Piante Guerriere

JOURNEY AMONG PLANTS THAT BELIEVE TO BE ANIMALS

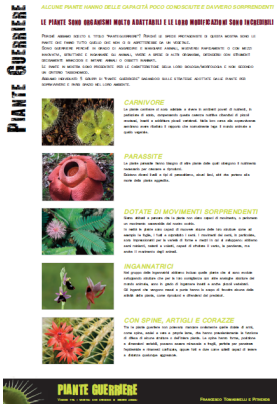
Francesco Tomasinelli e Raffaella Fiore

WARRIOR PLANTS
SOME PLANTS HAVE LITTLE-KNOWN AND TRULY SURPRISING ABILITIES

Plants are highly adaptable organisms, and their modifications are incredible.
Why did we choose the title "Warrior Plants"? Because the plants in this exhibition challenge everything you'd typically expect from a plant. They are warriors because they can attack and consume animals, move rapidly or use creative methods, deceive and exploit animals, survive by depending on other organisms, defend themselves with fierce weapons, and mimic both animals and inanimate objects. These remarkable abilities make them stand out as true survivors, defying the usual characteristics we associate with plants.

The plants in the exhibition are presented based on their biological/morphological characteristics, not according to a taxonomic criterion.
"We have identified five groups of 'Warrior Plants' based on the strategies they use to survive and establish their space in their environment."

CARNIVOROUS
Carnivorous plants have evolved to thrive in environments lacking essential nutrients, especially nitrogen. To make up for this, they feed on small creatures like insects, crustaceans, and even tiny vertebrates. In doing so, they seem to flip the typical dynamic between plants and animals, as they take on the role of predators rather than prey. This unique adaptation allows them to survive in places where most plants would struggle.



PARASITIC
Parasitic Plants Parasitic plants rely on other plants to obtain the nutrients they need to grow and reproduce. Some forms of parasitism are mild, while others can even kill the host plant.

SURPRISINGLY MOVABLE
Surprisingly movable though we don't usually think of plants as movers, many can shift parts like leaves, stems, and especially seeds. Some seeds roll, float, or even fly, using wind, slopes, or animals to travel.

DECEPTIVE
These plants mimic animals to deceive insects and small vertebrates, aiding their reproduction or defense.

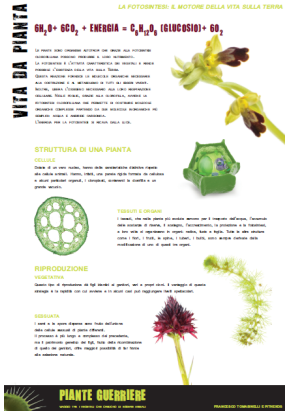
WITH SPINES, CLAWS, AND ARMOR
These plants wield sharp spines or thorns for protection, sometimes acting like real weapons to fend off threats.
LIFE OF A PLANT: PHOTOSYNTHESIS

LIFE OF A PLANT: PHOTOSYNTHESIS
THE ENGINE OF LIFE ON EARTH
$6H_2O + 6CO_2 + ENERGY = C_6H_{12}O_6 (GLUCOSE) + 6O_2$

Plants are autotrophic organisms that can produce their own food through chlorophyll photosynthesis. This process is essential for life on Earth as it provides the organic molecules necessary for the construction and metabolism of all living beings. Additionally, it releases oxygen needed for cellular respiration. Photosynthesis occurs in leaves, where chlorophyll enables the synthesis of complex organic molecules from simpler inorganic ones: water and carbon dioxide. The energy for photosynthesis comes from light.

STRUCTURE OF A PLANT
CELLS
Plants have true nucleus and possess distinctive features compared to animal cells. They have a rigid cell wall made of cellulose and contain specific organelles called chloroplasts, which house chlorophyll, as well as a large vacuole.

TISSUES AND ORGANS
In more evolved plants, tissues facilitate water transport, nutrient storage, support, growth, protection, and photosynthesis. These tissues organize into organs: roots, stems, and leaves. Other structures, such as flowers, fruits, thorns, tubers, and bulbs, are modifications of these three organs.



VEGETATIVE REPRODUCTION
This type of reproduction produces offspring identical to the parents, essentially clones. The advantage of this strategy lies in its speed, which can reach remarkable levels.

SEXUAL REPRODUCTION
Seeds and dispersed spores result from the union of sexual cells from different plants.
This process is longer and more complex than vegetative reproduction, but the genetic diversity in the offspring, derived from the recombination of parental genes, offers greater adaptability to natural selection.

"YOU REAP WHAT YOU SOW."
THE FARTHER YOU GO, THE BETTER YOU SETTLE.
TREE: THE SLOW EXPLOSION OF A SEED - BRUNO MUNARI, WRITTEN REPORT, 1992

Plants fight to disperse their seeds. Once mature, seeds must move away from the mother plant. The phenomenon that allows this action is called dispersion, which can occur in various and bizarre ways.
Since plants cannot move much, they develop a series of dispersion systems mediated by living beings or abiotic factors. Different dispersion mechanisms enhance the survival of various species as the seed distances itself from the mother plant, either through the plant's own means (autochory) or through external mechanisms (allochory).

HYDROCHORY: WATER HELPS
This type of dispersion occurs through fresh or saltwater. It is common in plants that release seeds from capsules and fruits capable of floating, thus navigating to distant locations from the mother plant. Rain can also cause the release of seeds or fruits, which are expelled several meters away.

ANEMOCHORY: CARRIED BY THE WIND
Engineers and designers have long studied this form of dispersion, using it for useful human tools. Wind dispersion is an ancient mechanism where seeds are transported far away in various ways depending on the structure developed by the plant, such as wings or parachute-like mechanisms, typical of organisms producing large quantities of seeds.

ZOOCORY: ANIMAL TRANSPORT
Animals play a central role in this type of dispersion, which can be external when a seed is carried, for example, by getting caught in fur or on paws, and internal through the ingestion of seeds and fleshy fruits designed to be eaten (like nuts, pine nuts...). The co-evolution mechanism between animals and plants has led to the development of highly sophisticated structures, ensuring plants have effective systems for transportation.

THE POWER OF PLANTS

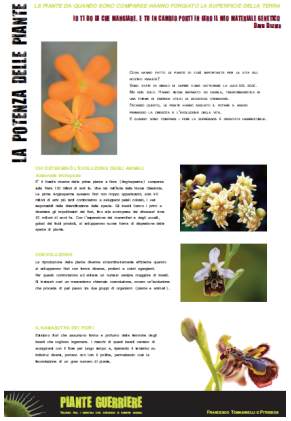
"I provide you with food, and in return, you carry my genetic material." — David Dilcher

Since their appearance, plants have shaped the Earth's surface. What have plants done that is so crucial for life on our planet? They have learned how to capture sunlight. Not only that, they have also figured out how to use it, transforming it into a useful form of energy: organic molecules. By doing this, plants have gained power and enabled the growth and evolution of life. With the emergence of flowers, their supremacy became unstoppable.

WHO DETERMINED THE EVOLUTION OF ANIMALS?

Amborella trichopoda

This living fossil represents the first flowering plants (angiosperms) that appeared on Earth 130 million years ago. It now lives on the island of New Caledonia. The earliest angiosperms had inconspicuous flowers; only 40 million years later did colorful petals begin to develop, which were key to species diversification. Insects were the first pollinators of flowers until the extinction of dinosaurs about 65 million years ago. With the expansion of mammals and birds, who enjoyed the produced fruits, new forms of plant species dispersion emerged.



COEVOLUTION

The reproduction of plants became extraordinarily efficient when flowers with different shapes, scents, and bright colors developed. This began to attract an increasing number of insects, establishing a mechanism called coevolution, where evolution progresses side by side between two groups of organisms (plants and animals).

THE KAMASUTRA OF FLOWERS

Some flowers mimic the shape and scent of female insects they want to deceive. Males of these insects attempt to mate with the flower for an extended period, and by repeatedly trying with different individuals, they carry pollen, thus allowing the fertilization of numerous plants.

PHOTO EXHIBITION

THE CRAB OF THE CARNIVOROUS PLANT

What appears to be yet another victim of a carnivorous plant from Borneo, *Nepenthes ampullaria* (fig. 2), is actually a crab that takes advantage of the plant. This undescribed *Geosesarma* species is tolerant of the plant's aggressive liquid, used to digest organic matter, and hides inside it (fig. 1) to limit dehydration and consume the insects that fall into the trap of *Nepenthes* (fig. 4). The crustaceans move from one plant to another and can also catch small prey, such as crickets and cockroaches (fig. 3), found on the forest floor. It is unclear what benefits the plant derives from the crab's presence, but it likely utilizes its waste and leftover food.

THE AMBUSH OF THE DIONAEA

The lightning-fast reflexes of a fly are not enough to save it from the traps of *Dionaea muscipula*. This carnivorous plant, native to the swamps of the southern United States, lures its victims with a sugary secretion on its leaves (fig. 1), which snap shut like traps when the ultra-sensitive hairs of the *Dionaea* are touched by the insect (fig. 2-3). To prevent false alarms, the trap only springs if at least two hairs are contacted within 20 seconds. About a week after digesting its prey, the *Dionaea* reopens its trap (fig. 4) and is ready to hunt again.

THE FUNNELS OF SARRACENIA

They resemble curious works of art, rising up to fifty centimeters from the moist, poor soil of North American swamps, but they are actually carnivorous plants known as *Sarracenia* (fig. 1, *Sarracenia flava*). Equipped with a lid atop the trap (fig. 2-4, *Sarracenia leucophylla*), they hunt similarly to *Nepenthes*. The inner walls are lined with tiny hairs pointing downwards, making it difficult for trapped insects to escape (fig. 3, *Sarracenia purpurea*). Like many other carnivorous plants, *Sarracenia* takes a "break" in spring by producing large flowers, well above their deadly traps, which are pollinated by insects.

THE KILLER FLOWER

Many small predators lie in wait among flowers, but none has a more sophisticated disguise than the orchid mantis, *Hymenopus coronatus*, which lives in the tropical forests of Malaysia and Indonesia. Every detail of its body resembles some aspect of the plant, especially the *Phalaenopsis* orchids, where the mantis awaits the pollinating insects it preys on (fig. 1-4). Mantises can also hunt on green leaves, near other inflorescences, mimicking flowers themselves (fig. 2). There is always some insect that approaches to investigate, attracted by promising shapes and colors, finding death in the mantis's embrace (fig. 4).

THE PITCHER PLANTS TRAPS

The elegant shapes of these vines of the genus *Nepenthes*, spread across much of South-East Asia and in Madagascar, they hide their nature of carnivorous plants (fig. 1). Insects attracted by the scent emitted by the vegetable glide on the walls inside the trap in which a liquid is able to digest their bodies (Fig. 2). All *Nepenthes* have a kind of roof, the operculum (fig. 3), to prevent rainwater from entering. Some are so big that they can catch even small mammals and contain up to 2 liters of liquid. Small Australian *Cephalotus*, also hidden in the soil, they use a similar strategy, attracting small insects moving on the ground (fig. 4).

UNITY IS STRENGTH

Ants are the most abundant insects in the tropics, and many have formed formidable alliances with plants, especially those in inhospitable environments with acidic and nutrient-poor soils or growing as epiphytes. The swollen stems of *Hydnophytum formicarium* (fig. 1) and *Myrmecodia tuberosa* in Borneo always house the nests of *Iridomyrmex* ants (fig. 2). In exchange for shelter, the insects defend the plant from herbivores and nourish it with their organic waste and food scraps. *Macaranga*, with large green leaves (fig. 3), and spiny *Korthalsia* (fig. 4) provide ants with special chambers called domatia. In some cases, the ants even eliminate competitors of their "mother" plant by damaging seedlings of other species growing nearby.

THE RAFFLESIA'S STRATEGY

Even though it has become famous for being the largest flower in the world, the *Rafflesia* (fig. 1), a leafless endemic plant from the Indonesian archipelago, hides a little-known dark side. It is, in fact, a parasite of a single genus of vine (*Tetrastigma*), from which it siphons nutrients through a network of root-like structures (haustoria) that penetrate the host plant. The immense flower produced, which can reach a meter in diameter and weigh up to 10 kg in some *Rafflesia* species, emits a putrid smell essential for attracting flies, the plant's pollinators (fig. 2-3). The production of this oversized inflorescence requires a significant investment: 9 months for just one week of flowering.

THE RACE TOWARD SHADOW

Young plants always seek light, but the sprouts of *Monstera*, which grow on the forest floor in Central and South America, do the opposite. Thanks to the reserves in the seed, they quickly head toward the shade, where they can find a tree to climb. Only at this point does the young plant begin to produce leaves, which fuel its upward growth (fig. 3). Once it reaches a brighter position, *Monstera* changes shape again, expanding on the host plant (fig. 1) and producing large leaves with “windows” (fig. 2), allowing light to reach the underlying leaves and managing water weight during tropical downpours.

THE PATIENT WELWITSCHIA

In few places around the world is the struggle for survival in a hostile environment as evident as in the Namib Desert, where *Welwitschia mirabilis* (fig. 1) thrives. It appears as a large clump of green leaves that feel plastic to the touch, yet despite its suffering appearance, which makes it seem perpetually on the brink of death (fig. 3), it is one of the most resilient and long-lived plants on Earth: some individuals exceed two thousand years and can go two years without water, constantly exposed to the desert sun. *Welwitschia* is pollinated by flies and a small bug, *Probergrothius sexpunctatus*, which is always found nearby (fig. 2).

THE LIVING STONES

In the arid grasslands and deserts of Southern Africa thrive some of the most unusual and resilient plants in the world. These *Lithops* (fig. 1-3) mimic the shapes and colors of stones, rising only slightly above the ground to remain unnoticed by the few herbivores that traverse these lands. The upper part of the plant still allows light to penetrate for photosynthesis, although during dry periods, *Lithops* can reduce their volume and nearly disappear into the soil. The flowering (fig. 4) lasts only a few days, typically appearing after rainy days. This is the best time for insect pollination. The tortoises commonly found in these areas often eat the tiny fruits and flowers, helping to disperse the plant's seeds (fig. 2-3).

A TOXIC LATEX

In every season, *Euphorbia dendroides*, the emblematic plant of the Mediterranean, manages to maintain its charm. In summer, the leaves turn brownish-red and fall off to minimize damage from aridity, only to reappear in autumn as tender shoots, which turn yellow during winter flowering (fig. 1). Most euphorbias are specialized for life in arid climates, particularly among rocks (*Euphorbia unicornis*, endemic to Mozambique, fig. 3), defending themselves from herbivores with spines and toxins. The white latex contained in the plant's tissues is dangerous and should not come into contact with the eyes, mouth, or nose (fig. 2).

THE ROSES OF THE DESERT

Among the ancient rocks of the deserts in Africa and the Middle East, some of the most curious succulent plants in the world can be found. In Namibia, *Pachypodium namaquanum* protects itself from the few herbivores present with a trunk covered in long spines (fig. 1) and produces a large yellow bloom after the light rains, attracting many insects. On the other hand, *Adenium obesum* from the Arabian Peninsula relies on its giant, bottle-shaped trunk to survive for many months without water. Its delicate yet abundant flowers remain on the plant for several weeks, earning it the name "desert rose" (fig. 2-3).

THE EXTREME DEFENSE OF CACTI

Excluding the poles, there is no environment on Earth more severe and challenging than the vast deserts of Africa, America, and Asia. Yet, even here, plants manage to survive... Cacti, which are found only in the Americas (fig. 1, *Echinocactus grusonii*), have spines, thorns, and bristles instead of leaves to keep predators away and reduce transpiration (fig. 2, Big Bend National Park). The ridges on the stems of these plants (fig. 3) function like "cooling fins," similar to those of a radiator. The alternating patterns of light and shadow created by these vertical surfaces produce ascending and descending air currents that improve heat dissipation.

A THORN WALL

Many cactus adaptations are so effective for surviving in arid environments that similar traits have evolved independently in other succulent plants. For example, *Sarcocaulon crassicaule,* (fig. 1), from southern Africa has deadly spines and tiny leaves. The agave, *Agave americana*, (fig. 2), defends itself with sharp spines along the edges of its large leaves. Some trees, such as *Ceiba speciosa*, (fig. 3), even grow tough, conical thorns on the lower part of their trunks to ward off herbivores. These defense mechanisms are crucial for survival in harsh environments.

THE FIRE WAR

The Cape region in South Africa has one of the highest floral diversities in the world, with hundreds of endemic species categorized into two botanical communities: the succulents of the Karoo (like *mesembryanthemums*, stone plants, and many others, fig. 1) and the fynbos (including proteas, fig. 3, and heaths, fig. 4). The two groups seem to be in a constant state of war: the Karoo community "deploys its troops" at the edge of the fynbos areas, which attempt to counter the advance with fire (fig. 2). Karoo plants thrive in arid zones due to water retention in their tissues, while fynbos is less drought-tolerant but better adapted to fire, which frequently affects these semi-desert regions. Millions of years of evolution and recurring fires have defined the survival strategies of both groups.

PARASITIC ORCHIDS

Some plants lack vibrant colors but compensate with a unique lifestyle. One such plant is *Epipogium aphyllum* (fig. 1-2), one of the rarest and most intriguing parasitic orchids in the world. *Epipogium* survives through microscopic underground fungi that are in symbiosis with surrounding green plants, deriving all its nourishment without giving anything in return, unlike other orchids. The faded color and lack of leaves result from the absence of chlorophyll, essential for photosynthesis, which is no longer needed in this species. *Neottia nidus-avis* (fig. 3-4) has a similar biology and is mostly pollinated by ants attracted to the sugary liquid produced by the plant itself.

THE DECEPTION OF THE ORCHID

Mediterranean orchids of the genus *Ophrys* exhibit highly elaborate flowers that serve as lures to attract pollinating insects. The orchids resemble, in touch and scent, the females of their species. Males, deceived by this resemblance, attempt to mate with the flower, thereby transporting pollen (the small yellow sack atop the bumblebee's head, fig. 1) to fertilize another plant of the same species during their next encounter. Sometimes, "mating with the flower" can be dangerous, as these orchids are hunting grounds for small yet lethal predators like crab spiders (fig. 2) and praying mantises (fig. 3).

THE FROG AND THE BROMELIAD

The colors of this South American frog, *Dendrobates histrionicus*, serve as a warning: red and black in nature signify danger (fig. 1). Indeed, this species, found only in Colombia's humid forests west of the Andes, is highly toxic. It is typically found in areas with abundant bromeliads, plants that grow on tree trunks and collect small amounts of water in their leaf rosettes due to continuous rainfall. In this mini-pool, the frog lays a tadpole, which has limited food sources (fig. 2). The female lays an egg in the bromeliad every few days, providing nourishment for the tadpole until its development is complete a few weeks later (fig. 3).

THE FLOWERS OF EVIL

The appearance of these plants is unsettling. In fact, the flowers of *Stapelia hirsuta* (fig. 1-3), as well as those of the similar *Stapelia grandiflora* (fig. 2), they do not have a pleasant perfume for us. Their scent resembles that of rotting flesh, reinforced by a reddish-brown color mottled by dark spots. In doing so, these African-origin plants can attract a plethora of pollinators such as flies and carrion beetles, deceived by the smell, even come to lay eggs on the plant. The insect larvae pose no threat to the plant and soon perish due to a lack of suitable nourishment.

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THE SEYCHELLES PALM

Nestled in the heart of Praslin Island is the Vallée de Mai forest, (fig. 1), the crown jewel of the Seychelles. This unique ecosystem is home to the ancient coco de mer palm (*Lodoicea maldivica*), endemic to the island. Towering at 20 meters, its enormous fan-shaped leaves block sunlight from reaching the forest floor, (fig. 1). The coco de mer produces a colossal seed, weighing up to 20 kg, resembling a woman's pelvis. This helps it thrive in low-light, nutrient-poor soils, (fig. 1). The forest also harbors specialized endemic species, including snails, and geckos like *Ailuronyx trachygaster*, often found on the male palm's inflorescences.

CARNIVORES OF ITALY

Carnivorous plants are often linked to tropical forests, but several species also thrive in the bogs and wetlands of Italy's mountains. The best-known species is *Drosera rotundifolia*, (fig. 1), recognized by its sticky red stalks that can trap small spiders and grasshoppers, (fig. 2). Another species, *Pinguicula*, uses sticky, glandular leaves to capture insects, like mosquitoes, (fig. 3). These plants bloom delicate flowers in early summer, strategically placed above their traps to avoid harming pollinating insects, ensuring both survival and reproduction.

THE SYMBOL OF AFRICA

An African legend says that the baobab was planted upside down by hyenas, which is why its branches resemble roots. In the savannas and deserts of Africa, baobabs (*Adansonia digitata*) are ancient natural monuments, some over a thousand years old. They survive drought, storms, and elephants, which scrape their bark for water stored within. Their leaves appear at the end of the dry season to catch the first rains, and their large, white flowers bloom at night, pollinated by bats and small nocturnal mammals like galagos.

THE QUIVER TREE

If there's a symbolic tree for the rocky landscapes of Namibia and South Africa, it's undoubtedly the Quiver Tree (*Aloe dichotoma*). This unusual plant owes its name to the San people, who used its hollowed branches as containers for carrying arrows. Exceptionally drought- and heat-resistant, these *Aloe* trees grow very slowly in harsh, sun-scorched environments where few others can survive. During their brief flowering period, they are pollinated by nectar-loving sunbirds, small African birds similar to hummingbirds.

CLIMBING WITH CRAMPONS

In tropical forests, light is a precious resource for which there is intense competition. All climbing plants strive to push upward, using trees as support to reach the forest canopy, where they create habitats for animal species that rarely descend to the ground (fig. 1). In Southeast Asia, rattan palms of the genus *Korthalsia* have a secret weapon: continuously growing tendrils that can extend for many meters, covered with hooked spines that deter herbivores and cling to the vegetation (fig. 2). In *Calamus* rattan palms, these 5 cm long spines form a deadly tangle to better protect the lower part of the trunk (fig. 3).

THE MIRACLE OF FLIGHT

Although they lack the mobility of animals, plants have also found ways to "lift themselves into the air" and disperse their seeds as far as possible from the parent plant using various techniques. Seeds of the *Dipterocarpaceae* family, trees from Asian tropical forests, have a rotating wing, similar to a helicopter rotor, to slow their fall and travel far in windy conditions (fig. 1), while maple seeds adopt the same solution (fig. 2). Dandelion seeds, the yellow flower that fills our fields in spring, instead utilize a microscopic parachute (fig. 3). One of the most sophisticated designs belongs to *Alsomitra macrocarpa*, a Southeast Asian vine, whose seeds feature a broad membrane providing a wing surface of about 15 cm, allowing future seedlings to travel long distances (fig. 4).

HITCHING RIDES FROM STRANGERS. WE'RE VERY AGGRESSIVE!

ATTACHMENT SYSTEMS

Seeds have evolved excellent dispersal mechanisms to move away from the parent plant. Some, like the devil's claw (*Harpagophytum procumbens*), have hooks that allow them to cling to the fur of mammals, the scales of reptiles, or the legs of birds, such as ostriches. *Martynia annua* reproduces through seeds contained within a fruit that has claw-like protrusions. These structures enable it to spread easily by attaching to animals, clothing, and vehicles.

SOCKS AS TRANSPORT MEANS

After walking through meadows, have you ever found your socks filled with seeds? These seeds, which have clung to the socks, can travel long distances, just as animals do.

SRDU AGGRESSION SCALE

This scale was developed by a group of professors at Palomar College in San Diego, based on the difficulty of removing seeds that have attached to the fabric of socks worn during a walk in the fields. The dot O identifies the unit of measure on the scale, known as the Sock Removal Difficulty Unit (SRDU). Next time you find a small seed firmly stuck to your socks, consider how far it may have traveled and where it comes from.

AILANTHUS, THE KING OF CITIES

The first *Ailanthus altissima* trees arrived in Italy in 1760 from China for breeding the *ailanthus* silk moth as an alternative to the diseased mulberry silkworm. However, the silk produced was of poor quality, and the attempt was quickly abandoned. Left to grow unchecked, the ailanthus spread rapidly across northern Italy. Today, it thrives in urban areas, often sprouting in degraded spaces, roadsides, and even cracks in buildings. Known by various names, including "tree of heaven" and the less poetic "gas station tree," it showcases impressive adaptability.

THE OFFENSIVE OF THE WATER HYACINTH

The floating green mats of water hyacinth (*Eichhornia crassipes*) symbolize the vast wetlands of South America (fig. 3). With its large bluish-purple flowers (fig. 1), this plant was introduced to the West as an ornamental species for garden ponds in the early 20th century, later invading water bodies worldwide. Lacking natural enemies, seedlings travel with currents (fig. 2), covering lakes and slow-moving rivers and depriving native species of light and living space. Each plant can produce clones through vegetative reproduction, and air-filled pockets at the leaf bases keep it buoyant. Today, water hyacinth is listed among the most harmful invasive botanical species globally.

THE STRANGLER FIG TREE

At the beginning of its existence, it appears merely as a small plant that has fortuitously sprouted among the branches of a tree in a tropical forest (fig. 2). However, a few months later, the roots of the young strangler fig (genus *Ficus*, with various species) begin to reach down toward the ground in search of nutrients. Year after year, the fig wraps itself around the host plant with roots resembling the tentacles of a giant octopus while simultaneously reaching upward in search of light, which it takes from the plant it grows upon (fig. 3). Within 15 to 20 years, the fig is large enough to survive independently (fig. 4) and delivers the final blow to the dying tree that has supported it, which decomposes rapidly in the warm, humid climate of the forest. The only testament to the existence of the deceased plant is a hollow cylindrical space between the coils of the strangler fig (fig. 1).

THE PRISON OF ARISTOLOCHIA

The oversized and foul-smelling flower of *Aristolochia* (fig. 1), a genus of tropical climbing plants, is a powerful lure for flies, which easily enter the inflorescence to reach a chamber where they find nectar, their reward (fig. 2). However, they can only exit after collecting pollen and thus contributing to the plant's fertilization. At this point, the plant slightly lowers the inward-facing hairs in the entrance funnel, preventing the insects from escaping (fig. 3-4).

THE ICE PLANTS

Some species of *mesembryanthemums* from southern Africa have tissues that shine in sunlight, earning them the name "ice plants," a term that seems inappropriate for these arid lands (fig. 3, *Drosanthemum floribundum*; fig. 4, *Mesembryanthemum cristallinum*). These succulents are covered in blisters that reflect light and store water reserves (fig. 2). The mineral salts contained in the soil are absorbed by the plant and, upon its death, dispersed into the ground, creating an environment where seeds of other species struggle to germinate—a good strategy for reducing competition and colonizing new areas (fig. 1, *Mesembryanthemum guerichianum*).

CAPTIONS

Dionaea muscipula

VENUS FLYTRAP

RESEMBLING MINIATURE TRAPS, THE LEAVES OF THIS CARNIVOROUS PLANT ARE DESIGNED TO CATCH SMALL FLYING INSECTS. THE TRAPS CLOSE WHEN SPECIALIZED SENSORY HAIRS ARE TRIGGERED. TO AVOID FALSE ALARMS CAUSED BY WIND-BORNE DEBRIS, THE TRAP SHUTS ONLY IF THE HAIRS ARE TOUCHED AT LEAST TWICE WITHIN 20 SECONDS (THE *Dionaea* CAN EVEN "COUNT"!). HOWEVER, IF REPEATEDLY STIMULATED, THE TRAPS STOP CLOSING TO CONSERVE ENERGY. A TYPICAL PREY, SUCH AS A FLY, IS DIGESTED WITHIN A WEEK.

Origin

MARSHES OF NORTH AND SOUTH CAROLINA, USA.

Pinguicula

BUTTERWORTS

THE CARNIVOROUS PLANTS OF THE GENUS *Pinguicula* (FROM THE LATIN *Pinguis*, MEANING FAT) HAVE LEAVES THAT LIE FLAT ON THE GROUND, COVERED WITH MICROSCOPIC ADHESIVE VESICLES. HIDDEN WITHIN ARE INVISIBLE GLANDS THAT SECRET A STICKY LIQUID CAPABLE OF CAPTURING PREY, WHICH WILL BE DIGESTED BY THE PLANT. ONLY THE EXOSKELETONS OF INSECTS REMAIN AT THE END OF THE DIGESTIVE PROCESS. THE STICKY LIQUID ALSO ACTS AS AN ANTIBACTERIAL AGENT, PREVENTING PREY FROM DECAYING ON THE LEAVES—A FEATURE THAT WAS ONCE SO WELL-KNOWN THAT THE LEAVES WERE USED TO TREAT INFECTIONS IN INJURED ANIMALS. IN BOTH GENERA, THE LARGE AND STRIKING FLOWERS RISE UPWARD ON LONG STEMS TO KEEP POLLINATING INSECTS AWAY FROM THE TRAPS.

Origin

EUROPE, MOROCCO AND ALGERIA, RUSSIA, ASIA, AMERICA, CANADA, ALASKA

Mimosa pudica

SENSITIVE MIMOSA

Mimosa pudica, ALSO KNOWN AS "TOUCH-ME-NOT," IS EASILY RECOGNIZED BY ITS IMPRESSIVE REACTION TO TOUCH, WHICH SERVES AS AN EXCELLENT DEFENSE SYSTEM AGAINST PREDATORS. THE LEAVES HAVE A SPECIALIZED STRUCTURE AT THE BASE OF THE PETIOLE, CALLED THE PULVINUS, WHICH FOLDS RAPIDLY OR SLOWLY IN RESPONSE TO CHANGES IN TURGOR IN THE CELLS, CAUSED BY OSMOSIS. THIS FOLDING OCCURS AT NIGHT AS PART OF THE NORMAL CIRCADIAN CYCLE. THE PLANT, WITH ITS CLOSED, WILTED LEAVES, APPEARS AS IF ROTTEN, MAKING IT LESS ATTRACTIVE TO PREDATORS. THIS MECHANISM ALSO HELPS TO PREVENT WATER LOSS DURING THE HOTTEST HOURS.

Origin

TROPICAL ZONES OF AMERICA

SENSITIVE PLANTS

SENSITIVE PLANTS ARE EASILY RECOGNIZED BY THEIR IMPRESSIVE REACTION TO TOUCH, WHICH PROVIDES AN EXCELLENT DEFENSE SYSTEM AGAINST PREDATORS. THE LEAVES HAVE A SPECIALIZED STRUCTURE AT THE BASE OF THE PETIOLE, THE PULVINUS, WHICH, DUE TO CHANGES IN THE TURGOR OF THE CELLS CAUSED BY OSMOSIS, CLOSES QUICKLY OR SLOWLY, LIKE AT NIGHT WHEN THEY FOLLOW THE NORMAL CIRCADIAN CYCLE. THE PLANT WITH CLOSED, WILTED LEAVES, AS IF THEY WERE DECAYING, IS LESS ATTACKED BY PREDATORS. THIS MECHANISM ALSO HELPS TO PREVENT WATER LOSS DURING TOO HOT HOURS.

Origin

TROPICAL ZONES OF AMERICA, ASIA, AND AFRICA

SARRACENIA

THEY LOOK LIKE SLIM AND ELEGANT VEGETABLE GOBLETS RISING FROM THE WET SOIL OF SWAMPS, BUT IN REALITY, THEY ARE THE TRAPS OF CARNIVOROUS PLANTS KNOWN AS SARRACENIA. INSECTS THAT VISIT THEM, ATTRACTED BY NECTAR, SLIP INTO THE CAVITY, WHICH NARROWS TOWARD THE GROUND, PREVENTING THE PREY FROM ESCAPING THANKS TO STRONG HAIRS POINTING DOWNWARD. CAPTURED INSECTS ARE DIGESTED WITHIN A FEW DAYS. HOWEVER, THIS PLANT ALSO USES LARGE FLOWERS THAT BLOOM IN SPRING TO BE POLLINATED BY INSECTS KEPT WELL AWAY FROM THE TRAPS.

Origin

SWAMPS OF NORTHEAST AMERICA, CANADA, AND ALASKA

Nepenthes

NEPENTHES

THE LARGE "PITCHERS" OF THESE CARNIVOROUS CLIMBING PLANTS, KNOWN AS ASCIDIA, ARE DEADLY TRAPS FOR INSECTS. THE VICTIMS ARE ATTRACTED BY SPECIAL SECRETIONS TO THE EDGE OF THE PITCHER, WHERE THEY SLIP AND FALL TO THE BOTTOM, WHICH CONTAINS A VISCOUS LIQUID. THE PREY CANNOT CLIMB BACK UP THE WALLS BECAUSE THEY ARE COVERED WITH WAXY SCALES THAT PREVENT INSECT LEGS FROM GAINING PURCHASE, AND THEY ARE QUICKLY DIGESTED. THE LID ABOVE THE ENTRY HOLE PREVENTS WATER FROM RAINFALL FROM DILUTING THE SOLUTION INSIDE. THE LARGEST *Nepenthes* CAN HOLD UP TO TWO LITERS OF LIQUID AND HAVE EVEN DIGESTED SMALL VERTEBRATES, SUCH AS MICE AND LIZARDS, IN SOME CASES.

Origin

FORESTS OF ASIA, INDOCHINA, AUSTRALIA, AND MADAGASCAR

Bromeliads

BROMELIADS ARE SPECIALISTS IN LIVING "HIGH UP," ON THE BRANCHES OF LARGE TREES IN TROPICAL FORESTS. THEIR TIGHTLY PACKED LEAVES FORM A KIND OF BASIN AT THE BASE, ALLOWING THEM TO COLLECT RAINWATER. MONKEYS, BIRDS, AND SMALL MAMMALS USE THESE POOLS TO DRINK, WHILE INSECTS, FROGS, MOLLUSKS, AND CRABS LAY THEIR EGGS IN THEM. THE BROMELIAD BENEFITS FROM THE MINIATURE ECOSYSTEM THAT DEVELOPS IN THE WATER BY EXTRACTING NUTRIENTS FROM THE BODIES OF DEAD ANIMALS AND THEIR WASTE, WHICH IT CANNOT OBTAIN FROM THE SOIL AS IT IS SUSPENDED METERS ABOVE THE GROUND.

Origin

RAINFORESTS OF CENTRAL AND SOUTH AMERICA

Tillandsia

AIR PLANTS

THE MAIN CHARACTERISTIC OF THESE PLANTS IS THAT THEY LIVE WITHOUT SOIL AND NATURALLY OCCUPY VARIOUS HABITATS WHERE OTHER PLANTS CANNOT SURVIVE DUE TO THEIR INCREDIBLE ADAPTABILITY. THEY CAN BE FOUND CLINGING TO THE BARK OF TREES, WHERE THEY SOMETIMES SHARE THE SAME BRANCH WITH MANY OTHER BROMELIADS AND ORCHIDS. THEY CAN LIVE AT ALTITUDES OF OVER 4,000 METERS AND IN DENSE FORESTS WHERE LIGHT IS SCARCE BECAUSE IT IS BLOCKED BY VEGETATION. THEY CAN GO WITHOUT WATER FOR MONTHS, EVEN YEARS, BY UTILIZING THE MOISTURE IN THEIR ENVIRONMENTS. EPIPHYTE SPECIES (Epi=ON TOP OF, *Phyton*=PLANT) USE OTHER PLANTS AS ANCHORS TO GAIN LIGHT AND WATER FOR PHOTOSYNTHESIS.

Origin. SUBTROPICAL AND TROPICAL REGIONS OF AMERICA

Myrmecodia tuberosa

ANT PLANT

LIVING AS AN "EPIPHYTE," CLINGING TO THE BARK OF TREES IN TROPICAL RAINFORESTS, THIS PLANT CANNOT RECOVER THE NUTRIENTS IT NEEDS FROM THE SOIL. ITS HOSTS PROVIDE THESE: TENS OF ANTS THAT LIVE INSIDE THE SWOLLEN STEMS OF *Myrmecodia*, PROTECTED BY SPINES. IN EXCHANGE FOR SHELTER, THE INSECTS DEFEND THE PLANT FROM SMALL HERBIVORES AND PROVIDE NUTRIENTS THROUGH THEIR WASTE, IN ACCORDANCE WITH A WELL-ESTABLISHED MODEL OF MUTUALISTIC SYMBIOSIS: "I HELP YOU, AND YOU HELP ME." THE PLANT ON DISPLAY DOES NOT HAVE AN ANT COLONY AND OBTAINS WHAT IT NEEDS FROM THE SPECIFIC SUBSTRATE.

Origin: TROPICAL RAINFORESTS OF SOUTHEAST ASIA, AUSTRALIA, AND NEW GUINEA.

Monstera deliciosa

SWISS CHEESE PLANT

THIS IS ONE OF THE MOST COMMON HOUSEPLANTS, YET IT HAS SEVERAL SPECIAL CHARACTERISTICS. YOUNG *Monstera* SEEDLINGS ARE PROGRAMMED TO SEEK SHADE RATHER THAN LIGHT, AS THIS HELPS THEM MOVE TOWARD A LARGER PLANT FOR SUPPORT. ONCE "CLINGING" TO THE TRUNK, THE YOUNG MONSTERA GROWS UPWARD, GRADUALLY CHANGING THE SHAPE OF ITS LEAVES UNTIL IT REACHES THE FINAL DESIGN WE SEE HERE. THE HOLES IN THE LEAVES PROBABLY ALLOW FOR AN INCREASE IN SURFACE AREA FOR PHOTOSYNTHESIS WITHOUT OVERBURDENING THE PLANT WITH WATER DURING HEAVY TROPICAL RAINS.

Origin

GUATEMALA AND MEXICO

Rafflesia arnoldii

STINKING CORPSE LILY

CONSIDERED THE LARGEST FLOWER IN THE WORLD, THE BLOOM OF *Rafflesia arnoldii* CAN REACH ONE AND A HALF METERS IN DIAMETER AND WEIGH UP TO TEN KILOGRAMS. THIS PLANT LACKS LEAVES AND SPENDS ALMOST ITS ENTIRE LIFE NESTLED BETWEEN THE TISSUES OF A TROPICAL LIANE, OF WHICH IT IS A PARASITE, BEFORE DEVELOPING ITS DRAMATIC BLOOM, OFTEN AFTER YEARS OF WAITING. *Rafflesia* IS TOTALLY DEPENDENT ON THE HOST PLANT, WHICH CAN ALSO BE SEVERAL METERS AWAY, AS IT PROVIDES THE WATER AND NUTRIENTS IT NEEDS. ON DISPLAY IS A LIFE-SIZE MODEL, AS THE SPECIES IS NOT CULTIVATABLE.

Origin

TROPICAL FORESTS OF BORNEO AND SUMATRA

Amorphophallus titanum

GIANT AROID

DESPITE ITS TOWERING HEIGHT, WHICH CAN REACH NEARLY THREE METERS, THIS IS NOT THE LARGEST FLOWER IN THE WORLD AS IT IS ACTUALLY AN INFLORESCENCE. HIDDEN AT THE BASE OF THE SPADIX, THE YELLOW PART PROTRUDING UPWARDS, ARE NUMEROUS TINY FLOWERS. WHEN FULLY MATURE, THE INFLORESCENCE RELEASES A POWERFUL STENCH, DESCRIBED BY CHEMICAL ANALYSIS AS A MIX OF ROTTING FISH AND OLD SOCKS. THIS FOUL SMELL ATTRACTS THE PLANT'S POLLINATORS, BEETLES. AFTER THIS BRIEF BLOOM, LASTING ONLY A FEW DAYS, ANOTHER BLOOM MAY NOT OCCUR FOR 7–10 YEARS.
A LIFE-SIZED MODEL IS ON DISPLAY, AS THIS SPECIES IS EXTREMELY DIFFICULT TO CULTIVATE.

Origin

TROPICAL FORESTS OF SUMATRA ISLAND, INDONESIA

Hydnora africana

HYDNORA

MORE SIMILAR TO A FUNGUS THAN A PLANT, THIS IS ONE OF THE STRANGEST FLOWERING PLANTS IN THE WORLD. IT IS A PARASITIC SPECIES THAT, LACKING CHLOROPHYLL, EXTRACTS NUTRIENTS THROUGH ITS ROOTS FROM PLANTS OF THE *EUPHORBIA* GENUS. THE VISIBLE STRUCTURE IS THE FLOWER, WHICH EMITS A FOUL ODOR THAT ATTRACTS BEETLES FOR POLLINATION. THE FRUITS ARE ENJOYED BY ANIMALS LIKE PORCUPINES, MOLES, BABOONS, JACKALS, AND BIRDS. THE SEEDS, UNDAMAGED, ARE DISPERSED BY THESE ANIMALS. A MODEL TWICE THE PLANT'S SIZE IS DISPLAYED SINCE THE SPECIES CANNOT BE CULTIVATED.

Origin: DESERTS OF ANGOLA, BOTSWANA, SOUTH AFRICA, AND NAMIBIA.

Welwitschia mirabilis

WELWITSCHIA

IN THE DESERTS OF NAMIBIA LIVES A PLANT UNIQUE IN THE WORLD. UNLIKE MANY OTHER PLANTS IN ARID ENVIRONMENTS, THIS IS A GYMNOSPERMS, A DISTANT RELATIVE OF PINES AND FIR. THE CURIOUS STRUCTURES ON THE PLANT ARE CONES, WHICH RELEASE SEEDS THAT ARE EASILY CARRIED BY THE WIND. THE LEAVES OF THE REAL PLANT ARE VERY SIMILAR TO THESE: HARD AND LEATHERY, THEY RESIST FOR CENTURIES THE SUN AND THE DESERT WIND. A WELWITSCHIA OF THIS SIZE CAN BE EVEN A THOUSAND YEARS.
A LIFE-SIZE MODEL IS ON DISPLAY, BECAUSE THE SPECIES IS VERY DIFFICULT TO GROW.

Origin. THE DESERTS OF ANGOLA AND NAMIBIA

Conophytum

BUTTON PLANTS

SIMILAR TO THE MORE SPECIALIZED *Lithops*, THESE SMALL PLANTS RESEMBLE SMALL ROUND AND FLAT STONES. THEIR SHORT STEM IS HIDDEN UNDERGROUND, WITH ONLY THE FLESHY LEAVES VISIBLE. THE LEAVES GROW IN PAIRS, LEAVING A SMALL SLIT IN THE CENTER FROM WHICH THE FLOWER BLOOMS. THE PLANTS ARE COVERED WITH A LIGHT WAX OR WHITE HAIRS TO MINIMIZE WATER LOSS. *Conophytum* PROPAGATES BY UTILIZING RARE RAINS: WATER DROPLETS STRIKE THE FRUIT, CAUSING IT TO OPEN SUDDENLY AND SCATTER TINY SEEDS AROUND THE MOTHER PLANT.

Origin

ARID REGIONS OF NAMIBIA AND SOUTH AFRICA.

Lithops

ROCK PLANTS

ALMOST STEMLESS, HIDDEN SEVERAL CENTIMETERS DEEP IN THE FRESH AND MOIST SOIL, THESE LITTLE PLANTS ARE THE BEST ADAPTED TO ARID ROCKY ENVIRONMENTS. OFTEN, ONLY THE UPPER PART OF A PAIR OF LEAVES EMERGES FROM THE GROUND, DISPLAYING SHAPES AND COLORS THAT CAMOUFLAGE THEM AMONG THE STONES, SO AS NOT TO ATTRACT THE ATTENTION OF HERBIVORES. THE UPPER PART, MOREOVER, IS A SEMI-TRANSPARENT "WINDOW" THAT ENABLES PHOTOSYNTHESIS TO OCCUR DEEP WITHIN THE PLANT, EVEN THOUGH THE SURFACE EXPOSED TO THE SUN IS MINIMAL. AFTER RAINFALL, *Lithops* GAIN STRENGTH, SLIGHTLY RISING FROM THE GROUND AND PRODUCING A SINGLE, LARGE, VISIBLE FLOWER FOR EACH PAIR OF LEAVES.

Origin

ARID ZONES AND DESERTS OF SOUTHERN AFRICA.

THE THOUSAND SHAPES OF SEEDS

TO COLONIZE NEW TERRITORIES, ALL PLANTS RELY ON SEEDS, WHICH ARE DISPENSED IN THE MOST DIVERSE WAYS. SOME, FOR EXAMPLE, ARE CARRIED BY RIVERS, LIKE THE PODS OF *Entada gigas*, THE LARGEST IN THE WORLD, CAPABLE OF WITHSTANDING MONTHS IN WATER AND RELEASEING THE SEEDS ONCE REACHED DRY LAND. MANY OTHER PLANTS RELY INSTEAD ON ANIMALS, DEVELOPING STRUCTURES THAT CAN CLING TO FUR OR LEGS, LIKE THE CAPSULES LOADED WITH SEEDS FROM AMERICAN PLANTS, NICKNAMED "DEVIL'S CLAWS" (GENERA *Ibicella*, *Proboscidea*). STILL OTHERS TRAVEL WITH THE WIND, ALLOWING THEMSELVES TO BE CARRIED OVER LONG DISTANCES THANKS TO SOPHISTICATED AERODYNAMIC STRUCTURES THAT ENABLE THE SEEDS TO GLIDE.

CHECK THE LABELS TO IDENTIFY THE DIFFERENT SPECIES.

Fockea edulis

FOCKEA

THIS CURIOUS PLANT HAS A SWOLLEN STEM, CALLED A CAUDEX, WHICH CAN REACH HALF A METER IN DIAMETER IN THE LARGEST SPECIMENS. NORMALLY, IN THE ARID REGIONS WHERE *Fockea* GROWS, THE STEM, WHICH IS VISIBLE HERE, REMAINS HIDDEN UNDERGROUND TO PREVENT DEHYDRATION AND HERBIVORE ATTACKS. THE NAME "EDULIS" MIGHT SUGGEST IT IS EDIBLE, BUT TO BE SAFELY CONSUMED, *Fockea* MUST BE COOKED FOR MANY HOURS TO ELIMINATE THE HIGH ALKALOID CONTENT IN ITS TISSUES.

Origin

DESERTS OF THE CAPE PROVINCE AND KWAZULU-NATAL, SOUTH AFRICA.

Euphorbia tirucalli

PENCIL TREE

LIKE ALL EUPHORBIAS, THIS ONE ALSO CONTAINS A TOXIC LATEX, MAKING THE PLANT INEDIBLE FOR MOST HERBIVORES. HOWEVER, SOME ANTELOPES CONSUME SMALL PARTS OF THIS AND OTHER EUPHORBIAS TO ELIMINATE PARASITES IN THEIR DIGESTIVE SYSTEM: THE POISON, WHEN TAKEN IN MODEST QUANTITIES, CAN ALSO HAVE BENEFICIAL EFFECTS. IN TRADITIONAL MEDICINE, THIS SPECIES IS USED AS A REMEDY FOR ASTHMA, RHEUMATISM, NEURALGIA, AND EVEN LEPROSY. THE COMMON NAME "PENCIL TREE" REFERS TO THE SLIM AND REGULAR SHAPE OF ITS BRANCHES.

Origin

MADAGASCAR

Dioscorea elephantipes

ELEPHANT'S FOOT

TO SURVIVE IN THE DRIEST AFRICAN REGIONS, WHERE PRECIPITATION IS SCARCE AND TEMPERATURES SHOW WIDE FLUCTUATIONS BETWEEN DAY AND NIGHT, THIS PLANT HAS DEVELOPED A STUMPY, WOODY STEM KNOWN AS A CAUDEX, WHICH REMAINS AT GROUND LEVEL, PARTIALLY BURIED, PROTECTING IT FROM HEAT, DEHYDRATION, AND EVEN FIRE. IN *Dioscorea*, THIS PART OF THE PLANT CAN REACH NEARLY A METER IN DIAMETER AFTER DECADES OF GROWTH AND RESEMBLES THE SHELL OF A TORTOISE, WITH NUMEROUS SQUARISH WOODEN PLATES THAT PROTECT THE STEM. YELLOWISH-GREEN FLOWERS ONLY APPEAR AFTER THE RAINY SEASON.

Origin: ARID REGIONS OF SOUTH AFRICA

Cactus & Co: Surviving in the Desert

ASIDE FROM THE POLES, NO ENVIRONMENT ON EARTH IS AS HARSH AND CHALLENGING AS THE VAST DESERTS OF AFRICA, AMERICA, AND ASIA. YET SPECIALIZED PLANTS LIKE CACTI AND SUCCULENTS MANAGE TO THRIVE. THEIR LEAVES ARE REPLACED BY SPINES, AND THE STEM OFTEN BECOMES GLOBULAR, ALLOWING PHOTOSYNTHESIS. THE TYPICAL RIBS OF CACTI ACT LIKE RADIATOR FINS TO DISPERSE HEAT, WHILE TINY HAIRS REFLECT LIGHT AND LOWER SURFACE TEMPERATURES. CHECK THE LABELS TO IDENTIFY THE VARIOUS SPECIES.

Crassulacean Acid Metabolism

CAM

GROWING IN THE SCORCHING DESERTS WITH MINIMAL RAINFALL IS A TRUE CHALLENGE FOR PLANTS. MANY SPECIES HAVE LIGHT COLORS, THICK CUTICLES, SOMETIMES COVERED IN HAIRS, AND GLOBULAR SHAPES TO REDUCE WATER LOSS. HOWEVER, ONE OF THE MOST EFFECTIVE ADAPTATIONS INVOLVES THEIR METABOLISM, KNOWN AS **CAM** (CRASSULACEAN ACID METABOLISM). IN THIS PROCESS, THE STOMATA, WHICH ABSORB CARBON DIOXIDE, ONLY OPEN AT NIGHT WHEN TEMPERATURES ARE LOWER AND HUMIDITY IS HIGHER, PREVENTING WATER LOSS. THE CO_2 IS STORED AS MALIC ACID IN THE PLANT CELLS TO BE USED FOR PHOTOSYNTHESIS DURING THE DAY.

Alluaudia

COVERED IN ROWS OF SMALL SPINES THAT WRAP AROUND ITS ENTIRE STEM, THESE PLANTS ARE ENDEMIC TO MADAGASCAR. THE SMALL GREEN LEAVES, WHICH FALL OFF DURING THE COLD AND DRY SEASON, ENABLE PHOTOSYNTHESIS BUT ALWAYS REMAIN SMALL TO STAY PROTECTED BY THE SPINES. IN THE LARGEST SPECIMENS, THESE SPINES CAN REACH UP TO 10 METERS IN HEIGHT. THIS THORNY BARRIER MAKES IT DIFFICULT FOR LEMURS, THE ENDEMIC MONKEYS OF MADAGASCAR, TO FEED ON THE LEAVES OF *Alluaudia*.

Origin. ENDEMIC TO MADAGASCAR

Pachypodium lamerei

MADAGASCAR PALM

LIKE MANY OTHER PLANTS FROM ARID ZONES, THIS *Pachypodium* FEATURES A BROAD TRUNK NEAR THE GROUND AND A LIGHT COLOR TO REFLECT SUNLIGHT AND REDUCE EXCESS HEAT. FROM THE TOP OF THE TRUNK, COVERED WITH PAIRS OF ROBUST SPINES ABOUT 2 CM LONG, THE LEAVES GROW RADIALLY, GIVING THE PLANT THE APPEARANCE OF A MINIATURE PALM. THE FLOWERS ARE LARGE, IN A BEAUTIFUL PINK OR INTENSE WHITE COLOR, AND ARE PRODUCED IN GREAT QUANTITIES TO ATTRACT AS MANY INSECTS AS POSSIBLE DURING THE LESS ARID PERIODS OF THE YEAR.

Origin

ARID REGIONS OF MADAGASCAR

Kroenleinia grusonii

CUSCINO DELLA SUOCERA

AMONG THE THOUSANDS OF CACTUS SPECIES KNOWN TODAY, NONE CAN BOAST A BARRIER OF SUCH DENSE AND ROBUST SPINES AS *Echinocactus*. THESE SUCCULENT PLANTS, WHICH CAN REACH UP TO ONE METER IN HEIGHT, DEFEND THEMSELVES AGAINST DESERT HERBIVORES WITH THEIR POWERFUL "CLAWS," WHICH PREVENT MAMMALS FROM GETTING CLOSE AND ARE VERY PAINFUL EVEN FOR HUMANS. FOR THIS REASON, *Echinocactus grusonii*, NOW RENAMED *Kroenleinia grusonii*, IS JOKINGLY CALLED "MOTHER-IN-LAW'S CUSHION." THE LARGE FLOWERS, WHICH ARE PINK OR YELLOW, BLOOM ONLY FOR A FEW DAYS AFTER THE RAINS IN WINTER AND AUTUMN AND ARE POLLINATED BY SPECIFIC SPECIES OF BEES.

Origin

ARID AREAS IN NORTHEAST MEXICO

Opuntia ficus-indica

PRICKLY PEAR

THIS SPECIES IS VERY COMMON, WITH SHORT SPINES CLUSTERED IN SMALL GROUPS ON THE "PADDOCKS" AND EDIBLE YELLOW-RED SPINY FRUITS. IT IS NATIVE TO MEXICO, PARTICULARLY TO THE STATE OF OAXACA. IT GROWS MAINLY IN TROPICAL BIOMES THAT CAN SEASONALLY BE DRY. IT IS USED AS ANIMAL FOOD, BUT IT ALSO HAS MEDICINAL APPLICATIONS AND IS EMPLOYED, IN ITS NATIVE AREAS, FOR ENVIRONMENTAL PURPOSES, SUCH AS FUEL AND HUMAN CONSUMPTION. THE PRICKLY PEAR HAS BECOME A COMMON PLANT IN WARM PLACES IN ITALY, WHERE IT HAS BECOME INVASIVE, AND IT CAN BE FOUND THROUGHOUT THE PENINSULA, PARTICULARLY IN THE SOUTH AND ON THE ISLANDS, WHERE IT COMPETES WITH NATIVE SPECIES.

Origin

MEXICO

Euphorbia obesa

BASBALL PLANT

Euphorbia obesa CAN GROW UP TO 20 CM IN HEIGHT AND IS A PLANT WITH A SINGLE, UNBRANCHED, ROBUST STEM. YOUNG PLANTS REMIND ONE OF A SEA URCHINS, WITH A ROUND, GRAY-GREEN STEM AND CROSSWISE PURPLE BANDS. THE PLANT HAS VERY SMALL LEAVES THAT FALL OFF QUICKLY, AND ITS FLOWERS APPEAR IN A STRUCTURE CALLED A CYATHIUM, WHICH LOOKS LIKE A SMALL CUP AND IS AN INFLORESCENCE. EACH CYATHIUM CAN CONTAIN MANY SMALL MALE FLOWERS OR A SINGLE FEMALE FLOWER. *Euphorbia obesa* IS A RARE ENDEMIC SPECIES OF THE GREAT KAROO IN SOUTH AFRICA. EXCESSIVE HARVESTING BY COLLECTORS AND PLANT EXPORTERS HAS NEARLY LED TO THE SPECIES' EXTINCTION IN THE WILD. TODAY, IT IS PROTECTED BY NATIONAL (NATURE CONSERVATION) AND INTERNATIONAL (CITES) LAWS.

Origin

ARID ZONES OF SOUTH AFRICA

DO NOT TOUCH THE PLANTS

ASK THE GUIDES