The gazelle and the plastic bag – a dramatic story with a happy end

One day, a plastic bag that had probably drifted out of one of the garbage bins in the Zoological Garden, became wrapped around one of the horns of a female gazelle from our small free-ranging herd of gazelles. The gazelle panicked and started to run across the garden, with the trapped bag hanging from its horn and occasionally covering its face and preventing it from seeing its way. The gazelle attempted to join the rest of the herd, but the other gazelles saw its unusual appearance and fled. The zoo keepers then tried to sneak up on the gazelle to catch it and remove the bag, but had no success. Dr Ron Elazari-Volcani, the administrative director of the Zoological Garden and a veterinarian, hoped to avoid shooting it with a tranquilizer dart, because in its present state, unable to see where it was running, it might have crashed into a wall or even just disappeared from sight and fallen asleep and suffocated with the bag over its face. If this were to happen, every minute would be critical. The zoo keepers continued to watch the gazelle from a safe distance and decided to wait until late afternoon and see what would happen. Finally, in the early afternoon the hole torn in the bag got bigger and bigger until the bag finally fell off without any intervention.
Physical challenges as enrichment for the caracal

One of the most difficult problems for animals in a cage is that of boredom. The number of stimuli is small, the food is served on a regular basis and the animal does not have to hunt or forage for food, there are no enemies or dangers, and the space is restricted. Developing and introducing a variety of environment enrichment means are the way in which zoos, the Zoological Garden included, are trying to mitigate the boredom problem.

In our previous issue of "Gardens Newsletter" we informed our readers that our caracal had been given a new and improved cage that enables it to use the three dimensions of the cage. Nonetheless, during most of the day, the caracal chooses to lie down motionless. We are therefore constantly looking for new and creative ways to challenge it and make it more active. As part of our attempts to enhance its physical activity we constructed a long pole and, with it, we got it jumping to a height of two meters and even higher. The caracal keeper ties a piece of food to the end of the pole and for about three minutes moves the pole with the “prey” attached over the cage roof, while the caracal continues to jump again and again in order to get at the food. After the three minutes, the keeper lowers the pole and lets the caracal jump and catch it. During the first month of this activity we could already observe improvement in the caracal’s coordination and jumping ability.
A research system in the Zoological Garden – wild rat navigation

A great deal of research has been carried out on the ability of animals to find their way around, but most of the accumulated information has come from studies on laboratory rats and under laboratory conditions. The research system that has been built in the Zoological Garden will enable Yael Weisberg, an MSc student at the Sagol School, under the supervision of Dr Yossi Yovel, to study the navigation strategy of wild rats under natural conditions. Which senses do they use? How far from their nests do they usually travel? What is the greatest distance from their nest that they might travel? The research assumption is that the rats' navigation strategy enables them to move freely in their surroundings, with no need to orient by passing through constant landmarks and with the ability to take shortcuts between every two locations in the field.

The basic research system was built by Orit Dashevsky, a PhD student under the supervision of Dr Yossi Yovel. Orit caught young rats in the Zoological Garden, habituated them, enabled them to breed and created a small active and breeding colony. Yael is working with the rat colony that Orit has established and continues to construct and develop it: a system of open cages – spacious and comfortable wooden boxes – that allow the rats to go in and out as they please. The rat cages are monitored 24/7 by cameras and by a microphone that detects the ultrasonic frequencies that the rats use to communicate with each other. The research system was built in an isolated corner of the Zoological Garden, in a big yard that provides the rats with a variety of safe areas – from sun, rain, and people. The rats can move freely in the yard, investigate it and choose where to go and when to return to their nest. The young rats that are born in the colony are habituated to the

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researchers’ hands and are accustomed to wearing a backpack. In the future, the backpack will include a GPS to enable tracking the rats in the yard. When new rats are introduced into the research system, they are prevented from leaving their nest box until they feel “at home” in it, a process that takes about a week. The researcher then opens up a little hole in the box roof and the rats can start to go out and in at will.

Yael’s research is still in its early stages. From preliminary trials it seems that the rats like to explore their environment during the night, return to their nest box at dawn, and spend the day sleeping. During the first stage of the research the rats will be able to freely explore their yard and data on their exploration habits will be collected. At a later stage the rats will be moved to a novel location, outside their territory, where they will be released and will have to find their way back home. The rats will be equipped with a GPS, enabling the researchers to learn about their navigation strategy.

The uniqueness of the current study lies in that the researcher knows the full history of all the rats. In other studies in which navigation strategy has been investigated in nature, the researchers did not know for certain where the animals had been previously, and therefore had to take into consideration that the rats may have had certain prior knowledge of their environment. Thanks to the current study we will soon be able to learn about the rats’ first encounter with their nearby environment, their travel habits, and their navigation strategy.
Possible breeding of our Gila monsters

The Gila monster is a large desert lizard that lives in arid areas in the south-west USA. The species is unique in possessing a specialized venom injection mechanism: a venom gland in the lower jaw and slits in its teeth through which the venom is channelled when the Gila monster bites.

A male and a female Gila monster live in our Zoological Garden. We received them both as adults in the early 1980s from the Abu Kabir Zoological Garden, which means that they are at least 40 years old. The two live in a spacious cage in the reptile yard, which has various sunny and shaded areas, vegetation, shelters and soil, in which the Gila monsters dig their burrows. Occasionally the keeper wets some of the soil in order to add moisture, coolness and interest. The Gila monsters eat only meat and are fed here with a variety of food items: rat and mice pups, minced meat, vital eggs, crickets and more.

At the beginning of May, Barak Levi, the keeper in the reptile yard, noticed that the female was fatter than usual, probably full of eggs. The eggs are expected to be laid in one of the burrows that the female is digging dedicatedly in the ground. We will continue to watch and update our readers.

Drama on the grass!

At the beginning of this winter, like every winter, a flock of yellow-legged gulls that have been nesting here for several years arrived in the Zoological Garden. This flock has been studied consecutively since 2010, by Amir Ben Dov. As part of the study, carried out using large leg rings that enable their detection from a distance, Amir is examining incubation and fledgling success.

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This year, at the beginning of the breeding season, Dr Ron Elazari-Volcani, the administrative director of the Garden, noticed that the gulls were attacking one of the pelicans whenever it approached the nesting area. One day Ron saw that one of the nests had been robbed – of the four eggs that had been laid, only one remained, and that was broken. We are aware that in the last few years the survival rate of the gulls' chicks has been lower than expected, in comparison to other nesting sites in Israel, but our suspicion always fell on the crows. This year it became clear that pelican bills – at least one specific bill – are to blame. On the 9th of May, the animal keeper Jacob Zlait caught the pelican in the act, with a gull chick in its bill. Jacob rescued the chick and the pelican was caught and "detained" in the cormorants' cage. It will be released back to the main grass only after the gulls' breeding season is over.

**New water plants in the turtle pond**

Our turtle pond continues to undergo renovation. Last summer, a variety of water and lakeshore plants from the Botanical Garden were planted along the pond banks. We have now transferred to the pond new water plants that were removed from the crocodile cages, which are being renovated to host their new inhabitants. The plants, which now cover the pond water, prevent the water from heating and also conceal the mosquitofish (which help us to reduce the mosquito population) from their predators. There are now three species of water plants in the pond: the water lettuce (*Pistia stratiotes*), which was brought to Israel as an ornamental plant for fish ponds and aquaria and is considered today an invasive species since it inhabits natural water bodies in Israel; the common duckweed (*Lemma minor*), one
of the fastest growing plants in the world and serving as a food source for many fish and water birds; and the floating fern (*Salvinia natans*), which was also brought to Israel as an ornamental plant but has spread to natural water sources in the north and central Israel. If you enlarge the photo you will be able to see the tiny hairs on its leaves. These hairs repel water and help the plant to float on the water surface.

![Floating fern, Photo: Moshe Peri](image1)

![Common duckweed](image2)

**National training course on the ethics of working with birds**

This is the third time we have held a national training course on the ethics of working with birds in ecological-behavioural research. The course took place in the museum classroom and in the Zoological Garden. The course is offered every two years for researchers and students who study wild birds in the field or laboratory. In the first part of the course the participants heard Dr Mickey Harlev, manager of the veterinary service centre at Tel Aviv University, talking on...
the laws and procedures of conducting research on animals. Prof Arnon Lotem then gave a broad review of the methods and problems of performing research on wild birds in nature and in captivity, followed by a lecture on veterinary and bird health, given by Dr Ron Elazari-Volcani. The last part of the course consisted in demonstrations and basic practice in the Zoological Garden.

**Zoological Garden newsflash**

- 🌿 Our four young jungle cats have moved to a new home in "Gan Hai" in Ra'anana Park, where they been given a spacious and comfortable enclosure. It seems that they have acclimatized well and feel "at home" at their new location.

- 🌿 The agave plant at the Zoological Garden entrance has sprouted an impressively big florescence stem that continues to grow slowly. We think that the plant is *Agave sisalana*, but we will know for sure only after it flowers.

- 🌿 Summer has arrived in the reptile yard: shade nets have been spread between the cage rows, our lizards and snakes are waking up, and young pups have been observed in the cages of the fat sand rat and the golden spiny mouse.
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A robot is roaming the Botanical Garden

One of the most important aspects of agriculture is the ability to accurately estimate the expected yield. This is usually done by means of a manual count of all the fruit from a sample of trees – a time-consuming and inaccurate process. Although the use of a robot for this job seems obvious, agricultural robots still lack the necessary abilities. In an unusual study conducted by Itamar Elyakim, an MSc student in the School of Mechanical Engineering, under the supervision of Dr Yossi Yovel from the School of Zoology and Director of the Zoological Garden, the researchers are seeking to develop agricultural technology using bio-inspired sonar. Bats use sonar for orientation and can easily navigate through dense vegetation and distinguish between fruit and foliage. In this study, which was partially conducted in the Botanical Garden, the researchers successfully developed the robot’s ability to identify and classify different plants and estimate the mass of fruit they bear. The project focuses on the robotic orientation aspects of the Agrirobot initiative, aiming to develop a sonar-
based method for robotic-mapping, obstacle avoidance and path planning in a greenhouse or an orchard. This will allow the yield-assessment robot to autonomously navigate at the requisite site based on bio-sonar only. Such an ability is an essential step on the way to developing a fully automatic yield assessment approach, which will be far cheaper and more accurate than all the measurement means currently in use. Developing such a sonar-based method for robotic-mapping will enable obstacle avoidance and path planning in a greenhouse or an orchard, and thus contribute to a breakthrough in the ability to correctly estimate the expected fruit yield.

**Donkey business**

When we returned from the Independence Day holiday we discovered two completely unexpected visitors in the Garden. First, we found smelly evidence in the orchard, but the intruders themselves were only found after an extensive search: a pair of wild-looking donkeys that were grazing beneath the white mulberry tree and which fled from us when we approached. We later learned from Tel-Aviv Municipality’s veterinary service that these donkeys have been roaming at large throughout northern Tel Aviv for the last two years and have been under surveillance. The celebrated duo continued to hang out in the Botanical Garden for some time and to surprise the visitors, while spending most of their time in the current collection of succulent plants. The municipal employees who came to the Garden were forced to chase the two for several hours before they managed to catch them. Luckily, the visit ended without serious damage and the two even “helped” in the weeding and fertilization of the plots.
Focus on the Botanical Garden

An unusual buzzing sound was heard above the treetops in the Garden. A new video clip, which is currently being produced for the University, was the cause. The Quadcopter, a four-engine drone, hovered above the Israel plant collection and documented the Garden at the peak of its season. The new video is due to be released soon.

The Botanical Garden continues to prove an attractive site for photographers and filmmakers. We most recently enjoyed accommodating the Israeli Educational Television, which is producing a second season of the children’s series Schuster & Schuster. This is a humorous educational show that deals with the connections among a variety of issues, including science, technology, culture and so on. With our water lilies (Nymphaea sp.) and pond lilies (Nuphar lutea) blooming in the background, the filming took place near the water plant pond.

Prof Jonny Gershoni is developing a new online course as part of the TAU-Online project. The course, entitled “Viruses and how to beat them”, will include several short videos. One of these was filmed in the Botanical Garden desert plot at the beginning of May and presents several examples of interesting and provocative animal behaviour on Acacia trees.
New Plants

Six new species have joined the Israeli plant collection, planted at the end of April in the desert and heavy soil plots. The desert plot received *Crotalaria aegyptiaca*, a dwarf shrub from the Legumes family (Faboideae), which flowers in yellow and has green almost leafless stems; *Pergularia tomentosa*, a poisonous dwarf shrub from the Apocynaceae family (until recently Asclepiadaceae), which protects itself against pests and grazing through the secretion of toxic resin and is known as the main host of the grasshopper *Poekilocerus bufonius*; the desert nettle (*Forsskaolea tenacissima*), a chamaephyte from the Urticaceae family, covered with stiff hairs and hook-like prickles, which allow the seeds to disperse through adhering to animals; and the common Fagonia (*Fagonia mollis*), a round dwarf shrub from the Zygophyllaceae family, rather spiny despite its name. Its pink blossom stands out in the desert landscape.

Two additional species of plants were planted in the heavy soil section, both "red" (endangered) species: tumble garlic (*Allium schubertii*), a geophyte from the Amaryllidaceae family. When its seeds ripen, the plant detaches from the ground, tumbles over a distance and distributes its seeds; and Zohary's woundwort (*Stachys zoharyana*), an annual endemic to Israel, very rare and which produces attractive purple flowers that appear in the spring. The plant is named after the botanist Michael Zohary who discovered it.

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Cacti celebration
The hot days are a sign that summer is almost here, the spring bloom in the Israeli plants collection is almost over and this is a perfect time to visit our succulent and cacti collection. Many species of cacti are starting to bloom in a variety of colours and shapes.

A tractor entered our yard
The entrance to the Botanical Garden is sometimes blocked by tractors and trucks that are working on the new entrance platform to the Botanical Garden and The Steinhardt Museum of Natural History, which will be opened to the public in a few months. In the area we can see tall concrete columns that mark the location of the future Garden gate. The work spreads over about 1,000 m², according to the program designed by the landscape architect Julie Peled-Levy. In the near future, a wide entrance gate will lead the visitors to a gathering area, sitting corners and flowerbeds, and from there they can choose in which collection to start their visit. We apologize for the temporary inconvenience.