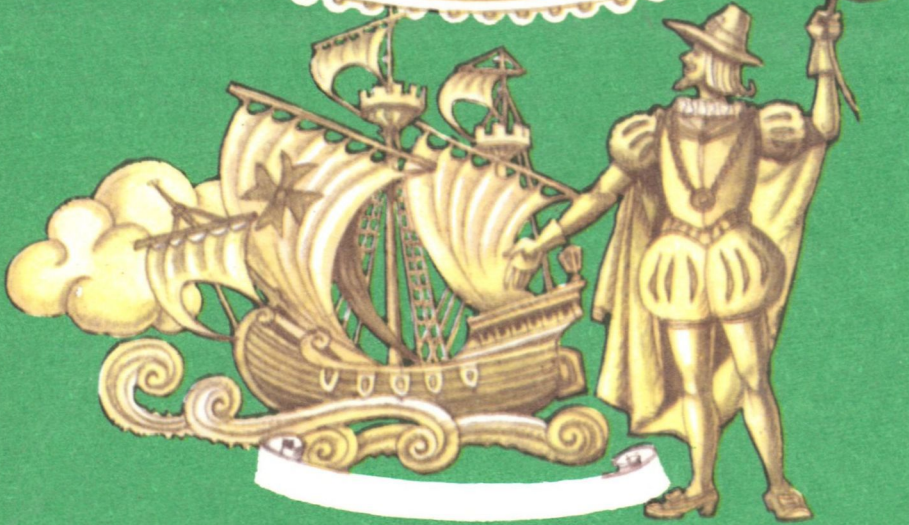


NIKOLAI OSIPOV



A TICKET
TO RIDE



Nikolai Osipov

A Ticket to Ride

or Stories About
Resourceful Travellers
with a Truthful Introduction
and Equally Truthful
Afterwords, with Puzzles
and Hints
by the Author,
and with Complete Answers
at the
End of the Book



Raduga Publishers
Moscow

Drawings by *Yuri Smolnikov*
Translated from the Russian by *Cynthia Rosenberger*

Н. Осипов

БЕЗ БИЛЕТА ПО БЕЛУ СВЕТУ

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The Greedy Oak

At the edge of the forest grew an oak—sullen, cantankerous, and greedy. He refused to share with anyone else. Once a field mouse came scampering up to him and said:

“Let me have two of your acorns. I’ll eat one, and the other I’ll plant in a distant clearing, so that a little oak will grow there too.”

But how the oak berated her:

“Get away from here while you’re still in one piece! I won’t give you any acorns—they’re all staying with me!”

Trembling with fear, the little mouse ran off and never came back again.

From that time on, none of the forest animals dared to go near the oak. And so he lived, completely alone.

Every now and then acorns would appear. After ripening, they would fall to the earth and there, beneath the oak’s mighty crown, they would take root. The oak wanted all his countless descendants to be right beside him. But things went badly for his descendants. There was not enough room for all the sprouts. They stifled one another and they died at a young age.

The years went by. The oak grew old and began to decay, and one day during a storm a gust of wind brought him crashing to the ground. And so the greedy old oak died without leaving any successors...

This is only make-believe, of course. But now you know why it is absolutely essential for seeds to go wandering. And how important it is for these restless souls to have friends who will help them move to new places.

And since these friends have their own habits and ways, plants have no choice but to adapt themselves to them. Many have developed cunning devices and various enticements: some seeds dress up in extravagant clothes, others equip themselves with bizarre offshoots, while still others become overgrown with hair...

In short, they are no longer simply seeds, but fruits. At times you cannot even detect the seeds in these fruits, they have camouflaged themselves so well. There are some fruits whose "clothing" is a thousand times heavier than the seeds themselves.

So now young reader, turn the page, and I shall introduce you to seeds, fruits, and their friends.



Part One

At Nature's Will



THE MIGHTY HELPER

THE FORESTS CHANGE THEIR ADDRESS

In the fall of 1941 the German Nazis launched an offensive on Moscow. In order to hold back the enemy, defense fortifications were hastily erected on the approaches to the city: anti-tank trenches were dug, bridges were blown up.

The war reached the quiet little town of Solnechnogorsk. Along the road leading to the capital saws buzzed the entire day: the soldiers together with the local residents were chopping down the forest. Shaggy fir trees crashed to the ground with a thunderous boom. Tree was heaped upon tree, branch upon branch. The people put their hearts into their work. The obstruction they erected helped to hold back the German tanks advancing towards Moscow.

When the enemy had been driven off, the remaining forest timber was used to build peasant cottages and collective farm buildings burned down by the Nazis. And so, in the fir forest, where the people had once gone to gather mushrooms, not a single fir tree was left standing.

But after a few years went by the local people began to notice that a birch wood was growing in the place of the fir forest. Of course, no one had planted the birch trees. Then where had the seeds come from?

A professor of botany, who told me about it, explained: the seeds had been "sent" by the birch trees growing quite a distance away from the former fir forest.

Who had carried them to the new location?

The wind. But no wind would have been able to carry the birch seeds such a distance if they had not equipped themselves with two slender little wings slightly larger than a pin head. A wing on the left, a wing on the right, and in the center—the seed. Something like a tiny butterfly.







SEED POD OF THE BIRCH

Thanks to these wings the birch seeds are superb fliers. A gust of wind seizes the winged seed pods and carries them far away—sometimes almost a mile from the mother tree. And there wee little birch trees begin to grow.

The seeds of the birch tree make such a flight each year. Of course, they had been flying by the thousands to the fir forest each summer even before the war. But then the birch's envoys had not been as lucky.

The shoots perished beneath the cover of thick fir boughs. The birch is a tree which likes the light—it can't bear the shade. And the fir grove is always gloomy and dim. And so the little birch saplings could not survive. But once the fir grove had been chopped down, the young birches could grow up in its place.

This is always the way in nature: the seed pods of the birch are among the first to colonize barren ground.

That's what it means to have wings—no matter how tiny they may be.

AN AIRBORNE LANDING FORCE

In the summer you can often see bits of fluff drifting in the air.

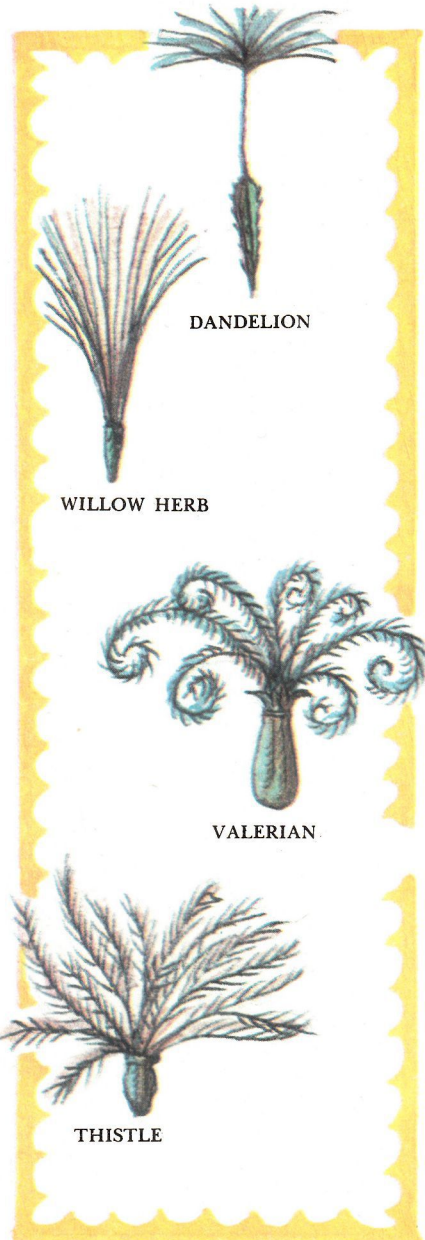
But what exactly is this fluff?

Let's try to catch a few of such bits of fluff. Here's one. Here's another. And a third... They differ from one another both in size and appearance. But all have something in common: each bit of fluff has hair filaments and, attached to them, a grain-pellet. The grains are the seeds, and the hairs are flying devices. You can liken the hairs to a parachute, and the seeds, to the parachutist. The parachutist is being drawn downwards while the parachute is retarding his fall. And the slower the fall, the further the wind can carry the parachutist.

This is how the seeds of many plants make their way to new locations: willow herb, thistle, valerian, and cattail...

Among the parachutist-seeds there are even more inventive fliers.

Have you ever had a chance to observe how a real parachutist lands? Leading from the safety belts around his body to the dome of the parachute are





long ropes known as shroud lines. A shroud line is several yards long.

Sometimes if there's a strong wind the shroud lines get tangled up, endangering the parachutist.

Couldn't they be shortened, so the parachute would look like this?

No, they can't. Then the parachute would lose its stability and the wind would start to toss it from side to side and could even overturn it.

Man didn't hit upon the idea of long shroud lines at once. The first parachutes had short shroud lines.

The parachutist seeds perfected themselves just as gradually.

Only they required millions of years to do it. Of course the plant parachutists didn't develop real shroud lines.

In place of these they equipped themselves with a single shaft known in botany as a "funiculus." But this proved to be sufficient: the tossing decreased noticeably, the small parachutes became more steady, and the wind no longer overturned them.

The seeds of the dandelion with which you are very familiar are equipped with such a "funiculus."

Take a minute to observe how lightly and smoothly they fly and you will see for yourself what skillful parachutists they are.

Some of the fliers from the parachute regiment have yet another special feature: as soon as the little parachutes hit upon some hard object during the flight, they "disengage themselves" and continue on independently, while the parachutist-seeds fall down.

What happens after this you will soon figure out yourself.

PHANTOMS OF THE STEPPES

Long, long ago in the Ukraine people used to tell terrifying stories about witches.

Travellers forced to spend the night in the steppes swore that they had seen the witches with their own eyes—as soon as darkness fell they would set up wild games, riding broomsticks and chasing one another around in the air.

According to the stories, the witches always gathered together for their games at the same time—in the fall. No one saw them in the spring, summer, or winter. And no one was able to explain why they went on a rampage in the steppes during one season only.

And so the superstition about the witches of the steppes was passed on, until botanists guessed their secret. The “witches”



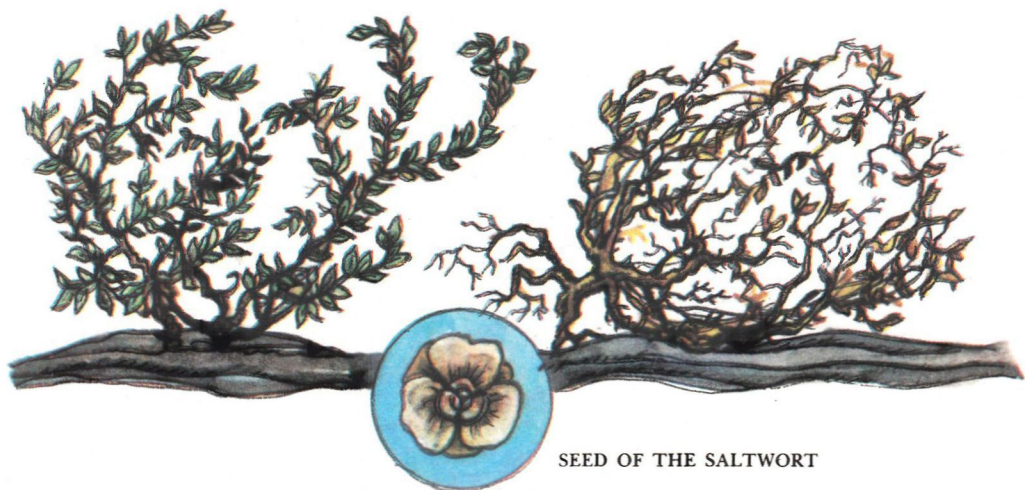
turned out to be the ordinary plants of the dry steppes—saltwort, eryngo, tumbleweed, and *Inula Oculus*.

As a rule, these plants are low to the ground but very branchy, and resemble a ball in shape. By the end of the summer the steppe has been scorched dry by the hot sun. Without moisture, the plants dry up. A strong gust of wind breaks them off at the root or even uproots them entirely. The “balls” break away from their “tethers” and begin to tumble around the steppe. For this reason they are called “tumbleweeds.”

All autumn long, until the ground is covered by snow, the tumbleweeds are driven around the steppes by the wind. They collide with one another, bob up and down, and at dusk it seems that fantastic creatures are whirling around.

You’re probably thinking: “These plants have a rough time of it; the sun dries them up and the wind uproots them.”

But actually the tumbleweeds don’t have such a bad life. Botanists have noticed that the plants of the steppes start roving about only when their seeds have ripened. And then the wind does not do them damage, but rather a great service. It drives



SEED OF THE SALTWORT

them around, and on the way they scatter their seeds. They operate like real sowing-machines. And they sow a lot of seeds. Saltwort, for instance, has up to 200 thousand seeds on each plant.

The sowing-machine works wonderfully. There's only one drawback: saltwort is a weed, and when it invades the melon patches, it can wreak havoc with the melons and the pumpkins.

*Afterword,
Written in Order to Placate the Wind*

If the wind could talk, it would probably be quite distressed: "It's insulting that so little has been said about my work. After all, it's not only the seeds of the plants you've mentioned that I transport through the air and drive along the ground."

In actual fact, the wind has a heavy workload. It transports a countless number of seeds from one place to another. And it transports them in different ways, depending upon the flying apparatus of each.

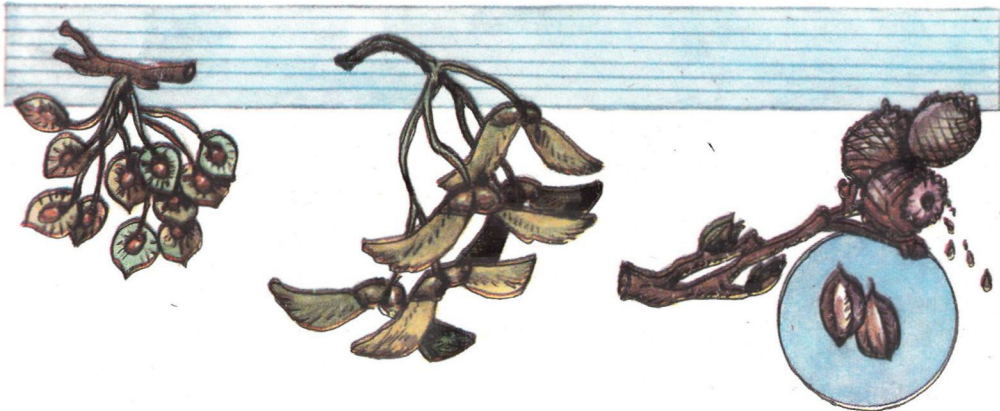
Most of our tall trees have seed pods with wings.

Take the seed pod of the alder tree. Like the birch, it also has two wings and also glides smoothly.

SEED POD
OF THE ELM

SEED POD
OF THE MAPLE

SEED POD
OF THE ALDER



The seed pod of the elm can be considered a capable glider. Its seed is placed in the center of a circular wing.

An engineer would say about such a flying apparatus: "The center of gravity has been determined with great accuracy." A slight puff of wind and the tiny glider takes off, like on a magic carpet.

The seed pod of the maple flies in a completely different manner.

If you have the chance, pick one up and examine it. You'll see that one side of the wing is straight and thick, while the other is curved and slender.

What does it remind you of? Have you guessed?

Why, of course. The blade of a propeller!

And the maple blade operates like a propeller: falling from the tree, it spins rapidly around. The fall is retarded, and this means that the wind can carry the seed farther from the tree.

The seed pods of the linden tree, attached to a broad wing, also spin during flight.

When they fly, they resemble minute helicopters coming in for a landing. The wing spins like a helicopter propeller.

The seeds of the firs, pines, and other conifers fly in the same way. But these seeds also have another method of travel.

In March and April the sun heats up the fir and pine cones, and they begin to crack. Their brown scales open wide. Winged seeds scatter out from beneath the scales.

After spinning in the air and flying off some distance from the tree, the seeds fall onto the snow.

At this time of the year the surface of the snow thaws a little during the day and forms a crust of ice at night. It only takes a little gust of wind for the seed's light wing to be lifted up, forming a natural sail. The wind blows on the "sail", and the little seed begins to glide over the ice, like an ice-yacht.

Further and further it goes... Sometimes it can race off all of five miles.

Some of the winged seeds use very unusual methods of locomotion.

In the deserts of Central Asia grows a shrub called the

calligonum.

It has small seed pods with five wings which are arranged like the blades of a turbine. The wind blows on these blades and the "turbine" begins spinning rapidly and takes off along the sand dunes.

In the same region also grows the large swollen sedge, a member of the sand sedge family.

Its seed pods have no wings at all, but they "run" along the sand just as well as the calligonum.

How do they manage this?

With the help of a sack!

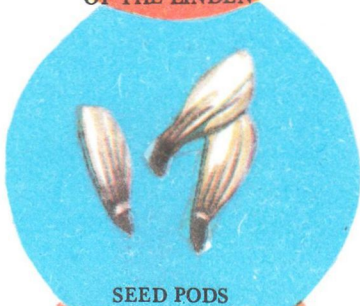
Only please don't be surprised. The whole thing depends on what kind of sack it is and who climbs into it.

If you were to climb into a sack and try to run you would fall. But the seeds of the large swollen sedge fit themselves into special little air-filled sacks—light, resilient, and spacious. The result is a "balloon pod", a little less than one inch long.

Even a weak gust of wind is enough to send such a balloon bouncing with extraordinary ease over the sand dunes.



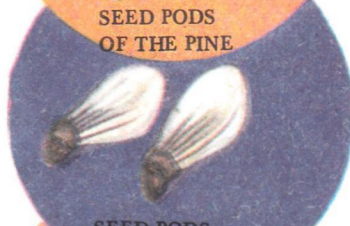
SEED PODS
OF THE LINDEN



SEED PODS
OF THE FIR



SEED PODS
OF THE PINE



SEED PODS
OF THE LARCH



SEED PODS
OF THE CALLIGONUM

Puzzles of the Wind

(With hints by the author, who from here on will help you in difficult cases)

1

Everyone, of course, has noticed that weeds grow along fences. There are especially many “parachutists” among them. Think: why is it that these grow especially thickly by fences?

2

To which regiment of flyers do these seeds belong?

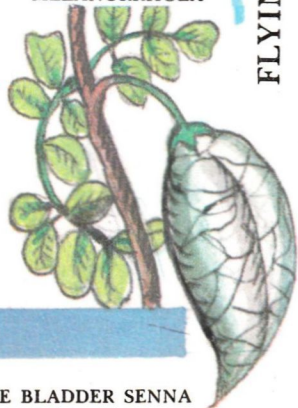
The trees that produce them grow in the tropical forests of Asia and Africa and attain gigantic proportions—often the height of a twenty-storey building.

3

The decorative shrub called the bladder senna is cultivated in gardens and parks. Its name is no coincidence: the shrub has inflated seed pods. Inside the pods are tiny seeds, which have too much room inside their dwelling. Guess what type of seed pods these are.



MELANORRHOEA



FLYING SEED PODS OF TROPICAL PLANTS

SEED PODS OF THE BLADDER SENNA

The Author's Hints

1

Try to remember a special feature of some parachutists, mentioned on page 13.

2

If you still haven't figured out the answer, I'll try to help. In order to do this you have to remember how the seeds of the maple and the linden fly. Although outwardly they don't resemble these tropical flyers, the principle is the same.

3

You haven't guessed? Then think about the seeds of the swollen sedge with which you are already familiar. Perhaps this will help you with your answer. After all, the bladder senna, just as the sedge, is a native of sandy regions, even though it has taken up residence in other locations.



SEED POD OF THE MAPLE



SEED POD OF THE LINDEN

SACKS OF THE SWOLLEN SEDGE

SAILING THE SEVEN SEAS

GREAT SEAFARERS

It was a strange trade. The seller and the buyers seemed to live in some enchanted land. The one didn't know exactly what he was selling, and the others didn't know just what it was they were buying. But they paid enormous sums for it just the same.

And the most amazing thing was that this trade went on for centuries.

What was sold and bought were strange gifts of the sea, which the inhabitants of the Maldivé Islands found from time to time on the beach.

Enormous, almost two feet thick, they boggled the imagination.

The islanders thought they were fruits from mysterious trees which grew at the bottom of the ocean. It was even said that the Sea God sent them as gifts to men, and that they brought good fortune to the person who found them.

Everyone wanted a share in the good fortune. But the ruler of the islands set up strict control over the gathering of the strange fruits.

The mysterious gifts of the sea found themselves wealthy buyers.

It was believed that there was a miraculous power in the fruits that could protect from poisoning. Many Indian rajahs, who went in fear of being poisoned by their courtiers, ordered their court masters to make goblets of the hard shell of the kernel and drank only from them.

The ruler of the Maldivé Islands did everything possible to keep this superstition alive and sold his merchandise to the rajahs at a fabulously high price—almost the weight of gold.

But as the centuries passed the miraculous talisman was gradually forgotten.



On the Seychelles Islands to the east of Africa a palm was discovered which bore gigantic fruits. The palm itself did not grow very tall—about the height of the average birch.

Why did it need such enormous and heavy fruits?

The Seychelles palm grows on the shore. After they ripen, its fruits drop into the water and set out on a long voyage over the ocean.

SEYCHELLES PALM



Who knows to what shores the waves will carry them? Just to be sure, the palm provides its fruits with an enormous supply of nutriment, so that they will germinate as quickly as possible in their new location. For safe-keeping, it encloses the seeds in a sturdy shell.

If such a “heavyweight” were to fall into the water, it would sink to the bottom like a stone.

In order to prevent this, it was necessary to wrap it up in a layer of porous fiber. And so that this layer wouldn’t get soaked—it had to be provided with a waterproof covering.

The result was a very large, heavy fruit weighing up to 55 pounds! Growing such a fruit was no easy job: it took seven or eight years for the fruit to ripen!

It seemed the palm had done everything necessary to help its gigantic fruits to settle the world over. But somewhere along the line it had “miscalculated”.

Excellent seafarers, the fruits of the Seychelles palm suffer

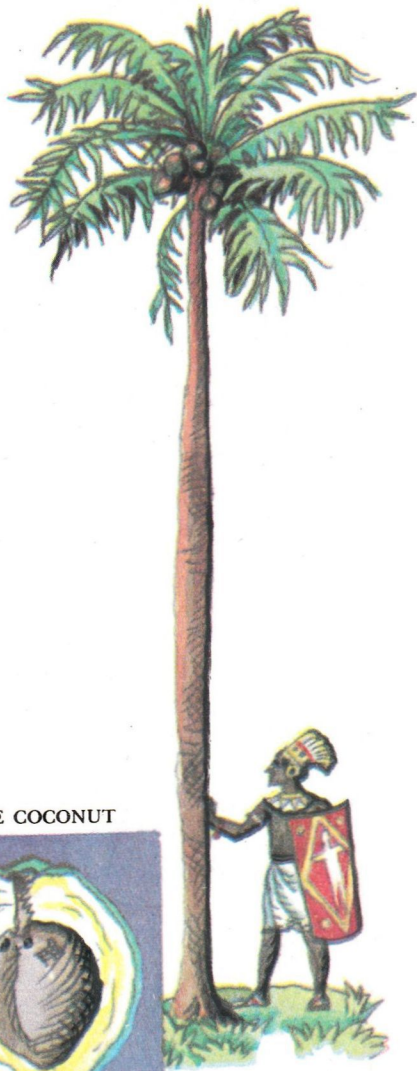
from one major shortcoming: once tossed out upon the shore by a wave, they do not germinate. They are destroyed by the salt water with which the sand on the shore is saturated.

The coconut palm has adapted itself well to the very same unfavorable conditions. Its fruit is only half the thickness of the Seychelles palm, but on the other hand it germinates superbly in new locations. That is why the coconut palm has taken up residence along the shores of all the tropical seas. While the Seychelles palm grows nowhere except its own islands.

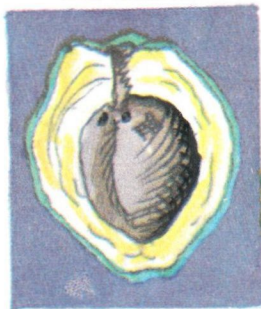
THE GARBAGE COLLECTOR

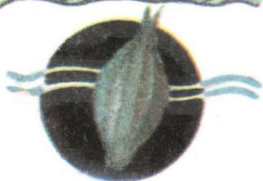
Every spring the Voronezh River overflows its banks. Its foaming, muddy waters tear along with a tremendous roar. But once the spring waters have emptied out, the river grows calm once more, as if there had never been a flood. All that remains from its rebelliousness is a layer of debris in the water meadows. People give this debris a wide berth, but there was once an oddball who spent entire days digging around in it.

COCONUT PALM

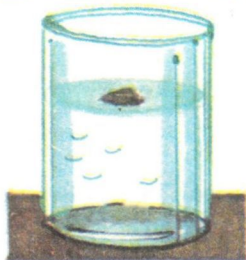
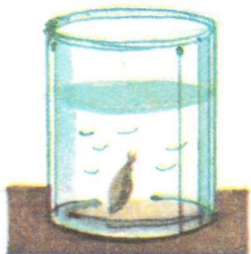


THE COCONUT





SACK OF THE SEDGE



SEEDS OF THE BIRTHWORT

“What is he rooting around in the dirt for?” passers-by wondered. “It would be a different matter if he were fishing—in these times, you could understand it.”

And in actual fact those were hard times. Russia was in the grips of the Civil War. The country’s economy lay in ruins. People were starving and freezing and thought mainly about where their next meal was coming from. But the “oddball” had his thoughts elsewhere.

The “oddball” was professor Boris Alexandrovich Keller from the Voronezh Institute of Agriculture.

The scientist had a good motive for digging in the garbage on the shore. He was searching for the seeds of plants washed ashore by the flood waters.

Gradually he accumulated a large collection of the seeds of various plants: sedge, water plantain, pondweed, sagittaria, and birthwort. It turned out that each seed has its own curious apparatus for staying afloat.

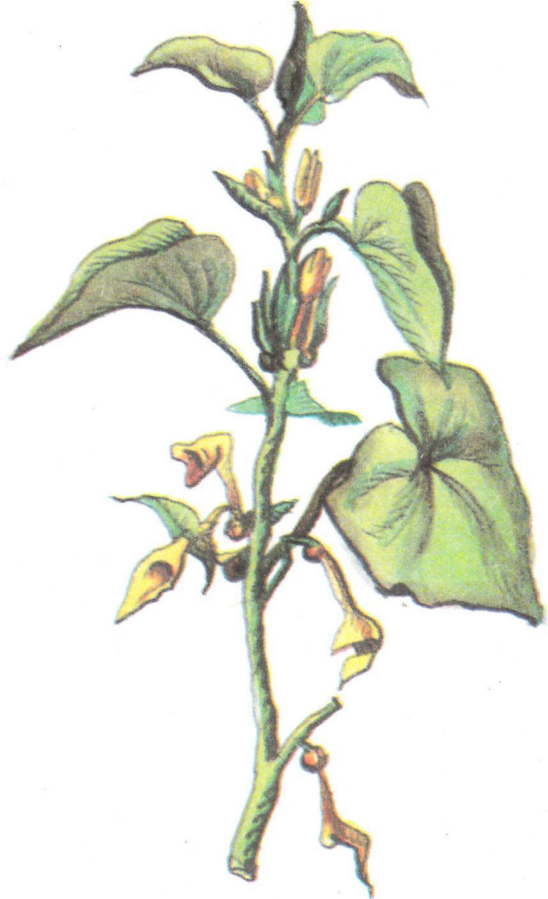
Just take the familiar sedge, which grows in large thickets along the banks of rivers, lakes and ponds. Its tiny seed is surrounded by a spacious air-filled “sack”. The walls of the sack are thin, but waterproof. The seed lies at the bottom of the little sack, like a tiny weight. Therefore, once it has landed in the water, the sack always floats upright, like a buoy. Its pointed tip remains above the water’s surface like a sail: even a light breeze can drive this remarkable “vessel” far away.

The professor attempted to find out

how long the seeds he had collected could stay afloat. He threw them into a jar of water and observed them. The seeds of the sedge, water plantain and pondweed didn't make him wait long. Within a few days their "buoys" were soaked and they sunk to the bottom.

The seeds of the birthwort, an herb often found along the river banks and water meadows, turned out to possess marvellous buoyancy. Its light brown seeds spent more than nine months in the jar of water and did not sink! Keller began to study the seeds of the birthwort. The ovule, from which the plant would grow, looked like a tiny thin blade. The entire remaining space in the seed was taken up by a "life-belt" of a soft, cork-like material. It surrounded the ovule from all sides and saved it from drowning for a whole nine months!

BIRTHWORT



SEEDS AND SEED POD
OF THE BIRTHWORT

LIANE ENTADA



ENTADA BEAN

*Afterword,
With a Comparison of
Who Does More Work*

From the story "Great Seafarers" you learned how the fruits of the Seychelles and coconut palms travel. But the generous ocean waves disseminate other tropical plants the world over.

On the coast of South America grows the liane entada. Its enormous seeds, which look like flat brown cakes, are confined inside a gigantic pod. This pod is about three feet long. The seeds set out on their journey in this "boat". The pod is tightly closed up so no water can leak through. But this isn't all: it is full of air, which helps it to remain on the surface:

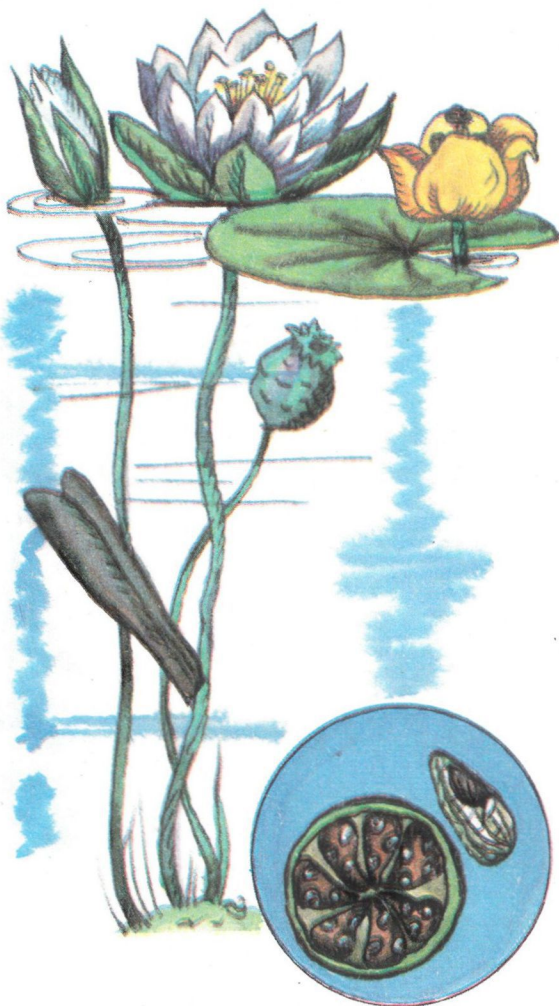
Such waterproof "boats" with their "passengers" can travel over the ocean for many months. The pods of this liane have even been discovered on the cold shores of Norway, carried there by the Gulf Stream current. That means they travelled thousands of miles! Norwegian botanists attempted to germinate the seeds in greenhouses, and they obligingly took root...

Rivers, lakes and streams cannot compare with the oceans in power, but they, too, help to transport fruits and seeds to new locations.

I'm sure you have seen many times the snow-white beauty of our reservoirs—the white water lily. Its black seed, like that of the sedge, is enclosed in an air-filled “sack”. In such a sack the seed of the water lily can float for several days—until the sack is destroyed. By then the river current will have carried the seed a great distance.

Near the white water lily often grows the yellow water lily. And although one could call these plants close relatives, they employ different methods of swimming. Unlike the white water lily, the seeds of the yellow water lily are not surrounded by a sack, but a thick mass of mucus, which is filled with air bubbles. And it is these air bubbles which keep the seeds afloat.

Rain helps some plants to disseminate. In dry weather the seed pods and calathidia of such plants as veronica, chicory and marsh marigold are closed. But just as soon as it begins to rain, they open wide to let the water wash their seeds out.



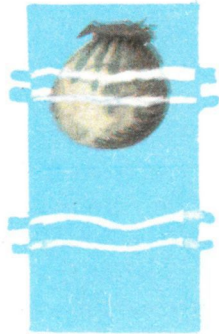
SEED POD
OF THE WHITE WATER LILY

Puzzles of the Water

1

This large fruit belongs to the tree *Hernandia ovigera*, which grows in South America. The fruit is a remarkable sea-farer.

Determine to what group of swimmers it belongs.



This is sorrel. You should be quite familiar with it.

And this is the seed of the sorrel. It's not very likely that you've seen it, although the entire plant is covered with them. The secret is that the seed is concealed by three small leaves which botanists call a perianth.

2

Try to guess: why does the seed need these leaves? And why is sorrel most often found growing in damp places, at the bottom of gullies, and along the banks of ponds and rivers?



SEED POD OF THE SORREL

The Author's Hints

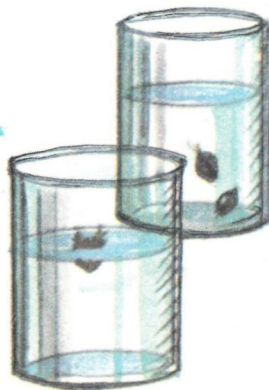
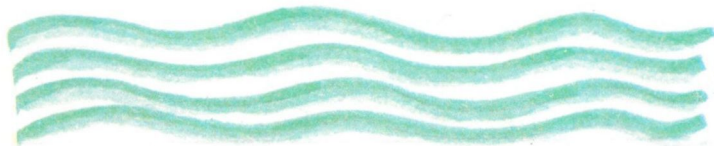
1

I specially requested that the artist draw this seed in cross-section, because otherwise you would never guess the answer. Take a look at the drawing and think of which of the seed pods you know it reminds you of.



2

If you were to throw the seed of the sorrel into a glass of water without its leaves, it would sink immediately to the bottom. But it does not sink when the leaves are in place. Observe how many days the seed with the leaves can stay afloat. And then you will probably be able to solve the riddle.



FRIENDS AND ENEMIES

THE UNFORTUNATE ISLANDS

The government of the Netherlands was infuriated by the disobedience of the natives of one of its colonies; "They dared to disobey the order? They'll pay for this!"

And ships with more troops set sail for the Molucca Islands.

The Dutch soldiers burst into the villages. The natives swore that they were in no way guilty. No one believed them. The evidence was everywhere: small trees bearing yellow fruits. As punishment for disobedience the Dutch soldiers chopped down all the trees, burned down the huts, massacred the populace. What offence had the natives committed?

Nutmeg trees grew on their islands, the seeds of which were highly valued the world over. These seeds, housed in pulpy fruits, had a pungent aroma and taste. In Europe they were considered an indispensable spice for many dishes.

Nutmeg trees grew only on the Molucca Islands. The Portuguese discovered these islands and turned them into a colony. The nutmeg business brought them fabulous profits. Beside themselves with envy the Dutch outfitted a large fleet and won the islands from the Portuguese in persistent battles.

The arrival of the new colonizers made the life of the natives totally unbearable. Just to be sure that no one would engage in

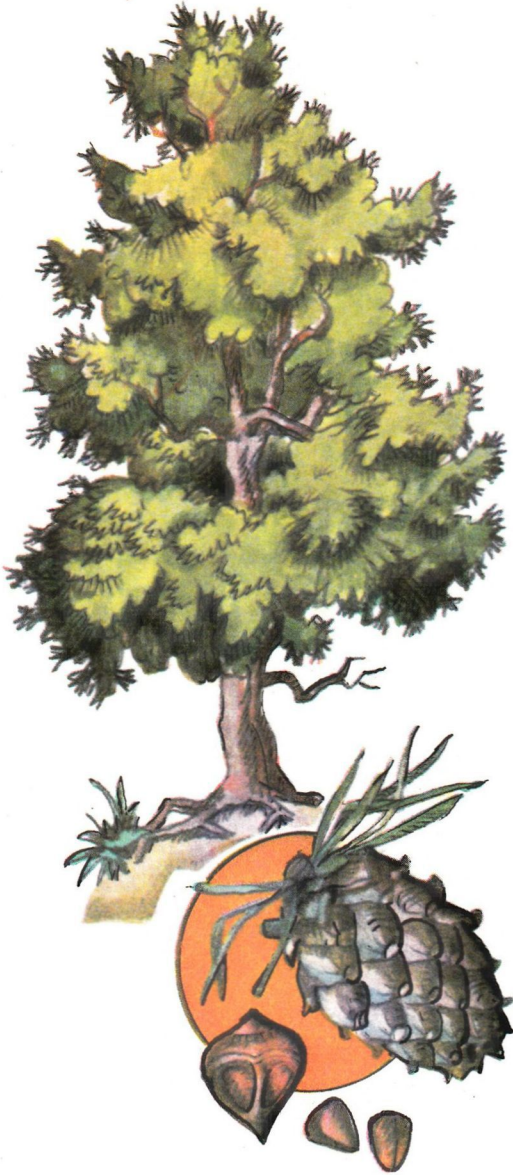
secretly exporting the valuable nuts and bring down their price, the Dutch decided to set up nutmeg plantations on two islands only, to make them easier to guard. On all the other islands the natives were ordered to destroy all the nutmeg trees.

THE NUTMEG





SIBERIAN PINE



At first the orders were carried out. Soon, however, the Dutch government began receiving alarming reports: the natives were continuing to grow the trees! The colonizers dealt unsparingly with the natives. But no matter how many natives they exterminated, the prohibition continued to be broken.

This went on for many years. Until the true culprits of the illegal plantings were accidentally discovered. They turned out to be ... birds. They pecked the fruits of the nutmeg together with the seeds. Protected by a hard shell, the seeds passed through the birds' digestive system intact, and were expelled together with the droppings. Frequently, after eating the fruits on the plantations, the birds would fly to other islands and expel the seeds there. This is how the illegal plantations arose, for which the natives paid so dearly.

THE FAITHFUL HELPER

You already know how the seeds of our ordinary pine tree disseminate: with the help of their small wings and the wind.

This is also a pine, but its seeds have no wings. And there is no way the wind could carry off

such a wingless creature. Botanists call this the Siberian pine (because it grows in Siberia), but the local residents call it a cedar.

The seeds of the Siberian pine are usually (although incorrectly) called cedar nuts. Many creatures compete with the people for these delicious nuts.

In late August when cedar nuts ripen, a real feast begins in the Siberian forests. The seeds from the fallen cones are eaten by all and sundry: the squirrels and the woodgrouse, the shrews and the bears... Even the carnivorous sable changes over to a diet of nuts. And for the chipmunks the wood and cedar nuts are the main article of diet, and they make large stores of them.

The Siberian pine would have a really rough time of it if it weren't for a remarkable helper—the nutcracker bird.

The nutcracker's entire existence depends on these seeds. For days on end it carries them away in a special sac beneath its tongue and buries them for future use. It has an immense number of hiding spots in the moss and lichen, each containing about 10-15 seeds (exactly the amount it needs for one meal). In the winter the bird scratches up the snow and unerringly finds its provisions. But it overlooks a few spots just the same.

In the spring in the forest clearings, and even some miles from the forest one can frequently see groups of ten to fifteen tiny saplings of the Siberian pine, with their trunks intertwined. There is no doubt that they were "planted" by the nutcracker.

THE TIRELESS TOILERS

The summer that year turned out to be uncommonly hot and dry. The leaves on the trees began wilting earlier than usual, and the grass dried up. All it took was for one careless person to drop a smouldering match in the forest, and the fallen branches caught on fire. Little tongues of flames spread in all directions from the match, licking the tree trunks and enveloping them in a hot blaze. The most terrible thing that can happen in a forest began—a forest fire.

The fire raged for several days, and when it had ended, in the place of the forest was a smoking ash heap. Some charred tree



trunks here and there were all that remained of the mighty forest.

This occurred in 1891 in the northwest of the United States of America. A long time passed, but still nothing had begun to grow from the ashes. And then in the spring of 1919 the forest suddenly began to revive. Tender green shoots began to spring up from the charred earth.

Everyone was amazed: who had made these plantings? Forestry specialists had not been at work there. The birds and wild animals had abandoned the forest the first day of the fire. The nearest forests were quite a distance away—which meant there was no way the wind could have carried seeds here. Nor could the water have done this: there were no rivers or streams nearby.

Scientists spent a long time puzzling over the problem. Finally they came up with the explanation: the forest had grown back from seeds which had been hidden in the earth by squirrels before the fire!

The seeds of the American yew had remained hidden in the



squirrels' "pantries" for twenty eight years, and when the conditions had become right they sent out shoots. And the shoots were strong and even, as though the best forestry specialists had planted them.

The secret turned out to be simple. Squirrels, like other rodents, store away only choice seeds. Otherwise the seeds would begin to rot and the animals would starve through the winter.

Man still has not learned to select seeds as unerringly as the wild animals do.

The case of the squirrels' "plantings" suggested to forestry specialists an idea: "Why couldn't we make the rodents 'help' us?" They gave it a try, and the experiment was a success. From that time on American forestry specialists have been making the round of the burrows and "pantries" of squirrels, mice, and other animals who store up the forest's wealth. They consider that this is the most reliable method of obtaining choice seeds.

Soviet forestry specialists work the same way. They obtain the best pine seeds from the squirrels' "pantries". And in areas where squirrels are rare, they use the "services" of other provident four-legged creatures.

Every year in late November and December the workers of the Smelyansk Forestry in the



Ukraine set out for the woods. They search out mice burrows, guided to them by small mounds of earth. If they dig up a burrow they are sure to find plenty of provisions there: often up to 30 pounds of acorns and up to 10 pounds of other seeds and fruits. During good years this enterprise extracts about 300 tons of choice acorns from mice burrows. To obtain such a quantity of seeds by the usual method would be impossible—the enterprise simply wouldn't have the manpower.

For many years now workers of the Smelyansk Forestry have gone out "mice-foraging". And each time they return with a rich bounty. The mice have not once let them down.

PARTNERSHIP

Observant people have long noticed this peculiarity: grasses grow especially densely around ant-hills, and often form thick rings around the insects' dwelling.

And they have also noticed that the ant-hills are always surrounded by the same plants. No matter how hard you search, you won't find any others.

With time scientists explained this puzzle. The seeds of some plants have succulent appendage-offshoots, which are rich in tasty and nutritious oil. For the ants they are a real delicacy.

The seeds themselves are not fit for food as far as the ants are concerned because of their hard shells. But, allured by the tempting offshoots, the ants also drag the seeds into their dwelling, thinking nothing of the extra burden.

As a result, a curious partnership forms between the seeds and the ants. The plants form appendages on their seeds which are useless to them, while the insects pay for their "daily bread" by carrying an extra burden—the seeds.

The ants gradually nibble away the appendages in their stores and from time to time rid their dwelling of accumulated garbage. The seeds with their appendages already eaten off are carried to the surface together with the refuse. They germinate and form thickets around the ant-hill.

In the Soviet Union the ants most often "sow" the seeds of

the snowdrop, lungwort, melampyrum, celandine and violet.

Botanists have calculated that one ant family can drag up to 40 thousand seeds into its cellars in the course of one summer. Although the Bushmen living in Africa's Kalahari Desert may never have counted the seeds, they are quite familiar with the ants' provisions. In times of famine the Bushmen set out in search of ant-hills. They always wait until after a rainfall. And for a good reason.

If there's a strong downpour, the seeds in the ants' pantries get wet and could begin to rot. And in order to prevent this, as soon as the sun peeks back out, the ants carry their provisions outside to dry. And here the hungry Bushmen are lying in wait. They gather the seeds and carry their booty home, where they grind them into flour and cook up a gruel.

By robbing the ants, the Bushmen deprive them of their tasty offshoots and for a certain time destroy the "partnership" between the insects

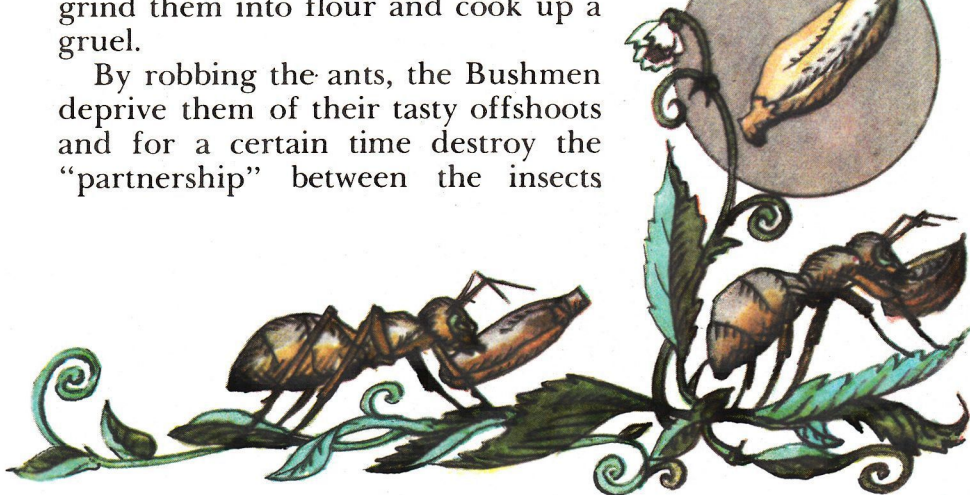
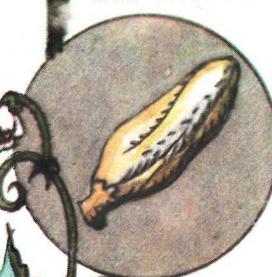
SEED OF THE CORYDALIS

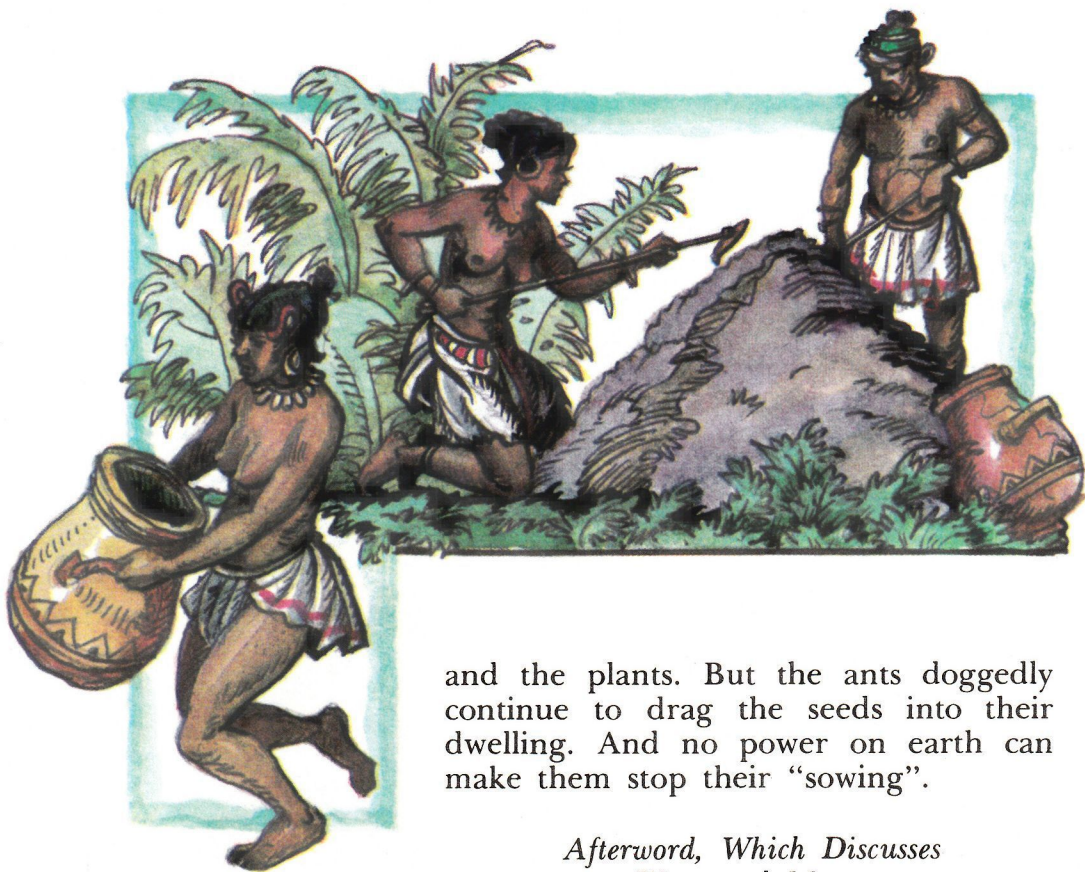


SEED OF THE CELANDINE



SEED OF THE MELAMPYRUM





and the plants. But the ants doggedly continue to drag the seeds into their dwelling. And no power on earth can make them stop their "sowing".

*Afterword, Which Discusses
Ways and Means*

Have you ever stopped to wonder why the wild strawberry is so red, succulent and sweet?

You probably think it's because that way it's enjoyable for us to eat. Not at all. The wild strawberry appeared on earth before there were people.

It would seem that the plant itself has no need of the sweet pulp. After all, all that's needed for propagation are the seeds (they're located inside the tiny nuts covering the entire surface of the berry). An adult plant can grow from each seed. But the pulp? Why is it necessary? Botanists call it the false berry. And this is why. The wild strawberry "thought up" this berry

for the sole reason of enticing birds. No one pays any attention to its tiny and insignificant real fruits.

The red color serves the same purpose—it is more noticeable than any other from a distance. It is as if the wild strawberry is saying to the birds: “Come here, my friends, and I’ll treat you to a splendid feast!”

Our feathered friends hasten to taste the false berries of the wild strawberry, and “repay” the treat by scattering its seeds all over the forest.

The next time you treat yourself to a wild strawberry, prick out some of its nut-like fruits with a pin and take a good look at them. There should be one seed in each little kernel.

Other plants have their own enticements for attracting birds. The apple, pear and dog-rose are all false fruits. The grape, gooseberry and currant are berries. The cherry, plum, apricot and peach are stone-fruits. The color and taste of all these enticements are quite familiar to you.

Some birds are not very particular about what they eat. For example, the thrush eats whatever fruits it finds. Therefore it helps to disseminate about thirty species of plants. Other birds are more selective. The jay, for instance, feasts mostly on acorns.

In olden times, people used to marvel: who is it that plants oaklings in thickets of young pines? And then they noticed: there the jay likes to feast on acorns, which it often brings from afar. Now and then someone frightens the bird and it flies off, forgetting about its treat. And the fallen acorn takes root. The crossbill and the woodpecker carry the seeds of the fir and the pine all over the forest.

Many birds help water plants to change residence. Normally the seeds of such plants are disseminated by water. But





when a duck, goose, swan or some other waterfowl swims and dives in a pond or lake, the seeds stick to their feathers. After feeding in one reservoir, the bird flies to another. And the seeds fly with it.

Botanists have noticed that waterfowl carry the seeds of the white and yellow water lily from one pond to another, and even from one country to another. These “stickers-on” are carried especially great distances during the birds’ spring and autumn migratory flights.

About one hundred years ago a plant was discovered in the reservoirs of Europe which is ordinarily found in India. It turned out that its seeds had been carried here by birds which had flown many hundreds of miles.

Another time an unusual plant turned up in the Lake of Geneva. Botanists determined that it was an inhabitant of tropical Africa. The migratory birds had “resettled” it as well.

But what about those plants which aren’t helped by either the wind, water, or birds?

No need to worry! They also manage to survive.

Just take a look at the illustration on page 43 and you will see what devices some seeds are equipped with. Here are burrs, hooks, and stickers!



What do you think they are for? Well of course, to stick on to everything that goes by: man, dog, sheep, cow, horse, pig...

Having fastened themselves to the fur of an animal or the clothes of a person, the seeds of such plants are carried great distances.

Puzzles of Various Friends

1

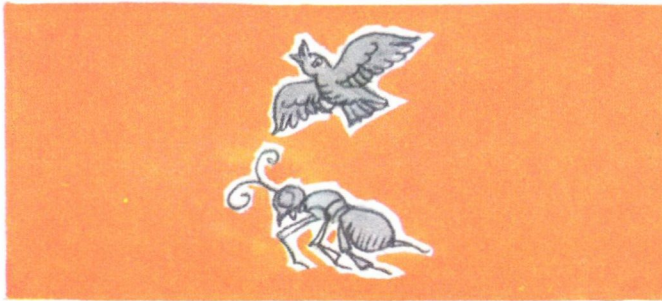
Try to recall: which of such “stickers-on” do you know?

You often use the services of one of them when you play with your friends. This plant has enormous leaves. And it likes to settle near rubbish heaps. Well, have you guessed?



2

This is the seed of the forget-me-not. There is a succulent white offshoot at its base. Remember: who likes to feast on such offshoots? And who, therefore, helps the forget-me-not to settle in new places?



SEED
OF THE FORGET-ME-NOT

WITHOUT FRIENDS

BOMBARDMENT IN THE NIGHT

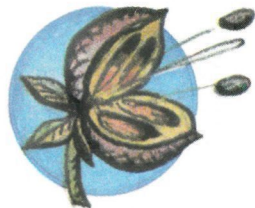
Almost two hundred years ago the great German poet Johann Wolfgang Goethe set out on a trip to Italy. Goethe was not only a poet, but a keen botanist. In Italy he came across many interesting plants and he gathered them for his collection.

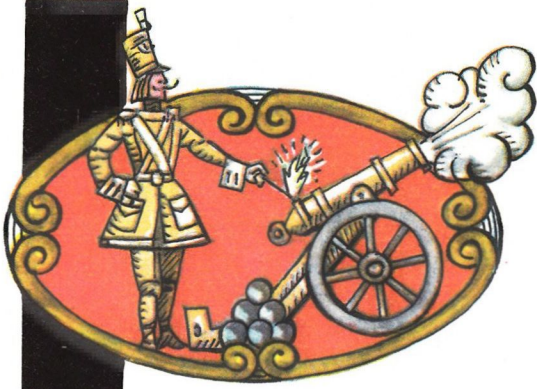
Once, wandering around the outskirts of Rome, Goethe noticed a plant with large seed pods. He plucked them off, brought them home and placed them in an open drawer. A few days passed, and then the poet was suddenly awakened in the middle of the night by some kind of noise. Goethe listened. Strange noises were resounding in the room—something like a clicking, or a crackling—as though some small creatures were bouncing off the walls and floor.

Goethe lit a candle. The narrow tongue of the flame illuminated some object flashing by in the air. And this was immediately followed by a click. The poet bent down and picked up the fallen “jumper”. It was slightly smaller than a plum pit. Goethe rushed to the table, glanced in the drawer and understood...

The noise was being produced by the seed pods Goethe had gathered in the outskirts of Rome. The pods had dried up in the drawer, their vessels began to split and throw out the seeds—with such force that they went flying about 10 yards.

The shooting pods which had awoken the poet were plucked from the acanthus. It is one of those plants which disseminate without outside help and so must take care of themselves. So they have thought up the trick of shooting out their seeds. For this reason botanists have nicknamed them the artillery plants.





In southern countries some plants unleash a real bombardment. Just take the Moreton Bay chestnut. Its seeds are as large as a ping-pong ball, and weigh up to two-thirds of an ounce. These are real cannon balls. Not only do they astonish, they can plant a fair sized lump on your forehead.

The artillery plants not only shoot, but they also produce a noise. Some confine themselves to a light crackling, while others make the sound of a popping bubble. But the seed pods of the hura—



ACANTHUS



VIOLET

a tropical plant from South America—explode so noisily you may imagine that someone is taking pot shots from a pistol.

There have been occasions when these pods wrought havoc in botanical museums. Placed on display in the exhibition halls they behaved themselves at first, but once they dried up they began to bombard the glass display windows with their live “projectiles” sometimes shattering the glass.

*Afterword,
Which Reveals Some Secrets of the “Artillerists”*

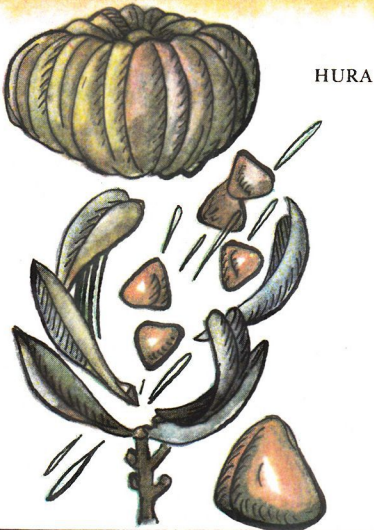
Such menacing “artillerists” as those just mentioned are not found in our country. But we too have our shooting plants.

The violet growing in a wood is a familiar sight to everyone.

But few know that the violet is a true “artillerist”.

When the fruits of the violet ripen they divide into three boat-like seed pods.

Each “boat” contains many seeds tightly pressed against one





TOUCH-ME-NOT

another. Drying out beneath the sun, the sides of the "boats" contract and push out the smooth, slippery seeds, which "jump overboard" one after the other.

In order to get a better idea of how the shooting is carried out, grasp an apple or watermelon seed by the end and squeeze it hard between your index finger and thumb. Now watch what happens!

In the coniferous forests grows the herb wood sorrel, so called because its leaves are sour like those of the true sorrel. In the wood sorrel the firing mechanism is located in the seeds themselves. When a seed ripens, its shell swells up and cracks under the strain, the edges of the shell roll back, ejecting the seed.

The touch-me-not, which grows in damp, shady spots, has its own method of shooting out seeds. Its seed pods resemble tiny green bottles.

If you take it into your head to pluck off the ripe seed pod of the touch-me-not, you're in for a big surprise. The slightest touch causes the tiny "bottle" to fly apart into separate strips because the sides of the "bottle" are

under great pressure. The strips instantly roll up, and acting like springs, forcibly eject the seeds.

Another "touch-me-not", only with a more ferocious temperament, is the squirting cucumber. It grows in wast plots of the Crimea and the Caucasus. This cucumber is a close relative of our ordinary cucumber.

Its fruits are just as attractive to the eye—green and juicy. But it's better to give them a wide berth.

If you accidentally brush against the ripe fruit of the squirting cucumber, it will break off instantly from its stem, which plugs up its opening like a cork. A stream of sticky fluid containing a multitude of reddish seeds squirts out with a loud noise. You will not forget the unpleasant experience of being "spat at" in a hurry.

The secret of the squirting cucumber is the great pressure built up inside it, which squirts out the contents of the fruit.



SQUIRTING CUCUMBER

Puzzles of the “Artillerists”

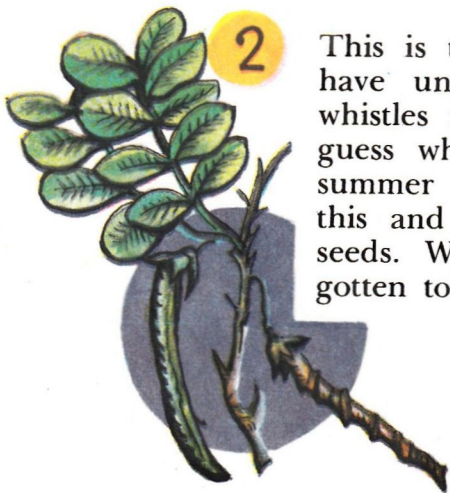
1

The squirting cucumber is clever, isn't it? But you still don't know all its tricks. Why do you think the squirting cucumber needs the sticky fluid? After all, the other artillery plants get by without it.

You haven't guessed? Then imagine what would happen if an animal were to brush against the ripe fruit. Recall the concluding words of the “Afterword, which discusses ways and means.”

2

This is the yellow acacia. You have undoubtedly made loud whistles from its pods. Try to guess why at the end of the summer these pods look like this and why they contain no seeds. Where could they have gotten to?



Part Two

Due to Carelessness
and
at Man's Will



CRAFTY CONQUERORS

SO WISHED THE KING

The French king Louis XIV was known for his hot temper. Woe to any courtier who was slow to carry out his commands. Somehow he heard about an unusual bird in the new French colony of Canada. And he wanted to have the bird stuffed and mounted.

The wish of the seventeen-year-old king was carried out with great haste.

Louis was pleased with the stuffed bird, and kept it in his bedroom for a long time. The sides of the bird soon grew worn from excessive handling. Then the court taxidermist was ordered to restore the bird.

The master worked conscientiously: after the repair the bird was as good as new.

Soon afterwards an unknown weed turned up in the fields of the French peasants. The newcomer was inordinately hardy and energetic. No matter how hard the peasants battled with it, it spread about the country like wildfire.

Superstitious people attributed this misfortune to the wrath of God. But the real cause was the stuffed Canadian bird.

Its stuffing was full of the seeds of this Canadian weed.

It is hard to say what fate would have befallen these seeds if the court taxidermist had not removed the stuffing from the bird during the repair work and so set loose a certain quantity of the seeds. The wind took care of the rest. The seeds had parachute-hairs. The wind carried some of the light parachutists from the royal workshop.

After landing somewhere not far off, they germinated the following year and grew into plants. Every plant bore over 100 thousand new seeds. Ten such plants produced one million seeds! Each year the number of these millions increased with



mind-boggling rapidity. The “devil’s windmill” had begun to turn, set into motion by the wind. And no one could stop it.

In this way, in the year 1655 the newcomer from Canada—*prideweed*—began its triumphant march across the fields of France.

Soon there was not a garden, ploughed field, meadow, ravine, roadside or hillock where this weed was not growing in profusion.

It knew no boundaries. From France it flew to neighboring countries. In a matter of forty years its tufted seeds dispersed throughout all of Europe, and then were carried to Russia, from where they made their way across the Urals and settled



throughout Siberia, Central Asia and the Far East.

In this way the small grayish hairy seeds less than one twentieth of an inch in length, conquered half the world!

Of course, the seeds of this weed are not such good parachutists that they could have made it across the ocean on their own. No wind, no matter how strong, could have helped them. The Canadian pridedweed just happened to hit it lucky.

MISPLACED SOLICITUDE

After living many years in Italy, the famous Danish sculptor Thorvaldsen was preparing to return to his homeland. His

sculptures were carefully wrapped in a thick layer of dried grass, nailed up in sturdy crates and loaded onto the ship with the greatest care.

The sea voyage was a long one, and at times heavy gales tossed the ship. It rolled heavily from side to side, the riggings creaked... At such moments Thorvaldsen was terribly worried about his creations—would they endure the hardships of the journey.

But all turned out well: the works of sculpture arrived in Copenhagen intact. Not a single piece had suffered damage.

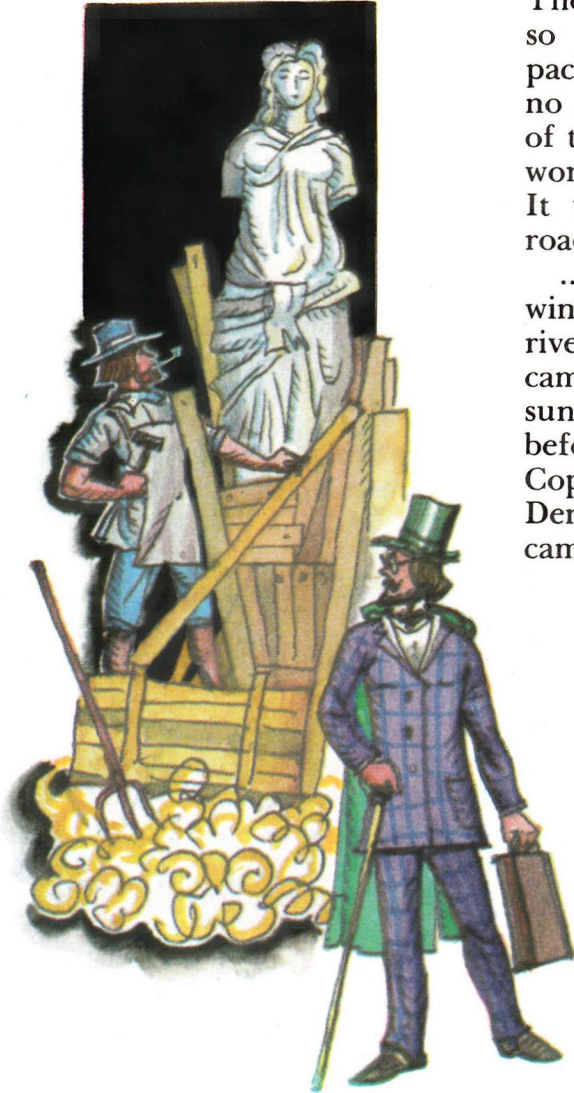
COPENHAGEN



There would have been no need to mention this at all if it weren't for one circumstance.

Once home, the solicitous Thorvaldsen, who had given so much attention to the packing of his works, showed no interest in the future fate of the packing materials. Why worry about some dry grass! It was simply tossed in the roadside ditch.

...Autumn passed, then winter, and finally spring arrived. And then the ditch came to life: warmed by the sun, plants which had never before been seen not only in Copenhagen, but in all of Denmark, sprouted up and came to bloom.



It took some time for people to figure out that Denmark was indebted to Thorvaldsen for its new "acquisition": hidden in the dry grass transported from Italy were the seeds of scores of weeds. They filled up the ditch, and, before long, occupied the whole east coast of the island of Zealand upon which Copenhagen is situated.

"WOOLEN DANGER"

At one time the French town of Port Juvéal had a notorious reputation among the neighboring peasants. Nowhere else did so many weeds grow as around this town. And each year their numbers increased...

This caught the interest of botanists. Finally they succeeded in coming up with an explanation for what was happening here.

From ancient times ships bearing wool had been coming to Port Juvéal. Wool was brought from almost every corner of the globe: from Turkey and Algeria, South America and Australia. Before being taken to the spinning mills, the imported wool was washed and cleansed in special factories situated near the port.

As you know, quite a few burrs and sticky seeds attach themselves to the wool of sheep.

After cleansing the wool, the factories threw all the waste, including the seeds, into a dump. And there the foreign weeds thrived, gradually spreading throughout the entire district.

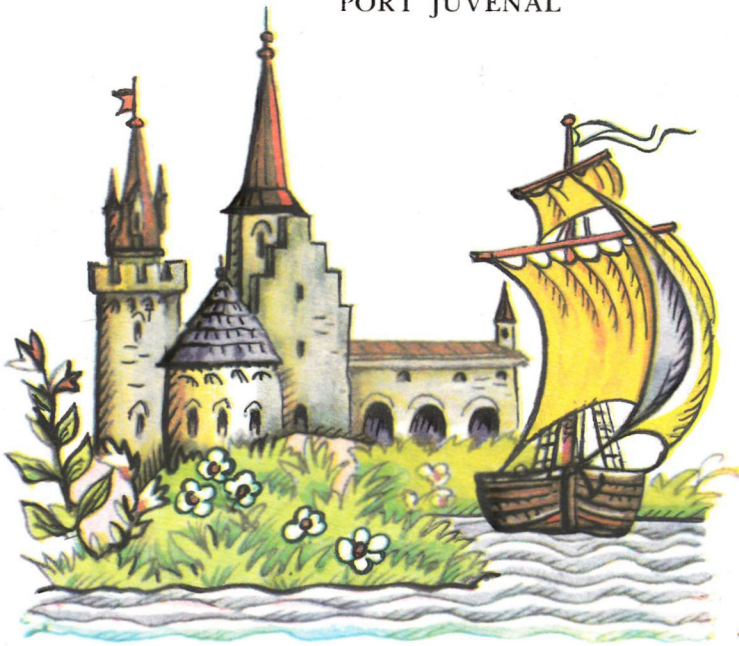
Once these factories had been closed down at the end of the last century, the weeds began to disappear. Soon only three varieties remained out of the enormous quantity of alien plants which once grew in the port and surrounding country.

Ships have long since stopped coming to Port Juvéal. But the story of the soiled wool does not end here...

In our times many countries buy up sheep's wool from Australia.

And where there's wool, there's bound to be the stick-on seeds. Weeds cause the Australian sheep-breeders many problems, but there is one which is a special nuisance. And the most amazing thing is that it is of European origin.

PORT JUVÉNAL



Until quite recently the little alfalfa plant grew only in southern Europe. It was totally unknown to Australia. And suddenly it turned up there! They believe its seeds were accidentally brought over on some European ship. The alfalfa took root and thrived in its new home. Its seeds, densely covered with hook-like thorns, stick easily to the wool of sheep and soil it badly. The Australian farmers just cannot get rid of the pesty weed.

All the known methods of cleaning wool are of little help.



SEED POD OF THE ALFALFA

Europe



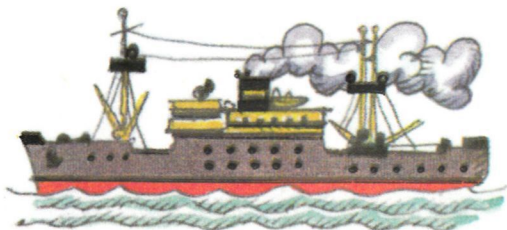
Now the seeds of alfalfa are brought together with Australian wool to many European countries. So at first it travelled from Europe to Australia, and now it comes from Australia to Europe and other parts of the world.



Australia



*Afterword, to Acquaint You
With the Secret
Passengers of Ships,
Trains and Automobiles*



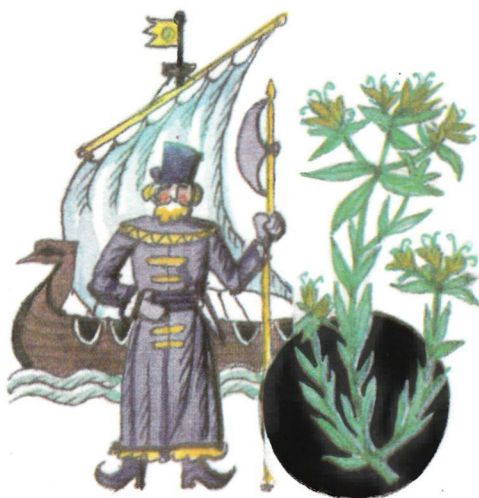
Ships have helped to carry innumerable weeds to all the corners of the earth.

Some of them get in the hold together with wool; others, with grain; still others, with cotton...

Even when the ship is travelling without cargo it is still not free of the persistent seeds. In order to decrease the ship's roll, a ballast—usually of sand—is placed in the empty holds. Of course, this sand contains quite a lot of seeds. After docking at the port of destination to pick up the cargo, the ship's crew empties the sand from the holds, and together with the sand, the seeds of many alien plants settle in the port.

In the central and southern regions of the Soviet Union there occurs a low-growing herb called the sickle spurge.

It has not always grown here. Its tiny greenish seeds were brought to Muscovy



SICKLE SPURGE



BLUEWEED



FLAX WEED

CARDUUS THISTLE



SEED POD OF THE THISTLE

about three hundred years ago by merchant boats carrying goods from North Persia. Their course ran up along the Volga River.

And in the places where the vessels put into shore, they left a memento of themselves in the form of the sickle spurge.

Ever since the time America was discovered there has been an intensified "exchange" of weeds between Europe and America. Thus, the common European weeds, such as the thistle, saltwort, wild oat, blueweed, and flaxweed, have made their way from Europe to North America, and the well-known Carduus thistle has propagated in South America to such an extent that it even began to choke out the hardy local cactuses.

On the other hand—from America to Europe—ships have carried quite a few weed plants, such as the oenothera and the white amaranth—a very prolific and dangerous weed which first appeared in Western Europe and travelled from there to Russia.

Railroads appeared much later than ships, and automobiles later still.

But they, too, have managed



to disperse a great multitude of weeds throughout the world.

The caltrop has had an interesting fate. At the start of this century ships accidentally brought the seeds of this plant from Europe to North America. There they began to stick their thorns which are sharp and hard as nails into the tires of passing automobiles. Soon the caltrop had spread throughout the entire country.

At one time rayless camomile—a plant with tiny yellow flowers and a strong fragrance—was not known in Western Europe.

It grew only in North America.

Some sixty years ago the tiny seeds of rayless camomile somehow ended up in crates containing various goods. The crates were delivered to one of the American ports and loaded onto a ship, which crossed the Atlantic Ocean and arrived at a French port. There the crates were loaded onto trucks and delivered to various parts of the country.

The following spring, rayless camomile was already blooming in many parts of France. And from there its seeds, also with the help of transportation, made their way to the neighboring countries. Thus this weed plant, which is still often called American camomile, received a permanent “residence permit” in Western Europe.

Puzzles of the Crafty Conquerors

1

At one time rayless camomile did not grow in Russia either. Then it suddenly appeared, and moreover, much earlier than in France...

About seventy years ago the Russian government bought up grain from America. The grain was loaded onto a ship and delivered to the Far East. There it was re-loaded onto freight cars and transported across all of Siberia to the country's European regions.

Shortly afterwards an unknown plant began to grow along the railroad tracks. The local residents were perplexed: where had it come from?

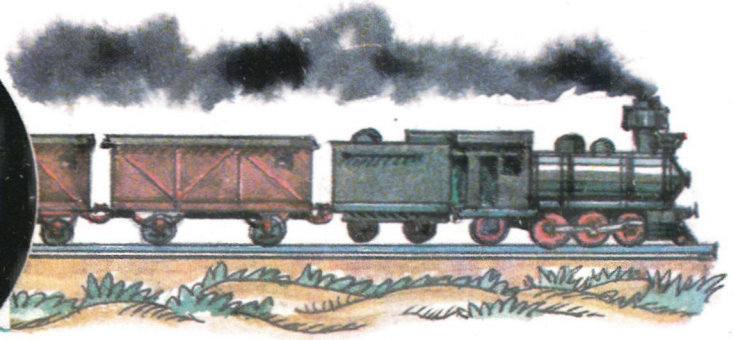
Now the name of the plant is well known. It is the very same rayless camomile. But you must figure out for yourself how it made its way into Russia.

2

You know this plant very well and therefore pay little attention to it. But you should. It's one of the great conquerors.

Once, long long ago its tiny sticky seeds stuck to the boots of the Spanish soldiers who were to be shipped across the ocean to subjugate the Indians in Central and South America. Together with them, the seeds crossed the ocean and found themselves in America. And there the same boots carried them all over the continent with amazing speed.





OVER HILL AND DALE

HOW IT ALL STARTED

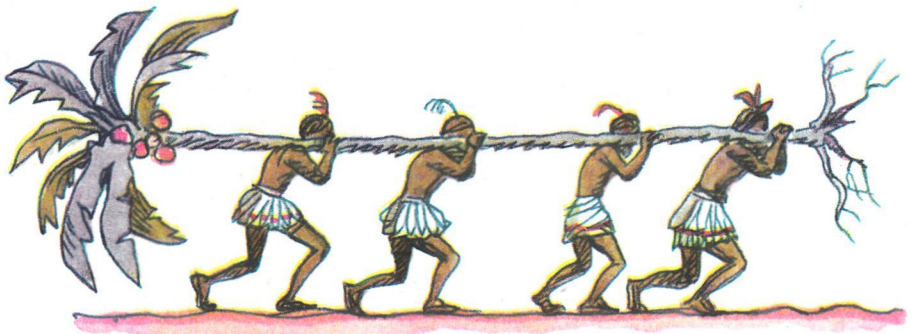
For centuries people have been unwittingly carrying seeds and fruits around the world. It took some time before they learned to do this deliberately.

A mere hundred years ago Europeans travelling in Africa often witnessed such a scene. The natives would head for the forests, search out fruit trees, dig them up with enormous difficulty and, hoisting them onto their shoulders, carry them back to the village. There they replanted the trees in previously dug holes. When the travellers asked the Africans why they did such heavy work, the answer was:

“What do you mean, why?! So as not to go far for the fruits. You mean you don’t do the same?”

The Europeans tried to explain that in their native lands fruit trees were cultivated from seeds, but the Africans just did not understand them. They simply couldn’t imagine that trees could be grown from seeds.

In the distant past Europeans didn’t know this either. Thousand of years passed before people figured out what plants needed seeds for and began to gather them and sow them.



This proved much easier than transporting whole trees.

Gradually man began to take notice of the best places and times for sowing and planting. The ancient Romans, who lived more than two thousand years ago, already knew that the willow grew best in damp places, that the seeds of the elm had to be planted in early March, while the seeds of the cypress—no earlier than April.

In the beginning man “domesticated” local varieties of wild plants. Then he began to import seeds from other countries. Many of them refused to settle because of the wrong climate or soil. But others took root, becoming Man’s inseparable friends.

Quite often people undertook long and hazardous journeys to seek out new plants.

ON THE WARPATH

The warriors were back, covered with dust and exhausted from their long campaign. The women, children, and old folk rushed out to meet them.

Surrounded by a crowd of their fellow-tribesmen, the victors proudly showed off their trophies: weapons, expensive fabrics, precious adornments. When the first excitement had passed, someone shouted from the crowd: “What about the maize?”

And immediately everyone began shouting: “Maize! Maize!..”

The chieftain smiled slyly. He knew well what surprise to save up until last. He gave a sign. Porters began to untie the leather sacks. A few agonizing seconds passed and the crowd let out a roar of delight: “Glory to the warriors!”

The sacks were filled with the golden kernels of corn. This was the trophy that the whole tribe had waited impatiently for...

The Iroquois Indians of North America have long cultivated maize. Maize was their staple food. The Indians highly valued this plant and even invented a protector for it—the Maize God, represented as a man in the shape of a cornstalk.

When there was no maize the tribe starved. The Iroquois tried new varieties of maize hoping that they might prove more productive or more resistant to drought. And so the Iroquois



would set out on long campaigns for the life-saving maize.

At the cost of much fighting they finally had 11 varieties of this valuable crop growing in their fields.

Maize was also the principal food for other Indian tribes inhabiting America. They also revered and worshipped it.

Up until the time Christopher Columbus discovered America, the Europeans knew nothing about maize. Columbus and his sailors were amazed by this plant. It was inordinately tall—twice the height of man—and bore seeds that were larger than wheat, rice, or any other grain.

Columbus brought the seeds of maize back to Spain. Rumours of the unusual Indian grain quickly spread through the villages. The Spanish peasants used every possible means to get hold of some seeds and planted them in their fields. Word spread to neighboring, and then distant countries, and the people there also began to grow maize.

With time maize was also brought to Russia. But at first it grew only in the South—the Kuban country, the Ukraine, and the Transcaucasus. North of these places it would not ripen. In recent years Soviet selectionists have been able to evolve more hardy varieties of maize, and it has moved far to the north.

Now the Indian grain grows in many new regions and produces rich harvests.

THE RETURN OF THE “FLOWER OF THE SUN”

The sunflower was highly revered by the inhabitants of ancient Mexico. It was called the “flower of





the sun". Depictions of the sunflower were cast in pure gold and placed in temples.

And so the "flower of the sun" grew in its native land, unknown everywhere else, until the Spaniards invaded the country. They were very interested in the sunflower, and carried its seeds back to their country.

The Spanish nobility was delighted with the "flower of the sun". Noblewomen adorned their sumptuous dresses with them and entwined them in their elaborate hairdos. A brisk trade of the sunflower seeds started up, and the prices quickly soared.

The sunflower vogue moved on from Spain to many other European countries. And everywhere people saw it only as a pretty plant.

It took a while for the sunflower to find its way to Russia—two hundred years after the Spanish had become acquainted with it.

Young Tsar Peter I came to the Netherlands to learn the craft

of ship-building and, spying the unusual flower, ordered that its seeds be sent immediately to his homeland.

At first the same thing happened in Russia as in Western Europe. Nobles, striving to show off their wealth, spent great sums of money to set up flower beds with the unusual plant. In Moscow the sunflower, as a great rarity, was even planted beside the Kremlin wall.

People did no more than admire the “flower of the sun” for a long time in Russia, until someone tried to extract oil from its seeds. The oil proved to be excellent. From that time on the peasants in the southern provinces of Russia set about cultivating the sunflower in their fields.

But the seeds were small and produced little oil.

And no wonder, since formerly people had only been concerned with the beautiful flowers, and no one had given a thought to the seeds. It was now up to the Russian peasants to correct this shortcoming. Year after year they selected only the largest seeds for the sowing, until they had developed productive varieties of the sunflower. This process took many decades.





After the revolution Soviet selectionists continued the work and evolved plants with even heavier seeds.

The sunflower which we know is very different from the ancient Mexican "flower of the sun". Formerly, in the cypsela of the plant one could count at most two or three hundred seeds. Now there is a thousand.

The wild Mexican sunflower had seeds the size of a buckwheat grain.

Those varieties which Peter I sent to Russia from the Netherlands had somewhat larger seeds.

But the seeds of the present-day sunflower are much larger.

Many European countries took an interest in the Russian varieties of the sunflower and began to cultivate it for the oil. And then the Russian descendant of the "flower of the sun" crossed the Atlantic Ocean and returned to the land of its forefathers—to America.

AT THE RISK OF LIFE

Everything was ready for the operation. Sacks with the precious cargo were lying at the bottom of the boat, safely hidden in the off-shore thickets. The oarsman sat ready, listening intently to the night sounds, and waiting for only one thing—for the moon which was illuminating the river's smooth surface to take cover behind a cloud.

As a hazy shroud veiled the edge of the moon, the man took to his oars. He held course for the ship, which was dimly outlined against the opposite bank of the river.

...The last few cautious sweeps of the oars, and the bow of the boat shoved lightly against the side of the ship. And immediately a voice spoke softly from the deck:

"Is that you, Sir Wickham?"

"Aye, captain. Throw down the ladder."

The sailors helped to bring the sacks on board. There they were carefully taken by agile hands and lowered into the hold. The ship weighed anchor and set off down the river...

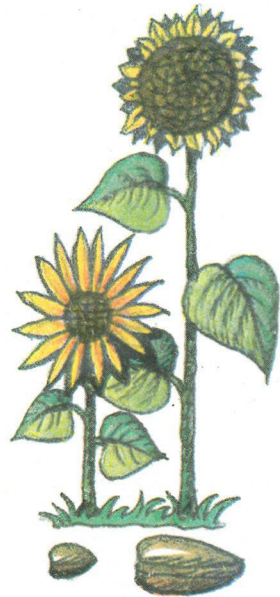
The captain led the nocturnal visitor to his cabin and invited him to make himself at home. His guest sank heavily into the leather chair and, unfastening the pistol from his belt, said in a tired voice:

"Everything has gone well. There wasn't even a chase."

But the captain added sensibly:

"Don't forget that there's still one more ordeal ahead, sir."

In a few days the ship arrived at port. Soon an officer accompanied by two soldiers climbed on deck and approached the captain:



SUNFLOWER SEEDS
1520 1970



“What are you carrying?” the officer inquired.

“Coffee, nuts and bananas,” the captain answered respectfully. “Here are the documents.”

“We’ll make a check ourselves,” the officer said, smiling coldly, and gave a sign to his subordinates.

The soldiers descended into the hold and embarked on their inspection.

While the inspection was going on, Wickham paced nervously around the cabin. He was well aware that right now the fate of not only the secret cargo, but of his life itself was being decided. Of course, he wouldn’t let them arrest him without a fight; he was prepared to shoot if necessary. But that thought didn’t help to ease his mind..

His painful thoughts were interrupted by a knock on the door. Wickham cocked his pistol.

“Open up, sir.”

At first Wickham did not recognize the captain’s voice.

“Are you alone?” he uttered finally.

“Word of honor, sir, I’m alone,” the captain answered. “Open



up! The danger has passed. They didn't find anything!"

Wickham leaned weakly against the wall, still unable to believe that everything had gone so well...

This happened about a hundred years ago. European industries required large amounts of caoutchouc, from which rubber was produced. Caoutchouc was obtained from the sap of the hevea tree. And the hevea grew only in the jungles of Brazil.

It would seem quite a simple matter to start growing the hevea in other places, seeing that a similar climate exists in many tropical countries. But this was not allowed.

The owners of the hevea plantations received large profits from the caoutchouc trade and did not want the valuable tree to be cultivated in other countries. At their insistence the Brazilian government issued a strict law: whoever should dare to carry even one single seed of the hevea out of the country would be put to death!

And Henry Wickham had decided to violate the law. The young Englishman had lived a long time in Brazil and knew the jungle well.

Wickham understood that the risk was too high, and the chances of success insignificantly small. But the British manufacturers had promised Wickham enormous sums of money for hevea seeds—ten thousand pounds of sterling.

And Wickham surrendered to the temptation.

He got into a boat and set off on a dangerous trip up the river to where the hevea grew.



SEEDS OF THE HEVEA

Risking being caught at any minute, he gathered the fallen greyish-yellow spotted seeds.

Filling ten sacks to the brim, Wickham put them onto the bottom of the boat, carefully camouflaged them, and headed for the pre-arranged spot.

There an English vessel was waiting, already under sail. The sacks with the seeds were hidden in the corner of the hold and covered up with bales containing other goods to mislead the Brazilians.

...Two thousand miles were already behind. Wickham arrived in England and was greeted like a national hero, elected a member of the Royal Academy, showered with favours...

But it was too early to rejoice: out of the 70 thousand seeds brought by Wickham and planted in a greenhouse, only three thousand germinated. The rest had not survived the arduous journey.

Another exhausting journey was ahead. What fate awaited the mollycoddle hevea in strange and distant lands?

No, Henry Wickham could not entrust the tender saplings to anybody else on their journey. He himself would accompany them to the distant shores.





The young saplings were carefully wrapped up, packed in crates and loaded on a ship. Agonizing days of the voyage went by, filled with storms and tropical downpours.

Finally it was all over. The ship with its unusual passengers dropped anchor in a port of the island of Ceylon. There the world's first man-created plantation of the hevea was destined to appear.



But many years were to pass before tall trees grew from the saplings and produced the caoutchouc sap. The seeds of these trees would be used to grow new saplings and those would be sent to new places—to Burma, Australia, and Java...

The time would come when these new plantations would eclipse the fame of the Brazilian hevea. They would produce more caoutchouc than was ever produced in Brazil.

THE MILK BROTHERS

It was the year 1931. New factories were being built in the Soviet Union, to manufacture automobiles, tractors, airplanes... And for all of them rubber was needed. Caoutchouc was imported from Great Britain and Brazil, paid for in gold.

Of course Russia was tempted to set up its own plantations. Attempts were even made to grow this valuable tree in the south of the country—both before and after the revolution. But the mollycoddle hevea perished at the first hint of frost.

Then it was decided to search for plants in Russia which could replace the hevea. Expeditions of botanists were sent to various parts of the country.

They travelled thousands of miles through wood thickets and mountain paths, through the steppes and swamps and they did find a number of caoutchouc producing plants—hondrilla, milkweed, guayule, dogbane, and tau-sagyz.

But unfortunately they all had one major shortcoming—they were poor in caoutchouc.

Among the tireless plant hunters there was a young botanist, Leonid Rodin, who had more luck than the others. His small group advanced with great difficulty along the spurs of the Tien Shan mountains in Kazakhstan. Those were troubled times. Armed bandits known as *basmachi*, who had penetrated the border, were roving everywhere. They robbed the local population, killed the collective farm workers, and attacked the frontier guards.

On one occasion Rodin set out for the mountains in search of plants together with his assistant, Mazanko. Suddenly they heard shots being fired and rushed back to their tents where they had left their weapons. But there an ambush was awaiting them. The *basmachi* seized Rodin and Mazanko and trained their rifles on them...

But just then the clatter of a horse's hooves could be heard, and a rider galloped up to the tents. He shouted out something to the *basmachi*—evidently informing them of some danger.

The bandits, forgetting all about their captives, jumped on

their horses and galloped off...

Rodin, of course, had friends in the mountains as well as enemies. Hearing that the Soviet botanist was searching for the sagyz—a plant which yielded a sticky juice, the local residents came to his aid.

At some stopping place a man walked up to Rodin and said:

“My friend Spivachenko has found the sagyz for you.”

The stranger handed the botanist a few partially dried roots and told him in which village Spivachenko lived.

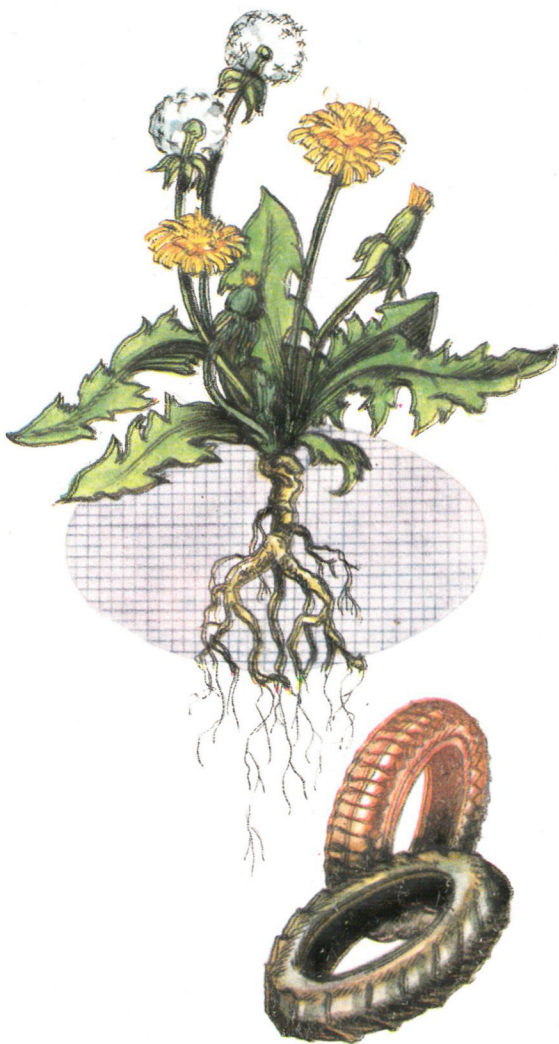
Rodin broke one of the roots in half. A thick juice formed at the place of the break—viscous, like rubber. Rodin asked Mazanko, who was a chemist, to make an analysis. The first test confirmed: the root was rich in caoutchouc!

Rodin and Mazanko got on their way immediately. It was only by the end of the second day that they found the village where Spivachenko lived.

“Where did you find these roots?” they asked the collective farm worker.

“It wasn't I who found them,” Spivachenko smiled, “but my lads. They chew on it!”

KOK-SAGYZ



“Come on, we’ll show you the roots!” the boys cried eagerly, and they led the scientists into the mountains...

And thus with the help of these boys the kok-sagyz, called “green gum” by the Kazakhs, was discovered. In its caoutchouc content this plant almost equals the famed hevea.

The next year a large expedition of scientists set out for the Kegen Valley, where the valuable caoutchouc-bearing plant had been found. They gathered many seeds of the kok-sagyz and brought them back to Moscow.

The seeds were planted in the Botanical Gardens, and their offspring were transported to various parts of the country—the Ukraine, Byelorussia, the Volga region, Moscow region, and Leningrad, and they were grown on the fields of collective and state farms.

For about twenty years enormous plantations of the kok-sagyz existed in the Soviet Union.

Then chemists devised a method of producing a less expensive, artificial caoutchouc, and the kok-sagyz turned once more into a common weed. And it began disseminating its seeds without outside help once more. How it succeeds in doing this you will find out when you reach the section “Puzzle of an Experienced Naturalist.”

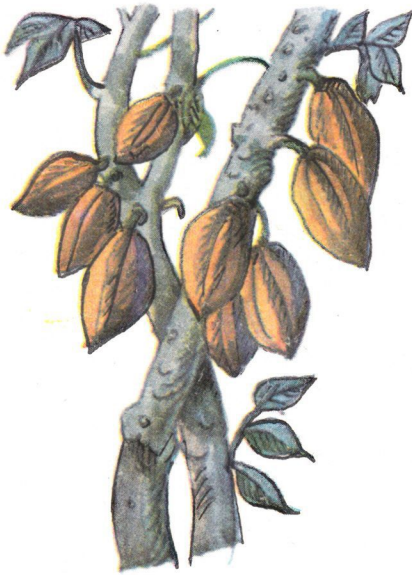
GREAT BENEFACTOR

Everyone is familiar with the taste of chocolate and cocoa. Many also know that they are prepared from the seeds of cacao trees. But very few know the homeland of these trees.

The cocoa beans are brought to us from Africa. But Africa is not the original home of the cacao trees either.

When a young boy named Tete Kwashi was born more than one hundred years ago in a small African village, no one there knew what cocoa was. They didn’t know its taste in the neighboring countries either, because then not a single cacao tree grew in all of Africa.

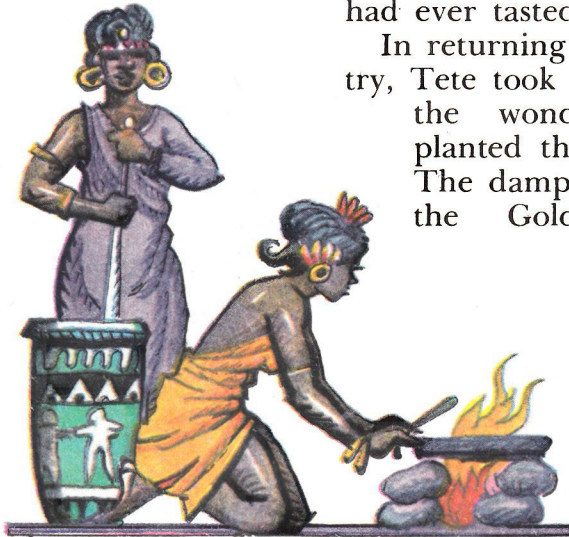
Tete grew up and became a skilled blacksmith. But his life was not easy. At that time his homeland was under British rule and



was known as the Gold Coast. Tete decided to leave his native village and try his luck somewhere else.

But in foreign lands life seemed no better. And so Tete roamed about different countries until fate landed him on the island of Fernando Póo. There he saw unusual trees. Their orange fruits similar to small ribbed melons, were attached directly to the trunks. Inside the fruits were a large quantity of reddish seeds. The islanders roasted the seeds, ground them down into a powder, poured on boiling water and made a drink more delicious than the blacksmith had ever tasted before.

In returning to his native country, Tete took along a handful of the wonderful seeds and planted them beside his hut. The damp tropical climate of the Gold Coast proved



PREPARATION OF COCOA

favourable for the newcomers. They flourished and in a few years bore their first fruits. Tete prepared a drink and treated his fellow-villagers. They liked the drink and in turn began to plant the unusual trees.

This is how the first cacao tree groves appeared in Ghana, which is what the former Gold Coast is now called. Now there is a great multitude of cacao trees there. The cocoa beans are exported by the thousands of tons to many countries of the world. The money from the sale of the cocoa beans is the principal source of revenue for the country.

The residents of Ghana have not forgotten to whom they are indebted for this. In the small town of Mampong—Tete's former village—there stands a dilapidated hut. Affixed to the hut is a board with an inscription made after Ghana gained its independence:

“Home of the deceased Tete Kwashi—great benefactor of Ghana, passed away December 22, 1892.”

The handful of seeds which brought unexpected good fortune to Ghana came from the island of Fernando Póo. But even this island is only an intermediate point, and not the true homeland of cacao trees.

The real home of the cacao is South America, and the people there were the first to learn how to prepare the marvellous drink. The Spaniards who conquered these countries learned the secret from them.

For a long time South America was the only place where the cacao tree grew. The Spanish colonizers kept a strict watch that the seeds should not be carried out to other tropical countries. And it was only after the Spaniards seized the island of Fernando Póo that



SEED POD OF CACAO

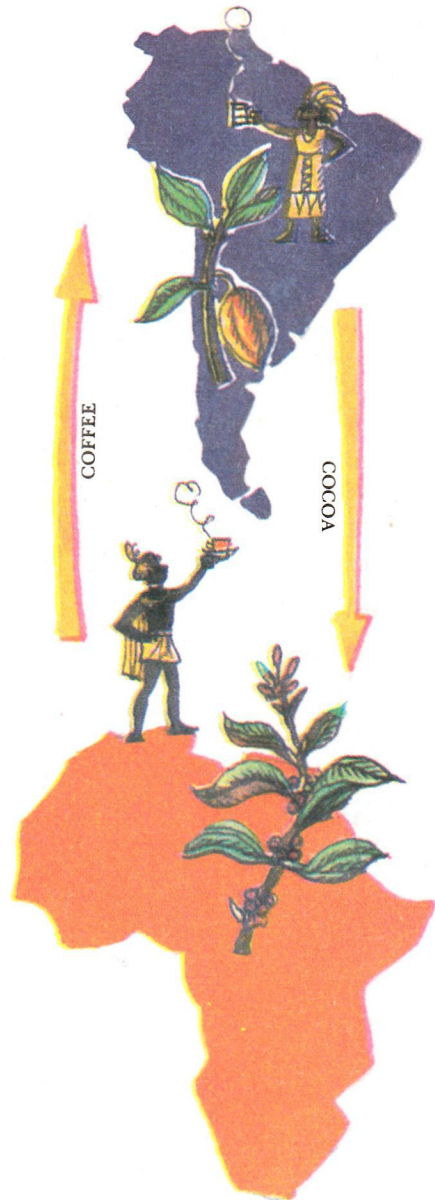
they began to cultivate cacao trees there.

Thanks to the resourcefulness of Tete these trees found their way to Ghana, and from there to Guinea and several other African countries. Now there are many more cacao trees growing in Africa than in their homeland, South America.

But the story of how the cacao found its way to its new home does not end here. Even after Africa had become a recognized exporter of cocoa beans attempts were made to grow the valuable trees in distant Australia and its adjacent islands. The climate of these places proved especially favourable for the new settlers. After some time, the high-quality Australian beans began to eclipse the fame of the African cocoa. Now the Moscow chocolate factory Red October uses Australian beans for the very finest brands of chocolate.

AERIAL SOWING

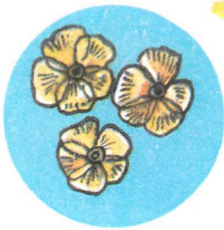
Stretching for many hundreds of miles along the southern border of the Soviet Union is the desert of Ka-



rakum. The Turkmen, who live there, have long dreamed of planting trees and gardens on the sterile sands. They tried sowing the seeds of trees growing in other places, but the newcomers could not adapt to life in a desert climate where the sun scorches mercilessly and there is no water.

Nature herself came up with an answer. In certain parts of the Karakum grows a strange looking tree called the haloxylon. Low-growing, with a gnarled trunk, as if warped from battling with sand storms, it has no leaves. It seems the haloxylon has no need for them: they would lose moisture, and the tree, on the contrary, needs to conserve it.

The haloxylon is not tall: in 20-30 years it reaches 15-25 feet.

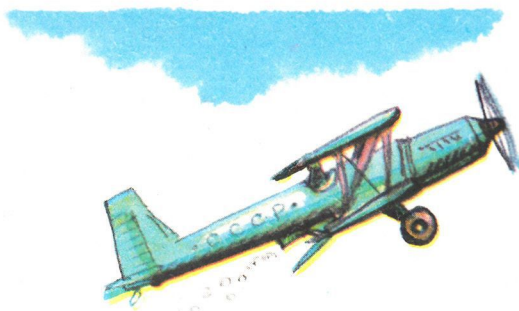


SEED PODS
OF THE HALOXYLON

But the impression of stunted growth is deceiving: the haloxylon grows very well—not in height but in depth. The roots of a full-grown tree go down about a hundred feet, the size of a ten-storey building. At such a depth they obtain water from underground springs. And the long roots serve as a brace for the sands. Where there are groves of the haloxylon—there the desert has been conquered.

Harsh conditions force the haloxylon to provide well for its offspring. The tree bears an abundant harvest of seeds. And

these have devices which help them to disperse: they are equipped with light wing-like leaves. The slightest breeze sends the seeds fluttering over the sand, bouncing from dune to dune. But if they are held up in a sheltered spot, they take root in a few days' time.



Nature shortchanged the seeds of the haloxylon in only one respect: they quickly lose their germinating capacity. A seed delayed on its journey for more than two months can no longer become a tree. It's all over! Its time has run out!

Here people decided to help the "guard of the desert". In late autumn the Turkmen forestry specialists gather the seeds from the haloxylon before they have fallen off, and in December or early January they sow the sands with them. Formerly they sowed by hand. But how much can be accomplished by hand? And the capricious seeds would not wait.

"No," the conquerors of the desert decided, "this is not the way it should be done! We need the help of aviation!"

In 1938 the forestry specialists placed a receptacle with the seeds of the haloxylon on an airplane. The plane flew slowly above the sand, and the winged "gliders" fanned out behind it. When the plane had landed, the specialists went out to check its work. It turned out that the plane had handled the task 60 times faster than a whole team of sowers. More than thirty years passed since. The aerial sowing of the haloxylon has become the usual practice; no one in the Karakum thinks anything of it. On New Year's eve the desert resounds with the roar of motors. These are the aerial sowers at work. They complete one circle after another above the sands. Spotting the planes, the Turkmen wave cordially to them from the backs of their camels. They are happy knowing that the attack on the desert is continuing...

HOW THE "KING OF PLANTS" WAS TAMED



GINSENG

SEEDS OF THE GINSENG

From time immemorial the people of the Far East have been spreading legends about the ginseng, one more unbelievable than the next. They said that its root was a panacea for all possible ailments, some of which even the best doctors were powerless to control...

In many countries the ginseng was called the "king of plants"—most likely because it was extremely rare. There was a time when its root cost two or three times its weight in gold.

The dream of getting rich led many on searches for the ginseng. But only rarely was someone fortunate enough to return home with the precious plant. One could roam about the taiga for years on end without seeing a single plant.

People tried more than once to "tame" the wild ginseng—to sow it like other cultured plants. But all attempts failed. The Korean Son Pon San was the only person to succeed in growing the "king of plants" from seeds gathered in the woods. For this his fellow-countrymen erected a monument in his honor.

Son Pon San discovered the reason why the plant did not take root in its new environment: it feared the direct rays of the sun, suffered from

drought and at the same time could not bear excessive moisture.

Now the valuable roots are grown by the thousands on ginseng plantations in the Democratic People's Republic of Korea.

They are sent to factories for processing and exported as well.

Up until recently the Soviet Union also imported ginseng roots.

But in the spring of 1952, experimental sowings of ginseng were begun in the Institute of Medicinal Plants near Moscow.

A group of researchers under the direction of Alexander Kiryanov made thorough preparations for this difficult task. They studied the experience

of their Korean friends, but they wanted to introduce a few adaptations of their own. The Koreans said:

"The plant is very discriminating about the soil. Therefore you must add humus, small bits of weathered granite, oil-cakes, soot, and various other substances as well."

The Soviet scientists were planning to set up enormous ginseng plantations, and for this they needed to simplify the task of preparing the soil.

The workers of the Institute decided to prepare the earth just as they would for ordinary plants, except for the addition of more humus.

The entire Institute waited impatiently to see how the "foreigners" would behave: after all, the seeds had come from distant Korea, where the plant had acquired a fondness for a fastidiously cultivated soil.

Twenty days after the sowing the sprouts appeared. Then the plot was partitioned off by wooden screens in order to protect the mollycoddle plants from the sun's rays.

In the third year the plants produced the first bright red seed



ROOT OF THE GINSENG



Pods. Each contained from one to three pale-yellow, wrinkled seeds.

From that time on all the ginseng seeds gathered in the Institute were sent to the Far East—to the true homeland of the plant. About sixty miles from the town of Vladivostok a special state farm named “Ginseng” was established. In 1967 the first roots were harvested on its plantations.

In their healing properties they were equal to the wild ginseng, and they grew almost four times faster than in the taiga.

Now the state farm’s production is sent to pharmaceutical factories. There tinctures, powders and tablets are prepared from the roots, which are distributed to pharmacies and hospitals.

Soviet ginseng has already helped many sick people to get well.



THE SEEDS OF FRIENDSHIP

The mother was reading a story about the forest to her daughter.

“I want to go to the forest!” her daughter suddenly said.

“That’s impossible,” the mother smiled.

“Why?”

“Because we don’t have any forests.”

The mother had told the truth. They lived in Iceland. And this is an enormous island situated right by the Arctic Circle.

Iceland has a harsh climate. The summer is short and cool. Freezing winds blow year round from the ocean and glacial valleys.

The trees fare badly there. There are many active volcanos on the island. The ground is covered by frozen lava upon which nothing can grow. The rains and constant winds wash and clear

away the small particles of soil from the surface of the lava.

Even where there is a layer of soil, it is very thin—only 4-8 inches deep.

Therefore, there are few trees in Iceland, and they are so stunted that the full-grown person can usually reach their crown. Only a few rare groves of gnarled birch reach a height of 16-18 feet, and these are one hundred years old.

The Icelanders have tried more than once to plant trees—they brought in soil from far away, fertilized it, sowed choice seeds. But all was in vain. The saplings grew puny and squat, with thin gnarled trunks. They were no good for anything: for making furniture, carving out skis, or even making frames.

Things went on like this until Soviet forestry specialists sent their Icelandic friends the seeds of the Siberian larch.

They thought that this species ought to grow under harsh climatic conditions of Iceland. The larch has sturdy roots, and therefore the tree does not fear heavy winds. It is not demanding as regards soil and grows quickly. Its seeds preserve their germinating capacity for four to five years (while the seeds of the birch lose it by the next year).

The first plantings of the larch exceeded all expectations. In a few years' time the tallest saplings had reached some 40 feet, doubling and tripling the height of saplings of other species. The larch has become the Icelandic "giant". But it's not just a matter of height. Even in Iceland the larch has a straight trunk. And this means it can be used to make all kinds of wood articles.

The Icelandic forestry specialists rejoice in the amazing Siberian and keep asking for more seeds of the larch, which they call "the seeds of friendship".

These requests are sent to an address which is known throughout Iceland: "Forestry Department, Timiryazev Academy of Agriculture, Moscow, USSR."

In response, sackfuls of choice seeds, gathered in different parts of the Soviet Union—Siberia, the Urals, Arkhangelsk region, the Far East, Sakhalin Island, the Kamchatka Peninsula, are sent to Iceland.

And now slender larch trees are growing on the chilly island.

Who knows, perhaps they will some day form genuine forests. And then children hearing the story about the deep forest will not be puzzled as that little girl was.

UPS AND DOWNS

Sometimes it happens that a person begins to grow a plant which has caught his fancy. And then it turns out that he has grown the wrong plant entirely.

They say that a certain Australian farmer brought the prickly pear cactus from South America and planted it in his garden. In the spring the cactus blossomed. Its stem, resembling flatcakes layered one above the other, became covered with large, unusually beautiful flowers.

Hearing about this amazing plant the neighbors came to see Mr. Pete, as they called the farmer.

“Who would have thought,” they said, “that this ugly duckling would bloom so beautifully!”

Then in place of the flowers appeared dark red fruits. They looked like small pears, covered with prickles. Mister

PRICKLY PEAR CACTUS



FRUIT OF THE PRICKLY PEAR

Pete cut off the prickles from one fruit, split it open and tasted the pulp. Surprisingly enough, it had a pleasant sour-sweet taste. Mister Pete offered some to his neighbors. They were ecstatic. And they all began asking their host for seeds, for they wanted to grow this plant. Flattered by the attention, Mister Pete gave each one a packet of tiny greyish-yellow seeds.

The time came when the neighbors gathered their first harvest. They made jam and jelly out of the cactus fruits.

Someone discovered that thickets of the cactus made a wonderful hedge. Not a single animal could make its way through the prickles. Such a fence needed no upkeep; on the contrary, with each year it grew thicker and thicker.

Rumours about the marvellous plant spread throughout the country. A genuine "cactus fever" began. In the cities cactus-grower clubs were formed. Many of them elected Mister Pete as their honorary chairman. One of his most fervent admirers even suggested erecting a monument to this worthy son of Australia.

But a few more years passed, and the rapture changed to anxiety—the prickly pear cactus had begun to multiply with alarming speed.



The Australians had overlooked one peculiarity of this native of the desert. The plant's continual battle with the sterile sands and burning sun had made it very tenacious, and had given its seeds a remarkable germinating capability. It's no wonder that once finding itself in the favourable conditions of Australia, the prickly newcomer launched on a veritable conquest of the continent. A few days after falling to the ground the seeds took root. The stems quickly branched out, with meaty new "flat-cakes" growing out in all directions.

The prickly fences, spreading irrepressibly, choked out the wheat crops, vegetables, and even crowded out the grasses from the pastures. It looked as if even the forests were in danger. Thousands of farmers were ruined. The Australians cursed the day the prickly pear cactus had been brought to the continent.

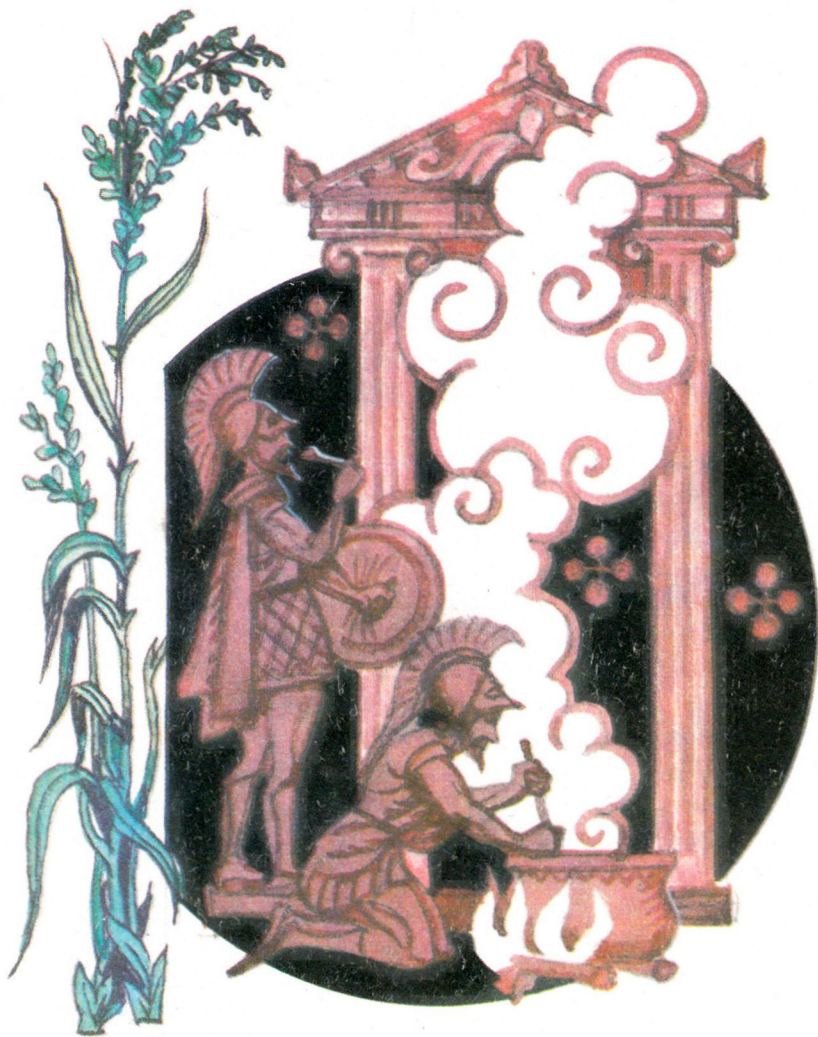
Of course, words alone do not heal. The Australians took to their axes. But it was already too late. No matter how many of the pernicious plants they chopped down, how many they burned, new ones sprouted and grew everywhere. The farmers grew desperate.

Scientists were called in to help. They remembered about the age-old enemy of the prickly pear—the *Cactoblastis cactorum* butterfly, which abounds in South America. The insects were brought to Australia and set loose on the prickly pear growths. The butterflies deposited eggs and the caterpillars which hatched from them got down to business. In eight years' time they had exterminated almost half of all the cactuses. At last the farmers could breathe a sigh of relief. As a token of their thanks they erected a marble monument in honor of the gluttonous caterpillar. It stands on the bank of the Darling River in the state of Queensland.

Despite this happy ending, the story has a continuation...

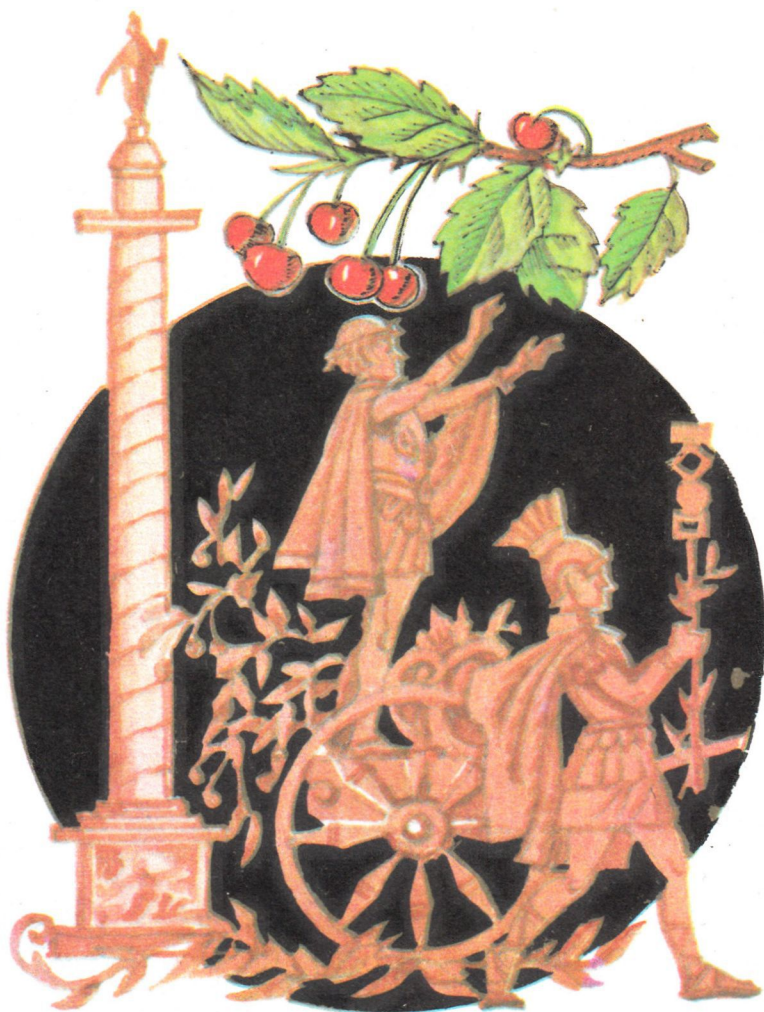
Visitors from Australia now say that just recently the invasion of another cactus—the harrisia—has begun. Evidently some careless Australian brought it back from South America, attracted, just as Mister Pete had been, by its bright flowers.

Harrisia has a violent temperament. Its taut stems, which look like hoses, coil into gigantic springs. The result is a living



“barbed wire”, which grows with unbelievable rapidity.

The Australians have taken to their axes once again. And the scientists are searching once more for helpers among the insect



pests. But it is still too early to tell who will save the farmers of Australia this time, and whether another monument to an insect will be erected.

*Afterword,
Which Mentions the Services of the Countless,
Usually Obscure Helpers of Plants*

In the preceding chapter you learned how several plants got established in new homes. But there are many others which have had interesting fates as well.

Take rice for example. Its homeland is India. From there rice made its way to the neighboring countries and then spread throughout Asia, where it became the staple food for millions of people. But in Europe this plant remained unknown for a long time. The first people to taste boiled rice were the warriors of Alexander the Great, who had undertaken a campaign to conquer India. And they carried the rice back with them to Greece. From there the plant found its way to Italy and other European countries.

And the tree which bears fruits which you love and consider the most ordinary also has a very interesting history.

The Roman general Lucullus was waging a determined battle against Mithridates the Great, the King of Pontus, an enormous state in Asia Minor. The Romans seized the palace of Mithri-



dates, which had a magnificent orchard, and there small trees with unusual fruits were growing which Lucullus had never seen before. He tried them and was ecstatic.

When Lucullus returned to Rome and rode triumphantly through the streets, his chariot was decorated with several such trees.

Thus, two thousand years ago, the Romans became acquainted with the cherry tree. At first Lucullus and his aristocratic guests—patricians and senators—were the only ones to feast on its fruits. After eating the juicy pulp they didn't spit out the seeds as we do, but saved every single one. Returning home, they buried the seeds in their orchards and waited impatiently for the shoots.

With time the cherry became a common fruit tree in the orchards of Rome and its vast provinces. And from there it spread to other countries, as well.

You already know the story of the nutmeg tree, which was disseminated by the birds. The time came when this tree began to travel at man's will.





Despite all the restrictions of the Dutch government, in 1769 the Frenchman Poivre succeeded in secretly transporting the nutmeg to the Antilles and setting up nutmeg plantations there. From there the nutmeg made its way to Guyana and other South American countries.

But this is not the end of the “nutmeg story”. It was to be continued by the English. In 1795 they seized the Molucca Islands—the homeland of the nutmeg—and transplanted the spice tree to India and other of their colonial possessions.

At one time the sole owners of mulberry trees were the Chinese. With the leaves of these trees they fed special worms, which “spun” cocoons of the finest threads which served as raw material for silk. Without these trees there could be no silk.

Harsh laws concerning mulberry trees were enforced in the Chinese Empire. The death sentence threatened anyone who dared to take out of the country the seeds of this tree—brownish grains slightly larger than poppy seeds—beyond the boundaries of the empire. And all the same some people dared

to risk death. They brought the forbidden seeds to Europe, along with the cocoons of the silk worms. Since then the mulberry trees have spread throughout the world.

The map on pages 102-103 will show you how some other useful plants came to us.

The story of many plants which we value for their beautiful flowers is also interesting.

Everyone is quite familiar with the poppy, carnation and violet. But at one time they did not grow in Russia. They were brought from the Mediterranean countries.

And some flowers came to us from more distant places. Now it's even difficult to imagine that long, long ago Europe had very few pretty flowers. And if it weren't for travellers bringing the seeds of unusual plants, we still wouldn't know the rose, or the white lily, or the tulip, or the hyacinth, or the jasmine, or the hydrangea, or the chrysanthemum. Because they are all emigrants from Asia.

And if someone at one time had not brought the seeds of the gladiolus, mignonette and the geranium from distant Africa, we wouldn't know these plants either.

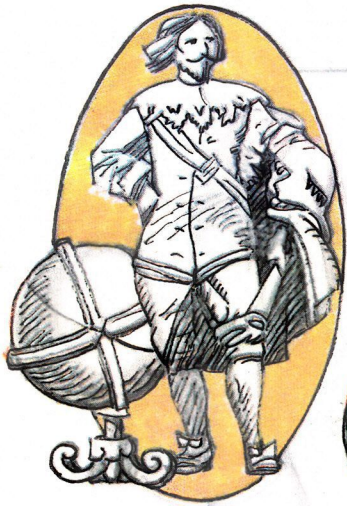
From America we have been brought the nasturtium, the tuberose, the petunia, the fuchsia, the dahlia, and the phlox...

Man is still re-settling plants in our times.

Recently Tajik researchers from the Botanical Institute became interested in a wild plant which is found in the mountains of Central Asia—the eremurus. It was found that its above-ground parts contained substances which help people with impaired blood coagulation. And the plant's root is rich in another valuable substance...

From time immemorial the Tajiks had a legend about the "magical flower". It said that the builders of ancient fortresses and temples used its sticky juice as a mortar, which is why these structures had stood for ages.

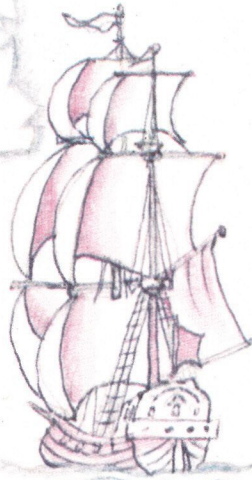
But it was considered nothing more than a legend. And then the properties of the "magical flower" were suddenly discovered in the roots of the eremurus. Now the Tajik botanists are teaching the barbarian to grow on plantations.



MAIZE



SUNFLOWER



OATS



COTTON



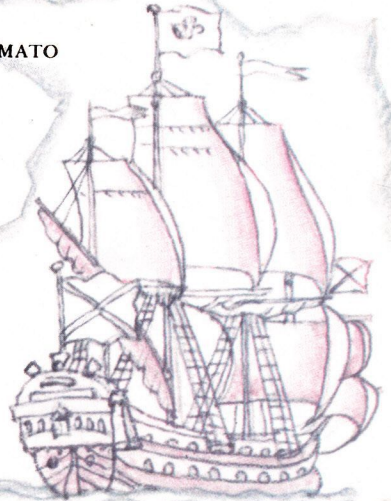
TOMATO

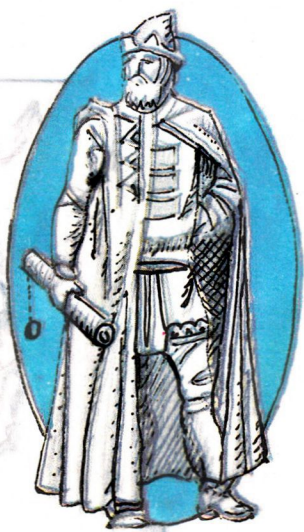


POTATO



PUMPKIN





OATS



CUCUMBER



TEA



RYE



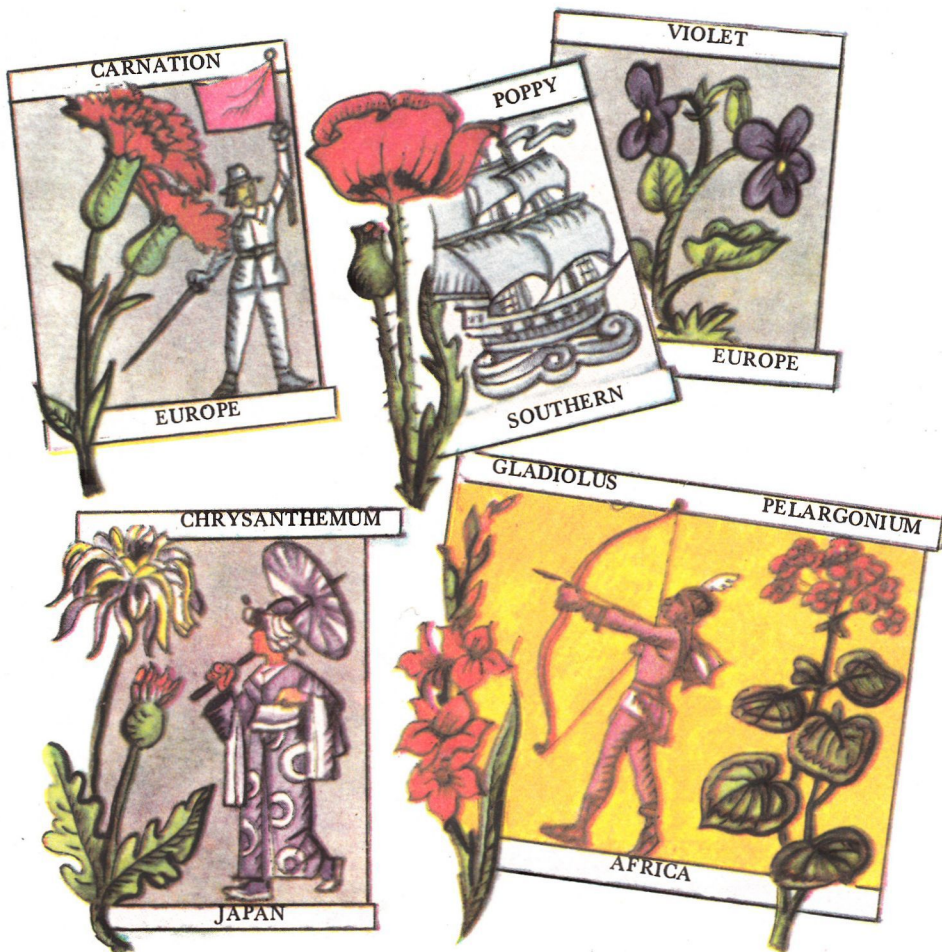
WHEAT



EGG-PLANT



WATERMELON



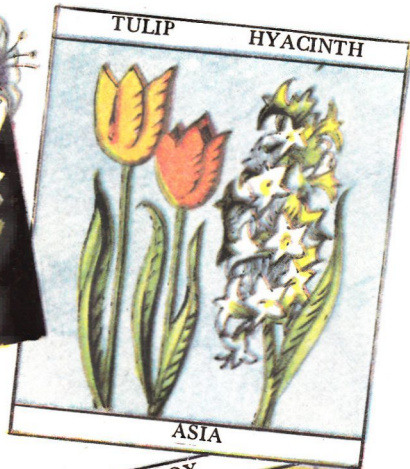
The botanists of Altai grew interested in the willow thorn shrub. In the autumn its prickly branches are so thickly packed with orange berries the size of a large rowanberry that they often break beneath their weight. The berries of the shrub are renowned for being exceptionally rich in vitamins—a real multi-vitamin capsule! And in addition, they contain a medicinal oil which is used to treat many illnesses.



ROSE

LILY

PERSIA



TULIP

HYACINTH

ASIA



FUCHSIA

DANLIA

MEXICO



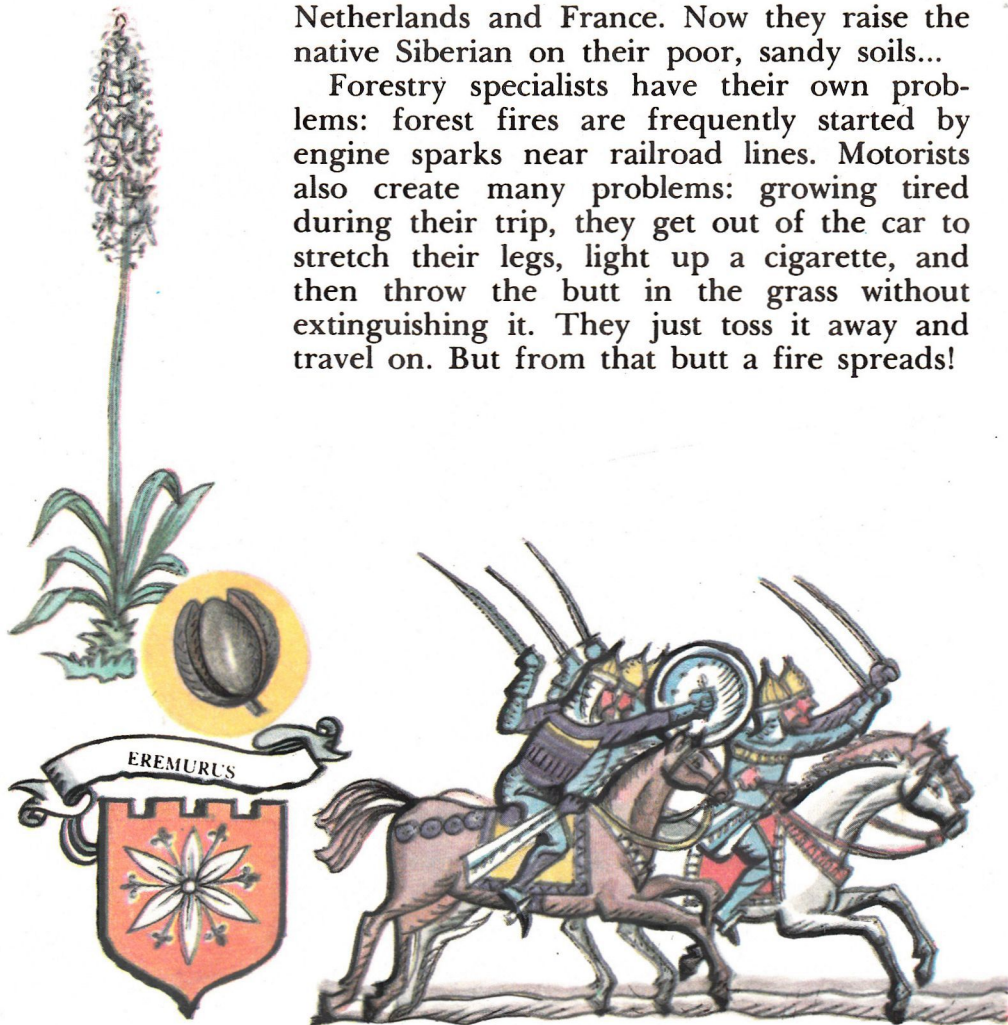
PHLOX

AMERICA

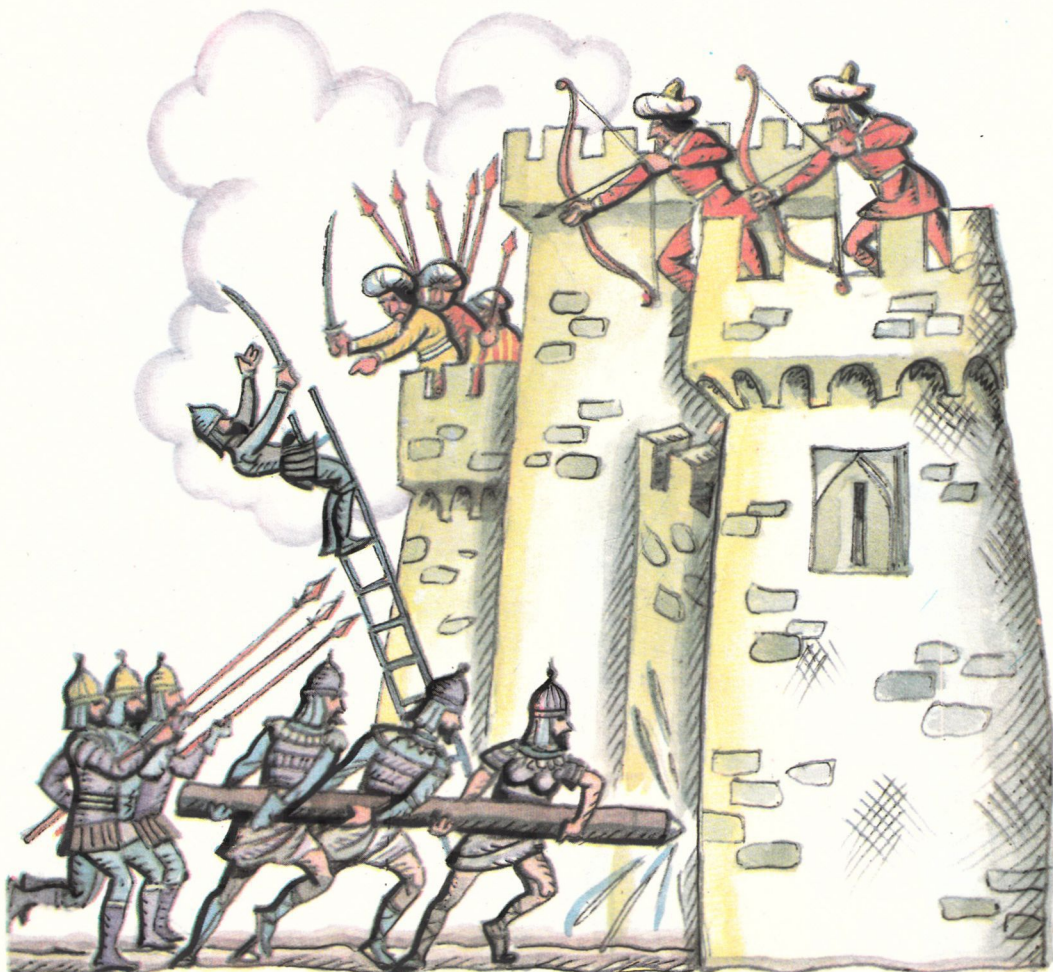
And so the botanists decided to set up plantations of the sallow thorn. There are now many such plantations in Altai, and they provide the vitamin factory in the town of Biisk with valuable raw material. The next time you take a multi-vitamin pill, take a look at the label. Perhaps it was manufactured at this very factory.

The Siberians are not the only ones to appreciate the sallow thorn. Hearing about its productivity and hardiness, horticulturists from Scandinavian countries, where the harsh climate does not allow for the cultivation of many useful plants, asked for its seeds to be sent to them. Now sallow thorn orchards stretch all the way to the Arctic Circle. The next to request the seeds of the sallow thorn were horticulturists from the Netherlands and France. Now they raise the native Siberian on their poor, sandy soils...

Forestry specialists have their own problems: forest fires are frequently started by engine sparks near railroad lines. Motorists also create many problems: growing tired during their trip, they get out of the car to stretch their legs, light up a cigarette, and then throw the butt in the grass without extinguishing it. They just toss it away and travel on. But from that butt a fire spreads!



Railroad linesmen were run completely ragged until unexpected help arrived. Botanists discovered an interesting peculiarity in the tamarisk—a resident of saline steppes. Its wood and leaves contain many mineral salts, extracted by the plant from the soil. Therefore it is difficult to set fire to such a shrub. Burning cigarettes and matches are extinguished on its fallen leaves. Now Soviet forestry specialists plant the tamarisk along





SALLOW THORN



TAMARISK

roadsides in those places where there is the necessary saline soil.

Workers of the scientific research station in Repetek, where thirty years ago the aerial sowing of the haloxylon was begun, are presently engaged on an interesting project. Now they are planting trees and gardens along the gigantic Karakum canal which runs across the desert. In addition to the haloxylon, the Repetek botanists are trying to cultivate other local drought-resistant plants—the sand acacia and the turanga, a variety of poplar.

But they're not stopping there! They decided to search in other deserts for plants which could take root in the Karakum Desert. Recently they received parcels with seeds from India and the Middle East. And the first shoots have already appeared in Repetek.

In recent years Soviet botanists have discovered many useful properties in wild plants, and domesticating them, have settled them on the fields of cooperative and state farms, in gardens, in the steppes and deserts.

Puzzle of an Experienced Naturalist



You are familiar with this plant. But if a boy or girl from Kazakhstan were to see it, they would say: "That's the kok-sagyz!"

"Some kind of mix-up," you're probably thinking.

But don't make any rash judgements. The plants happen to be brothers. They have identical flowers and parachutist-seeds. They are also alike in that their roots contain the same valuable substance, only the kok-sagyz has a great deal more of it.

Recall what this substance is. And identify the plant itself.

Answers to the Puzzles

Wind

1. As you know, when some "parachutists" meet up with an obstacle their seeds drop off. Such an obstacle is often a fence.
2. These are seeds from the "helicopter regiment".
3. The seed pods of the bladder senna are "balloonists".

Water

1. The fruit of this seafarer is akin to the seed of our sedge.
2. These leaves are swimming devices. The seeds of the sorrel are disseminated by flood waters.

Various Friends

1. Most often you encounter the burdock with its burrs.
2. Ants help the forget-me-not to settle in new places.

"Artillerists"

1. The sticky fluid of the squirting cucumber acts like a glue. With its help the seeds adhere to the coats of animals and begin to travel along with them.
2. The yellow acacia is an artillerist-plant. The sides of its pods roll back and send the seeds flying several yards.

Crafty Conquerors

1. The camomile came to Russia together with American grain.
2. The plantain.

Experienced Naturalist

1. The dandelion. Its root contains caoutchouc.

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