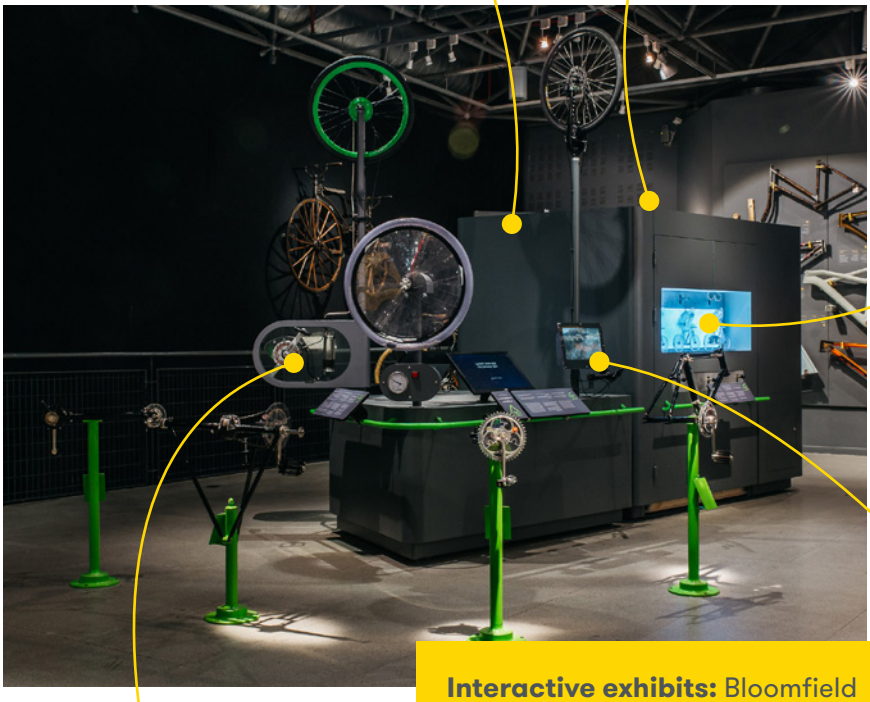
Today most bicycles use the chain 'added' back in the 19th century, and also the derailleur transmission system that entered common usage over 80 years ago. In parallel, countless devices have been developed and are still being developed. These are based on cogwheels and friction wheels, cables and strings, air pressure and oil pressure... some remain an idea, an archetype or even a patent, some have become commercial products, and some can be seen in the exhibition.

# Machine - Interactive Hub



***Changing Force & Speed***

***Chain Free***



***Seeing the Strain***

**Interactive exhibits:** Bloomfield Science Museum Jerusalem & VELORAMA Bicycle Museum, The Netherlands

***Plugging the Hole***

***Stopping Downhill***

# Machine-Innovation: automobile


**The 'Sparkbrook' Tricycle:**
Velorama bicycle museum,
The Netherlands

## *From Bicycle to Automobile*

### *The invention of the Car*

The history of technology is paved with inventions that are linked to bicycles. Most of the inventions are improvements on the actual bicycle mechanism and the cycling experience. In quite a few cases, inventions intended for bicycles spread to other fields. In other cases, the bicycles themselves became a form of laboratory or experiment facility. Between 1879 and 1885, Carl Benz and Gottlieb Daimler separately conducted experiments aiming to create an “automobile” – a vehicle propelled by an internal combustion engine. Interestingly, both chose the bicycle as an experimental tool, as opposed to a carriage for example, although it was a much more common vehicle at the time.
While Daimler chose the bicycle, Benz selected the tricycle – one very similar to the historic one presented here.

# Machine-Innovation: Airplane


**Bicycle reproduction:** Bloomfield science Museum Jerusalem
**2D collection:** Library of Congress, Wright University, Franklin Institute

## *From Bicycle to Airplane*

### *The Wright Brothers and the Invention of the Airplane*

Brothers Wilbur and Orville Wright began their joint professional path as bicycle repairmen, later establishing the Wright Cycle Company bicycle factory. Despite having had only high-school educations, the Wright brothers were scientists in every fiber of their being. Their passion to create an aircraft that could carry a person led them to conduct myriad experiments over a long period of time, trying to fully understand how air friction affected aircraft. They were pioneers not only in developing the first airplane but also in the science of aerodynamics.

Their background as bicycle manufacturers had a huge impact on the way they developed their aircraft. This impact is apparent In their “hands-on” experience in building bicycle prototypes, in the way they used bicycle parts for the aircraft they built, and in the use of the bicycles themselves as an experiment facility to study the aerodynamics of wing shapes.

# Machine - Innovation: Tullio Campagnolo


## *Tullio Campagnolo*

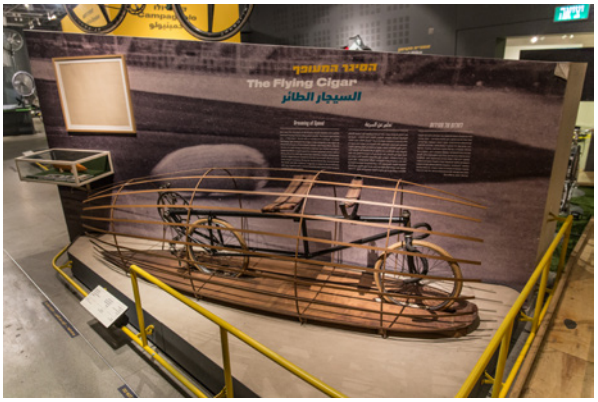
### *Rider & Inventor*

Many legends have been tied to the name of Tullio Campagnolo (1901 – 1983). In his youth, Campagnolo, a native of Vicenze in Italy, competed in amateur races with relative success, gaining firsthand knowledge of the competitive cyclist's needs. Over the years, Campagnolo registered many dozens of patents, which upgraded the 20th century cyclist's racing experience. The parts offered by Campagnolo include the quick release mechanism, the derailleur and the Gruppo – the modular groupset for bicycle gearing and transmission. These became famous thanks to the high quality of design, engineering and aesthetics that he insisted on. Many world champions adopted Campagnolo products, helping to further establish the company carrying his name. To this day Campagnolo is a leading manufacturer of bicycle components.

# Machine-Innovation: Taga, Cardboard, Lunartic


# Human - Machine Aerodynamics

**Historical collection:**
Velorama bicycle museum, The Netherlands
**Interactive exhibits:**
Bloomfield Science Museum Jerusalem


# Human - Learning to Ride

**Interactive exhibits:**
Bloomfield Science Museum Jerusalem

*Learning to Pedal*

*Reverse Steering*

*Rolling Wheels*

*Roll... Don't Fall*


**Historical bicycles:** VELORAMA Bicycle Museum, The Netherlands
**Photos:** Wende Cragg, Velorama & Ingenium Canada's Museums of Science and Innovation

# *Children Ride*

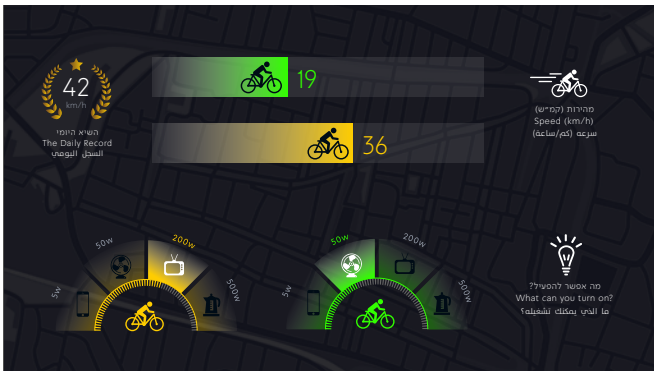
## *200 years of kids' bikes*

This historical collection shows children's versions of important bicycle models from the past 200 years. Back in 1824, very close to the invention of the bicycle, it was thought that children should learn to ride at an early age. Ever since then, in every period and style, bicycle models have been made for children as well.

# Human - Maximum Capabilities 2 Interactive Exhibits

For younger and older kids

***How fast can we pedal, what can we operate?***




**Interactive exhibits:**
Bloomfield Science Museum Jerusalem

# The Social Impact of Bicycles - Synchronization


***Interactive Installation: Two Riders***

Michal Rinot, Shachar Geiger, Giori Politi

# The Social Impact of Bicycles - Africa


Contemporary African and historical bikes

## *Bikes in Africa*

### *Riding Afar*

Bicycles are a wonderful mode of transportation wherever they are found. However, in some countries access to bicycles determines the difference between success and failure, between sickness and health. In many places in Africa there are people who find it difficult to get to work, to school or to receive medical attention because there is no public transportation and they cannot afford to buy a vehicle. Projects such as Buffalo Bicycles combine access between villages and cities with the development of local industry. Ghana's bamboo bicycles demonstrate bamboo's potential as frame material – a 19th century Austrian development – and its suitability as a local industry initiative.

Bicycles with bamboo frames have become very common in recent years, especially as projects with social emphasis. The reason for this is twofold: bamboo's structural qualities make it both strong and light, and it is comparatively easy to build frames from bamboo without special equipment. The advantage of the African bamboo project lies in the ability to grow bamboo near the factory. Not only does this foster local industry, it is also a sustainable environmental solution.

# The Social Impact of Bicycles - Woman


**Historical bicycle:** Peter Zheutlin, Velorama.
**Artifacts:** Velorama & Ingenium Canada's Museums of Science and Innovation
**Photo:** Ingenium Canada's Museums of Science and Innovation

## *Riding to Freedom*

### *Women's rights and bicycles*

In the second half of the 19th century, bicycles were a significant agent of change in the way the female body was viewed in Europe and the United States. At the beginning of that century women were required to hide their bodies. This was expressed in bicycle models that were adapted to cycling in 'feminine' clothing: Draisine bicycles with a low 'top tube' and clumsy tricycles were built to accommodate cyclists in long dresses. Safety Bicycles, which were very similar to the bicycles known today, appeared towards the end of the 19th century and were adapted to 'acceptable' feminine clothing. Despite baseless statements that cycling was injurious to women's bodies and character, tens of thousands of women adopted the bicycle as a vehicle that combined mobility, a healthy lifestyle and was just plain fun. Moreover, many women chose to adopt clothing that would enable more comfortable cycling, in accordance with the New Woman or Rational Dress approach. Even today, women's cycling is not the norm in various communities around the world.

# The Social Impact of Bicycles - Mountain Bikes


**Mountain bikes:** Marin bicycle museum
**Photos:** Wende Cragg & Larry Cragg

## *Birth of the Mountain Bike*

### *From local improvisation to global product*

The connections between social processes and bicycle development take many forms. At times they are calculated and deliberate, at times they are unplanned and amusing. In the 1970's, on the slopes of Marin County, California, a lively group of hippies began a series of friendly races. Although the group included two or three professional road riders, it was mostly a diverse bunch of amateurs who loved speed and adventure. As bicycles were not suited to riding on steep dirt roads, the riders used old bicycles and tried to adapt them to the demanding task. When the improvised bicycles failed, and they realized it was possible to add gears to bicycles to permit uphill pedaling, talented people such as Tom Ritchey and Joe Breeze began to develop an original bicycle model – the Mountain Bike. What began as a brand name became the generic name of the most popular bicycle in the world. Another respected member of the original group was photographer Wende Cragg, thanks to whom we have documentation of how mountain bikes originated.

# The Social Impact of Bicycles- Hand Bikes


## *Pedaling with your Hands*

### *Freedom to move*

The sense of freedom provided by bicycles takes on a special meaning when we think of riders with disabilities. Alongside athletic events such as tandem riding of a blind person with a seeing person, millions of people around the world achieve freedom of movement through hand-pedaled bicycles. This exhibition includes hand-pedaled bicycles from India that serve people who cannot afford a motor vehicle of their own, alongside hand-pedaled bicycles intended for pleasure or sports.

# The Social Impact of Bicycles - Folding Bikes


100 years of folding bicycles

## *Folding Bikes*

### *Enhanced mobility*

It seems that folding bicycles are the obvious solution for anyone who wants mobility to become even more mobile. Folding bikes, which gained fame when carried on the backs of 19th century French soldiers, later developed into an attractive solution for urbanites who wanted to pack their bicycles in the trunks of their cars and go cycling in the country. In time, folding bikes became the ultimate urban device, as they could easily be brought into the home or office to prevent theft. It especially provided a solution for the 'final mile', – from the train or bus to the entrance of the home or office.

In recent years many countries have upgraded traffic regulations to enable bicycle riders to carry their bicycles on public transportation.

# The Social Impact of Bicycles - China


**Chinese bicycle:** During communist times and today
**Photo:** Hiroji Kubota Magnum Photos

## *China*

### *From mass mobility to shared mobility*

In the middle of the 20th century– with the encouragement of Chinese leader Mao Zedong – bicycles became the main means of transportation in China. Although in the 1970's over 60% of the population travelled by bicycles, by 2014 this number had dropped to less than 12%.

China underwent a process of accelerated urbanization and industrialization process that led to a situation in which cities like Beijing suffer from chronic traffic jams and the worst pollution in the world. Hundreds of millions of the Flying Pigeon bicycle model were produced, probably more than any other single vehicle of transportation in human history, and became a symbol of the Mao period. These bicycles were rejected by the younger Chinese generation who aspired to a modern image, free of the tyranny of Communist China. In recent years, a number of Chinese entrepreneurs have established huge initiatives of shared bicycles. Within a very few years China became a country in which the number of shared bicycles is larger than the number of shared bicycles in the rest of the world combined.

# The Social Impact of Bicycles - Political Bikes


**Interactive exhibit:**
Bloomfield Science Museum Jerusalem

## *Protest Bike*

### *Bikes for freedom of expression*

Bicycles provide their riders not only with freedom of movement, but also serve as a vehicle for freedom of speech. Riding groups such as Peace Riders, who foster trust and brotherhood between Palestinians and Israelis, often band together around ideas of sharing, brotherhood and fundraising for a common humanitarian goal. At times, improvisations and additions to the bicycles themselves make them a powerful vehicle of expression. Among these is the' Bikes Against Bush' project of 2004, and Nicholas Hanna's 'March for Science' bicycle, intended to protest the expected cut in the USA science budget for 2017. Using bicycles as a means of advertising and an instrument of protest began way back at the end of the 19th century and continues to this day.

***Political bicycles***

# Thief school - Workshop

## *School for Thieves*

### *A place to improvise*

The accelerated global urbanization of the 20th century and the beginning of the 21st century has increased pollution and traffic jams on a previously unknown scale. Bicycles seem to be the perfect solution: zero pollution; cheap, readily available and renewable energy; and excellent mobility. As a result there is a constantly increasing use of bicycles in cities, especially in the large metropolises. However this increase is often hampered by an accompanying increase in bicycle theft. In certain places, theft has become such a serious issue that the use of bicycles is in many cases avoided. In this activity zone you can learn more about how to steal bicycles as well as ways to protect against thieves; try your hand at picking locks; and learn about historic and current means of protection. In recent years there have been many initiatives aimed at creating better protection for urban bicycles. Many of these initiatives started out as improvisations or local inventions that later developed into actual products.

# Accessories Showcase


Historical artifacts from the collections of Ingenium Canada's Museums of Science and Innovation, and Velorama bicycle museum

# Cinema

# Virtual Trail

**Interactive exhibit:**
Bloomfield Science Museum Jerusalem

# Cat, Cactus, House, Bicycle


## *Cat, Cactus, House, Bicycle*

### *Students illustrate Bikes*

An encounter between a cat, a cactus, a house and a bicycle brings to mind the quote (originally by Isidore Ducasse) which served as an inspiration for surrealist artists: “A chance encounter of a sewing machine and an umbrella on the operating table …”

This exhibit is inspired by a more humble source: an exercise given to second year students at the Bezalel Academy of Arts and Design’s Visual Communications department by their teacher, illustrator Michel Kichka. At first the students drew each component separately. Later on they were requested to draw one illustration combining all components.

Look for the bicycles in the illustrations, which are sometimes hiding in original locations, and try to guess what kind of relationship each young illustrator has with his or her bicycle.

**Students' names:**

Shai Cotani, Anya Ligay, Denisse Micaela Hakim, Nofar Cohen, Noga Mann, Yuval Orion, Rotem Ben-Ari, Danielle Elias, Tamar Chen, Tal Keren, Noam Palombo, Kineret Noam, Stav Balachssan, Yaniv Zada

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